CIGNA MEDICAL COVERAGE POLICIES - RADIOLOGY

Abdomen Imaging Guidelines

Effective Date: May 15, 2025

Instructions for use

The following coverage policy applies to health benefit plans administered by Cigna. Coverage policies are intended to provide guidance in interpreting certain standard Cigna benefit plans and are used by medical directors and other health care professionals in making medical necessity and other coverage determinations. Please note the terms of a customer's particular benefit plan document may differ significantly from the standard benefit plans upon which these coverage policies are based. For example, a customer's benefit plan document may contain a specific exclusion related to a topic addressed in a coverage policy.

In the event of a conflict, a customer's benefit plan document always supersedes the information in the coverage policy. In the absence of federal or state coverage mandates, benefits are ultimately determined by the terms of the applicable benefit plan document. Coverage determinations in each specific instance require consideration of:

1. The terms of the applicable benefit plan document in effect on the date of service
2. Any applicable laws and regulations
3. Any relevant collateral source materials including coverage policies
4. The specific facts of the particular situation

Coverage policies relate exclusively to the administration of health benefit plans. Coverage policies are not recommendations for treatment and should never be used as treatment guidelines.

This evidence-based medical coverage policy has been developed by EviCore, Inc. Some information in this coverage policy may not apply to all benefit plans administered by Cigna.

These guidelines include procedures EviCore does not review for Cigna. Please refer to the **Cigna CPT code list** for the current list of high-tech imaging procedures that EviCore reviews for Cigna.

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Abbreviations for Abdomen Imaging Guidelines

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Abbreviations for Abdomen Imaging Guidelines	
AAA	abdominal aortic aneurysm
AASLD	American Association for the Study of Liver Diseases
ACE	angiotensin-converting enzyme
ACG	American College of Gastroenterology
ACR	American College of Radiology
ACTH	adrenocorticotropic hormone
AFP	alpha-fetoprotein
AGA	American Gastroenterological Association
ALT	alanine aminotransferase
ASGE	American Society for Gastrointestinal Endoscopy
AST	aspartate aminotransferase
AUA	American Urological Association
BEIR	Biological Effects of Ionizing Radiation
BUN	blood urea nitrogen
CAG	Canadian Association of Gastroenterology
CNS	central nervous system

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Abbreviations for Abdomen Imaging Guidelines	
CT	computed tomography
CTA	computed tomography angiography
CTC	computed tomography colonography (aka: virtual colonoscopy)
DVT	deep vein thrombosis
ERCP	endoscopic retrograde cholangiopancreatography
EUS	endoscopic ultrasound
FNH	focal nodular hyperplasia
GFR	glomerular filtration rate
GGT	gamma glutamyltransferase
GI	gastrointestinal
HCC	hepatocellular carcinoma
HCPCS	Healthcare Common Procedural Coding System (commonly pronounced: “hix pix”)
HU	Hounsfield units
IAA	iliac artery aneurysm
IV	intravenous
KUB	kidneys, ureters, bladder (plain frontal supine abdominal radiograph)
LFT	liver function tests
MASLD	metabolic dysfunction associated steatotic liver disease (formerly known as NAFLD)

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Abbreviations for Abdomen Imaging Guidelines	
MRCP	magnetic resonance cholangiopancreatography
MRA	magnetic resonance angiography
MRI	magnetic resonance imaging
mSv	millisievert
NAFLD	nonalcoholic fatty liver disease (now known as MASLD)
PA	posteroanterior projection
PET	positron emission tomography
RAS	renal artery stenosis
RBC	red blood cell
SBFT	small bowel follow through
SPECT	single photon emission computed tomography
VC	virtual colonoscopy (CT colonography)
PFT	pulmonary function tests
WBC	white blood cell
ZES	Zollinger-Ellison Syndrome

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General Guidelines (AB-1.0)

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- A relevant clinical evaluation is required before advanced imaging can be considered. The clinical evaluation must include a history relevant to the current complaint and physical examination, and may include appropriate laboratory studies, and non-advanced imaging modalities such as plain x-ray or ultrasound. Other meaningful contact (telephone call, electronic mail or messaging) by an established individual can substitute for a face-to-face clinical evaluation.

Red Flag Findings

- The following signs and symptoms can be indicative of more serious conditions. Documentation of abdominal pain along with ANY of the following warrants exclusion from prerequisites to advanced imaging:
  - History of malignancy with a likelihood or propensity to metastasize to abdomen
  - Fever (≥101 degrees Fahrenheit)
  - Elevated WBC >10,000, or above the upper limit of normal for the particular lab reporting the result
  - Low WBC (absolute neutrophil count <1000)
  - Palpable mass of clinical concern and/or without benign features
  - GI bleeding, overt or occult, not obviously hemorrhoidal
  - Abdominal tenderness documented as moderate or severe
  - Peritoneal signs, such as guarding or rebound tenderness
  - Suspected complication of bariatric surgery
  - Notation by the ordering provider that the individual has a "surgical abdomen"
  - Age ≥60 years with unintentional weight loss of ≥10 lbs. or ≥5% of body weight over 6 months or less
- See the condition-specific sections for when the above list of exclusionary criteria apply and lead directly to advanced imaging.

Imaging Recommended Per Drug Manufacturer

- When follow up imaging for the purposes of monitoring or screening is recommended in the package insert for a particular drug therapy or medication, that imaging may be indicated.

Complications Related to COVID-19

- Please refer to the appropriate condition-specific guideline relevant to the presenting signs or symptoms in individuals with potential sequelae of COVID-19.

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- Examples include:
  - For suspected acute mesenteric ischemia, see: **Mesenteric Ischemia (AB-6.1)**
  - For suspected renal failure, see: **Renal Failure (AB-36.1)**
  - For left upper quadrant pain and suspected infarct, see: **Left Upper Quadrant (LUQ) Pain (AB-2.4)**

Pre-operative Radiologic Imaging

- Please refer to the appropriate condition-specific guideline relevant to the clinical condition for pre-operative imaging indications (e.g., **Percutaneous Gastrostomy (AB-9.2)**)
- If imaging is requested by the operating surgeon to support planned surgery, the imaging may be approved.
- Radiologic therapeutic intervention is addressed elsewhere in this Guideline
  - Radiologic management of lower GI bleeding, see: **Small Bowel Bleeding Suspected (AB-22.2)**
  - Radiologic management of mesenteric ischemia, see: **Mesenteric/Colonic Ischemia (AB-6.1)**
  - Radiologic management of portal hypertension, see: **Portal Hypertension (AB-26.3)**

3D Rendering

- CPT® 76377 (3D rendering requiring image post-processing on an independent workstation) or CPT® 76376 (3D rendering not requiring image post-processing on an independent workstation) can be considered in the following clinical scenarios:
  - Preoperative planning for complex surgical cases
  - CT Urogram (See: **Hematuria and Hydronephrosis (AB-39)**)
  - MRCP (See: **MR Cholangiopancreatography (MRCP) (AB-27)**)
- CPT® codes for 3D rendering should not be billed in conjunction with computer-aided detection (CAD), MRA, CTA, nuclear medicine SPECT studies, PET, PET/CT, or CT Colonography (virtual colonoscopy).

Evidence Discussion

Except as noted in condition-specific sections of these Abdominal Guidelines, initial evaluation by ultrasound is generally prerequisite to advanced imaging modalities. Ultrasound requires no ionizing radiation, is cost effective, helps determine most appropriate next advanced imaging study (CT vs. MRI), contrast level, readily accessible, and often can be scheduled same day.

When Red Flag signs and symptoms are present, literature supports early use of computer tomography (CT) and/or magnetic resonance imaging (MRI) without need for a prior ultrasound. Red Flags include:

- Risk of metastases: Liver, lung, and regional lymph nodes are frequent metastatic targets readily identified by advanced abdominal imaging. Metastatic foci are less readily identified by ultrasound in the hollow viscus than solid abdominal organs - e.g., in high prevalence metastatic spread to the gas-filled stomach by breast cancer (27%), lung cancer (23%), renal cell cancer (7.6%), and malignant melanoma (7%).
- Fever: Accompanied by abdominal pain, or in combination with vomiting, bloody stools, unexplained weight loss, persistent fever requires urgent imaging evaluation. CT and MRI are better suited than ultrasound in localizing and characterizing gut-related urgencies such as bowel blockage, abdominal ischemia, acute inflammatory conditions (diverticulitis, flares of inflammatory bowel disease, perforation), and obstructing tumors.
- Abnormal white cell number: Neutropenia or leukocytosis warrants definitive advanced imaging to avoid delays in diagnosis and treatment, especially in immunocompromised settings, for life-threatening pathology such as neutropenic enterocolitis (typhilitis) or the various infectious, inflammatory, or injurious conditions described in the Abdominal Guideline sections in which an elevated white cell count is seen.
- Concerning palpable mass: The imaging approach to diagnosis varies by location and clinician-concern. For intra-abdominal masses, contrast-enhanced CT and ultrasound examination have demonstrated accuracy. For abdominal wall masses, which may arise from muscle, subcutaneous tissue, or connective tissue, MRI, CT, and ultrasound all provide diagnostic value. When mass is accompanied by abdominal pain, advanced imaging modalities may facilitate care.
- GI bleeding: When the source of bleeding is unidentified after upper endoscopy and/or colonoscopy, subsequent diagnostic modalities should be guided by clinical presentation, hemodynamic stability, and local expertise. CT angiography demonstrates a sensitivity of 86% and specificity of 95% in acute GI bleeding, and is useful in directing definitive hemostatic treatment.
- Significant abdominal tenderness, with or without peritoneal signs: Rapid onset of severe abdominal pain with significant tenderness, an acute abdomen or surgical abdomen, may indicate a potentially life-threatening condition requiring urgent surgical intervention for which accurate and timely diagnosis is critical. Advanced imaging also offers greater accuracy than ultrasound in the setting of a painless acute abdomen seen in older people, children, the immunocompromised, and in the last trimester of pregnancy.
- Suspected complication of bariatric surgery: Early advanced imaging followed by emergent intervention avoids morbidity in roux-en-Y patients with internal hernias or in balloon recipients with bowel obstruction or perforated gastrojejunal ulcer.

- Unexplained weight loss: Problematic weight loss in the older adult is defined by the United States Omnibus Budget Reconciliation Act of 1987 (Title IV: subtitle C: Nursing Home Reform) as a loss of 5% of body weight in one month or 10% over a period of six months or longer. Unintentional weight loss is associated with an increased risk of death among older adults.

Overview (AB-1.1)

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- GI Specialist evaluations can be helpful, particularly in determining mesenteric/colonic ischemia, diarrhea/constipation, irritable bowel syndrome (IBS), or need for MRCP.
- Abdominal imaging begins at the diaphragm and extends to the umbilicus or iliac crest.
- Pelvic imaging begins at the iliac crest and extends to the pubis.
- Clinical concerns at the dividing line can be providers' choice (abdomen and pelvis; abdomen or pelvis).

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CT Imaging (AB-1.2)

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- CT imaging is a more generalized modality. CT Abdomen is usually performed with contrast (CPT® 74160):
  - Oral contrast has no relation to the IV contrast administered. Coding for contrast only refers to IV contrast. There is no coding for oral contrast.
  - Exceptions are noted in these guidelines, and include:
    - CT Abdomen with contrast (CPT® 74160) or without and with contrast (CPT® 74170) with suspicion of a solid organ lesion (liver, kidney, pancreas, spleen).
      - Please refer to the specific guideline for the lesion in question for specific guidance.
    - CT Abdomen without contrast (CPT® 74150) or CT Abdomen and Pelvis without contrast (CPT® 74176) if there is renal insufficiency/failure, or a documented allergy to contrast. It can also be considered for diabetics or the very elderly.
    - CT Abdomen and Pelvis without and with contrast (CPT® 74178 – CT Urogram) for certain urologic conditions (e.g. hematuria)
  - Shellfish allergy:
    - It is commonly assumed that an allergy to shellfish infers iodine allergy, and that this implies an allergy to CT iodinated contrast media. However, this is NOT true. Shellfish allergy is due to tropomysins. Iodine plays no role in these allergic reactions. Allergies to shellfish do not increase the risk of reaction to IV contrast any more than that of other allergens.
  - CT Abdomen and Pelvis, usually with contrast (CPT® 74177), should be considered when signs or symptoms are generalized, or involve a lower quadrant of the abdomen.
  - CT Enterography (CPT® 74177) combines CT imaging with large volumes of ingested neutral bowel contrast material to allow visualization of the small bowel.
  - CT Enteroclysis
    - A tube is placed through the nose or mouth and advanced into the duodenum or jejunum. Bowel contrast material is infused through the tube and CT imaging is performed either with or without intravenous contrast.
    - CT Enteroclysis is used to allow visualization of the small bowel wall and lumen. CT Enteroclysis may allow better or more consistent distention of the small bowel than CT Enterography.
    - Report by assigning: CPT® 74176 or CPT® 74177
  - Triple-phase CT
    - 3 phases of a triple-phase CT are:
      - 1) Hepatic arterial phase,

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    - 2) Portal venous phase, and
    - 3) Washout or delayed acquisitions phase.
  - It should be noted that, in general, a pre-contrast or non-contrast CT is usually not needed in a standard triple-phase CT, except in those individuals previously treated with locoregional embolic or ablative therapies. Other specific instances in which a prior non-contrast CT may be indicated for the evaluation of liver lesions are noted in **Liver Lesion Characterization (AB-29.1)**.
- CT Colonography (CTC)
  - There are 3 CPT® codes for CTC:
    - CPT® 74263: Screening CTC (only used for screening procedures)
    - CPT® 74261: CTC without contrast
    - CPT® 74262: CTC with contrast
  - See: **CT Colonography (CTC) (AB-25)** for further indications for these procedures

MR Imaging (AB-1.3)

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- MRI may be preferred as a more targeted study in cases of renal failure, in individuals allergic to intravenous CT contrast, and as noted in these guidelines.
  - MRI Abdomen with contrast only is essentially never performed. If contrast is indicated, MRI Abdomen without and with contrast (CPT® 74183) should be performed.
  - For pregnant individuals ultrasound or MRI without contrast should be used to avoid radiation exposure. The use of gadolinium contrast agents is limited during pregnancy, as gadolinium contrast agents cross the placenta and enter the amniotic fluid with unknown long-term effects on the fetus.
    - See: **Pregnancy Considerations for Imaging (AB-1.12)** for additional discussion of this issue
- MR Elastography (CPT® 76391) replaces MRI Abdomen (CPT® 74183 or CPT® 74181) for requests for MR Elastography liver (See: **Liver Elastography (AB-45)**)

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MR Enterography and Enteroclysis Coding Notes (AB-1.4)

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- MR Enterography or Enteroclysis is reported in one of two ways:
  - MRI Abdomen without and with contrast (CPT® 74183), or
  - MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis with and without contrast (CPT® 72197)

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Ultrasound (AB-1.5)

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- Ultrasound, also called sonography, uses high frequency sounds waves to image body structures.
  - The routine use of 3D and 4D rendering, (post-processing), in conjunction with ultrasound is not medically necessary.
  - All ultrasound studies require permanently recorded images either stored on film or in a Picture Archiving and Communication System (PACS).
  - The use of a hand-held or any Doppler device that does not create a hard-copy output is considered part of the physical examination and is not separately billable. This exclusion includes devices that produce a record that does not permit analysis of bi-directional vascular flow.
- Duplex scan describes an ultrasonic scanning procedure for characterizing the pattern and direction of blood flow in arteries and veins with the production of real-time images integrating B-mode 2D vascular structures, Doppler spectral analysis, and color flow Doppler imaging.
  - The minimal use of color Doppler alone, when performed for anatomical structure identification during a standard ultrasound procedure, is not separately reimbursable.

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Abdominal Ultrasound (AB-1.6)

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- Complete abdominal ultrasound (CPT® 76700) includes all of the following required elements:
  - Liver, gallbladder, common bile duct, pancreas, spleen, kidneys, upper abdominal aorta, and inferior vena cava
  - If a particular structure or organ cannot be visualized, the report should document the reason.
- Limited abdominal ultrasound (CPT® 76705) is without all of these required elements and can refer to a specific study of a single organ, a limited area of the abdomen, or a follow-up study.
  - Further, CPT® 76705 should:
    - Be assigned to report follow-up studies once a complete abdominal ultrasound (CPT® 76700) has been performed; and
    - Be assigned to report ultrasonic evaluation of diaphragmatic motion; and
    - Be reported only once per individual imaging session; and
      - Not be reported with CPT® 76700 for the same individual for the same imaging session

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Retroperitoneal Ultrasound (AB-1.7)

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- Complete retroperitoneal ultrasound (CPT® 76770) includes all of the following required elements:
  - Kidneys, lymph nodes, abdominal aorta, common iliac artery origins, inferior vena cava
  - For urinary tract indications, a complete study can consist of kidneys and bladder
- Limited retroperitoneal ultrasound (CPT® 76775) studies are without all of these required elements and can refer to a specific study of a single organ, a limited area of the abdomen, or a follow-up study.
  - Further, CPT® 76775 should:
    - be assigned to report follow-up studies once a complete retroperitoneal ultrasound (CPT® 76770) has been performed; and
    - be reported only once per individual imaging session; and
      - Not be reported with CPT® 76770 for the same individual for the same imaging session

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Contrast-Enhanced Ultrasound (AB-1.9)

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Ultrasound with contrast (CEUS, CPT® 76978, CPT® 76979) is an emerging technology that may be as good, if not better, than CT or MRI in certain circumstances. Abdominal Imaging Guidelines address its use as appropriate. CPT® 76978 refers to the initial imaging of the first lesion, and CPT® 76979 refers to additional lesions that are imaged subsequently.

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Quantitative MRI (AB-1.10)

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- Quantitative MR analysis of tissue composition (CPT® 0648T, 0649T, 0697T and 0698T)
  - These CPT codes are experimental and investigational.
  - See: **Quantitative MR Analysis of Tissue Composition (Preface-4.8)** and **Fatty Liver (Metabolic Associated Steatotic Liver Disease (MASLD), Formerly Known as NAFLD) (AB-29.2)** for further discussion of these modalities.

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RADCAT Grading System (AB-1.11)

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- The RADCAT (Radiology Report Categorization) Grading System was developed in order to communicate to ordering physicians (most commonly in the ER setting), the relative urgency of a radiologic finding. It is not related to the LI-RADs reporting system, nor does it necessarily imply the need for follow-up imaging, as opposed to clinical follow-up. The rating system is as follows:
  - RADCAT 1: Normal Result
  - RADCAT 2: Routine Result
  - RADCAT 3: Result with recommendation for non-urgent routine follow-up
  - RADCAT 4: Priority Result
  - RADCAT 5: Critical Result

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Pregnancy Considerations for Imaging (AB-1.12)

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The American College of Obstetricians and Gynecologists has issued guidelines with regards to imaging during pregnancy and lactation. Their recommendations are as follows:[15]

- Ultrasonography and magnetic resonance imaging (MRI) are not associated with risk and are the imaging techniques of choice for the pregnant patient, but they should be used prudently and only when use is expected to answer a relevant clinical question or otherwise provide medical benefit to the patient.
- With few exceptions, radiation exposure through radiography, computed tomography (CT) scan, or nuclear medicine imaging techniques is at a dose much lower than the exposure associated with fetal harm.
  - If these techniques are necessary in addition to ultrasound or MRI or are more readily available for the diagnosis in question, they should not be withheld from a pregnant individual.
- The use of gadolinium contrast with MRI should be limited; it may be used as a contrast agent in a pregnant patient only if it significantly improves diagnostic performance and is expected to improve fetal or maternal outcome.
- With regards to iodinated IV contrast media, “it is generally recommended that contrast only be used if absolutely required to obtain additional diagnostic information that will affect the care of the fetus or woman during pregnancy”.

References (AB-1)

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1. Faerber EN, Benator RM, Browne LP, et al. ACR–SPR Practice Parameter For The Safe And Optimal Performance Of Fetal Magnetic Resonance Imaging (MRI) American College of Radiology. Published 2014.
2. ACR Practice Guideline for Imaging Pregnant or Potentially Pregnant Adolescents and Women with Ionizing Radiation. American College of Radiology. Published 2014.
3. Runyon BA. Management of adult patients with ascites due to cirrhosis: An update. *Hepatology*. 2009;49(6):2087-2107.(revised 2012).
4. Berzigotti A, Ashkenazi E, Reverter E, et al. Non-Invasive Diagnostic and Prognostic Evaluation of Liver Cirrhosis and Portal Hypertension. *Disease Markers*. 2011;31(3):129-138.
5. Choi J-Y, Lee J-M, Sirlin CB. CT and MR Imaging Diagnosis and Staging of Hepatocellular Carcinoma: Part II. Extracellular Agents, Hepatobiliary Agents, and Ancillary Imaging Features. *Radiology*. 2014;273(1):30-50. doi:10.1148/radiol.14132362.
6. Chiorean L, Tana C, Braden B, et al. Advantages and Limitations of Focal Liver Lesion Assessment with Ultrasound Contrast Agents: Comments on the European Federation of Societies for Ultrasound in Medicine and Biology (EFSUMB) Guidelines. *Medical Principles and Practice*. 2016;25(5):399-407. doi:10.1159/000447670.
7. Claudon M, Dietrich C, Choi B, et al. Guidelines and Good Clinical Practice Recommendations for Contrast Enhanced Ultrasound (CEUS) in the Liver – Update 2012. *Ultraschall in der Medizin - European Journal of Ultrasound*. 2012;34(01):11-29. doi:10.1055/s-0032-1325499.
8. Beyer L, Wassermann F, Pregler B, et al. Characterization of Focal Liver Lesions using CEUS and MRI with Liver-Specific Contrast Media: Experience of a Single Radiologic Center. *Ultraschall in der Medizin - European Journal of Ultrasound*. 2017;38(06):619-625. doi:10.1055/s-0043-105264.
9. Trillaud H, Bruel J-M, Valette P-J, et al. Characterization of focal liver lesions with SonoVue®-enhanced sonography: International multicenter-study in comparison to CT and MRI. *World Journal of Gastroenterology*. 2009;15(30):3748. doi:10.3748/wjg.15.3748.
10. Marrero JA, Kulik LM, Sirlin CB, et al. Diagnosis, Staging, and Management of Hepatocellular Carcinoma: 2018 Practice Guidance by the American Association for the Study of Liver Diseases. *Hepatology*. 2018;68(2):723-750. doi:10.1002/hep.29913.
11. Baig, Mudassar. "Shellfish Allergy and Relation to Iodinated Contrast Media: United Kingdom Survey." *World Journal of Cardiology* 6, no. 3 (2014): 107-111. doi:10.4330/wjc.v6.i3.107.
12. Schabelman, Esteban, and Michael Witting. "The Relationship of Radiocontrast, Iodine, and Seafood Allergies: A Medical Myth Exposed." *The Journal of Emergency Medicine* 39, no. 5 (2010): 701-07. doi:10.1016/j.jemermed.2009.10.014.
13. Beckett, Katrina R., Andrew K. Moriarity, and Jessica M. Langer. "Safe Use of Contrast Media: What the Radiologist Needs to Know." *RadioGraphics* 35, no. 6 (2015): 1738-750. doi:10.1148/rg.2015150033.
14. Swenson DW, Baird GL, Portelli DC, Mainiero MB, Movson JS. Pilot study of a new comprehensive radiology report categorization (RADCAT) system in the emergency department. *Emergency Radiology*. 2017;25(2):139-145. doi:10.1007/s10140-017-1565-8.
15. Guidelines for diagnostic imaging during pregnancy and lactation. Committee Opinion No. 723. American College of Obstetricians and Gynecologists. *Obstet Gynecol.* 2017;130:e210–6.
16. Longo SA, Moore RC, Canzoneri BJ, Robichaux A. Gastrointestinal conditions during pregnancy. *Clin. Colon Rectal Surg*. 2010;23(2):80-89. doi:10.1055/s-0030-1254294.
17. Aslanian HR, Lee JH, Canto MI. AGA clinical practice update on pancreas cancer screening in high risk individuals: expert review. *Gastroenterology*. 2020;159(1):358-362. doi:10.1053/j.gastro.2020.03.088.
18. National Institute for Health and Care Excellence (NICE). Upper gastroinestinal tract cancers. In: Suspected cancer: recognition and referral. 2015. https://www.nice.org.uk/guidance/ng12/chapter/Recommendations-organised-by-site-of-cancer#upper-gastrointestinal-tract-cancers.
19. Baluch, A., Shewayish, S. (2019). Neutropenic Fever. In: Velez, A., Lamarche, J., Greene, J. (eds) Infections in Neutropenic Cancer Patients. Springer, Cham. https://doi.org/10.1007/978-3-030-21859-1_8.

20. Weigt J, Malfertheiner P. Metastatic disease in the stomach. *Gastrointest Tumors*. 2015;2(2):61–64. doi:10.1159/000431304.
21. Banerjee A. Emergency clinical diagnosis. *Gastrointestinal Emergencies*. 2017:235–260. doi:10.1007/978-3-319-50718-7.
22. Chow EJ, Bishop KD. Painless neutropenic enterocolitis in a patient undergoing chemotherapy. *Curr Oncol*. 2016;23(5):e514–e516. doi:10.3747/co.23.3119.
23. Fowler KJ, Garcia EM, Kim DH, et al. ACR Appropriateness Criteria® Palpable Abdominal Mass-Suspected Neoplasm. *J Am Coll Radiol*. 2019;16(11S):S384-S391. doi:10.1016/j.jacr.2019.05.014.
24. Sik B, Kim M, Li BT, et al. Diagnosis of gastrointestinal bleeding: A practical guide for clinicians. *World J Gastrointest Pathophysiol*. 2014;5(4):467–478. doi: 10.4291/wjgp.v5.i4.467.
25. Ragsdale L, Southerland L. Acute abdominal pain in the older adult. *Emerg Med Clin North Am*. 2011;29(2):429-48. doi:10.1016/j.emc.2011.01.012.
26. Fry BT, Finks JF. Abdominal pain after roux-en-y gastric bypass-a review. *JAMA Surg*. 2023;158(10):1096-1102. doi:10.1001/jamasurg.2023.3211.
27. Stajkovic S, Aitken EM, Holryod-Leduc J. Unintentional weight loss in older adults. *CMAJ*. 2011;183(4):443–449. doi:10.1503/cmaj.101471.

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Abdominal Pain (AB-2)

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Acute/Persistent (Non-Chronic) Lower Abdominal Pain (AB-2.2)

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- The presence of any red flag findings per **General Guidelines (AB-1.0)** precludes adjudication based on any other criteria.
- Left Lower Abdominal Pain (including suspected diverticulitis) <6 months duration
  - CT Abdomen and Pelvis with contrast is indicated if ANY of the following are present:
    - Age ≥65
    - The presence of LLQ tenderness specifically noted on physical examination
    - Immunocompromised individual (e.g., on immunosuppressive therapy, history of HIV)
    - If prior abdominal and pelvic US has been performed and demonstrates a need for additional imaging OR if they do not explain the source of pain
    - CBC, Basic Metabolic Panel, C-Reactive Protein or other inflammatory marker, Pregnancy Test, and Urinalysis have been performed
      - Note: All the specific laboratory studies listed are not required, but there should be some studies performed relating to the current episode in order to help direct imaging appropriately.
    - For follow-up imaging of acute diverticulitis if symptoms or elevated WBC persists despite treatment
    - For follow-up of complicated diverticulitis, including confirmed abscess, fistulae, free fluid, or perforation (See: **Abdominal Sepsis/Suspected Abdominal Sepsis (AB-3)**)
    - For follow-up of diverticulitis treated with radiologic intervention (e.g. drainage procedure)
    - Note: Per ASCRS, colonic endoscopic evaluation is recommended to confirm the diagnosis after resolution of acute diverticulitis to exclude malignancy, especially when initial CT scan supports abscess, shouldering, or shelf-like appearance of a presumed inflammatory mass, obstruction, mesenteric or retroperitoneal adenopathy.
  - Pregnant individuals
    - US Abdomen and/or Pelvis should be considered initially to avoid ionizing radiation.
    - MRI Abdomen and MRI Pelvis without contrast if US is nondiagnostic. (See: **Pregnancy Considerations for Imaging (AB-1.12)**)
- Right Lower Abdominal Pain (including suspected appendicitis)

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- CT Abdomen and Pelvis with or without contrast is indicated if ANY of the following are present:
  - Age ≥65
  - For Alvarado Score of ≥4
  - For AIR (Appendicitis Inflammatory Response Score) of ≥5
  - Immunocompromised individual (e.g., on immunosuppressive therapy, history of HIV)
  - US of the abdomen and pelvis has been performed and is nondiagnostic or negative or indicates a need for further advanced imaging
  - CBC or CRP (or other inflammatory marker such as ESR or fecal calprotectin) have been performed related to this episode
- Pregnant individuals
  - Abdominal US and/or Pelvic US initial imaging
  - MRI Abdomen and Pelvis without contrast if initial US is nondiagnostic.
  - See above statement regarding CT and contrast during pregnancy.

- For Chronic lower abdominal pain (≥6 months), see: **Chronic Abdominal Pain (AB-2.6)**
- For follow-up imaging for conservatively treated acute appendicitis, see: **Non-Operative Treatment of Acute Appendicitis (AB-2.7)**.
- For Rectal Pain (Proctalgia) see: **Pelvic Pain/Dyspareunia (PV-11.1)**, Female, Proctalgia Syndromes and **Male Pelvic Disorders, Proctalgia Syndromes (PV-19.1)**.
- For pain described as pelvic, see: **Pelvic Pain/Dyspareunia (PV-11.1)** or other appropriate sections based on likely etiology.

CPT® Codes for Acute/Persistent (Non-Chronic) Lower Abdominal Pain (AB-2.2)			
CPT® 74150	CT Abdomen without contrast	CPT® 76700	Ultrasound, complete Abdomen
CPT® 74160	CT Abdomen with contrast	CPT® 76705	Ultrasound, limited Abdomen
CPT® 74176	CT Abdomen and Pelvis without contrast	CPT® 76830	Ultrasound, Transvaginal
CPT® 74177	CT Abdomen and Pelvis with contrast	CPT® 76856	Ultrasound, complete Pelvis
CPT® 74181	MRI Abdomen without contrast	CPT® 72195	MRI Pelvis without contrast

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CPT® Codes for Acute/Persistent (Non-Chronic) Lower Abdominal Pain (AB-2.2)			
CPT® 74183	MRI Abdomen without and with contrast	CPT® 72197	MRI Pelvis without and with contrast

Background and Supporting Information

The Alvarado Score for appendicitis risk is comprised of the following parameters with points assigned based on their presence, as follows:

Migration of pain	1 point
Anorexia	1 point
Nausea/vomiting	1 point
Right lower quadrant tenderness	2 points
Rebound pain	1 point
Temperature > 99.1	1 point
WBC > 10,000	2 points
PMNs ≥ 75%	1 point

- Low Risk: <4
- Moderate Risk: 4-7
- High Risk: ≥8

Appendicitis Inflammatory Response Score (AIR)

Vomiting	1 point
Right iliac fossa pain	1 point
Rebound tenderness	Light – 1 point Medium – 2 points Strong – 3 points

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Febrile (temperature ≥ 101.3)	1 point
PMNs	70-84% - 1 point ≥85% - 2 points
WBC	10-14.9 – 1 point ≥15 – 2 points
CRP	10-49 – 1 point >50 – 2 points

- Low Probability: 0-4
- Mild Probability: 5-8
- High Probability: 9-12

Evidence Discussion

When red flag signs and symptoms are present, literature supports early use of computer tomography (CT) and/or magnetic resonance imaging (MRI).

In the absence of red flags, a more focused evaluation of lower abdominal pain is indicated to distinguish conditions likely to require advanced imaging due to suspected pathology from those that are self-limiting or benign. For benign or self-limiting diseases, advanced imaging would be unnecessary and could increase radiation risk to patients.

When the cause is not found to be benign or self-limiting through focused evaluation, advanced imaging is warranted. CT imaging of the abdomen and pelvis provides high diagnostic value for symptoms with a wide differential of underlying conditions. CT imaging can characterize gut-related urgencies including, but not limited, as bowel blockage, abdominal ischemia, acute inflammatory conditions, and obstructing tumors. CT is also sensitive for diverticulitis and appendicitis.

ACR Appropriate Use Criteria states, "MRI is not useful for the initial evaluation of acute abdominal pain. It is less sensitive for extraluminal air and urinary tract calculi, is more time-consuming to perform, requires an active screening process for indwelling devices and metal, and is more subject to motion artifacts in symptomatic patients." (2104) Thus, MRI is reserved for pregnant patients with non-diagnostic ultrasound.

Right Upper Quadrant Pain including Suspected Gallbladder Disease (AB-2.3)

AB.AP.0002.3.C

v2.0.2025

- The presence of any red flag findings per **AB-1.0: General Guidelines** precludes adjudication based on any other criteria.
- For pregnant individuals, see: **Pregnancy Considerations for Imaging (AB-1.12)**
- For all others:
  - Abdominal ultrasound (complete or limited) is the initial diagnostic test
  - CT Abdomen with contrast, or MRCP/MRI (MRI Abdomen without or without and with contrast) if ultrasound is equivocal or nondiagnostic

Evidence Discussion

When red flags suggesting serious underlying pathology exist in patients with right upper quadrant abdominal pain, early use of advanced imaging is warranted.

Right upper quadrant abdominal (RUQ) pain is most commonly associated with disease of the gallbladder and hepatobiliary system. Ultrasound is the initial imaging study for RUQ pain due to its availability, lack of exposure to ionizing radiation, and utility in diagnosis. Use of ultrasound can not only confirm the diagnosis of biliary disease but if inconclusive, it can often identify the next most appropriate study and contrast level needed for evaluation (MRCP/ERCP for dilated biliary ducts, CT for pancreatitis, MRI/CT with and without contrast for a liver or kidney mass, etc.).

Hepatobiliary System Imaging (HIDA) is useful for suspected biliary disease if US is inconclusive. HIDA scanning is also useful for many hepatobiliary specific disease processes such as bile leaks and choledochal cyst.

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Left Upper Quadrant (LUQ) Pain (AB-2.4)

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- The presence of any red flag findings per **General Guidelines (AB-1.0)** precludes adjudication based on any other criteria.
- Most common causes which may be more specifically evaluated:
  - Splenic etiologies:
    - Suspected trauma, or splenomegaly
      - See: **Spleen (AB-34)**
    - Suspected infarct or abscess (severe pain and tenderness, fever, history of atrial fibrillation)
      - CT Abdomen without and with contrast or with contrast (CPT® 74170 or CPT® 74160)
  - Pancreatic etiologies:
    - Suspected pancreatitis
      - See: **Acute Pancreatitis (AB-33.1)**
  - Renal etiologies
    - Suspected nephrolithiasis
      - See: **Suspected Renal/Ureteral Stone (AB-4.1)**
    - Suspected pyelonephritis or abscess
      - See: **Upper (Pyelonephritis) (AB-40.1)**
  - Suspected small or large bowel etiologies (e.g., ischemia, obstruction, volvulus, diverticulitis)
    - CT Abdomen (CPT® 74160) or CT Abdomen and Pelvis (CPT® 74177)
  - Gastric etiologies
    - If there is concern for peptic ulcer disease, or if the complaint is dyspepsia, without any signs or symptoms suggesting possible perforation or penetration, endoscopy would be the best study for assessing these potential conditions. See: *EGD-1* in the EGD guidelines
    - If there is concern for a more urgent gastric problem, such as perforation, then a CT Abdomen (CPT® 74160) or CT Abdomen and Pelvis (CPT® 74177) can be approved.
  - Suspected aortic dissection
    - See: **Aortic Dissection and Other Aortic Conditions (PVD-6.7)** in the Peripheral Vascular Disease Imaging Guidelines
  - Unknown etiology, simply reported as LUQ pain
    - Prior to advanced imaging, an adequate history and physical examination, with lab work to include: CBC, chemistry profile including electrolytes, BUN,

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creatinine, LFTs (ALT, AST, alkaline phosphatase and bilirubin) lipase, amylase, and urinalysis, should be performed with the intention of trying to establish a potential etiology.
  - All the specific laboratory studies listed are not required, but there should be some studies performed relating to the current episode in order to help direct imaging appropriately.
- CT Abdomen (CPT® 74160) or CT Abdomen and Pelvis (CPT® 74177) is indicated for ANY of the following:
  - History and physical examination and lab studies are negative or inconclusive for establishing a potential etiology

Background and Supporting Information

- LUQ pain is more difficult to categorize with regard to imaging as there are many potential etiologies, which might be better evaluated with different imaging procedures.

Evidence Discussion

- There are many potential causes of left upper quadrant pain. In the absence of red flags indicating serious pathology, the initial evaluation should include patient history, physical examination, and laboratory testing. This approach guides the use of advanced imaging studies toward the appropriate body region and modality, thereby avoiding unnecessary imaging and radiation exposure.
- If the initial evaluation does not identify a specific cause for the left upper quadrant pain, advanced imaging with CT of the abdomen or abdomen and pelvis with contrast may be warranted. CT is better suited than ultrasound in localizing and characterizing gut-related urgencies such as blockage, ischemia, acute inflammatory conditions, and obstructing tumors. ACR states "with a generally broad differential and need for fast imaging because of clinical acuity, CT is a preferred imaging option".

Epigastric Pain and Dyspepsia (AB-2.5)

AB.AP.0002.5.A
v2.0.2025

- The presence of any red flag findings per **General Guidelines (AB-1.0)** precludes adjudication based on any other criteria.

Epigastric Pain or Dyspepsia Without Additional Signs or Symptoms

- Epigastric pain or dyspepsia (dyspepsia is defined by the ACG and CAG as predominant epigastric pain lasting at least one month and can be associated with any upper gastrointestinal symptoms such as epigastric fullness, nausea, vomiting, or heartburn) without any red flag findings:
  - Ultrasound Abdomen (CPT® 76700 or CPT® 76705) to assess for biliary/pancreatic disease is the initial study
  - CT Abdomen (CPT® 74160) or MRI Abdomen (CPT® 74183), or MRCP (CPT® 74181 or CPT® 74183), may be appropriate to evaluate positive findings on ultrasound. The use of these advanced imaging procedures to evaluate the ultrasound findings may be specifically addressed in the dedicated guideline.
  - CT Abdomen (CPT® 74160), or MRI Abdomen (CPT® 74183) for persistent symptoms after a negative or inconclusive upper gastrointestinal endoscopy and ultrasound as well as ONE of the following:
    - Test and treat for Helicobacter pylori (H. pylori) and a trial of acid suppression with a proton pump inhibitor (PPI) for 4–8 weeks if eradication is successful, but symptoms do not resolve OR
    - An empiric trial of acid suppression with a PPI for 4–8 weeks
- NOTE: See imaging for pregnant individuals **Pregnancy Considerations for Imaging (AB-1.12)**
- For suspicion of superior mesenteric artery syndrome, see: **Superior Mesenteric Artery (SMA) Syndrome (AB-20.4)**

Special Considerations for Suspicion of Pancreatic Cancer

- CT Abdomen with contrast (CPT® 74160), CT Abdomen and Pelvis with contrast (CPT® 74177), or MRI Abdomen without and with contrast (CPT® 74183) is appropriate for suspicion of pancreatic cancer in individuals aged ≥60 years with weight loss and any ONE of the following:
  - Diarrhea
  - Back pain
  - Abdominal pain
  - Nausea
  - Vomiting

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  - Constipation
  - New onset diabetes
  - Abnormal lab results raising the possibility of pancreatic cancer (e.g., elevated CA-19-9, GGTP, alkaline phosphatase, or bilirubin)
  - Nondiagnostic or negative prior US
- If none of the above signs or symptoms applies, follow criteria for epigastric pain and dyspepsia
- See also: **Pancreatic Cancer – Suspected/Diagnosis (ONC-13.2)** in the Oncology Imaging Guidelines

Evidence Discussion

- When patients with epigastric abdominal pain exhibit red flags suggesting serious underlying pathology, early use of advanced imaging is warranted
- In the absence of red flags, biliary or pancreatic disease and gastric issues such as gastritis, peptic ulcer disease, or gastric mucosal pathology often cause epigastric pain and dyspepsia. Ultrasound is the initial imaging study of choice due to its availability, non-exposure to ionizing radiation, and diagnostic utility. While ultrasound can confirm a diagnosis, if results are inconclusive, it can often guide the selection of the next most appropriate study and the required contrast level (e.g., MRCP/ERCP for dilated biliary ducts, CT for pancreatitis, MRI/CT with and without contrast for liver or kidney masses).
- Upper endoscopy can identify conditions such as gastritis, mucosal abnormalities (which may indicate early malignancies), and peptic ulcer disease that are not detectable with advanced imaging.
- Due to the high prevalence of peptic ulcer disease and gastritis in patients with epigastric pain and dyspepsia, and the generally successful treatment with medication (acid suppression and treatment of Helicobacter pylori), a course of treatment prior to advanced imaging is warranted.
- If these studies do not determine the cause and treatment is unsuccessful, advanced imaging with CT should be considered.

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Chronic Abdominal Pain (AB-2.6)

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- The presence of any red flag findings per **General Guidelines (AB-1.0)** precludes adjudication based on any other criteria.
- Evaluation of Chronic Abdominal Pain (defined as continuous or intermittent symptoms >6 months)
  - Epigastric Pain and Dyspepsia
    - See: **Epigastric Pain and Dyspepsia (AB-2.5)**
  - Right Upper Quadrant Pain
    - See: **Right Upper Quadrant Pain Including Suspected Gallbladder Disease (AB-2.3)**
  - Left Upper Quadrant Pain
    - See: **Left Upper Quadrant (LUQ) Pain (AB-2.4)**
  - Nonspecific, generalized, or lower abdominal pain
    - CT Abdomen with contrast (CPT® 74160) or CT Abdomen and Pelvis with contrast (CPT® 74177) as requested (include pelvis for lower abdominal complaints or findings) for the following:
      - Initial laboratory assessment (see below) is negative or does not provide specific causes for more directed workup (for example, colonoscopy or EGD if iron deficiency anemia is found, or CT Urogram if urinalysis shows hematuria)
        - CBC with differential, chemistry profile including electrolytes, glucose, creatinine, BUN and liver chemistries, ESR, urinalysis, amylase and lipase (for generalized or upper abdominal complaints), thyroid function tests, and serology testing for celiac (if celiac is suspected)

Evidence Discussion

- When red flags suggesting serious underlying pathology are present in patients with chronic (>6 months) abdominal pain, early use of advanced imaging is warranted.
- When no red flags exist, a more focused initial evaluation with patient history, physical exam, and laboratory investigation is indicated. US of the abdomen is readily available and involves no radiation and can be included as part of the initial evaluation but is not required. "Abdominal ultrasound is a sensitive, non-invasive, cost effective test that can be used to help diagnose the cause of abdominal pain."

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- If this evaluation does not suggest a specific etiology for the chronic pain, advanced imaging with CT of the abdomen or abdomen and pelvis with contrast would be indicated.

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Non-operative Treatment of Acute Appendicitis (AB-2.7)

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- Recurrent symptoms or routine post-treatment follow-up, if requested:
  - One-time CT Abdomen and Pelvis with contrast (CPT® 74177)

    (Note: Non-operative treatment of acute appendicitis is increasingly utilized. There is an approximately 2% chance of a pathologic finding not initially identified prior to treatment (e.g. Crohn's Disease or an appendiceal neoplasm such as a carcinoid). In view of this, some authors suggest a follow-up imaging study in asymptomatic patients, post-antibiotic treatment.)

Evidence Discussion

Non-operative treatment of acute appendicitis is increasingly utilized. Follow up imaging to ensure resolution and to identify coexisting pathology that may not have been visible on prior imaging due to appendiceal inflammation is warranted.

Patients with ongoing or recurrent symptoms should also be re-imaged for progression of disease or complications that may require surgery.

ACR states, "CT of the abdomen and pelvis is an excellent diagnostic imaging modality for the evaluation of patients with nonspecific right lower quadrant pain because of its high diagnostic yield for detection of appendicitis as well as suggesting alternative diagnosis". Thus, imaging should include the abdomen and pelvis with contrast to fully assess potential etiologies.

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Non-chronic Nonspecific Abdominal Pain with No Localizing Findings (AB-2.8)

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- Nonspecific abdominal pain can have multiple etiologies and be a diagnostic dilemma. Often, the history, physical examination, and laboratory data can guide subsequent workup in individuals presenting with abdominal pain (e.g. RUQ pain would lead to US for the evaluation of cholecystitis). If, despite an initial history and physical examination the clinical suspicion cannot be localized, and there is no specific indication of a significant concern for serious pathology (e.g., no red flags) then further workup and appropriate imaging may be directed by the results of initial lab studies or the results of non-advanced imaging relevant to and ordered for the evaluation of the current complaint being investigated.
- When possible, please use the more specific guideline, depending on clinical presentation and the differential diagnosis offered by the provider:
  - **Right Upper Quadrant Pain including Suspected Gallbladder Disease (AB-2.3)**
  - **Left Upper Quadrant (LUQ) Pain (AB-2.4)**
  - **Epigastric Pain and Dyspepsia (AB-2.5)**
  - **Chronic Abdominal Pain (AB-2.6)**
  - **Flank Pain, Rule Out or Known Renal/Ureteral Stone (AB-4)**
  - **Gastroenteritis (AB-5.1)**
  - **Mesenteric/ Colonic Ischemia (AB-6)**
  - **Post-Operative Pain With-in 60 Days Following Abdominal Surgery – Abdominal Procedure (AB-7)**
  - **Bowel Obstruction and Gastroparesis (AB-20)**
  - **Diarrhea, Constipation, and Irritable Bowel (AB-21)**
  - **Inflammatory Bowel Disease Rule Out Crohn's Disease or Ulcerative Colitis (AB-23)**
  - **Pancreatitis (AB-33)**
- Evaluation of Nonspecific Abdominal Pain:
  - US Abdomen and/or Pelvis (CPT® 76700 and/or CPT® 76856)
  - CT Abdomen and Pelvis with contrast (CPT® 74177):
    - Age ≥65
    - Any Red Flag

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        - If a prior US Abdomen and/or Pelvis performed for the current complaint is unrevealing or does not explain the pain
        - Preliminary labs such as CBC, electrolytes, lipase or amylase, urinalysis, ESR or CRP, or LFT's are unrevealing or do not point to a specific etiology that would otherwise direct more appropriate imaging (such as findings suggestive of pancreatitis or biliary tract disease). Note) All the specific laboratory studies listed are not required, but there should be some studies performed relating to the current episode in order to help direct imaging appropriately. (Note) Pregnancy test should be performed prior to CT in all appropriate reproductive age females)
    - Special Populations:
        - Pregnant individuals:
            - US Abdomen and/or Transvaginal and/or complete Pelvis (CPT® 76700 and/or CPT® 76830 and/or CPT® 76856) as the initial study
            - If US is equivocal OR ANY Red Flag:
                - MRI Abdomen and/or Pelvis without contrast (CPT® 74181 and/or CPT® 72195)

Evidence Discussion

Nonspecific abdominal pain can be a diagnostic challenge. In the absence of red flags suggest serious pathology, the initial evaluation should include patient history, physical examination, and laboratory testing. This approach guides the use of advanced imaging studies toward the appropriate body region and modality, thereby avoiding unnecessary imaging and radiation exposure.

When the cause of pain is indeterminate after focused evaluation, imaging is warranted. Ultrasound (US) of the abdomen, which involves no radiation and is readily available, can be part of the initial evaluation but is not mandatory. If US fails to suggest an etiology, then proceeding with advanced imaging is also indicated. CT imaging of the abdomen and pelvis provides high diagnostic value for symptoms with a wide differential of underlying conditions. (ACR, 2018) CT imaging can characterize gut-related urgencies including, but not limited, as bowel blockage, abdominal ischemia, acute inflammatory conditions, and obstructing tumors. CT is also sensitive for diverticulitis and appendicitis. ACR Appropriate Use Criteria® states "MRI is not useful for the initial evaluation of acute abdominal pain. It is less sensitive for extraluminal air and urinary tract calculi, is more time-consuming to perform, requires an active screening process for indwelling devices and metal, and is more subject to motion artifacts in symptomatic patients." (ACR, 2014) Thus, MRI is reserved for pregnant patients with non-diagnostic ultrasound.

References (AB-2)

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1. Cartwright S and Knudsen M. Evaluation of Acute Abdominal Pain in Adults. *Am Fam Physician*. 2008 Apr 1:77(7)971-978.
2. Moayyedi PM, Lacy BE, Andrews CN, et al. ACG and CAG Clinical Guideline: Management of Dyspepsia. *Am J Gastroenterol*.
3. Fashier J and Gitu A.Diagnosis and Treatment of Peptic Ulcer Disease and H. pylori infection. *Am Fam Physician* 2015 Feb 15:91(4):236-242.
4. Talley NJ, Vakil N, and the Practice Parameters Committee of the American College of Gastroenterology. Guidelines for the management of dyspepsia. *American Journal of Gastroenterology*, 2005; 100:2324–2337.
5. ACR Appropriateness Criteria® left lower quadrant pain. *The American College of Radiology*. Revised 2023.
6. Yarmish GM, Smith MP, Rosen MP, et al. Expert Panel on Gastrointestinal Imaging. ACR Appropriateness Criteria® right upper quadrant pain. *J Am CollRadiol*. 2014;11(3):316–32.
7. Continuing Medical Education: July 2017: ACG and CAG Clinical Guideline: Management of Dyspepsia. *The American Journal of Gastroenterology*. 2017;112(7):987-987. doi:10.1038/ajg.2017.190.
8. Ringel-Kulka, Tamar, et. al. Evaluation of Chronic Abdominal Pain in Adults. Nov 28, 2018. Epocrates (Content by British Medical Journal).
9. Charles, G, Chery, M, King Channell, M. Chronic Abdominal Pain: Tips for the Primary Care Provider. *Osteopathic Family Physician*; Jan/Feb, 2019.11(1).
10. Mendelson R. Diagnostic tests: Imaging for chronic abdominal pain in adults. *Australian Prescriber*. 2015;38(2):49-54. doi:10.18773/austprescr.2015.019.
11. Sakorafas GH. Interval routine appendectomy following conservative treatment of acute appendicitis: Is it really needed. *World Journal of Gastrointestinal Surgery*. 2012;4(4):83. doi:10.4240/wjgs.v4.i4.83.
12. Talan DA, Saltzman DJ, Deugarte DA, Moran GJ. Methods of conservative antibiotic treatment of acute uncomplicated appendicitis. *Journal of Trauma and Acute Care Surgery*. 2019;86(4):722-736. doi:10.1097/ta.0000000000002137.
13. Jang T, Chauhan V, Cundiff C, Kaji AH. Assessment of emergency physician–performed ultrasound in evaluating nonspecific abdominal pain. *The American Journal of Emergency Medicine*. 2014;32(5):457-460. doi:10.1016/j.ajem.2014.01.004.
14. Gans SL, Pols MA, Stoker J, Boermeester MA. Guideline for the Diagnostic Pathway in Patients with Acute Abdominal Pain. *Digestive Surgery*. 2015;32(1):23-31. doi:10.1159/000371583.
15. Lameris W, Randen AV, Es HWV, et al. Imaging strategies for detection of urgent conditions in patients with acute abdominal pain: diagnostic accuracy study. *Bmj*. 2009;338(jun26 2). doi:10.1136/bmj.b2431.
16. American College of Radiology. ACR Appropriateness Criteria. Acute Nonlocalized Abdominal Pain. 2018.
17. DiSaverio S, Podda M, De Simone B, et. al. Diagnosis and treatment of acute appendicitis: 2020 update of the WSES (World Society of Emergency Surgery) Jerusalem guidelines. *World J Emerg Surg*. 2020;15:27. doi:10.1186/s13017-020-00306-3.
18. Garcia EM, Camacho MA, Karolyi DR, et. al. ACR Appropriateness Criteria® right lower quadrant pain – suspected appendicitis. *J Am Coll Radiol*. 2018;15(11S):S373-S387. doi:10.1016/j.jacr.2018.09.033.
19. Longo SA, Moore RC, Canzoneri BJ, Robichaux A. Gastrointestinal conditions during pregnancy. *Clin*. *Colon Rectal Surg*. 2010; 23(2):80-89. doi:10.1055/s-0030-1254294.
20. Guidelines for diagnostic imaging during pregnancy and lactation. Committee Opinion No. 723. American College of Obstetricians and Gynecologists. *Obstet Gynecol.* 2017;130:e210–6.
21. Von-Mühlen B, Franzon O, Beduschi MG, Kruel N, Lupselo D. AIR score assessment for acute appendicitis. *Arg Bras Cir Dig*. 2015;28(3):171-173. doi:10.1590/S0102-672020150003000006.
22. Snyder MJ, Guthrie M, Cagle S. Acute appendicitis: efficient diagnosis and management. *Am Fam Physician*. 2018;98(1):25-33.
23. Hall J, Hardiman K, Lee S, et. al. The American Society of Colon and Rectal Surgeons clinical practice guidelines for the treatment of left-sided colonic diverticulitis. *Dis Colon Rectum*. 2020;63:728-747. doi:10.1097/DCR.0000000000001679.

24. Wilkins T, Embry K, George R. Diagnosis and management of acute diverticulitis. *Am Fam Physician*. 2013;87(9):612-620.
25. Schultz JK, Azhar N, Binda GA, et. al. European Society of Coloproctology: guidelines for the management of diverticular disease of the colon. *Colorectal Disease*. 2020;22(2):5-28. doi:10.1111/codi.15140.
26. Strate LL, Morris AM. Epidemiology, pathophysiology, and treatment of diverticulitis. *Gastroenterology*. 2019;156:1282-1298. doi:10.1053/j.gastro.2018.12.033.
27. Schreyer AG, Layer G. S2K guidelines for diverticular disease and diverticulitis: diagnosis, classification, and therapy for the radiologist. *Rofo*. 2015;187(8):676-84. doi:10.1055/s-0034-1399526.28.
28. Aslanian HR, Lee JH, Canto MI. AGA clinical practice update on pancreas cancer screening in high risk individuals: expert review. *Gastroenterology*. 2020;159(1):358-362. doi:10.1053/j.gastro.2020.03.088.29.
29. National Institute for Health and Care Excellence (NICE). Upper gastroinestinal tract cancers. In: Suspected cancer: recognition and referral. 2015. https://www.nice.org.uk/guidance/ng12/chapter/Recommendations-organised-by-site-of-cancer#upper-gastrointestinal-tract-cancers.
30. Banerjee A. Emergency clinical diagnosis. *Gastrointestinal Emergencies*. 2017;235-260. doi:10.1007/978-3-319-50718-7.

Abdominal Sepsis (Suspected Abdominal Abscess) (AB-3)

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Abdominal Sepsis (AB-3.1)

AB.AS.0003.1.A

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- CT Abdomen, or CT Pelvis, or CT Abdomen and Pelvis with contrast (CPT® 74160, or CPT® 72193, or CPT® 74177) for abdominal symptoms associated with fever and/or elevated white blood cell count.[1]
- CT Abdomen and Pelvis with contrast (CPT® 74177) interval imaging as requested for intraperitoneal abscess.
- Serial Ultrasound (CPT® 76705) or CT Abdomen, CT Pelvis, or CT Abdomen and Pelvis with contrast (CPT® 74160, or CPT® 72193, or CPT® 74177) studies may be performed for follow-up of known abnormal fluid collections, especially following catheter drainage. The interval can be days, weeks, or months based on the clinical course of the individual.

Evidence Discussion

- Patients presenting with potential abdominal sepsis or an abscess represent an urgent clinical concern. Therefore, patients exhibiting abdominal symptoms accompanied by fever or an elevated WBC count (or any red flag) should proceed directly to advanced imaging without further evaluation. A CT scan of the abdomen and/or pelvis with contrast is typically the appropriate study for such evaluations.
- Interval imaging may be necessary for abscesses or other fluid collections, particularly after catheter drainage. Both ultrasound and CT imaging are appropriate for serial imaging. The timing of serial imaging is not specified and should be based on the patient's unique clinical course.

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Reference (AB-3)

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1. ACR Appropriateness Criteria® Acute (nonlocalized) Abdominal Pain and Fever or Suspected Abdominal Abscess. American College of Radiology, Published 2012. Rev. 2018.

Flank Pain, Rule Out or Known Renal/ Ureteral Stone (AB-4)

Guideline Page

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Ultrasound (AB-4.0)

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- Retroperitoneal ultrasound (CPT® 76770 or CPT® 76775) can be used in place of CT Abdomen and Pelvis at any of the initial or follow-up indications, if requested by provider.

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Suspected Renal/Ureteral Stone(s) (AB-4.1)

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- CT Abdomen and Pelvis without contrast (CPT® 74176) is indicated for ANY of the following:
  - Suspected renal/ureteral stone with symptoms in non-pregnant adults (flank pain/ renal colic)[1,2]
  - Suspected staghorn calculi[12,13,14]
- CT Abdomen and Pelvis without contrast (CPT® 74176) or CT Urogram (CPT® 74178) is indicated for the following:
  - Suspicion renal/ureteral stones (flank pain/renal colic) with hematuria
- Ultrasound (CPT® 76770 or CPT® 76775) or MRI Abdomen and Pelvis without contrast (CPT® 74181 and CPT® 72195) is indicated for the following:
  - Suspected renal/ureteral stone in pregnant individuals (flank pain/renal colic)[3,4]
    - The use of gadolinium contrast agents is contraindicated during pregnancy unless the specific need for that procedure outweighs risk to the fetus.
- Suspected renal/ureteral stone in children (flank pain/renal colic)
  - See: **Flank Pain, Renal Stone (PEDAB-4)** in the Pediatric Abdomen Imaging Guidelines

Evidence Discussion

Non-contrast CT (NCCT) is the imaging study of choice for initial evaluation of patients with acute onset of flank pain and suspicion of stone disease without known prior stone disease. NCCT can reliably characterize the location and size of an offending ureteral calculus, identify complications, and diagnose alternative etiologies of abdominal pain. Although less sensitive in the detection of stones, ultrasound may have a role in evaluating for signs of obstruction. Radiography potentially has a role, although has been shown to be less sensitive than NCCT. For patients with known disease and recurrent symptoms of urolithiasis, NCCT remains the test of choice for evaluation. In pregnancy, given radiation concerns, ultrasound is recommended as the initial modality of choice with potential role for non-contrast MRI. In scenarios where stone disease suspected and initial NCCT is inconclusive, contrast-enhanced imaging, either with MRI or CT/CT Urogram may be appropriate.

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Observation of Known Renal/Ureteral Stone(s) (AB-4.2)

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- Radiopaque Stones
  - Initial follow-up imaging:
    - Retroperitoneal ultrasound (CPT® 76770 or CPT® 76775) and KUB X-ray
  - Subsequent follow-up imaging:
    - If initial follow-up ultrasound and KUB are negative, and there is no hematuria and individual is asymptomatic:
      - See: **Annual Surveillance (AB-4.4)**
    - If initial follow-up ultrasound and KUB demonstrates hydronephrosis, retained stone, or if the individual has persistent hematuria, or is symptomatic:
      - CT Abdomen and Pelvis without contrast (CPT® 74176)
- Non-radiopaque Stones (i.e. radiolucent)
  - Initial follow-up imaging:
    - CT Abdomen and Pelvis without contrast (CPT® 74176)
  - Subsequent follow-up imaging:
    - If CT is negative:
      - See: **Annual Surveillance (AB-4.4)**
    - If CT demonstrates a retained stone, hydronephrosis, or if the individual is being evaluated for surgery:
      - Further imaging can be considered on an individual basis
- ANY of the following are indicated for surgical/procedural evaluation of staghorn calculi:[12,13,14]
  - CT Abdomen and Pelvis (contrast as requested)
  - 3-D reconstruction (CPT® 76377 or CPT® 76376)
  - Nuclear kidney imaging (CPT® 78707, CPT® 78708, or CPT® 78709) when there is concern for a poorly functioning kidney

Background and Supporting Information

- Radiopaque versus radiolucent stones on plain radiograph:
  - Radiopaque
    - Calcium-based stones (70-80%)
    - Struvite stones (triple phosphate) (usually opaque but variable – 15-20%)
  - Radiolucent

- Uric acid (5-10%)
- Cystine (1-3%)
- Medication stones (e.g. indinavir) (1%)

Evidence Discussion

Serial imaging can be used to follow the progress of a passing stone, and might also be used by the urologist and/or nephrologist as they monitor non-obstructing stones for growth. No evidence was found on the optimum frequency of imaging in people who have or have had renal or ureteric stones.

Non-contrast CT of the abdomen and pelvis consistently provides the most accurate diagnosis but also exposes patients to ionizing radiation. Traditionally, ultrasonography has a lower sensitivity and specificity than CT, but does not require use of radiation. However, when these imaging modalities were compared in a randomized controlled trial they were found to have equivalent diagnostic accuracy. Both modalities have advantages and disadvantages. Kidney, ureter, bladder (KUB) plain film radiography is most helpful in evaluating for interval stone growth in patients with known stone disease, and is less useful in the setting of acute stones. MRI provides the possibility of 3D imaging without exposure to radiation, but it is costly and currently stones are difficult to visualize.

Follow-up imaging for asymptomatic patients with radiopaque stones should be with retroperitoneal ultrasound and plain film radiography. Follow-up for radiolucent stones, hydronephrosis or retained stone on ultrasound, or symptomatic patients, non-contrast CT is indicated.

Patients with staghorn calculi who are being considered for surgery, CT Abdomen and Pelvis (any contrast level), with or without 3-D reconstruction can be performed. Additionally nuclear imaging may be indicated when there is concern for poor kidney function.

Follow-Up of Treated Renal/Ureteral Stone (AB-4.3)

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- Post-shock wave lithotripsy (SWL):
  - Retroperitoneal ultrasound (CPT® 76770 or CPT® 76775) is the appropriate initial follow-up imaging.
  - Retroperitoneal ultrasound (CPT® 76770 or CPT® 76775) and/or CT Abdomen and Pelvis (contrast as requested) may be indicated for:
    - Individuals who are symptomatic
    - Individuals with hydronephrosis
    - Individuals who have residual fragments
  - Individuals treated by SWL who have passed fragments, are asymptomatic and without hydronephrosis can be followed according to **Annual Surveillance (AB-4.4)**.
- Post-medical expulsive therapy (MET):
  - Retroperitoneal ultrasound for individuals treated by MET who have passed a stone and are symptomatic
  - CT Abdomen and Pelvis (contrast as requested) if hydronephrosis is demonstrated with ultrasound
  - Individuals treated by MET who have passed a stone and are asymptomatic can be followed according to **Annual Surveillance (AB-4.4)**.
- Post-ureteroscopic extraction with an intact stone:
  - Retroperitoneal ultrasound for individuals without symptoms
  - CT Abdomen and Pelvis with contrast (CPT® 74177) for individuals with symptoms or hydronephrosis demonstrated on ultrasound
  - Individuals without symptoms or without hydronephrosis demonstrated on ultrasound can be followed according to **Annual Surveillance (AB-4.4)**.
- Post-ureteroscopic extraction requiring fragmentation of the stone(s):
  - Retroperitoneal ultrasound for individuals without symptoms
  - CT Abdomen and Pelvis without contrast (CPT® 74176) for individuals without symptoms, but hydronephrosis demonstrated on ultrasound
  - Individuals without symptoms or without hydronephrosis demonstrated on ultrasound can be followed according to **Annual Surveillance (AB-4.4)**.
  - Retroperitoneal ultrasound and KUB for individuals with symptoms and a radiopaque stone

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  - CT Abdomen and Pelvis without contrast (CPT® 74176) for individuals with symptoms and a non-radiopaque stone
- Post-surgical/procedural treatment of staghorn calculi:
  - CT Abdomen and Pelvis without contrast (CPT® 74176)[12,13,14]
- Retroperitoneal ultrasound and/or CT Abdomen and Pelvis (contrast as requested) may be indicated for individuals with persistent symptoms and/or hydronephrosis.

Evidence Discussion

Following treatment for renal stones, retroperitoneal ultrasound is the recommended initial modality for follow-up. CT scan is indicated in patients with symptoms or if hydronephrosis identified on ultrasound. Ultrasound is subsequently recommended for annual surveillance in asymptomatic patients.

Annual Surveillance (AB-4.4)

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- Annual surveillance for stable individuals who have a history of stones may be indicated to assess for stone growth or formation of new stones:
  - Plain x-ray (KUB) should be performed for individuals with radiopaque stones
  - Retroperitoneal ultrasound (CPT® 76770 or CPT® 76775) is the preferred modality for individuals with non-radiopaque stones

Evidence Discussion

Plain x-ray is cost-effective and readily available for surveillance of radiopaque stones. Ultrasound is preferred for most patients with radiolucent stones. One year imaging interval is recommended for stable patients, but this may be tailored on stone activity or clinical signs.

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References (AB-4)

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1. Fulgham PF, Assimos DG, Pearle MS, et al. Clinical Effectiveness Protocols for Imaging in the Management of Ureteral Calculous Disease: AUA Technology Assessment. *The Journal of Urology*. 2013;189(4):1203-1213.
2. Dubinsky TJ, Sadro CT. Acute Onset Flank Pain–Suspicion of Stone Disease. *Ultrasound Quarterly*. 2012;28(3):239-240.
3. Faerber EN, Benator RM, Browne LP, et al. ACR–SPR Practice Parameter for the Safe and Optimal Performance of Fetal Magnetic Resonance Imaging (MRI*). American College of Radiology*.(Revised 2015).
4. Faerber EN, Abramson SJ, Benator RM, et al. ACR Practice Guideline for Imaging Pregnant or Potentially Pregnant Adolescents and Women with Ionizing Radiation. *American College of Radiology*. (Revised 2013).
5. Banks KP, Green ED, Brown RKJ, et al. ACR–SPR Practice Guideline for the Performance of Renal Scintigraphy. (Revised 2017*). American College of Radiology*.
6. Remer EM, Papanicolaou N, Casalino DD, et al. American College of Radiology Appropriateness Criteria – Renal Failure. *American College of Radiology.* (Revised 2013).
7. Pearle MS, Godfarb DS, Assimos DG. Medical management of kidney stones: AUA guideline. *American Urological Association* (AUA). 2019.
8. Assimos D, Krambeck A, Miller NL, et al. Surgical Management of Stones: American Urological Association/ Endourological Society Guideline, PART I. *Journal of Urology*. 2016;196(4):1153-1160. doi:10.1016/ j.juro.2016.05.090**.**
9. Assimos D, Krambeck A, Miller NL, et al. Surgical Management of Stones: American Urological Association/ Endourological Society Guideline, PART II. *Journal of Urology*. 2016;196(4):1161-1169. doi:10.1016/ j.juro.2016.05.091.
10. Cheng PM, Moin P, Dunn MD, Boswell WD, Duddalwar VA. What the radiologist needs to know about urolithiasis: part 1 – pathogenesis, types, assessment, and variant anatomy. *AJR Am J Roentgenol*. 2012;198(6):W540-7. doi:10.2214/AJR.10.7285.
11. Gupta K, Feiertag N, Gottlieb J, et. al. Imaging after ureteroscopy: practice patterns, patient adherence and impact on subsequent management in an urban academic hospital system. *Urology*. 2023;171:49-56. doi:10.1016/j.urology.2022.08.056.
12. Sharbaugh A, Morgan Nikonow T, Kunkel G, Semins MJ. Contemporary best practice in the management of staghorn calculi. *Ther Adv Urol*. 2019;11:1756287219847099. doi:10.1177/1756287219847099.
13. Marien T, Miller NL. Treatment of the infected stone. *Urol Clin North Am*. 2015;42:459–472. doi:10.1016/ j.ucl.2015.05.009.
14. Flannigan R, Choy WH, Chew B, Lange D. Renal struvite stones—pathogenesis, microbiology, and management strategies. *Nat Rev Urol*. 2014;11:333-341. doi:10.1038/nrurol.2014.99.
15. National Institute for Health and Care Excellence (NICE). NICE guideline – renal and ureteric stones: assessment and management. 2019;123(2):220-232. doi:10.1111/bju.14654.
16. Brisbane W, Bailey MR, Sorensen MD. An overview of kidney stone imaging techniques. *Nat Rev Urol*. 2016;13(11):654–662.

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Gastroenteritis/ Enterocolitis (AB-5)

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Gastroenteritis/Enterocolitis (AB-5.1)

AB.GE.0005.1.A
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- The presence of any red flag findings per **General Guidelines (AB-1.0)** precludes adjudication based on any other criteria.
- CT Abdomen and Pelvis with contrast (CPT® 74177) if:
  - acute abdomen suggesting bowel obstruction, toxic megacolon (abdominal swelling, fever, tachycardia, elevated white blood cell count), or perforation
  - bloody stools
  - immunocompromised
  - previous gastric bypass
- For suspected ischemic enterocolitis, see: **Mesenteric Ischemia (AB-6.1)** or **Colonic Ischemia (Including Ischemic Colitis) (AB-6.2)**

Background and Supporting Information

Gastroenteritis is a nonspecific term which denotes a constellation of symptoms including, to a varying degree, nausea, vomiting, diarrhea, and abdominal pain. It is usually caused by infectious agents such as norovirus. The broad differential of such symptoms evades establishing a guideline to evaluate gastroenteritis, as a specific entity, from an imaging standpoint.

Evidence Discussion

Generally, nausea and vomiting are evaluated through physical examination, lab studies, and x-ray imaging of the abdomen. Additional imaging is directed by the findings of these tests or if there is concern for serious underlying complications, such as intestinal obstruction or toxic megacolon. A CT scan of the abdomen and pelvis provides a non-invasive method to detect these underlying conditions and also allows for the evaluation of surrounding structures.

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References (AB-5)

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1. Scorza K, Williams A, Phillips D, et al. Evaluation of Nausea and Vomiting. *American Family Physician.* 2007; 76(1):76-84.
2. DuPont HI, Practice Parameters of the American College of Gastroenterology. Guideline on acute infectious diarrhea in adults. *The American Journal of Gastroenterology*. 1997;92:1962-1975.
3. Shane AL, Mody RK, Crump JA, et. al. 2017 Infectious Disease Society of America clinical practice guidelines for the diagnosis and management of infectious diarrhea. *Clin Infect Dis*. 2017;65(12):e45-e80. doi:10.1093/cid/cix669.

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Mesenteric/Colonic Ischemia (AB-6)

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Mesenteric Ischemia (AB-6.1)

AB.MI.0006.1.A
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Acute Mesenteric Ischemia

- Suspicion of acute mesenteric ischemia, ONE of the following:
  - CTA Abdominal and/or Pelvic (Mesenteric) (CPT® 74175, or CPT® 74174, or CPT® 72191) (preferable), **or**
  - MRA Abdominal and/or Pelvic (CPT® 72198 and/or CPT® 74185), **or**
  - CT Abdomen and Pelvis with contrast (CPT® 74177)

Chronic Mesenteric Ischemia

- Suspicion of chronic mesenteric ischemia:[10-13]
  - Mesenteric Artery Duplex Ultrasound (CPT® 93975 or CPT® 93976) AND/OR one of the following:
    - CTA Abdomen and Pelvis (CPT® 74174) or MRA Abdomen and Pelvis (CPT® 74185 and CPT® 72198)
- For clinical concern of median arcuate ligament syndrome, see: **Median Arcuate Ligament Syndrome, Nutcracker Syndrome and other Abdominal Vascular Compression Syndromes (PVD-18)** in the Peripheral Vascular Disease (PVD) Imaging Guidelines

Pre- and Post-Treatment for Mesenteric Ischemia

- Pre-operative evaluation, if not already performed (including prior to endovascular intervention):[10-13]
  - CTA Abdomen and Pelvis (CPT® 74174)
- Post-procedure surveillance imaging following invasive treatment for mesenteric ischemia (celiac, superior mesenteric, and inferior mesenteric angioplasty with or without stenting, or mesenteric artery bypass grafting):
  - Baseline Duplex Ultrasound (CPT® 93975 or CPT® 93976) within 1 month of the procedure
  - Duplex Ultrasound (CPT® 93975 or CPT® 93976) at 6 months, 12 months, 18 months, and 24 months, then annually thereafter[10-13]
  - CT Abdomen or Abdomen and Pelvis with contrast (CPT® 74160 and CPT® 74177) or CTA Abdomen or Abdomen and Pelvis (CPT® 74175 or CPT® 74174) or MRA Abdomen (CPT® 74185) and if requested, MRA Pelvis (CPT® 72198):
    - For symptoms suggesting recurrent ischemia OR

- In the absence of symptoms, following a Duplex Ultrasound if, on the Duplex study:
  - Celiac axis:
    - PSV >370 cm/s or a substantial increase from the post-treatment baseline PSV (substantial increase has not been defined) or demonstration of restenosis ≥70%
  - Superior mesenteric artery:
    - PSV >420 cm/s, or a substantial increase from the post-treatment baseline PSV (substantial increase has not been defined) or demonstration of restenosis of ≥70%
  - Inferior mesenteric artery:
    - Substantial increase from the post treatment baseline PSV (substantial increase has not been defined).

Surveillance of Asymptomatic Mesenteric Artery Occlusive Disease

- Annual Mesenteric Artery Duplex Ultrasound (CPT® 93975 or CPT® 93976)[10-13]

Evidence Discussion

- Mesenteric ischemia reflects decreased intestinal blood flow through the mesenteric vessels. Causes include: mesenteric artery embolism (often seen with atrial fibrillation), mesenteric artery thrombosis (typically from progressive atherosclerosis that may range from non-occlusive low flow to frank occlusion), and mesenteric vein thrombosis (commonly due to hyper-coagulable states).
- Typical presentation of acute mesenteric ischemia is based on severe abdominal pain out of proportion to findings on physical exam, usually in individuals with a combination of the following risk factors: advanced age, hyperlipidemia, heart disease, hypercoagulability, renal failure, inflammatory conditions (ex. vasculitis, pancreatitis, diverticulitis), recent vascular catheterization, substance use (tobacco smoking, cocaine).
- Chronic mesenteric ischemia (CMI) is a syndrome related to inadequate blood flow, typically related atherosclerotic occlusive disease affecting the mesenteric circulation. Blood flow to the bowel is from the celiac artery, superior mesenteric artery, and inferior mesenteric artery. Ischemia may occur when there is significant disease affecting at least two of three arteries; however, symptoms related to severe disease isolated to one artery is also possible. Symptoms may be characterized by postprandial abdominal pain, "food fear", diarrhea, weight loss. Revascularization is typically recommended once CMI is diagnosed; this may be done via an endovascular approach (angioplasty and stenting) or through open reconstruction.
- Duplex ultrasound provides an excellent screening tool for mesenteric artery occlusive disease. Duplex ultrasound is recommended for regular evaluation of

individuals treated for mesenteric ischemia. Duplex ultrasound requires no ionizing radiation and is readily available. Duplex ultrasound findings help to determine the next most appropriate advanced imaging study if needed. Duplex ultrasound has a high negative predictive value of 99% with overall accuracy of 96% in ruling out significant stenosis. CTA is recommended as an additional diagnostic tool in chronic mesenteric ischemia because it provides excellent image detail and helps to better define mesenteric lesions. Disadvantages of CTA include ionizing radiation, expense, and the need for a contrast agent. MRA is considered an alternative modality to CTA. MRA boasts sensitivity and specificity of over 95% for detection of significant stenosis. However, it is limited in its ability to characterize degree of calcification, requires contrast administration, is not as widely available, and presents limitation in patients with metallic implants.

Colonic ischemia (including ischemic colitis) (AB-6.2)

AB.MI.0006.2.C

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- CT Abdomen and Pelvis with contrast (CPT® 74177) is considered the first imaging modality in order to assess the distribution and phase of the colitis, and it can be performed if abdominal pain **and:**
  - lower GI bleed; **or**
  - moderate or severe tenderness; **or**
  - fever (≥101 degrees); **or**
  - guarding, rebound tenderness, or other peritoneal signs; **or**
  - elevated WBC as per the testing laboratory's range
- Repeat imaging for asymptomatic or unchanged symptoms, including routine post-operative imaging, is generally not needed.
- CTA Abdomen (CPT® 74175) or CTA Abdomen and Pelvis (CPT® 74174) or MRA Abdomen (CPT® 74185) and if requested, MRA Pelvis (CPT® 72198) can be performed for suspicion of right sided or pancolonic ischemia (as suggested on the initial CT Abdomen and Pelvis or by history/physical examination).

Background and Supporting Information

- Suspicion of colonic ischemia based on sudden cramping abdominal pain accompanied by urgency to defecate and passage of bright red blood, maroon blood, or bloody diarrhea, with risk factors including cardiovascular disease, diabetes mellitus, kidney disease, previous abdominal surgery, use of constipating medications, COPD, and atrial fibrillation.
- As noted in the ACG Clinical Guideline:
  - " In contrast to AMI (*acute mesenteric ischemia*) in which conventional mesenteric angiography or CTA plays an essential role, vascular imaging studies are not indicated in most patients with suspected CI (*colonic ischemia*) because by the time of presentation, colon blood flow has usually returned to normal and the observed changes are not from ongoing ischemia but rather reflect the ischemic insult with or without reperfusion injury".

Evidence Discussion

- Based on ACG Clinical Guideline: "In contrast to AMI (acute mesenteric ischemia) in which conventional mesenteric angiography or CTA plays an essential role, vascular imaging studies are not indicated in most patients with suspected CI (colonic ischemia) because by the time of presentation, colon blood flow has usually returned

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to normal and the observed changes are not from ongoing ischemia but rather reflect the ischemic insult with or without reperfusion injury".

- CT scan is recommended as first-line imaging for patients with ischemic colitis. CT allows for identification and/or exclusion of other causes of abdominal pain; may suggest diagnosis of colonic ischemia, including distribution of disease; and may allow assessment of disease severity.
- CT-angiogram (CTA) is generally not recommended, since in most cases, blood flow has returned to normal by the time of clinical presentation. CTA may be helpful in distinguishing between acute mesenteric ischemia (AMI) and ischemic colitis. In diagnosing AMI, sensitivity and specificity are reported to be over 90%. Isolated right sided colonic ischemia (IRCI) carries a worse prognosis than other distributions of colitis and may represent evidence of significant SMA disease; as such, CTA is recommended to fully evaluate the vasculature and potentially prevent catastrophic associated complications.
- Radiation and contrast related complications are risks associated with CT and CTA
- MRA also allows for evaluation of the proximal celiac artery and SMA. Advantages include high sensitivity and specificity. Disadvantages include poor visualization of distal vessels and non-occlusive ischemia, long acquisition times, and motion susceptibility artifact which could potentially delay treatment. In contrast to CTA, MRA is "less likely to show ischemic findings within the bowel itself".
    - Alternative imaging studies include non-contrast CT scan, ultrasound, and barium enema:
    - Non-contrast CT scan – there is a lack of literature related to this imaging modality; however, signs of ischemia, including evaluation of bowel and vasculature, rely on use of contrast.
    - Ultrasound – Experience "in the setting of CI is very limited", also, there is a low specificity, high false negative rate.
    - Duplex US (arterial study) – there may be a role; however, various factor, including difficulty evaluating distal vessels and non-occlusive ischemia, as well as acquisition time, and patient discomfort do limit utility in evaluating for acute mesenteric ischemia.
    - Barium enema – originally described in diagnosis of CI in the 1960s. Very limited role today, as CT and colonoscopy are preferred. Modern usage is mainly to follow ischemic strictures in a chronic setting.

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References (AB-6)

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1. Fidelman N, Funaki BS, Ray CE , et al. Expert Panel on Interventional Radiology. ACR Appropriateness Criteria® radiologic management of mesenteric ischemia. American College of Radiology (ACR); 2011 (Revised 2016).
2. Menke J. Diagnostic Accuracy Of Multidetector CT In Acute Mesenteric Ischemia: Systematic Review And Meta-Analysis. *Radiology*, 2010; 256: 93-101.
3. Olivia IB, Davarpanah AH, Rybicki FJ, et. Al ACR Appropriateness Criteria- Imaging of Mesenteric Ischemia 2018.The American College of Radiology.
4. Brandt LJ, Feuerstadt P, Longstreth GF, et al. Epidemiology, Risk Factors, Patterns of Presentation, Diagnosis, and Management of Colonic Ischemia. *American College of Gastroenterology*. 2015; 110: 18-44.
5. Bala M, Kashuk J, Moore EE, et al. Acute mesenteric ischemia: guidelines of the World Society of Emergency Surgery. *World Journal of Emergency Surgery*. 2017;12(1). doi:10.1186/s13017-017-0150-5.
6. Zierler RE, Jordan WD, Lal BK, et al. The Society for Vascular Surgery practice guidelines on follow-up after vascular surgery arterial procedures. *Journal of Vascular Surgery*. 2018;68(1):256-284. doi:10.1016/j.jvs.2018.04.018.
7. Peck MA, Conrad MF, Kwolek CJ, Lamuraglia GM, Paruchuri V, Cambria RP. Intermediate-term outcomes of endovascular treatment for symptomatic chronic mesenteric ischemia. *Journal of Vascular Surgery*. 2010;51(1). doi:10.1016/j.jvs.2009.06.064.
8. Cai W, Li X, Shu C, et al. Comparison of Clinical Outcomes of Endovascular Versus Open Revascularization for Chronic Mesenteric Ischemia: A Meta-analysis. *Annals of Vascular Surgery*. 2015;29(5):934-940. doi:10.1016/j.avsg.2015.01.010.
9. Alahdab F, Arwani R, Pasha AK, et al. A systematic review and meta-analysis of endovascular versus open surgical revascularization for chronic mesenteric ischemia. *Journal of Vascular Surgery*. 2018;67(5):1598-1605. doi:10.1016/j.jvs.2017.12.046.
10. Björck M, Koelemay M, Acosta S, et al. Editor's choice – management of the diseases of mesenteric arteries and veins. Clinical practice guidelines of the European Society of Vascular Surgery (ESVS). *Eur J Vasc Endovasc Surg*. 2017;53:460-510.
11. Ginsburg M, Obara P, Lambert D, et al. Expert Panels on Vascular Imaging and Gastrointestinal Imaging: ACR Appropriateness Criteria ® Imaging of Mesenteric Ischemia. *J Am Coll Radiol*. 2018;15(11S):S332-40.
12. Huber TS, Björck M, Chandra A, et al. Chronic mesenteric ischemia: Clinical practice guidelines from the Society for Vascular Surgery. *J Vasc Surg*. 2021;73:87S-115S.
13. Zierler RE, Jordan WD, Lal BK, et al. The Society for Vascular Surgery practice guidelines on follow-up after vascular surgery arterial procedures. *J Vasc Surg*. 2018;68(1):256-284.

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Post-Operative Pain Within 60 Days Following Abdominal Surgery – Abdominal Procedure (AB-7)

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Post-Op Pain and/or Complication Within 60 Days (AB-7.1)

AB.OP.0007.1.A

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- CT Abdomen and/or Pelvis with contrast (CPT® 74177, or CPT® 74160, or CPT® 72193) can be performed for suspected postoperative/post procedure complications (For example: bowel obstruction, abscess, anastomotic leak, or post-endoscopic complication).
- Beyond 60 days postoperatively, see: **Abdominal Pain (AB-2)**.
- See: **Liver Transplant, Post-Transplant Imaging (AB-42.3)** for post-transplant indications and imaging.

Evidence Discussion

Early investigation with advanced imaging is indicated to identify post-operative/post-procedural complications. Most complications manifest within the first 2 months.

CT imaging is the mainstay for abdominal imaging in the post-operative period due to its high resolution and speed. It is particularly effective at identifying abdominal fluid collections in the peri-hepatic and peri-splenic areas, as well as in the pelvis. CT may also differentiate between post-operative seromas, hematomas, and abscesses, aiding in the drainage of these collections. The use of contrast is recommended to enhance diagnostic accuracy.

References (AB-7)

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1. ACR Appropriateness Criteria® acute (nonlocalized) abdominal pain and fever or suspected abdominal abscess. American College of Radiology. Published 2012. Rev. 2018.

Abdominal Lymphadenopathy (AB-8)

Guideline Page

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Abdominal Lymphadenopathy (AB-8.1)

AB.AL.0008.1.A
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- History of malignancy
  - Refer to oncology guidelines specific for that known malignancy.
  - Biopsy may be considered
- Clinical or lab findings suggesting a lymphoproliferative disorder:
  - Biopsy
  - PET/CT (CPT® 78815) may be considered prior to biopsy in order to determine a more favorable site for biopsy, when a prior biopsy was nondiagnostic, or a relatively inaccessible site is contemplated which would require invasive surgical intervention for biopsy attempt.

    Clinical note: Due to its relative lack of specificity as well as higher cost, PET is a less efficient alternative to biopsy.
- If clinical, laboratory findings, biopsy, or PET suggest benign etiology, and no history of malignancy:
  - CT Abdomen and Pelvis (CPT® 74177) at 3 months for follow-up.
  - If no changes at 3 months, 2 additional follow-up scans (at 6 months and one year) can be approved.
  - If no changes by one year, the finding can be considered benign. No further imaging.
- If a follow-up CT demonstrates a concerning change, biopsy should be performed. If biopsy is inconclusive, PET/CT (CPT® 78815) can be approved.

Evidence Discussion

Abdominal lymphadenopathy can be associated with infectious, autoimmune, and malignant etiologies. Whenever possible, tissue pathology is preferred in the diagnosis of enlarged lymph nodes.

CT remains the main modality for evaluation of intra-abdominal lymph nodes. This can be used for identification, follow-up, and guidance for percutaneous biopsy. Serial CT should be done with consideration of radiation exposure.

PET/CT, although not specific for malignancy, can assist in identifying alternate sites for biopsy in patients with a previously non-diagnostic biopsy or when lymph nodes are relatively inaccessible and biopsy would require an invasive surgical intervention.

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Inguinal Lymphadenopathy (AB-8.2)

AB.AL.0008.2.A
v2.0.2025

There is no evidence-based support for advanced imaging of clinically evidenced inguinal lymphadenopathy without biopsy. Advanced imaging should be directed by results of biopsy. If biopsy results are negative or benign, then no advanced imaging is indicated.

If biopsy is positive for malignancy, advanced imaging is guided by sections specific to the histological diagnosis:

- High suspicion of lymphoma: See **Non-Hodgkin Lymphomas (ONC-27)** and **Hodgkin Lymphoma (ONC-28)** in the Oncology Imaging Guidelines
- Prior history of malignancy: See **Metastatic Cancer, Carcinoma of Unknown Primary Site, and Other Types of Cancer (ONC-31)** in the Oncology Imaging Guidelines

Background and Supporting Information

- Localized inguinal lymphadenopathy should prompt:
  - search for adjacent extremity injury or infection
  - 3 to 4 weeks of observation if clinical picture is benign
  - excisional or image guided core needle biopsy under ultrasound or CT guidance of most abnormal lymph node if condition persists or malignancy suspected
- Generalized inguinal lymphadenopathy should prompt:
  - diagnostic work-up, including serological tests, for systemic diseases and
  - excisional or image guided core needle biopsy under ultrasound or CT guidance of most abnormal lymph node if condition persists or malignancy suspected

Evidence Discussion

Inguinal adenopathy is benign and self-limited in most patients. History and physical alone can often identify the cause of the adenopathy. Biopsy remains the primary diagnostic tool in evaluation of undiagnosed inguinal adenopathy. This can be done with fine needle aspiration or core needle biopsy. Diagnostic rates can be improved with the use of ultrasound.

There is no evidence-based support for advanced imaging of inguinal adenopathy in the absence of biopsy results that would direct that imaging. If benign, no further work-up is necessary.

Sclerosing Mesenteritis and Mesenteric Panniculitis (AB-8.3)

AB.AL.0008.3.A
v2.0.2025

- For new or worsening clinical symptoms, or if not previously performed:
  - CT Abdomen and Pelvis without and with contrast (CPT® 74178)
- Requests for follow-up imaging in asymptomatic individuals or for sequential imaging to monitor for the development of malignancy:
  - Further imaging in these scenarios is not supported in the absence of worsening or new clinical symptoms.
- PET imaging is not indicated for the evaluation of Sclerosing Mesenteritis or Mesenteric Panniculitis

Background and Supporting Information

- Sclerosing mesenteritis and mesenteric panniculitis are rare, incompletely understood entities that are characterized by an idiopathic inflammatory condition of the mesentery, with radiologic findings including:
  - fatty mass lesion in the small intestinal mesentery
  - “halo” (fat ring) surrounding lymph nodes or vessels
  - lymph nodes in the fatty mass
  - a “pseudocapsule”
  - “misty” mesentery
  - calcifications from fat necrosis
- Sclerosing mesenteritis may represent a spectrum of diseases (retractile mesenteritis, mesenteric panniculitis, and mesenteric lipodystrophy), or may be stages of one disease with progression.
- The chronic inflammation may result in fibrosis with a mass effect and can involve the gut (causing obstruction), the mesenteric vessels, and other intra-abdominal or retroperitoneal organs. The etiology is uncertain, but may be secondary to trauma (previous abdominal surgery), an autoimmune process, ischemia, infection, and possibly may represent a paraneoplastic syndrome secondary to a malignancy, though this is controversial.
- There is an increased prevalence of malignancy in individuals with sclerosing mesenteritis, and this has resulted in requests for sequential imaging in stable or asymptomatic individuals. In addition, requests may be made to assess the clinical response in those undergoing active treatment.
- However, studies have reported that the data on potentially developing a subsequent malignancy is inconclusive and thus “it does not seem justified to subject patients with

MP, especially those in whom other associations such as abdomino-pelvic surgery may explain the MP findings, to multiple follow-up CT scans with the aim of detecting a future malignancy"[1]. This recommendation is supported by other authors.[2,3,4,5]

- In addition, there is no correlation between radiolologic and clinical findings, and management decisions are guided by the severity and type of symptoms. Thus, sequential radiologic imaging to assess treatment response is not recommended.[2]

Evidence Discussion

Mesenteric panniculitis is self-limited in over 80% of cases. There is no correlation between radiologic and clinical findings, and clinical management decisions should be guided by symptoms so sequential radiologic imaging to assess treatment response is not recommended. Evidence of potential malignancy is inconclusive and exposing patients to the risks of sequential radiation is not supported.

CT scan of the abdomen and pelvis is the preferred modality in the diagnosis of new or worsening symptoms. There is no role for PET/CT in the evaluation of sclerosing mesenteritis.

References (AB-8)

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1. Nyberg L, Björk J, Björkdahl P, Ekberg O, Sjöberg K, Vigren L. Sclerosing mesenteritis and mesenteric panniculitis – clinical experience and radiological features. *BMC Gastroenterology*. 2017;17(1). doi:10.1186/s12876-017-0632-7.
2. Akram S, Pardi DS, Schaffner JA, Smyrk TC. Sclerosing Mesenteritis: Clinical Features, Treatment, and Outcome in Ninety-Two Patients. *Clinical Gastroenterology and Hepatology*. 2007;5(5):589-596. doi:10.1016/j.cgh.2007.02.032.
3. Green MS, Chhabra R, Goyal H. Sclerosing mesenteritis: a comprehensive clinical review. *Annals of Translational Medicine*. 2018;6(17):336-336. doi:10.21037/atm.2018.07.01.
4. Catlow J, Twemlow M, Lee T. PWE-141 Should we reimage mesenteric panniculitis? *Small Bowel*. 2017. doi:10.1136/gutjnl-2017-314472.386.
5. Halligan S, Plumb A, Taylor S. Mesenteric panniculitis: systematic review of cross-sectional imaging findings and risk of subsequent malignancy. *European Radiology*. 2016;26(12):4531-4537. doi:10.1007/s00330-016-4298-2.
6. Protin-Catteau L, Thiéfin G, Barbe C, Jolly D, Soyer P, Hoeffel C. Mesenteric panniculitis: review of consecutive abdominal MDCT examinations with a matched-pair analysis. *Acta Radiologica*. 2016;57(12):1438-1444. doi:10.1177/0284185116629829.
7. Bazemore AW and Smucker DR. Lymphadenopathy and malignancy. American Family 2002, 66(1), 2103-2111.
8. Heller M, Harisinghani M, Neitlich J, et al. Managing incidental findings on abdominal and pelvic CT and MRI, part 3: white paper of the ACR ncidental Findings Committee II on splenic and nodal findings. *American College of Radiology*. 2013;10(11):833-839.
9. Gaddey HL, Riegel AM. Unexplained Lymphadenopathy: Evaluation and Differential Diagnosis. American Family Physician. *Am Fam Physician*. 2016 Dec 1;94(11):896-903.
10. Schwartz FR, James O, Kuo PH, et al. Lymphatic Imaging: current noninvasive and invasive techniques. *Semin Intervent Radiol*. 2020;37(3):237–249.
11. Zeman MN, Green C, Akin EA. Spectrum of [18F]FDG-PET/CT Findings in benign lymph node pathology. *Mol Imaging Biol*. 2021;23(4):469–480.

Bariatric Surgery and Percutaneous Gastrostomy (AB-9)

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Bariatric Surgery (AB-9.1)

AB.BS.0009.1.A
v2.0.2025

- Pre-operative Assessment:
  - Abdominal ultrasound (CPT® 76700 or CPT® 76705) to assess the liver and gallbladder
- Post-operative complications:
  - CT Abdomen and Pelvis with contrast (CPT® 74177) or CT Abdomen with contrast (CPT® 74160) may be used for individuals who have had weight loss surgery and present with suspected complications including:
    - weight loss failure
    - heartburn
    - nausea or vomiting
    - abdominal pain
    - fever
    - abdominal distension
    - suspected hernia
- Note: Internal hernias in patients who have had Roux-en-Y gastric bypasses may have intermittent and relatively mild abdominal symptoms which require immediate evaluation with CT imaging.
- See: **Post-Operative Pain Within 60 Days Following Abdominal Surgery – Abdominal Procedure (AB-7)**

Background and Supporting Information

- Bariatric procedures include gastric banding, gastric bypass, sleeve gastrectomy, and biliopancreatic diversion procedures.
- Though abdominal pain in post-operative bariatric patients may be gallbladder-induced and an ultrasound would be helpful for this diagnosis, the complications of bariatric surgery can become quickly life-threatening, and so any request for CT imaging in the post-operative bariatric individual should not be delayed with recommendations for ultrasound, even if the examination does not indicate any signs or symptoms of more serious or complicated disease.

Evidence Discussion

- Preoperative assessment:
  - Routine screening with ultrasound to assess the gallbladder is reasonable due to the frequent finding of cholelithiasis (21%) leading to synchronous cholecystectomy with the bariatric procedure.

  - In the absence of symptoms, advanced imaging is generally not indicated.
  - In patients with previous surgery of the foregut, imaging may be indicated for surgical planning. This is addressed in EviCore Abdomen Imaging Guidelines: General Guidelines (AB 1.0) under pre-operative radiology imaging. "If imaging is requested by the operating surgeon to support planned surgery, the imaging may be approved."
- Post-operative complications:
  - Bariatric procedures include gastric banding, gastric bypass, sleeve gastrectomy, and biliopancreatic diversion procedures.
  - Bariatric surgery can result in numerous complications that may not be apparent after initial evaluation or ultrasound. These include internal hernias, marginal ulceration, intussusception, stenosis, perforations, and leaks. Specifically, internal hernias in patients who have had Roux-en-Y gastric bypasses may have intermittent and relatively mild abdominal symptoms which require immediate evaluation with CT imaging.
  - Symptoms concerning for complications include weight loss failure, heartburn, nausea and vomiting, abdominal pain, fever, abdominal distention, and suspicion of a hernia.
  - Though abdominal pain in post-operative bariatric patients may be gallbladder induced and an ultrasound would be helpful for this diagnosis, the complications of bariatric surgery can become quickly life-threatening, and so any request for CT imaging in the post-operative bariatric individual should not be delayed with recommendations for ultrasound, even if the examination does not indicate any signs or symptoms of more serious or complicated disease.

Percutaneous Gastrostomy (AB-9.2)

AB.BS.0009.2.A
v2.0.2025

- Percutaneous Endoscopic Gastrostomy (PEG)
  - CT or MRI is generally not needed pre-operatively for PEG placement.
  - CT Abdomen with or without contrast (CPT® 74160 or 74150):
    - For pre-operative assessment in the presence of:
      - abdominal wall defects such as an open abdomen
      - the presence of “ostomy” sites or drain tubes
      - abdominal surgical scars or prior major abdominal surgery (e.g. laparotomy, laparoscopy)
      - known situs inversus
      - known paraesophageal hernia
      - previous endoscopic attempt did not achieve adequate transillumination through the abdominal wall or compression and a suitable site for PEG placement could not be determined
  - Percutaneous Gastrostomy via Interventional Radiologist using CT guidance
    - A pre-operative CT Abdomen with or without contrast (CPT® 74150, 74160) may be appropriate for complicated cases in which a safe window cannot be determined via fluoroscopy. See above indications for CT prior to endoscopic gastrostomy tube placement for pre-operative indications.
  - Suspected complication of an endoscopically or IR-placed gastrostomy or jejunostomy tube:
    - CT Abdomen with or without contrast (CPT® 74150, 74160) or CT Abdomen and Pelvis with or without contrast (CPT® 74176 or 74177)

Background and Supporting Information

- A percutaneous endoscopic gastrostomy utilizes endoscopic guidance in order to place the feeding tube.
- The optimal site for gastrostomy placement is determined by illuminating the abdominal wall from the stomach using the scope and simultaneously indenting the wall with the finger, and visualizing that indention endoscopically.
  - Routine CT prior to this is generally not needed.
  - A recent study[5] retrospectively compared complication rates between individuals who underwent a pre-procedure CT vs. those that did not, and found no difference in the rate of bleeding events, need for operative intervention, and accidental tube dislodgement.

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- One individual in the non-CT group had an injury due to the tube being placed through the colon, but in that case there was failure of transillumination through the abdominal wall.
- The authors concluded, “routine CT to evaluate for unfavorable anatomy such as overlying liver or transverse colon prior to PEG tube placement does not result in a reduced complication rate. Safe site selection utilizing the correct technique of transillumination of the abdominal wall and visualization of the indentation of the operator’s finger is essential for safe PEG tube placement.”

Evidence Discussion

The use of routine pre-procedure CT scans does not result in lower complication rates for endoscopic percutaneous gastrostomy. A retrospective study comparing complication rates between patients who underwent pre-procedure CT scans and those who did not found no difference in the rate of bleeding events, need for operative intervention, or accidental tube dislodgement. Thus, pre-procedure CT of the abdomen is reserved for complex placement scenarios.

Post-procedure, the role of CT imaging is to assist in identifying complications, allowing fast visualization of issues such as a migrated internal bumper or injury to internal viscera.

References (AB-9)

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1. Gaetke-Udager K, Wasnik A, Kaza R, et al. A Guide To Imaging In Bariatric Surgery. *Emergency Radiology*, June 2014; 21(3):309-319.
2. Levine MS and Carucci LR. Imaging of Bariatric Surgery: Normal Anatomy and Postoperative Complications. *Radiology*. 2014;270(2):327-341.
3. Varghese JC and Roy-Choudhury SH. Radiological imaging of the GI tract after bariatric surgery. *Gastrointestinal Endoscopy*. 2009;70(6):1176-1181.
4. Schneider R, Lazaridis I, Kraljević M, Beglinger C, Wölnerhanssen B, Peterli R. The impact of preoperative investigations on the management of bariatric patients; results of a cohort of more than 1200 cases. *Surgery for Obesity and Related Diseases*. 2018;14(5):693-699. doi:10.1016/j.soard.2018.01.009.
5. Miskimins RJ, Glenn JM, Kamya C, Paffett CL, Arshad S, Auyang ED. Routine CT Prior to PEG tube placement does not reduce complication rates. Poster presented at SAGES 2017 Annual Meeting.
6. Itkin M, DeLegge MH, Fang JC, et. al. Multidisciplinary practical guidelines for gastrointestinal access for enteral nutrition and decompression from the Society of Interventional Radiology and American Gastroenterological Association Institute, with endorsement by Canadian Interventional Radiological Association and Cardiovascular and Interventional Radiological Society of Europe. *AGA*. 2011;131:742-765. doi:10.1053/j.gastro.2011.06.001.
7. Jain R, Maple JT, Anderson MA, et. al. The role of endoscopy in enteral feeding. *Gastrointest Endosc*. 2011;74(1)7-12. doi:10.1016/j.gie.2010.10.021.
8. Arvanitakis M, Gkolfakis P, Despott EJ, et. al. Endoscopic management of enteral tubes in adult patients - part 1: definitions and indications. *Endoscopy*. 2021:53:81-92. doi:10.1055/a-1303-7449.
9. Arvanitakis M, Gkolfakis P, Despott EJ, et. al. Endoscopic management of enteral tubes in adult patients - part 2: peri- and post-procedural management. *Endoscopy*. 2021:53:178-195. doi:10.1055/a-1331-8080.
10. Ghaderi I, Gondal AB, Samamé J, Serrot F, Galvani CA. Preoperative endoscopic and radiologic evaluation of bariatric patients: what do they add? *J Gastrointest Surg*. 2020;24(4):764-771. doi:10.1007/s11605-019-04219-8.
11. Schlottmann F, Nayyar A, Herbella FAM, Patti MG. Preoperative evaluation in bariatric surgery. *J Laparoendosc Adv Surg Tech A*. 2018;28(8):925-929. doi:10.1089/lap.2018.0391.

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Blunt Abdominal Trauma (AB-10)

Guideline Page

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Blunt Abdominal Trauma (AB-10.1)

AB.BA.0010.1.A

v2.0.2025

- Abdominal and/or Pelvic ultrasound (CPT® 76700 and/or CPT® 76856) can be approved for the evaluation of blunt abdominal trauma when requested.
- CT Abdomen and/or Pelvis with contrast (CPT® 74160, or CPT® 72193, or CPT® 74177):
  - High probability intra-abdominal injury
    - Abdominal pain or tenderness
    - Pelvic or femur fracture
    - Lower rib fracture
    - Costal margin tenderness or evidence of thoracic wall trauma
    - Diminished breath sounds
    - Vomiting
    - Pneumothorax
    - Hematocrit <30%
    - Hematuria
    - Elevated AST
    - Non-examinable individual (intoxicated, less than fully conscious, Glasgow Coma Scale Score <13, etc.)
    - Evidence of abdominal wall trauma or seat-belt sign
  - If ultrasound demonstrates any definitive abnormalities or inconclusive results

Evidence Discussion

Intra-abdominal injury is an indication for ultrasound (US) and/or advanced imaging. Advanced imaging in acute trauma is generally with CT of the Abdomen and/or Pelvis with contrast. Both US and CT can be completed rapidly. CT with contrast can provide more detailed images of blood vessels and tissues, helping to better identify areas of bleeding, inflammation, or injury.

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References (AB-10)

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1. ACR Appropriateness Criteria® blunt abdominal trauma Clinical Practice Guidelines. Guideline Central.
2. Soto JA and Anderson SW. Multidetector CT of Blunt Abdominal Trauma. Radiology. 2012;265(3):678-693.
3. Nishijima DK, Simel DL, Wisner DH, et al. Does this adult patient have a blunt intra-abdominal injury? *JAMA* 2012; 307:1517.
4. Washington State Department of Health Office of Community Health Systems: Trauma Clinical Guideline. May 2017. https://www.doh.wa.gov/Portals/1/Documents/Pubs/530168.pdf.
5. Jansen JO, Yule SR, Loudon MA. Investigation of blunt abdominal trauma. *Bmj*. 2008;336(7650):938-942. doi:10.1136/bmj.39534.686192.80.
6. Diercks DB, Mehrotra A, Nazarian DJ, Promes SB, Decker WW, Fesmire FM. Clinical Policy: Critical Issues in the Evaluation of Adult Patients Presenting to the Emergency Department With Acute Blunt Abdominal Trauma. *Annals of Emergency Medicine*. 2011;57(4):387-404. doi:10.1016/j.annemergmed.2011.01.013.

Gaucher Disease and Hemochromatosis (AB-11)

Guideline Page

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Gaucher Disease (AB-11.1)

AB.GD.0011.1.A

v2.0.2025

- See: **Gaucher Disease (Storage Disorders) (PN-8.6)** in the Peripheral Nerve Disorders (PND) Imaging Guidelines

Hereditary (Primary) Hemochromatosis (HH) and Other Iron Storage Diseases (AB-11.2)

AB.GD.0011.2.A
v2.0.2025

- MRI Abdomen without contrast (CPT® 74181) for iron quantification
  - If transferrin iron saturation (TS) ≥45% OR Elevated serum ferritin (males >300 ng/ml, females >200 ng/ml)

AND

- Genetic studies for hemochromatosis have been performed and results are ANY of the following:
  - Negative for hemochromatosis
  - C282Y/H63D compound heterozygote
  - C282Y heterozygote
  - Non-C282Y homozygote
- Note:
  - For C282Y/C282Y homozygote, iron quantification generally not indicated. Workup is as follows:
    - If serum ferritin >1000 ug/L or elevated liver enzymes:
      - Liver biopsy for fibrosis staging and rule out concurrent liver disease
    - If serum ferritin <1000 ug/L and normal liver enzymes:
      - Therapeutic phlebotomy

    (Note: Studies indicate that measurements of hepatic iron concentration by MRI may be more useful in ruling out than diagnosing clinically significant iron overload. MRI can distinguish between primary and secondary iron overload based on iron uptake in the reticuloendothelial system.)
- For the evaluation of suspected hepatic iron overload in chronic transfusional states (e.g., sickle cell disease, thalassemia, oncology patients, bone marrow failure, and stem cell transplant individuals):
  - MRI Abdomen without contrast (CPT® 74181) for iron quantification can be performed annually.
- See: **Transfusion-Associated (Secondary) Hemochromatosis (PEDAB-18.2)** in the Pediatric Abdomen Imaging Guidelines regarding transfusion-associated hepatic iron deposition.

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- If clinical, biopsy, or radiological findings suggest advanced fibrosis or cirrhosis and HCC surveillance is requested, then follow HCC Screening Guidelines – See: **Chronic Liver Disease, Cirrhosis and Screening for HCC (AB-26.1)**.
- Role of MR Elastography (CPT® 76391):
  - The role of MR Elastography to assess the degree of fibrosis in the setting of hemochromatosis is not yet clearly defined and thus not currently approvable.
  - One of the main limitations of MR Elastography is that artifact from excess iron deposition degrades signal intensity in MRE sequences, leading to technical failure of elastography and a decrease in MRE's diagnostic reliability. The latest ACG Clinical Guideline (2019) indicates that MRI for the purpose of estimating hepatic iron concentration is appropriate in the circumstances described above. However, "if there is a concomitant need to stage hepatic fibrosis, then liver biopsy is the preferred method."[14] The ACG diagnostic algorithm for the workup of hemochromatosis does not include MR Elastography at any stage, including the evaluation for the presence, absence, or degree of fibrosis.

Background and Supporting Information

- An elevated serum ferritin >1000 mcg/l is associated with an increased risk of cirrhosis and mortality in C282 homozygotes, while a serum ferritin <1000 mcg/l is associated with a very low likelihood of cirrhosis.
- The role of serial MRI for monitoring hepatic iron concentration in hemochromatosis has not been defined. Treatment is phlebotomy and results are monitored by serum ferritin.

Evidence Discussion

The ACG Clinical Guideline indicates that MRI without contrast is the preferred modality for assessing hepatic iron concentration in iron overload conditions, including primary hereditary hemochromatosis (HH) as well as in secondary, multi-transfusion conditions, such as sickle cell disease, thalessemia, and in oncology patients and those with bone marrow failure, in whom it can be done annually. MRI offers several key advantages. MRI can distinguish between primary and secondary iron overload based on uptake in the reticuloendothial system, is non-invasive, radiation-free, and has the ability to be performed on both liver and heart. In addition, it is useful for screening, as noted, in the appropriate populations.

CT has been used but presents the negatives of radiation exposure. Dual-energy scans are required to compensate for background attenuation, so its use is reserved for patients without access to MRI.

Ultrasound-based elastography can assess the need for biopsy. However, Magnetic Resonance Elastography (MRE) is not preferred due to MRI signal degradation by excess iron and is not recommended by the ACG at any stage of the work-up.

For individuals with iron indices indicative of classic HH, iron mobilized by well-controlled phlebotomy can provide an alternative estimate of total body iron comparable to liver iron quantification. Serial MRI monitoring of hepatic iron concentration has not been defined; instead, serum ferritin levels are monitored during phlebotomy.

References (AB-11)

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1. Zoller H and Henninger B. Pathogenesis, Diagnosis, and Treatment of Hemochromatosis. *Digestive Diseases*. 2016;34:364-373.
2. Weinreb NJ, Aggio MC, Andersson HC, et al. Gaucher disease type 1: revised recommendations on evaluations and monitoring for adult patients. *Seminars in Hematology*, 2004, 41(4 Suppl 5), 15-22.
3. Taouli B, Ehman RL, Reeder SB. Advanced MRI Methods for Assessment of Chronic Liver Disease. *American Journal of Roentgenology*. 2009;193(1):14-27.
4. Penugonda N. Cardiac MRI in Infiltrative Disorders: A Concise Review. *Current Cardiology Reviews*, 2010, 6(2), 134-136.
5. Chavhan GB, Babyn PS, Thomas B, et al. Principles, Techniques, and Applications of T2*-based MR Imaging and Its Special Applications. *RadioGraphics*. 2009;29(5):1433-1449.
6. Bacon BR, Adams PC, Kowdley KV, et al. Diagnosis and management of hemochromatosis: 2011 Practice Guideline by the American Association for the Study of Liver Diseases. *Hepatology*. 2011;54(1):328-343.
7. Sarigianni M, Liakos A, Vlachaki E, et al. Exam 1: Accuracy of Magnetic Resonance Imaging in Diagnosis of Liver Iron Overload: A Systematic Review and Meta-analysis. *Clinical Gastroenterology and Hepatology*. 2015;13(1). Accessed October 19, 2017. http://www.cghjournal.org/article/S1542-3565(14)00928-8/fulltext.
8. Zoller H, and Henninger B. Pathogenesis, Diagnosis, and Treatment of Hemochromatosis: *Dig Dis* 2016;34:364-373.
9. Kanwar P, Kowdley KV. Diagnosis and treatment of hereditary hemochromatosis: an update. *Expert Review of Gastroenterology & Hepatology*. 2013;7(6):517-530. doi:10.1586/17474124.2013.816114.
10. EASL clinical practice guidelines for HFE hemochromatosis. *Journal of Hepatology*. 2010;53(1):3-22. doi:10.1016/j.jhep.2010.03.001.
11. Bacon BR, Adams PC, Kowdley KV, Powell LW, Tavill AS. Diagnosis and management of hemochromatosis: 2011 Practice Guideline by the American Association for the Study of Liver Diseases. *Hepatology*. 2011;54(1):328-343. doi:10.1002/hep.24330.
12. Initial TS% > 45% Hemochromatosis Diagnosis Algorithm. http://www.irondisorders.org/Websites/idi/files/Content/863362/HHC_Both_April_16_2017.pdf.
13. Kowdley KV, Brown KE, Ahn J, Sundaram V. ACG Clinical Guideline. Hereditary Hemochromatosis. *The American Journal of Gastroenterology*. 2019:1. doi:10.14309/ajg.0000000000000315.
14. Degnan AJ, Ho-Fung VM, Ahrens-Nicklas RC, et al. Imaging of non-neuronopathic Gaucher disease: recent advances in quantitative imaging and comprehensive assessment of disease involvement. *Insights into Imaging*. 2019;10(1). doi:10.1186/s13244-019-0743-5.
15. Wagner M, Corcuera-Solano I, Lo G, et al. Technical Failure of MR Elastography Examinations of the Liver: Experience from a Large Single-Center Study. *Radiology*. 2017;284(2):401-412. doi:10.1148/radiol.2016160863.
16. Ghoz HM, Kröner PT, Stancampiano FF, et al. Hepatic iron overload identified by magnetic resonance imaging-based T2* is a predictor of non-diagnostic elastography. *Quantitative Imaging in Medicine and Surgery*. 2019;9(6):921-927. doi:10.21037/qims.2019.05.13.
17. Yin M, Glaser KJ, Talwalkar JA, Chen J, Manduca A, Ehman RL. Hepatic MR Elastography: Clinical Performance in a Series of 1377 Consecutive Examinations. *Radiology*. 2016;278(1):114-124. doi:10.1148/radiol.2015142141.
18. Fitzsimons EJ, Cullis JO, Thomas DW, Tsochatzis E, Griffiths WJH. Diagnosis and therapy of genetic haemochromatosis (review and 2017 update). *British Journal of Haematology*. 2018;181(3):293-303. doi:10.1111/bjh.15164.
19. Wood JC. Guidelines for quantifying iron overload. *Hematology Am Soc Hematol Educ Program*. 2014;2014:210.
20. Angelucci E, Brittenham GM, McLaren CE, et al. Hepatic iron concentration and total body iron stores in thalassemia major. *N Engl J Med*. 2000;343:327.

Hernias (AB-12)

Guideline Page

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Inguinal or Femoral Hernia, or Indeterminate Groin Pain (AB-12.1)

AB.IH.0012.1.A
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- Clinical examination alone is usually sufficient for confirming the diagnosis of an evident groin hernia.
- If musculoskeletal ailments such as osteitis pubis or athletic pubalgia are in the differential, see: **Pelvis (MS-23)** in the Musculoskeletal Imaging Guidelines.
- Ultrasound, pelvic limited (CPT® 76857) or pelvic complete (CPT® 76856) is the initial imaging study if:
  - vague groin swelling with diagnostic uncertainty
  - poor localization of swelling (as might be seen with a small hernia and prominent overlying fat)
  - intermittent swelling not present on examination
  - other/indeterminate groin complaints without swelling
- If ultrasound is indeterminate or non-diagnostic, ONE of the following:
  - CT Pelvis with contrast (CPT® 72193) or without contrast (CPT® 72192)
  - MRI Pelvis without contrast (CPT® 72195) or with and without contrast (CPT® 72197)
- For suspected incarceration or strangulation (initial ultrasound is not required):
  - CT Pelvis with contrast (CPT® 72193) or without contrast (CPT® 72192)
- For chronic post-surgical groin pain (after hernia repair):
  - Pelvic ultrasound (CPT® 76856 or CPT® 76857) or US-guided nerve block
  - CT Pelvis with contrast (CPT® 72193) or without contrast (CPT® 72192) or MRI Pelvis without contrast (CPT® 72195) or without and with contrast (CPT® 72197) can be approved if either ultrasound or ultrasound-guided nerve block is indeterminate or non-diagnostic, to assess for other, non-neuropathic causes.

Evidence Discussion

- Diagnosis of inguinal and femoral hernias is usually possible by history and physical alone. When the diagnosis is in question because physical exam is inconclusive or symptoms are vague, ultrasound should be the initial imaging study. Ultrasound can provide useful information without the risk of radiation. It is readily available, easily performed and can be used in conjunction with provocative maneuvers such as valsalva to help delineate a hernia. These provocative maneuvers are more difficult to perform during CT scanning which gives a more static image.

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- In the event of an inconclusive ultrasound or if there is a concern for a complicated hernia, imaging of the pelvis with either CT or MRI is appropriate. Abdominal imaging is not necessary for evaluation of an inguinal or femoral hernia.
- Post-surgical pain can be associated with neuropathy, recurrence, or mesh complications. These problems should be evaluated with US and/or nerve block as well prior to proceeding to advanced imaging if these studies are indeterminate.

Spigelian, Ventral, Umbilical, or Incisional Hernia (AB-12.2)

AB.IH.0012.2.A

v2.0.2025

- Known or suspected primary or recurrent Spigelian hernia (anterior abdominal wall hernia through the semilunar line), ventral hernia, umbilical, or incisional hernia:
  - CT Abdomen without or with contrast (if at or above the umbilicus) (CPT® 74150 or CPT® 74160) **or**
  - CT Pelvis without or with contrast (if below the umbilicus) (CPT® 72192 or CPT® 72193) **or**
  - CT Abdomen and Pelvis without or with contrast (if above and below the umbilicus, or indeterminate) (CPT® 74176 or CPT® 74177)

Evidence Discussion

- Hernias of the abdominal wall can have a variable presentation and a challenging physical exam. In addition, there may be secondary hernias that are not noted on physical exam or the hernia may track through different layers of the abdominal wall. The size of the hernia defect is also an important consideration in determining operative approach. Ultrasound is limited in being able to evaluate size and extent of hernia through various tissue planes. Advanced imaging may be appropriate for both diagnosis and in planning treatment. Limits to imaging only involve targeting imaging to the appropriate body region.

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Hiatal Hernia (AB-12.3)

AB.IH.0012.3.A

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- CT Chest and/or Abdomen with contrast (CPT® 71260 and/or CPT® 74160) to evaluate ANY of the following:
  - GI specialist or surgeon or any provider in consultation with one of these specialists request for treatment/pre-operative planning.
  - Suspected complication of primary disease or surgery.

Background and Supporting Information

- Some complications might include suspicion of a gastric volvulus (torsion) within the chest cavity, vomiting, chest pain, and difficulty in swallowing

Evidence Discussion

- Hiatal hernias can become symptomatic. If so, evaluation should follow the guidelines for the specific symptom complex (such as reflux, cough, abdominal or chest pain, vomiting, dysphagia, abnormal chest x-ray, etc.).
- To avoid unnecessary testing and radiation exposure, advanced imaging for hiatal hernias should be reserved for specialist requests for preoperative evaluation or for complications of the primary disease or surgery.

References (AB-12)

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1. Yaghmai V, Yee J, Cash B, Expert Panel on Gastrointestinal Imaging. ACR Appropriateness Criteria® palpable abdominal mass. American College of Radiology. Published 2014.
2. LeBlanc KE, LeBlanc LL, LeBlanc KA. Inguinal hernias: Diagnosis and Management. *Am Fam Physician*, 2013;87(12):844-848.
3. Hartman S, Leyendecker JR, Friedman B, et al., Expert Panel on Urologic Imaging. ACR Appropriateness Criteria® acute onset of scrotal pain -- without trauma, without antecedent mass. Reston (VA): American College of Radiology (ACR); Last review date, 2014.
4. International guidelines for groin hernia management. Hernia. 2018;22(1):1-165. doi:10.1007/s10029-017-1668-x.
5. Murphy KP, Oconnor OJ, Maher MM. Adult Abdominal Hernias. *American Journal of Roentgenology*. 2014;202(6). doi:10.2214/ajr.13.12071.
6. Peters JH. SAGES guidelines for the management of hiatal hernia. *Surgical Endoscopy*. 2013;27(12):4407-4408. doi:10.1007/s00464-013-3212-0.

Abdominal Mass (AB-13)

Guideline Page

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Abdominal Wall Mass (AB-13.1)

AB.AM.0013.1.A

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- Abdominal ultrasound and/or Pelvic ultrasound (CPT® 76700 or CPT® 76705 and/or CPT® 76856) is the initial imaging study to assess an abdominal wall or subcutaneous mass.
- MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen with contrast (CPT® 74160) to assess a suspected malignant or indeterminate mass detected on ultrasound (Pelvic imaging can be included depending on the location of the mass).

Evidence Discussion

- Mass lesions of the subcutaneous tissue and abdominal wall are generally benign and can be diagnosed through physical examination (such as lipomas, fibromas, epidermal inclusion cysts, etc.). For lesions that require imaging for further delineation, ultrasound is the initial study of choice. Ultrasound allows for real-time imaging, and the addition of Doppler techniques can help identify vascular lesions. It is highly specific for benign lesions. If the ultrasound image is inconclusive, it can guide the choice of additional imaging modalities, body areas, and contrast levels.
- Subsequent or second-line imaging for indeterminate ultrasound findings includes CT with contrast or MRI with and without contrast. MRI is particularly useful for evaluating masses that appear sarcomatous prior to biopsy. The appropriate body region for imaging depends on the location of the mass.

Indeterminate Intra-Abdominal Mass (AB-13.2)

AB.AM.0013.2.A
v2.0.2025

- Palpable abdominal mass on physical examination:
  - CT Abdomen with contrast (CPT® 74160) if above the umbilicus
  - CT Abdomen and Pelvis with contrast (CPT® 74177) if extending below the umbilicus
  - CT Pelvis with contrast (CPT® 72193) if involving the pelvis
  - Abdominal ultrasound (CPT® 76700) and/or Pelvis ultrasound (CPT® 76856) may be approved in lieu of CT, if requested
- Indeterminate findings on a prior CT or ultrasound:
  - MRI Abdomen without and with contrast (CPT® 74183)
    - MRI Pelvis without and with contrast (CPT® 72197) may be approved to evaluate if the mass extends below the umbilicus or involves the pelvis
  - Specific lesions mentioned within the Abdomen Imaging Guidelines should be imaged according to those specific sections (e.g., liver lesion, pancreatic cyst, etc.).
- For a pulsatile abdominal mass, suspected aortic aneurysm: See: **Abdominal Aortic Aneurysm (AAA) (PVD-6.3)** in the Peripheral Vascular Disease (PVD) Imaging Guidelines.
- For females with a suspected adnexal mass or fibroid: See: **Adnexal Mass/Ovarian Cysts (PV-5)** or **Leiomyomata/Uterine Fibroids (PV-12)** in the Pelvis Imaging Guidelines.
- Pregnant individual:
  - Abdominal and/or Pelvic and/or Transvaginal ultrasound (CPT® 76700 and/or CPT® 76856 and/or CPT® 76830) is appropriate for initial imaging.

Evidence Discussion

- The origins and characteristics of a palpable intra-abdominal mass are difficult to determine on physical exam. For intra-abdominal masses, contrast-enhanced CT and ultrasound examination have demonstrated accuracy. Although ultrasound may be limited by body habitus or bowel gas, it offers several advantages. Ultrasound requires no ionizing radiation, is cost effective, helps determine most appropriate next advanced imaging study (CT vs. MRI), is readily accessible, and often can be scheduled same day.

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- ACR Appropriateness Criteria states, "CT demonstrated high positive predictive value (99%) and negative predictive value (97%) for determining the presence or absence of a mass and correctly identified the organ of origin in 93% of patients with palpable abnormalities on clinical examination". (2019) MRI is useful for further delineation of an indeterminate mass found on US or CT due to its excellent sensitivity for soft-tissue differentiation.

Abnormal Findings on Endoscopy/ Colonoscopy (AB-13.3)

AB.AM.0013.3.A
v2.0.2025

- Submucosal colonic lesions above the rectum or unexplained colonic extrinsic compression above the rectum:
  - CT Abdomen and Pelvis with contrast (CPT® 74177)
- Colonic Mucosal Mass or Polypoid Lesion above the rectum:
  - If pathology shows invasive cancer OR if colonoscopic findings describe a fungating, ulcerated, bleeding, irregular, circumferential (partial or complete) mass (i.e., findings that suggest a colonic malignancy based on the endoscopic appearance):
    - CT Abdomen and Pelvis with contrast (CPT® 74177), and if requested, CT Chest with contrast (CPT® 71260) (See: **Colorectal Cancer – Initial Work-up/ Staging (ONC-16.2)** in the Oncology Imaging Guidelines)
  - If the lesion is in the distal sigmoid:
    - MRI Pelvis without and with contrast (CPT® 72197) if requested can also be performed
  - Pre-operative planning for the surgical (not endoscopic) removal of a polypoid lesion:
    - CT Abdomen and Pelvis with contrast (CPT® 74177)
- Submucosal gastric lesions:
  - CT Abdomen with contrast (CPT® 74160) or CT Abdomen and Pelvis with contrast (CPT® 74177)
    - If endoscopic ultrasound with or without fine-needle aspiration (which is the preferred initial imaging modality to further characterize a gastric submucosal lesion detected on endoscopy) cannot be performed, is indeterminate, or if the findings of the endoscopic ultrasound indicate a need for further imaging.
- Gastric extrinsic compression:
  - CT Abdomen with contrast (CPT® 74160) or CT Abdomen and Pelvis with contrast (CPT® 74177)
- Submucosal rectal lesions or unexplained extrinsic compression in the rectum:
  - MRI Pelvis without and with contrast (CPT® 72197), or, if requested, MRI Pelvis without contrast (CPT® 72195)
    - If rectal endoscopic ultrasound, which is the preferred initial imaging study, cannot be performed (e.g. anal stricture, or severe inflammatory process prohibiting passage of probe, etc.), is indeterminate, or, if based on endoscopic ultrasound findings, additional imaging is needed for further characterization

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- Rectal Mucosal Mass or Polypoid Lesion:
  - If pathology shows invasive cancer OR if colonoscopic findings describe a fungating, ulcerated, bleeding, irregular, circumferential (partial or complete) mass (i.e., findings that suggest a colonic malignancy based on the endoscopic appearance):
    - CT Abdomen and Pelvis with contrast (CPT® 74177) and if requested, CT Chest with contrast (CPT® 71260)
    - MRI Pelvis without and with contrast (CPT® 72197) or without contrast (CPT® 72195) in addition to the above
  - Pre-operative planning for the surgical (not endoscopic) removal of a polypoid lesion:
    - CT Abdomen and Pelvis with contrast (CPT® 74177)
- For further imaging of a documented colonic or rectal malignancy: See **Colorectal Cancer – Initial Work-up/Staging (ONC-16.2)** in the Oncology Imaging Guidelines.
- For further imaging of a suspected Gastrointestinal Stromal Tumor (GIST): See **Gastrointestinal Stromal Tumor (GIST) (ONC-12.5)** in the Oncology Imaging Guidelines.
- For further imaging of gastric cancer: See **Gastric Cancer - Initial Work-up/Staging (ONC-14.9)** in the Oncology Imaging Guidelines.

Evidence Discussion

Radiologic imaging is necessitated by such endoscopic findings as narrowing, external impressions against the gut wall, therapeutic need to understand extent of visualized disease and/or of the origin of an endoscopically-apparent malignancy. Choosing the optimal imaging modality requires consideration of factors such as age, gender, fertility, co-morbidities, medications, and allergies.

- Ultrasound can provide high resolution imaging of the liver, gallbladder, bile ducts, pancreas, spleen, kidneys, and abdominal vasculature. It can also provide information regarding phase and direction of blood flow in arteries and veins via Duplex scanning. Ultrasound requires no ionizing radiation, is readily available being mobile, cost effective, and easier to schedule for same day testing. However, image quality may be limited due to bowel gas (a particular disadvantage in assessment of endoscopically-identified gut lesions), poor acoustic window acquisition, obesity, and sonographer experience level.
- Computed tomography (CT) of the abdomen offers excellent 3-dimensional resolution of the gut and its surrounding structures, especially when performed with use of oral and/or intravenous (IV) contrast agents. CT scan requires a significant dose of ionizing radiation, but is ideally suited to characterizing lesions within the gut because the quick speed of image acquisition reduces the potential for motion artifact.

- Magnetic resonance imaging (MRI) uses a magnetic field to capture excellent 3-dimensional soft tissue resolution. As with CT scans, the technique is often performed with IV contrast agents, and can with specialized techniques be directed either at whole or parts of the abdomen or at specific abdominal structures (examples: MR elastography of liver, MR enterography of small bowel, MR cholangiopancreatography [MRCP] of the biliary and pancreatic system). MRI yields better soft contrast resolution than CT and does not expose individuals to ionizing radiation, but due to longer image time is motion artifact-prone and thus less suited to resolving gastrointestinal detail. MRI has disadvantages in that it may require sedation in those with claustrophobia and in young patients who may be unable to hold still and follow directions. MRI also cannot be performed in those with ferrous magnetic implants or non-removable foreign bodies.

References (AB-13)

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1. Lakkaraju A, Sinha R, Garikipati Ret al. Ultrasound for initial evaluation and triage of clinically suspicious soft-tissue masses. *ClinRadiol,* 2009; 64: 615-621.
2. Gaskin CM, Helms CA. Lipomas, Lipoma Variants, and Well-Differentiated Liposarcomas (Atypical Lipomas): Results of MRI Evaluations of 126 Consecutive Fatty Masses. *American Journal of Roentgenology*. 2004;182(3):733-739.
3. Einarsdottir H, Söderlund V, Larsson O, et al. 110 Subfascial Lipomatous Tumors. *Acta Radiologica*. 1999;40(6):603-609.
4. Zoga AC, Weissman BN, Kransdorf MJ, et al. ACR Appropriateness Criteria: Soft Tissue Masses. American College of Radiology, 2012.
5. ACR Appropriateness Criteria. Palpable Abdominal Mass-Suspected Neoplasm. Revised 2019.
6. Evans JA, Chandrasekhara V, Chathadi KV, et al. The role of endoscopy in the management of premalignant and malignant conditions of the stomach. *Gastrointestinal Endoscopy*. 2015;82(1):1-8. doi:10.1016/j.gie.2015.03.1967.
7. Faulx AL, Kothari S, Acosta RD, et al. The role of endoscopy in subepithelial lesions of the GI tract. *Gastrointestinal Endoscopy*. 2017;85(6):1117-1132. doi:10.1016/j.gie.2017.02.022.
8. Benson AB, Venook AP, Al-Hawary MM, et al. National Comprehensive Cancer Network (NCCN) Guidelines Version 2.2021, January 21, 2021. Colon cancer, available at: https://www.nccn.org/professionals/physician_gls/pdf/colon.pdf. Referenced with permission from the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines™) for Colon cancer V2.2021,1/21/2021. ©2021 National Comprehensive Cancer Network, Inc. All rights reserved. The NCCN Guidelines™ and illustrations herein may not be reproduced in any form for any purpose without the express written permission of the NCCN. To view the most recent and complete version of the NCCN Guidelines™, go online to NCCN.org.
9. Benson AB, Venook AP, Al-Hawary MM, et al. National Comprehensive Cancer Network (NCCN) Guidelines Version 1.2021, December 22, 2020. Rectal cancer, available at: https://www.nccn.org/professionals/physician_gls/pdf/rectal.pdf. Referenced with permission from the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines™) for Rectal cancer V1.2021, 12/22/2020. ©2020 National Comprehensive Cancer Network, Inc. All rights reserved. The NCCN Guidelines™ and illustrations herein may not be reproduced in any form for any purpose without the express written permission of the NCCN. To view the most recent and complete version of the NCCN Guidelines™, go online to NCCN.org.
10. Rex DK, Hassan C, Bourke MJ. The colonoscopist's guide to the vocabulary of colorectal neoplasia: histology, morphology, and management. *Gastrointestinal Endoscopy*. 2017;86(2):253-263. doi:10.1016/j.gie.2017.03.1546
11. Emmanuel A, Gulati S, Ortenzi M, Burt M, Hayee B, Haji A. Radiological staging investigations before endoscopic resection of large colorectal lesions: significant burden with no benefit. *Gut*. 2018;67(Suppl 1). doi:10.1136/gutjnl-2018-bsgabstracts.94.
12. Maccioni F, Busato L, Valenti A, et al. Magnetic resonance imaging of the gastrointestinal tract: current role, recent advancements and future prospectives. *Diagnostics (Basel)*. 2023;13(14):2410. doi:10.3390/diagnostics13142410.

Lower Extremity Edema (AB-14)

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Lower Extremity Edema (AB-14)

AB.14.A
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See: **Acute Limb Swelling (PVD-12)** and **Chronic Limb Swelling Due to Venous Insufficiency/Venous Stasis Changes/Varicose Veins (PVD-13)** in the Peripheral Vascular Disease Imaging Guidelines.

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Zollinger-Ellison Syndrome (ZES-Gastrinoma) (AB-15)

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Zollinger-Ellison Syndrome (ZES-Gastrinoma) (AB-15.1)

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- See: **Neuroendocrine Cancers and Adrenal Tumors (ONC-15)** in the Oncology Imaging Guidelines.

Adrenal Cortical Lesions (AB-16)

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Adrenal Cortical Lesions (AB-16)

AB.AC.0016.A
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Procedure Code	Description
CPT® 74150	CT Abdomen without contrast
CPT® 74160	CT Abdomen with contrast
CPT® 74170	CT Abdomen without and with contrast
CPT® 74181	MRI Abdomen without contrast
CPT® 74183	MRI Abdomen without and with contrast
CPT® 78812	PET, Skull Base to Mid-Thigh
CPT® 78815	PET/CT, Skull Base to Mid-Thigh

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Asymptomatic Adrenal Cortical Lesions (AB-16.1)

AB.AC.0016.1.A
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Overall Considerations

- US is not a prerequisite study for advanced imaging in the evaluation of any adrenal abnormality
- The following recommendations are for asymptomatic individuals
  - Symptomatic refers to signs or symptoms of hormonal excess or abnormal adrenal hormone levels.
  - For symptomatic individuals, see: **Symptomatic Adrenal Cortical Lesions (AB-16.2)**.
- Abdominal pain may be present in large or rapidly expanding adrenal tumors due to mass effect or hemorrhage.
  - If the source of abdominal pain is suspected to be an incidental adrenal mass and initial imaging was indeterminate, immediate reimaging with a dedicated adrenal protocol study (see 3 imaging modalities below) is reasonable irrespective of the size of the mass.
  - See: **Abdominal Pain (AB-2)** in the Abdomen Imaging Guidelines for imaging recommendations if abdominal pain is unrelated to the adrenal mass.
- The three imaging modalities that can be used for definitive benign characterization of an adrenal mass are:
  - CT Abdomen without contrast (CPT® 74150)
  - CT Abdomen without and with contrast (CPT® 74170)
  - CS-MRI (chemical shift MRI, CPT® 74181)
- The following list represents definitively benign characteristics of the adrenal gland. This list applies wherever "benign characteristics" are mentioned in the table below:
  - ≤10 HFU on CT
  - ≥60% absolute washout or ≥40% relative washout on CT abdomen without and with contrast with calculated washout (adrenal protocol CT, CPT® 74170)
    - An important exception to the washout rule: Non-adenomatous adrenal masses that may show elevated washout on adrenal protocol CT but are not benign include:
      - adrenal metastasis from hypervascular tumors (e.g. RCC and HCC)
      - pheochromocytoma

        - adrenocortical carcinoma
        - clinical suspicion should be used in these cases to guide further investigation
    - Decreased signal on Chemical Shift MRI (CS-MRI, CPT® 74181)
    - Cyst (if imaging was completed with and without contrast and "no enhancement"- defined as <10HFU change between unenhanced and enhanced/contrasted CT)
    - Adrenal myelolipoma (macroscopic fat)
- If definitively benign diagnosis cannot be made during follow up imaging using dedicated CT adrenal protocol (If <60% absolute washout or <40% relative washout) or lack of signal drop out on MRI chemical shift:
    - Additional imaging is indicated at 6-12 months from initial follow up, OR
    - Consider resection for possible primary adrenocortical carcinoma after biochemical evaluation and exclusion of pheochromocytoma.
        - For individuals who are poor surgical candidates, if ordered by or in consultation with an endocrinologist, endocrine surgeon, or urologist:
            - Imaging as requested
- CT Abdomen without and with contrast (CPT® 74170) may be approved in place of any below recommended CT Abdomen without contrast for the following:
    - Facility protocol is to cease imaging if adrenal mass is found to have HFU<10 on initial non-contrasted images
- MRI Abdomen without contrast (CPT® 74181) is indicated in place of CT for the following:
    - Clips that cause artifacts when using CT
    - Allergy to CT contrast
    - Individuals in whom radiation exposure should be limited (children, pregnant individuals, individuals with known germline mutations, and individuals with recent excessive radiation exposure)
- CS MRI may not detect the intracellular lipid in an adrenal mass if HFU is 30 HU or more on CT without contrast. CS MRI is less effective than CT without and with contrast with calculated washout for adenomas with unenhanced attenuation of more than 20 HU
- Below imaging can be applied to bilateral adrenal masses, with each lesion addressed separately.

Mass Characteristics and Appropriate Imaging

Mass Details	Imaging Study
• Asymptomatic AND • Incidentally found on US, CT, or MRI of area OTHER than the abdomen or if seen only on US of the abdomen AND • Any size AND • No history of cancer	• CT Abdomen without contrast (CPT® 74150)
• Asymptomatic AND • Incidentally found on CT Chest without contrast, entirely imaged, and fully characterized as indeterminate by HFU score AND • >2 cm AND • No history of cancer	• CT Abdomen without and with contrast (CPT® 74170) in lieu of above recommended CT Abdomen without contrast
• Asymptomatic AND • Incidentally found on CT or MRI of the Abdomen or Abdomen and Pelvis AND • <1 cm in short axis AND • No history of cancer	• No further imaging indicated ◦ It is uncertain as to whether subcentimeter nodularity or adrenal thickening qualifies as an adrenal mass on radiology reports
• Asymptomatic AND • Incidentally found on CT or MRI of the Abdomen or Abdomen and Pelvis AND • No prior imaging for comparison AND • Diagnostic with benign imaging characteristics AND • ≥1 cm AND • No history of cancer	• No further imaging, regardless of size ◦ The risk of malignancy in a mass with diagnostically benign findings on imaging is extremely low[1, 3, 7, 8]

Mass Details	Imaging Study
• Asymptomatic AND • 1 cm to 2 cm AND • Incidentally detected and indeterminate on any CT or MRI Abdomen or Abdomen and Pelvis AND • No prior imaging for comparison AND • No history of cancer	• Reimaging indicated at 12 months from the initial indeterminate study, as follows*: ◦ CT Abdomen without and with contrast (CPT® 74170 - adrenal protocol), CT Abdomen without contrast (CPT® 74150), or CS-MRI (chemical shift MRI, CPT® 74181) ▪ No further imaging is indicated after initial 12 month study if ANY of the following: - Definitively benign characteristics - Stable in size (change <8mm) over >1 year (likely benign adenoma)[1, 7, 8] *NOTE: These instructions are regarding indeterminate lesions without prior studies to compare, in asymptomatic patients. If prior imaging exists for comparison and radiology report shows stability over 1 year or if the imaging study already shows definitively benign characteristics no further imaging is needed

Mass Details	Imaging Study
• Asymptomatic AND • >2 cm to <4 cm AND • Incidentally detected and indeterminate on any CT or MRI Abdomen or Abdomen and Pelvis AND • No prior imaging for comparison AND • No history of cancer	• Reimaging indicated immediately after initial indeterminate study, as follows*: ◦ CT Abdomen without and with contrast (CPT® 74170 - adrenal protocol), or CS-MRI (chemical shift MRI, CPT® 74181) ▪ Further follow-up imaging can be performed at 6 and 12 months ▪ No further imaging is indicated if the initial study or follow up study has definitively benign characteristics or if follow up study shows stability in size (change <8mm) over >1 year (as likely benign adenoma) *NOTE: These instructions are regarding indeterminate lesions without prior studies to compare, in asymptomatic patients. If prior imaging exists for comparison and radiology report shows stability over 1 year or if the imaging study already shows definitively benign characteristics no further imaging is needed
• Asymptomatic AND • ≥4 cm AND • Incidentally detected and indeterminate on any CT or MRI Abdomen or Abdomen and Pelvis AND • No prior imaging for comparison AND • No history of cancer	• Reimaging indicated immediately after initial indeterminate study, as follows: ◦ CT Abdomen without and with contrast (CPT® 74170) or chemical shift MRI (CPT® 74181) • Consider resection for possible primary adrenocortical carcinoma ◦ See: **Adrenocortical Carcinoma (ONC-15.13)** in the Oncology Imaging Guidelines
• History of cancer with a likelihood or propensity to metastasize to the adrenal gland or abdomen • Incidentally detected and indeterminate on any CT or MRI Abdomen or Abdomen and Pelvis	• See: **Adrenal Gland Metastases (ONC-31.4)** in the Oncology Imaging Guidelines

Mass Details	Imaging Study
• Known adrenal mass with benign characteristics, but newly symptomatic or new hormonal excess	• Repeat imaging per **Adrenal Hormone Excess/Symptomatic Adrenal Lesions (AB-16.2)**

Background and Supporting Information

Benign Adenoma Imaging Characteristics		
	Findings consistent with Adenoma:	Indeterminate for Adenoma:
CT Abdomen without contrast	≤10 Hounsfield Units	>10 Hounsfield Units
CT Abdomen WWO with calculated washout	≥60% absolute washout or ≥40% relative washout	<60% absolute washout <40% relative washout
Chemical Shift MRI	Signal drop out	Lack of signal drop out

- Endocrine guidelines recommend biochemical evaluation in all incidental adrenal lesions (with the exception of myelolipomas and cysts), however laboratory results are NOT required for imaging in an asymptomatic individual.
- Most benign adenomas, which account for up to 75% of adrenal incidentalomas, are lipid rich and thus easily characterized because they measure 10HFU or less on CT without contrast. CT Abdomen without and with contrast with calculated washout and chemical shift MRI help identify lipid poor adenomas which are the next most common group. Masses which remain indeterminate include pheochromocytomas (up to 7%) and primary adrenal cancers or metastases to the adrenal glands (approximately 4%).
- Adrenal masses are often found incidentally on CT scans performed WITH contrast to evaluate abdominal symptoms. While CT scans performed with contrast only may report the HFU of an adrenal mass, most benign adenomas are labeled "indeterminate" originally because non-contrasted HFU and HFU after washout cannot be measured or calculated.
- An "Adrenal Protocol CT" measures pre-contrast HFU of an adrenal mass as well as the HFU during "wash out" of contrast medium after 60 to 90 seconds [early] and 10 to 15 minutes [delayed]. Benign adenomas show more rapid and efficient contrast washout as compared to malignant adrenal masses.
- When an adrenal mass shows avid enhancement on CT scan (>110 – 120 HU), a pheochromocytoma should be considered.

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- In addition to the imaging features in the grid which are considered "diagnostic" of a benign adrenal mass, other radiographic characteristics "suggestive" of a benignity include: smooth/round shape, homogeneous content, lack of calcification/ hemorrhage/necrosis, growth rate <1cm/year, lack of FDG avidity on PET, <4cm
- Radiographic characteristics "suggestive" of malignancy include: irregular margins/ shape, heterogeneous content, presence of calcification/hemorrhage/necrosis, growth rate >1cm/year, presence of FDG avidity on PET, >4-6cm
- Malignancies most likely to metastasize to the adrenal glands include lung cancer, gastrointestinal cancer, melanoma, and renal-cell carcinoma.

Evidence Discussion

- CT scan of the abdomen is the recommended initial study to evaluate adrenal gland nodules.
- 75% of adrenal incidentalomas are benign, nonfunctioning adenomas. They are lipid-rich, with low density, exhibit Hounsfield Units (HU) of 10 or less, and have other benign characteristic appearances that make them easily identifiable on an unenhanced CT of the abdomen.
- The sensitivity and specificity for adenoma characterization are 71% and 98%, respectively, when using unenhanced CT scan for lesions having a density of 10 or less HU.
- A chemical shift MRI (CS-MRI) of the abdomen is also useful for characterizing adrenal gland masses with lower density. It is an alternative for follow-up studies, when there is a contraindication to CT or contrast, or during pregnancy.
- However, it should be cautioned that MRI may not detect intracellular lipid when the adrenal mass has a HU > 30.
- MRI is also less sensitive in evaluation of masses with higher HU over 20 compared to CT scans that calculate contrast wash out times.
- A CT scan may expose patients to radiation; however, it takes less time to perform and is less costly than an MRI. Additionally, CT scans are superior to MRI when evaluating lesions with higher density, particularly when using an adrenal CT protocol for washout measurements.
- Unenhanced CT scans of lesions with a density greater than 30 HU had a 66.6% chance of remaining indeterminate, even after evaluation with chemical shift MRI.
- Adrenal protocol CT, with its high sensitivity (98%) and specificity (92%), should be the study of choice to differentiate between adenomas and non-adenomas when an adrenal mass remains indeterminate.

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References (AB-16.1)

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1. Vaidya A, Hamrahian A, Bancos I, Fleseriu M, Ghayee HK. The evaluation of incidentally discovered adrenal masses. *Endocr Pract*. 2019;25(2):178-192.
2. Corwin MT, Remer EM. Adrenal Washout CT: Point-Not Useful for Characterizing Incidentally Discovered Adrenal Nodules. *AJR Am J Roentgenol*. 2021;216(5):1166-1167.
3. Kebebew E. Adrenal Incidentaloma. *N Engl J Med*. 2021;384(16):1542-1551.
4. Grajewski KG, Caoili EM. Adrenal Washout CT: Counterpoint-Remains a Valuable Tool for Radiologists Characterizing Indeterminate Nodules. *AJR Am J Roentgenol*. 2021;216(5):1168-1169.
5. Kiseljak-Vassiliades K, Bancos I, Hamrahian A, et al. American Association of Clinical Endocrinology Disease State Clinical Review on the Evaluation and Management of Adrenocortical Carcinoma in an Adult: a Practical Approach. *Endocr Pract*. 2020;26(11):1366-1383.
6. Zeiger MA, Thompson GB, Duh QY, et al. The American Association of Clinical Endocrinologists and American Association of Endocrine Surgeons medical guidelines for the management of adrenal incidentalomas. *Endocr Pract.* 2009;15 Suppl 1:1-20.
7. Mayo-Smith WW, Song JH, Boland GL, et al. Management of Incidental Adrenal Masses: A White Paper of the ACR Incidental Findings Committee. *J Am Coll Radiol*. 2017;14(8):1038-1044.
8. Expert Panel on Urological Imaging, Mody RN, Remer EM, et al. ACR Appropriateness Criteria® Adrenal Mass Evaluation: 2021 Update. *J Am Coll Radiol.* 2021;18(11S):S251-S267.
9. Park JJ, Park BK, Kim CK. Adrenal imaging for adenoma characterization: imaging features, diagnostic accuracies and differential diagnoses. *Br J Radiol*. 2016;89:20151018.

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Adrenal Hormone Excess/Symptomatic Adrenal Lesions (AB-16.2)

AB.AC.0016.2.A
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Overall Considerations

- Prior to advanced imaging, adrenal hormone excess must be clinically suspected, and then biochemically confirmed via testing listed in the table below.
- The following imaging recommendations can also be followed in asymptomatic individuals with an adrenal incidentaloma who are found to have abnormalities at initial hormonal evaluation.
- For severe hormone elevation or rapidly progressing symptoms for which adrenocortical carcinoma is suspected, see: **Adrenocortical Carcinoma (ONC-15.13)** in the Oncology Imaging Guidelines.

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Condition	Signs/Symptoms (not required to be documented for imaging)	Laboratory requirements PRIOR TO initial adrenal imaging	Indicated Imaging
• Suspected cortisol excess (adrenal Cushing's Syndrome)	• Weight gain • Hyperglycemia/ diabetes • Low bone mineral density/fractures • Hyperpigmented Striae • Lipodystrophy ("buffalo hump")	• ACTH low/ suppressed AND • Cortisol elevation documented by any of the following: ◦ Elevated AM cortisol following overnight 1mg dexamethasone suppression (cortisol >1.8 mcg/dL) ◦ Elevated late night salivary cortisol ◦ Elevated urine free cortisol	• CT Abdomen without contrast (CPT® 74150) ◦ If CT Abdomen without contrast shows an indeterminate adrenal mass, the following is indicated immediately: ▪ CT Abdomen without and with contrast adrenal protocol (CPT® 74170) OR ▪ MRI Abdomen without contrast chemical shift (CPT® 74181)

Condition	Signs/Symptoms (not required to be documented for imaging)	Laboratory requirements PRIOR TO initial adrenal imaging	Indicated Imaging
• Suspected adrenal hyper-androgenism/ virilizing adrenal tumor	• Hirsutism • Virilization (voice deepening, clitoromegaly)	• Elevated serum DHEAS AND/OR • Elevated testosterone	• CT Abdomen without contrast (CPT® 74150) ◦ If CT Abdomen without contrast shows an indeterminate mass, the following is indicated immediately: ▪ CT Abdomen without and with contrast adrenal protocol (CPT® 74170) OR ▪ MRI Abdomen without contrast chemical shift (CPT® 74181) • In individuals with an elevated testosterone level and an ovarian etiology is suspected, see: **Polycystic Ovary Syndrome (PV-8.1)** in the Pelvis Imaging Guidelines and **Ovarian Cancer-Suspected/ Diagnosis (ONC-21.2)** in the

Condition	Signs/Symptoms (not required to be documented for imaging)	Laboratory requirements PRIOR TO initial adrenal imaging	Indicated Imaging
			Oncology Imaging Guidelines.
• Suspected feminizing adrenal tumor	• Gynecomastia • Testicular atrophy	• Elevated serum estradiol AND • Non-elevated serum LH AND • No testicular mass seen on dedicated imaging	• CT Abdomen without contrast (CPT® 74150) ◦ If CT Abdomen without contrast shows an indeterminate adrenal mass, the following is indicated immediately: ▪ CT Abdomen without and with contrast adrenal protocol (CPT® 74170) OR ▪ MRI Abdomen without contrast chemical shift (CPT® 74181)

Condition	Signs/Symptoms (not required to be documented for imaging)	Laboratory requirements PRIOR TO initial adrenal imaging	Indicated Imaging
• Suspected primary aldosteronism (Conn's Syndrome)	• HTN • Hypokalemia	• Serum aldosterone >15-20ng/dL in the setting of suppressed renin* and spontaneous hypokalemia (K<3.5mEq/L) OR • Confirmatory testing** showing lack of aldosterone suppression. • (See **Background and Supporting Information** on renin* levels and confirmatory testing**)	• CT Abdomen without contrast (CPT® 74150) ◦ If CT Abdomen without contrast shows an indeterminate adrenal mass, the following is indicated immediately: ▪ CT Abdomen without and with contrast adrenal protocol (CPT® 74170) OR ▪ MRI Abdomen without contrast chemical shift (CPT® 74181)

Condition	Signs/Symptoms (not required to be documented for imaging)	Laboratory requirements PRIOR TO initial adrenal imaging	Indicated Imaging
• Suspected pheo-chromocytoma/ paraganglioma	• HTN • Palpitations • Tremor • Pallor • Flushing • Hyperadrenergic spells	• Elevated plasma free metanephrines OR • Elevated urinary fractionated metanephrines	• CT Abdomen and Pelvis without and with contrast (CPT® 74178), CT Abdomen and Pelvis with contrast (CPT® 74177), or MRI Abdomen (CPT® 74183) and Pelvis (CPT® 72197) without and with contrast • See also: **Adrenal Nuclear Imaging (AB-16.4)** and **Adrenal Tumors (ONC-15.10)** in the Oncology Imaging Guidelines and **Hereditary Paraganglioma-Pheochromocytoma Syndromes (PEDONC-2.13)** in the Pediatric and Special Populations Oncology Imaging Guidelines
• Suspected adrenocortical carcinoma	• Rapidly progressive symptoms • Elevation of multiple adrenal hormones	• NA	• See: **Adrenocortical Carcinoma (ONC-15.13)** in the Oncology Imaging Guidelines

Condition	Signs/Symptoms (not required to be documented for imaging)	Laboratory requirements PRIOR TO initial adrenal imaging	Indicated Imaging
• Confirmed adrenal hormone excess AND • Requested for surgical planning AND • Requested by or in consultation with an endocrinologist, endocrine surgeon, or urologist	NA	NA	• Repeat imaging as requested

Background and Supporting Information

- Surgery is the management of choice for patients with virilizing adrenal tumors, feminizing adrenal tumors, pheochromocytoma/PGL and suspected adrenocortical carcinoma due to an increased risk of malignancy and/or comorbidity. Adrenal masses that secrete excess cortisol (adrenal Cushing's syndrome) or aldosterone (primary hyperaldosteronism/Conn's syndrome) are rarely malignant; however, surgery is also definitive management.

Suspected cortisol excess (adrenal Cushing's syndrome)

- Low or suppressed ACTH levels (<10 pg/mL) are consistent with an adrenal source.
- DHEAS levels are also low in adrenal Cushing's syndrome.
- The diagnosis of Cushing's syndrome can be delayed for years due to the insidious nature of clinical presentation and the complexity of diagnostic testing.

Suspected adrenal hyperandrogenism/virilizing adrenal tumor

- Testosterone is produced by both the ovary (primary source) and adrenal gland while DHEA and DHEAS are produced almost exclusively by the adrenal gland.
- The magnitude of the androgen level is of poor predictive value for tumors, although a very high testosterone (adult-male range) or DHEAS level (>700 µg/dL) is suggestive.

Suspected feminizing adrenal tumor

- Adrenal tumors, mainly carcinomas (extremely rare, 0.5–2.0per million), can secrete both estrogens and high amounts of adrenal androgens, which aromatize to estrogens. In this case, gynecomastia is usually of recent onset, progresses rapidly and testicular atrophy can also be seen.
- Common causes of excessive endogenous estrogens should be excluded prior to adrenal imaging. These include increased secretion from testis (Leydig cell or Sertoli cell tumors, stimulation of normal Leydig cells by LH or hCG) and increased aromatization of androgens to estrogens (aging, obesity, alcoholic cirrhosis, hyperthyroidism, drugs, hCG-secreting tumors, aromatase excess syndrome).

Suspected primary aldosteronism (Conn's syndrome)

- A positive screen for primary aldosteronism is an aldosterone level >15-20ng/dL in the setting of suppressed renin* (plasma renin activity <0.6-1.0ng/mL/hour or plasma renin concentration <5-8.2 mU/L) and spontaneous hypokalemia (K<3.5mEq/L).
- The most common dynamic confirmatory tests include the oral sodium suppression test, the seated intravenous saline suppression test, the fludrocortisone suppression test, and the captopril challenge test and results that indicate a "positive" result are unique to the each test. For example, if oral sodium loading is used, a 24-hour urine aldosterone excretion of more than 12 mcg in the setting of 24-hour urine sodium excretion of more than 200 mEq is diagnostic of primary aldosteronism (and values of more than 10 mcg/24 hours are strongly suggestive).
- Primary hyperaldosteronism may be managed medically with mineralocorticoid receptor antagonists (spironolactone and eplerenone) in cases of bilateral adrenal disease or poor surgical candidacy. If there has been no recent adrenal imaging, reimaging can be considered in cases of diagnostic uncertainty or poor response to medical therapy.

Suspected pheochromocytoma/paraganglioma

- A pheochromocytoma (85% of chromaffin tumors) arises from the chromaffin cells in the adrenal medulla and commonly produces one or more of the following catecholamines: epinephrine, norepinephrine and dopamine.
- A paraganglioma (15-20% of chromaffin tumors) arises from the extra-adrenal chromaffin cells of the sympathetic paravertebral ganglia of the thorax, abdomen and pelvis (catecholamine producing) or the parasympathetic ganglia along the glossopharyngeal and vagal nerves in the neck and base of skull (not catecholamine producing).

- Cases of pheochromocytoma/paraganglioma can be sporadic but 1/3 are hereditary and due to germ-line mutations that may increase malignant potential

Suspected adrenocortical carcinoma

- Adrenocortical carcinoma may be suspected radiographically or clinically. Approximately 60% of patients present with evidence of adrenal steroid hormone excess, with or without virilization. Hormonally inactive ACCs typically produce symptoms related to tumor burden, including abdominal pain, back pain, early satiety, and weight loss.
- See: **Adrenocortical Carcinoma (ONC-15.13)**

Evidence Discussion

- Advanced imaging is indicated when there is biochemical confirmation of adrenal hormone excess
- CT of the abdomen is the initial imaging study of choice to identify adrenal adenomas when adrenal hormone excess is confirmed
- CT scans are readily available and can identify if adrenal lesions are present and can show characteristics of the lesions that help to distinguish benign lesions from indeterminate lesions
- MRI with chemical shift can further help characterize lesions that are indeterminate on CT scan
- Including the pelvis in CT scan imaging is indicated when evaluating for pheochromocytomas or paragangliomas as these tumors can appear in both the abdominal and pelvis areas and also indicated for staging purposes when adrenal carcinoma is suspected

References (AB-16.2)

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1. Fleseriu M, Auchus R, Bancos I, et al. Consensus on diagnosis and management of Cushing's disease: a guideline update. *Lancet Diabetes Endocrinol.* 2021;9(12):847-875. doi:10.1016/S2213-8587(21)00235-7
2. Vaidya A, Hamrahian A, Bancos I, Fleseriu M, Ghayee HK. The evaluation of incidentally discovered adrenal masses. *Endocr Pract*. 2019;25(2):178-192.
3. Nieman LK, Biller BM, Findling JW, et al. Treatment of Cushing's Syndrome: An Endocrine Society Clinical Practice Guideline. *J Clin Endocrinol Metab*. 2015;100(8):2807-2831.
4. Goodman NF, Cobin RH, Futterweit W, et al. American association of clinical endocrinologists, american college of endocrinology, and androgen excess and pcos society disease state clinical review: guide to the best practices in the evaluation and treatment of polycystic ovary syndrome--part 1. *Endocr Pract.* 2015;21(11):1291-1300.
5. Fassnacht M, Arlt W, Bancos I, et al. Management of adrenal incidentalomas: European Society of Endocrinology Clinical Practice Guideline in collaboration with the European Network for the Study of Adrenal Tumors. *Eur J Endocrinol*. 2016;175(2):G1-G34.
6. Martin KA, Anderson RR, Chang RJ, et al. Evaluation and Treatment of Hirsutism in Premenopausal Women: An Endocrine Society Clinical Practice Guideline. *J Clin Endocrinol Metab*. 2018;103(4):1233-1257.
7. Shah MH, Goldner WS, Benson AB, et al. Neuroendocrine and Adrenal Tumors, Version 2.2021, NCCN Clinical Practice Guidelines in Oncology. *J Natl Compr Canc Netw*. 2021;19(7):839-868. Published 2021 Jul 28.
8. Carlson HE. Approach to the patient with gynecomastia. J Clin Endocrinol Metab. 2011;96(1):15-21.
9. Kanakis GA, Nordkap L, Bang AK, et al. EAA clinical practice guidelines-gynecomastia evaluation and management. *Andrology.* 2019;7(6):778-793.
10. Funder JW, Carey RM, Mantero F, et al. The Management of Primary Aldosteronism: Case Detection, Diagnosis, and Treatment: An Endocrine Society Clinical Practice Guideline. *J Clin Endocrinol Metab*. 2016;101(5):1889-1916.
11. Vaidya A, Carey RM. Evolution of the Primary Aldosteronism Syndrome: Updating the Approach [published correction appears in J Clin Endocrinol Metab. 2021 Jan 1;106(1):e414]. *J Clin Endocrinol Metab.* 2020;105(12):3771-3783.
12. Hundemer GL, Vaidya A. Primary Aldosteronism Diagnosis and Management: A Clinical Approach. *Endocrinol Metab Clin North Am*. 2019;48(4):681-700.
13. Lenders JW, Duh QY, Eisenhofer G, et al. Pheochromocytoma and paraganglioma: an endocrine society clinical practice guideline. *J Clin Endocrinol Metab.* 2014;99(6):1915-1942.

Adrenal Insufficiency (AB-16.3)

AB.AC.0016.3.A

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- CT Abdomen (contrast as requested), or MRI Abdomen (contrast as requested) if CT is contraindicated, if the cause of primary adrenal insufficiency is unclear.
- Imaging is NOT indicated if clinical presentation and labs are consistent with any of the following:
  - Primary autoimmune destruction of the adrenal cortex (Addison's disease)
  - Congenital adrenal hyperplasia
  - Adrenoleukodystrophy

Background and Supporting Information

- Imaging can detect infiltrative disease, adrenal hemorrhage, infections, and malignant tumors which may be the cause of adrenal dysfunction

Evidence Discussion

A CT scan of the abdomen is recommended to evaluate the cause of primary adrenal insufficiency when it is unclear.

- If screening tests for autoimmune or genetic causes of primary adrenal insufficiency are positive, then imaging is not warranted.
- Other causes of primary adrenal insufficiency include adrenal hemorrhage, infiltrative diseases, infections such as tuberculosis, and tumors. All of these can be identified by a CT scan of the abdomen
- The CT scan is usually readily available, relatively quick to process, and therefore preferred over MRI as the initial study unless contraindicated.
- It can accurately identify the size, location, and appearance of adrenal tumors, as well as the presence of local or vascular invasion, lymph node involvement, and distant metastases in the majority of patients.
- The CT scan can also accurately identify hemorrhage of the adrenal gland.
- While an abdominal ultrasound is less expensive, it does not provide the precise anatomic definition seen on a CT scan, making the CT scan the preferred study.

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References (AB-16.3)

v2.0.2025

1. Bornstein SR, Allolio B, Arlt W, et al. Diagnosis and Treatment of Primary Adrenal Insufficiency: An Endocrine Society Clinical Practice Guideline. *J Clin Endocrinol Metab*. 2016;101(2):364-389.
2. Badawy M, Gaballah AH, Ganeshan D, et al. Adrenal hemorrhage and hemorrhagic masses; diagnostic workup and imaging findings. Br J Radiol. 2021;94;202110753.
3. Huang Y, Tang Y, Zhang X, Zeng N, Li R, Chen T. Evaluation of primary adrenal insufficiency secondary to tuberculous adrenalitis with computed tomography and magnetic resonance imaging: current status. World J Radiol. 2015;7(10):336-342. doi:10.4329/wjr.v7.i10.336.
4. Udelsman R, Fishman EK. Radiology of the adrenal. Endocrinology and Metabolism Clinics of North America. 2000;29(1):27-41.

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Abdominal Aortic Aneurysm (AAA), Iliac Artery Aneurysm (IAA), and Visceral Artery Aneurysms Follow-Up of Known Aneurysms and Pre-Op Evaluation (AB-17)

Guideline Page

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Abdominal Aortic Aneurysm (AAA) (AB-17.1)

AB.17.1.A

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- See: **Abdominal Aortic Aneurysm (AAA) (PVD-6.3)** in the Peripheral Vascular Disease Imaging Guidelines

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Iliac Artery Aneurysm (IAA) (AB-17.2)

AB.17.2.A
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- See: **Iliac Artery Aneurysm (IAA) (PVD-6.4)** in the Peripheral Vascular Disease Imaging Guidelines

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Visceral Artery Aneurysm (AB-17.3)

AB.17.3.A
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- See: **Visceral Artery Aneurysm (PVD-6.5)** in the Peripheral Vascular Disease Imaging Guidelines

Abdominal Aortic Aneurysm (AAA) and Iliac Artery Aneurysm (IAA)-Post Endovascular or Open Aortic Repair (AB-18)

Guideline Page

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AAA, IAA, Post Endovascular or Open Aortic Repair (AB-18.1)

AB.18.1.A

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- See: **Post Aortic Endovascular/Open Surgery Surveillance Studies (PVD-6.8)** in the Peripheral Vascular Disease Imaging Guidelines

Aortic Dissection and Imaging for Other Aortic Conditions (AB-19)

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Aortic Dissection and Other Aortic Conditions (AB-19.1)

AB.19.1.A
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- See: **Aortic Imaging** in the Peripheral Vascular Disease Imaging Guidelines

Imaging for Other Aortic Conditions (AB-19.2)

AB.19.2.A
v2.0.2025

- See: **Aortic Imaging** in the Peripheral Vascular Disease Imaging Guidelines

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Bowel Obstruction, Gastroparesis, and Bloating (AB-20)

Guideline Page

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Bowel Obstruction (AB-20.1)

AB.BO.0020.1.A
v2.0.2025

- Suspected bowel obstruction:
  - CT Abdomen and Pelvis with contrast (CPT® 74177)
  - Pediatric individuals:
    - MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) can be approved if requested.
  - Pregnant individuals:
    - MRI Abdomen and Pelvis without contrast (CPT® 74181 and CPT® 72195)
  - If the etiology or level of suspected intermittent or low-grade small bowel obstruction remains undetermined and additional imaging is needed after CT Abdomen and Pelvis:
    - CT Enteroclysis (CPT® 74176 or CPT® 74177) or
    - CT Enterography (CPT® 74177) or
    - MR Enteroclysis (CPT® 74183 and CPT® 72197) or
    - MR Enterography (CPT® 74183 and CPT® 72197)
- If there is a suspected small bowel tumor as a cause of the small bowel obstruction (including a history of no prior abdominal or pelvic surgery, no known hernia and/or concomitant obscure GI bleeding):
  - CT Enterography (CPT® 74177)
- Small bowel obstruction suspected to be secondary to Crohn's Disease:
  - See: **IBD (Crohn's Disease or Ulcerative Colitis) (AB-23.1)** and **Known IBD (AB-23.2)**
- Bariatric surgery patients, see: **Bariatric Surgery (AB-9.1)**

Background and Supporting Information

- Complete or high-grade obstruction can be defined as no fluid or gas passing beyond the site of obstruction. In incomplete or partial obstruction (low-grade), some fluid or gas passes beyond the point of obstruction. However, a plain film is not required prior to advanced imaging for suspicion of either high- or low- grade obstruction.

Evidence Discussion

In individuals suspected of having small or large bowel obstruction, the best imaging modality is CT of the abdomen and pelvis. Such imaging plays a crucial role in both diagnosis and management. Computed tomography (CT) is more useful than plain radiographs especially in identifying the severity, location, etiology, inflammation, and complications of bowel obstructions including ischemia, necrosis, and perforation.

Magnetic resonance imaging (MRI) can be a useful alternative to CT imaging in special populations for whom radiation exposure needs to be limited, but the higher prevalence of motion artifact may make images more difficult to interpret.

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Nausea and Vomiting as the Primary Symptom (AB-20.3)

AB.BO.0020.3.A

v2.0.2025

- The presence of any red flag findings per **General Guidelines (AB-1.0)** precludes adjudication based on any other criteria.
- Nausea and vomiting as the primary symptom
  - An initial assessment should be performed prior to imaging requests. The initial assessment should include a history with a delineation of the duration, frequency, and severity of symptoms, including a description of their characteristics and any associated symptoms. The purpose of the initial assessment is to define whether the symptom complex suggests a central (neurologic), endocrine (e.g. pregnancy, thyroid disorder), iatrogenic (chemotherapy/medication-induced), obstructive (e.g., low-grade small bowel obstruction), or a mucosal (gastritis, peptic ulcer disease) etiology. Diagnostic testing for nausea and vomiting should be targeted at finding the etiology suggested by a thorough history and physical examination. In the absence of more complicated or serious disease, if the cause is not obvious or suggestive from the history and physical, laboratory data including a CBC, chemistry profile, and, in a reproductive-age female, pregnancy testing, should be performed prior to advanced radiographic imaging. Imaging is based on the findings of the initial evaluation as follows:
    - CT Abdomen and Pelvis with contrast (CPT® 74177) for ANY of the following:
      - If the initial assessment does not suggest a specific cause
      - If the evaluation proves unproductive
    - Symptoms suggesting mucosal disease (e.g. GERD, suspicion of ulcer disease):
      - EGD prior to advanced imaging
    - If nausea and vomiting remains unexplained despite workup and CT Abdomen and Pelvis is negative:
      - Gastric emptying study (CPT® 78264)
    - Symptoms suggesting an intracranial etiology (vertigo/nystagmus, associated headache, or neurogenic vomiting suggested by a positional nature and/or associated with other neurologic signs and symptoms):
      - See: **Headache (HD-11)** , **Dizziness, Vertigo and Syncope (HD-23)** , or other Head Imaging Guidelines depending on the predominant neurologic presentation

  - See: **General Guidelines – Other Imaging Situations (HD-1.7)** in the Head Imaging Guidelines for persistent, unexplained nausea and vomiting, when GI evaluation is negative.
- Nausea and vomiting associated with RUQ pain and suspicion of gallbladder disease, see: **Right Upper Quadrant Pain including Suspected Gallbladder Disease (AB-2.3)**
- Nausea and vomiting associated with dyspeptic symptoms, or epigastric pain, see: **Epigastric Pain and Dyspepsia (AB-2.5)**

Evidence Discussion

Nausea and vomiting are common symptoms encountered in medicine. Prior to imaging studies, an evaluation including a detailed history including duration, frequency, and severity should be performed. Diagnostic testing for nausea and vomiting should focus on finding the etiology of the symptoms. In addition to a detailed history and physical examination, laboratory work up and pregnancy testing may reveal the etiology of symptoms. If mucosal disease causing vomiting is suspected, upper endoscopy should be performed prior to advanced imaging. If gallbladder disease is suspected, right upper quadrant ultrasound should be performed. If neurologic symptoms are present, advanced brain imaging may be indicated depending on symptoms and presentation. If the initial evaluation of nausea and vomiting does not reveal a specific cause, advanced imaging may be pursued. CT abdomen and pelvis with contrast provides valuable information regarding abdominal and pelvic anatomy such as obstruction or inflammation and may be used to evaluate nausea and vomiting when clinically appropriate.

Superior Mesenteric Artery (SMA) Syndrome (AB-20.4)

AB.BO.0020.4.A

v2.0.2025

- CTA Abdomen (CPT® 74175) or MRA Abdomen (CPT® 74185) are indicated for clinical suspicion of SMA syndrome and ANY of the following:
  - Risk factors or radiographic/EGD findings as noted below:
    - Recent significant weight loss which leads to a loss of retroperitoneal fat
    - Presence of a severe debilitating illness such as malignancy, malabsorption syndromes, AIDS, trauma, and burns.
    - History of corrective spine surgery for scoliosis
    - Anorexia Nervosa
    - Abdominal surgery
    - Congenital short ligament of Treitz
  - Radiologic findings or history suggestive of duodenal obstruction
  - Failure to diagnose either persistent nausea and vomiting despite the workup outlined in **Nausea and Vomiting as the Primary Symptom (AB-20.3)**

Background and Supporting Information

- SMA syndrome is a rare cause of duodenal obstruction in which there is a decrease in the aortomesenteric angle with resulting compression of the duodenum by the SMA.
- The typical clinical scenario includes an episode of weight loss followed by chronic food intolerance with nausea and vomiting, further weight loss, and epigastric pain, and can be relieved by lying prone or in the left lateral decubitus position.
- The diagnosis can be suspected with barium studies demonstrating delayed passage of contrast beyond the duodenum, dilatation of the first and second portions of the duodenum, anti-peristaltic flow of barium proximal to the obstruction, and relief of obstruction when placed in the prone, knee-chest, or left lateral position, or with an upper endoscopy revealing pulsatile extrinsic compression of the duodenum, or plain films suggesting duodenal obstruction.

Evidence Discussion

The gold standard test for suspicion of SMA syndrome is a CTA of the abdomen or an MRA of the abdomen, which confirms the diagnosis and provides a measurement of the angle between the SMA and the abdominal aorta. All other investigative modalities may suggest an obstruction at the third portion of the duodenum but are not diagnostic.

Bloating, Gas, and Distention (AB-20.5)

AB.BO.0020.5.A
v2.0.2025

- For bloating as the primary symptom, present for at least 3 months, see: **Irritable Bowel Syndrome (AB-21.4)**
- For documented suspicion of bowel obstruction (e.g., patients with prior abdominal surgery, previous history of SBO, known adhesions, history of Crohn's Disease, etc.) see: **Bowel Obstruction (AB-20.1)**.
- If associated with constipation, see: **Constipation (AB-21.3)**
- If associated with dyspeptic symptoms, see: **Epigastric Pain/Dyspepsia (AB-2.5)**
- CT Abdomen and Pelvis with contrast (CPT® 74177) if any of the following is present:
  - History of malignancy with a likelihood or propensity to metastasize to abdomen
  - Fever (≥101 degrees Fahrenheit)
  - Elevated WBC >10,000, or above the upper limit of normal for the particular lab reporting the result
  - Low WBC (absolute neutrophil count <1000)
  - Palpable mass of clinical concern and/or without benign features
  - GI bleeding, overt or occult, not obviously hemorrhoidal
  - Abdominal tenderness documented as moderate or severe
  - Peritoneal signs, such as guarding or rebound tenderness
  - Suspected complication of bariatric surgery
  - Notation by the ordering provider that the patient has a "surgical abdomen"
  - Age >60 years with unintentional weight loss of ≥10 lbs. or ≥5% of body weight over 6 months or less, without an identifiable reason

Background and Supporting Information

Bloating and distension are among the most common gastrointestinal complaints, and appears in 96% of patients with IBS, and 20-30% of the general population. Bloating is the subjective perception of increased abdominal pressure. Distension is the objective finding of increased abdominal girth.

The following approaches were offered by the American Gastroenterological Association (AGA)[21] as Best Practice Advice in evaluation and management of belching, abdominal bloating, and distension:

- Clinical history and physical examination findings and impedance pH monitoring can help to differentiate between gastric and supra-gastric belching.
- Rome IV criteria (see also: **Irritable Bowel Syndrome [AB-21.4]**) should be used to diagnose primary abdominal bloating and distention.

- Carbohydrate enzyme deficiencies may be ruled out with dietary restriction and/or breath testing. In a small subset of at-risk patients, small bowel aspiration or biopsy may be warranted.
- Serologic testing may rule out celiac disease in patients with bloating and, if serologies are positive, a small bowel biopsy should be done to confirm the diagnosis.
- Abdominal imaging and upper endoscopy should be restricted to patients with alarm features, recent worsening symptoms, or an abnormal physical examination.
- Gastric emptying studies should not be ordered routinely for bloating and distention, but may be considered if nausea and vomiting are present. See also: **Gastroparesis and Dumping Syndrome (AB-20.2)**
- Whole gut motility and radiopaque transit studies should be restricted to patients with refractory lower GI symptoms and suspected neuromyopathic conditions.
- When abdominal bloating and distention may be related to constipation or difficult evacuation, anorectal physiology testing is suggested to rule out a pelvic floor disorder. See also: **Constipation (AB-21.3)**

Evidence Discussion

Determining when symptoms of bloating, gas, and distention require imaging is done by risk stratification using demographics factors such as patient age as well as concomitant signs and symptoms.

- Computer tomography (CT) of the abdomen offers excellent 3-dimensional resolution of the gut and its surrounding structures, especially when performed with use of oral and/or intravenous (IV) contrast agents. CT imaging captures all of the abdominal organs and the surrounding cavity and mesentery. It is central to the evaluation of this condition because it can accurately diagnose the presence and location of obstruction, malignancy, vascular insufficiency, or infection, which are important pathologic diagnoses to identify or exclude in the subset of high-risk patients. CT scan requires a significant dose of ionizing radiation but is ideally suited to imaging lesions within the gut because the speed of image acquisition reduces the potential for motion artifact. Typically performed with IV contrast in patients with normal kidney function, there is the added risk of allergic reaction to contrast; however the contrast enhances the ability to evaluate for both infectious and vascular conditions.

References (AB-20)

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1. Expert Panel on Gastrointestinal Imaging. ACR Appropriateness Criteria® suspected small-bowel obstruction. American College of Radiology (ACR); 2013
2. Donohoe KJ, Maurer AH, Ziessman HA. Society of Nuclear Medicine Procedure Guideline for Gastric Emptying and Motility, Version 2.0. Society of Nuclear Medicine and Molecular Imaging. Published June 6, 2004.
3. Parkman HP, Hasler WL, RS Fisher. American Gastroenterological Association Medical Position Statement: diagnosis and treatment of gastroparesis.*Gastroenterology*, 2004; 127:1589-1591
4. Abell TL, Camilleri M, Donohoe KJ, et al. Consensus recommendations for gastric emptying scintigraphy: A joint report of the American Neurogastroenterology and Motility Society and the Society of Nuclear Medicine, *Am J Gastroenterol*, 2008; 103:753-763.
5. Sarnelli G, Caenepeel P, Geypens B, et al. Symptoms associated with impaired gastric emptying of solids and liquids in Functional dyspepsia, *Am J Gastroenterol*, 2003; 98:783-788.
6. Parkman HP, Hasler WL, RS Fisher. American Gastroenterological Association technical review on the diagnosis and treatment of gastroparesis, *Gastroenterology*, 2004; 127:1592-1622.
7. Lawal A, Barboi A, Krasnow A, et al. Rapid gastric emptying is more common than gastroparesis in individuals with autonomic dysfunction, *Am J Gastroenterol*, 2007; 102:618-623.
8. Chial HJ, Camilleri M, Williams DE, et al. Rumination Syndrome in Children and Adolescents: Diagnosis, Treatment, and Prognosis, *Pediatrics*, 2003;111(1):158-62
9. Paulson EK, Thompson WM. Review of Small-Bowel Obstruction: The Diagnosis and When to Worry. *Radiology*. 2015;275(2):332-342. doi:10.1148/radiol.15131519.
10. Mullan CP, Siewert B, Eisenberg RL. Small Bowel Obstruction. *American Journal of Roentgenology*. 2012;198(2). doi:10.2214/ajr.10.4998.
11. American Gastroenterological Association medical position statement: Nausea and vomiting. *Gastroenterology*. 2001;120(1):261-262. doi:10.1053/gast.2001.20515.
12. Scorza K, Williams A, Phillips JD, Shaw J. Evaluation of Nausea and Vomiting, *American Family Physician*, 2007; 76(1)76-84.
13. Quigley EM, Hasler WL, Parkman HP. AGA technical review on nausea and vomiting. *Gastroenterology*. 2001;120(1):263-286. doi:10.1053/gast.2001.20516.
14. Baluch, A., Shewayish, S. (2019). Neutropenic Fever. In: Velez, A., Lamarche, J., Greene, J. (eds) Infections in Neutropenic Cancer Patients. Springer, Cham. https://doi.org/10.1007/978-3-030-21859-1_8.
15. Sinagra E, Raimondo D, Albano D, et al. Superior Mesenteric Artery Syndrome: Clinical, Endoscopic, and Radiological Findings. *Gastroenterology Research and Practice*. 2018;2018:1-7. doi:10.1155/2018/1937416.
16. Zaraket V, Deeb L. Wilkies Syndrome or Superior Mesenteric Artery Syndrome: Fact or Fantasy. *Case Reports in Gastroenterology*. 2015;9(2):194-199. doi:10.1159/000431307.
17. Merrett ND, Wilson RB, Cosman P, Biankin AV. Superior Mesenteric Artery Syndrome: Diagnosis and Treatment Strategies. *Journal of Gastrointestinal Surgery*. 2008;13(2):287-292. doi:10.1007/s11605-008-0695-4.
18. Foley A, Burgell R, Barrett JS, Gibson PR. Management strategies for abdominal bloating and distension. *Gastroenterol Hepatol*. 2014;10(9):531-571.
19. Scarpellini E, Arts J, Karamanolis G, et. al. International consensus on the diagnosis and management of dumping syndrome. *Nat Rev Endocrinol*. 2020;16:448-466. doi:10.1038/s41574-020-0357-5.
20. Lacy BE, Cangemi D, Vazquez-Roque M. Management of chronic abdominal distension and bloating. *Clin Gastroenterol Hepatol*. 2021;19(2):219-231.e.1. doi:10.1016/j.cgh.2020.03.056.
21. Moshiree B, Drossman D, Shaukat A. AGA clinical practice update on the evaluation and management of belching, abdominal bloating, and distention. *Gastroenterology*. 2023;165-791-800.
22. Oka A, et al. Superior mesenteric artery syndrome: diagnosis and management. *World J Clin Cases*. 2023;15:3369-3384.
23. Sinagra E, Raimondo D, Albano D, et al. Superior mesenteric artery syndrome: clinical, endoscopic, and radiological findings. *Gastroenterology Research and Practice*. 2018;2018:1-7.

24. Zaraket V, Deeb L. Wilkies Syndrome or superior mesenteric artery syndrome: fact or fantasy. *Case Reports in Gastroenterology*. 2015;9(2):194-199.

Diarrhea, Constipation, and Irritable Bowel (AB-21)

Guideline Page

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Acute and Persistent Diarrhea (Up to 30 Days) (AB-21.1)

AB.DC.0021.1.A
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- The presence of any red flag findings per **General Guidelines (AB-1.0)** precludes adjudication based on any other criteria.
- Routine advanced imaging is not supported for acute, or persistent (up to 30 days) uncomplicated, including infectious diarrhea.
- Travel and dysenteric (including bloody) diarrhea should undergo biological assessment and antimicrobial treatment.[9,10,11]
- CT Abdomen and Pelvis with contrast (CPT® 74177) can be used if:
  - Suspected ischemia (See: **Mesenteric Ischemia (AB-6.1)** and **Colonic Ischemia (AB-6.2)**)
  - Older (>50) individuals with significant abdominal pain
  - Previous gastric bypass
  - Immunocompromised
  - Obstruction, toxic megacolon, or perforation suspected

Evidence Discussion

Acute or persistent (up to 30 days) diarrhea is a common complaint that most often results from self-limited infectious or digestive causes, and for this reason, imaging is generally not indicated. However, in a subset of patients and in the setting of clinical suspicion, imaging is necessary to exclude vascular insufficiency, perforation, obstruction and severe metabolic derangement. Determining the situations in which imaging is necessary is based on provider concern for such conditions in addition to demographic factors such as age and prior medical and surgical history. When imaging is necessary, CT scan with contrast is the modality of choice.

- Computer tomography (CT) of the abdomen offers excellent 3-dimensional resolution of the gut and its surrounding structures, especially when performed with use of oral and/or intravenous (IV) contrast agents. CT imaging captures all of the abdominal organs and the surrounding cavity and mesentery. It is central to the evaluation of this condition because it can accurately diagnose the presence and location of obstruction, malignancy, vascular insufficiency, toxic megacolon, and perforation in the subset of high-risk patients. CT scan requires a significant dose of ionizing radiation but is ideally suited to imaging lesions within the gut because the speed of image acquisition reduces the potential for motion artifact. Typically performed with IV contrast in patients with normal kidney function, there is the added risk of allergic

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reaction to contrast, however the contrast enhances the ability to evaluate for both infectious and vascular conditions.

Chronic Diarrhea (More than 30 Days) (AB-21.2)

AB.DC.0021.2.A
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- Basic lab work including routine CBC, chemistries, as well as stool tests for pathogens.
- CT Abdomen with contrast (CPT® 74160), CT Abdomen and Pelvis with contrast (CPT® 74177), CT Enterography (CPT® 74177), or MR Enterography (CPT® 74183 or CPT® 74183 and CPT® 72197), can be approved if all of the following have been performed:
  - Colonoscopy has been performed and is nondiagnostic or suggestive of inflammatory bowel disease
  - Fecal calprotectin or fecal lactoferrin
  - Testing for giardia antigen or PCR for giardia
  - Testing for celiac disease with serum IgA tissue transglutaminase (tTG)
- See: **IBD (Crohn's Disease or Ulcerative Colitis) (AB-23.1)** for concerns regarding inflammatory bowel disease.

Evidence Discussion

The initial evaluation of chronic diarrhea (more than 30 days) involves non-imaging modalities (blood tests, stool tests, and colonoscopy), to evaluate for celiac disease, giardia and inflammatory bowel disease. If these evaluations are non-diagnostic, imaging can be considered to identify more unusual causes of chronic diarrhea such as obstruction, malignancy, biliary causes and small bowel disorders such as small bowel Crohn's disease.

- Computer tomography (CT) of the abdomen offers excellent 3-dimensional resolution of the gut and its surrounding structures, especially when performed with use of oral and/or intravenous (IV) contrast agents. CT imaging captures parts or the whole of the abdomen, or can be directed to interrogate with specialized techniques a specific organ. Depending on clinical suspicion, for this condition, CT of the abdomen, CT of the abdomen and pelvis or specialized CT enterography of the small bowel may be employed. CT scan requires a significant dose of ionizing radiation, but is ideally suited to imaging lesions within the gut because the speed of image acquisition reduces the potential for motion artifact.
- Magnetic resonance imaging (MRI) uses a magnetic field to capture excellent 3-dimensional resolution. As with CT scans, the technique is often performed with IV contrast agents, and can with specialized techniques be directed either at whole or parts of the abdomen or at specific abdominal structures. For this condition MR

enterography delivers high resolution images of small bowel mucosa to evaluate for the subtle inflammatory changes such as those seen in small bowel Crohn's disease. MRI yields better soft contrast resolution than CT and does not expose individuals to ionizing radiation, but due to longer image time is motion artifact-prone and thus less suited to resolving gastrointestinal detail. In addition, and especially in youths, MRI may require sedation.

Constipation (AB-21.3)

AB.DC.0021.3.A
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- The presence of any red flag findings per **General Guidelines (AB-1.0)** precludes adjudication based on any other criteria.
- CT Abdomen and Pelvis with contrast (CPT® 74177) if:
  - Concern for obstruction
- MRI Defecography (MRI Pelvis without contrast CPT® 72195) can be approved if the following conditions are met:
  - Individual has undergone ano-rectal manometry **and** a balloon-expulsion test, and the results confirm a defecatory disorder or are inconclusive, **and** the individual has failed a trial of biofeedback or other conservative therapy.

  or

  - Balloon expulsion test is normal and there is a need to identify structural lesions

  or

  - To guide planned surgical therapy for rectoceles, cystoceles, or uterine prolapse.

Background and Supporting Information

- The work-up and treatment of constipation usually proceeds with a history and physical followed by empiric medication or dietary trials.
  - In general, a colonoscopy is performed prior to advanced imaging in an individual presenting with chronic constipation if the alarm symptoms of blood in the stool, anemia, or weight loss are present.
- Defecography can be used in the evaluation of constipation to obtain information regarding the structural causes of outlet dysfunction (e.g. rectal prolapse, rectocele, or enterocele).
- Defecography can be performed either as a barium study with fluoroscopy (conventional defecography or CD), or with MRI (D-MRI). In a comparative study, D-MRI was found to be less diagnostic than CD for diagnosing rectocele and enterocele, but superior in identifying intussusception.
- Serial manometry may be used to assess therapeutic response to pelvic floor directed management strategies.

Evidence Discussion

Clinical presentation and results of minimally invasive testing determine the situations in which constipation requires imaging.

- Computer tomography (CT) of the abdomen offers excellent 3-dimensional resolution of the gut and its surrounding structures, especially when performed with use of oral and/or intravenous (IV) contrast agents. CT imaging captures all of the abdominal organs and the surrounding cavity and mesentery. It is central to the evaluation of patients with constipation alongside red flag symptoms that suggest infection or malignancy. CT scan requires a significant dose of ionizing radiation but is ideally suited to imaging lesions within the gut because the speed of image acquisition reduces the potential for motion artifact. Typically performed with IV contrast in patients with normal kidney function, there is the added risk of allergic reaction to contrast; however, the contrast enhances the ability to evaluate for both infectious and malignant conditions.
- MRI Defecography is a dynamic study evaluating the movement of abdominal and pelvic structures during the expulsion phase. It is used as an alternative to fluoroscopy and is superior to fluoroscopy in identifying intussusception. Magnetic resonance imaging (MRI) uses a magnetic field to capture excellent 3-dimensional resolution. MRI yields better soft contrast resolution than CT and fluoroscopy and does not expose individuals to ionizing radiation, but due to longer image time is motion artifact-prone and thus less suited to resolving gastrointestinal detail. In addition, and especially in youths, MRI may require sedation.
- For this condition, MR Defecography is performed without contrast, eliminating contrast-related risk. MR Defecography is indicated in refractory constipation when minimally invasive diagnostic modalities such as manometry and balloon-expulsion have confirmed a defecatory disorder or are nondiagnostic or for guiding surgical planning of pelvic structural abnormalities.

Irritable Bowel Syndrome (AB-21.4)

AB.DC.0021.4.A
v2.0.2025

- The presence of any red flag findings per **General Guidelines (AB-1.0)** precludes adjudication based on any other criteria.
- Advanced imaging in the absence of alarm symptoms has a very low yield, but can be considered in the following circumstances:
  - CT Abdomen (CPT® 74160) or CT Abdomen and Pelvis (CPT® 74177) can be considered in the following circumstances:
    - Presence of any of the following alarm symptoms:
      - Weight loss
      - Frequent nocturnal awakenings due to gastrointestinal symptoms
      - Fever
      - Blood in the stool or iron deficiency anemia (See: **GI Bleeding (AB-22)** for appropriateness of imaging in this circumstance)
      - New onset and progressive symptoms
      - Onset of symptoms after age 50
      - Family history of colon cancer or inflammatory bowel disease
      - Findings of an abdominal mass
      - Presence of lymphadenopathy
    - Fecal calprotectin ≥50ug/g or fecal lactoferrin ≥4.0ug/g or CRP >0.5 in individuals with diarrhea-predominance
    - Celiac testing should also be performed in individuals with diarrhea-predominance IBS, and if positive see: **Celiac Disease (AB-24.1)** for imaging guidance. (See background and supporting information in **IBD (Crohn's Disease or Ulcerative Colitis) (AB-23.1)**

Background and Supporting Information

- Irritable bowel syndrome is characterized by abdominal pain associated with altered bowel habits, abdominal distention, and bloating. It is important to understand that IBS is a positive diagnosis, not a diagnosis of exclusion. ACG guidelines (2021) strongly suggest that IBS be assessed with a "positive diagnostic strategy as compared to a diagnostic strategy of exclusion". Subtypes include IBS-C (constipation-predominant), IBS-D (diarrhea-predominant), IBS-M (mixed), and unclassified IBS. Rome IV Criteria for the diagnosis of irritable bowel syndrome are:
  - Recurrent abdominal pain, on average ≥1 d/wk in the past 3 months, related to ≥2 of the following:
    - Defecation

- Change in stool frequency
- Change in stool appearance (form)

Evidence Discussion

Risk stratification (using demographics factors such as patient age, family history, timing of symptoms, concomitant symptoms, and physical exam findings) determines the situations in which imaging is necessary for irritable bowel syndrome. In a subset of patients, imaging is necessary to exclude inflammatory conditions such as Crohn's disease and malignant conditions such as bowel cancer.

- Computer tomography (CT) of the abdomen offers excellent 3-dimensional resolution of the gut and its surrounding structures, especially when performed with use of oral and/or intravenous (IV) contrast agents. CT imaging captures all of the abdominal organs and the surrounding cavity and mesentery. It is central to the evaluation of this condition because it can accurately identify both the presence and location of inflammatory conditions and malignant conditions in the appropriately identified subset of high-risk patients. CT scan requires a significant dose of ionizing radiation but is ideally suited to imaging lesions within the gut because the speed of image acquisition reduces the potential for motion artifact. Typically performed with IV contrast in patients with normal kidney function, there is the added risk of allergic reaction to contrast; however, the contrast enhances the ability to evaluate for both inflammatory and malignant conditions.

References (AB-21)

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1. O'Connor OJ, McSweeney SE, McWiliams S, et al. Role of radiologic imaging in irritable bowel syndrome: Evidence-based review. *Radiology*. 2012;262(2):485-494.
2. Riddle MS, Dupont HL, Connor BA. ACG Clinical Guideline: Diagnosis, Treatment, and Prevention of Acute Diarrheal Infections in Adults. *The American Journal of Gastroenterology*. 2016;111(5):602-622.
3. Bharucha A. Exam 3: American Gastroenterological Association Technical Review on Constipation. *Gastroenterology*. 2013;144(1).
4. van Iersel JJ, Jonkers F, Verheijen PM et al. (2017), Comparison of dynamic magnetic resonance defaecography with rectal contrast and conventional defaecography for posterior pelvic floor compartment prolapse. *Colorectal Dis*. 19: O46–O53.
5. Wald A, Bharucha AE, Limketkai B, et.al. ACG clinical guidelines: management of benign anorectal disorders. *Am. J. Gastroenterol*. 2021;116(10):1987-2008. doi:10.14309/ajg.0000000000001507.
6. Menees SB, Powell C, Kurlander J, Goel A, Chey WD. A meta-analysis of the utility of c-reactive protein, erythrocyte sedimentation rate, fecal calprotectin and fecal lactoferrin to exclude inflammatory bowel disease in adults with IBS. *The American Journal of Gastroenterology*. 2015;110(3):444-454. doi:10.1038/ajg.2015.
7. Sultan S, Malhotra A. Irritable Bowel Syndrome. *Annals of Internal Medicine*. 2017;166(11). doi:10.7326/aitc201706060.
8. An Evidence-Based Position Statement on the Management of Irritable Bowel Syndrome. *The American Journal of Gastroenterology*. 2008;104(S1). doi:10.1038/ajg.2008.122.
9. O'Connor OJ, Mcsweeney SE, Mcwilliams S, et al. Role of radiologic imaging in Irritable Bowel Syndrome: evidence-based review. *Radiology*. 2012;262(2):485-494. doi:10.1148/radiol.11110423.
10. Ford AC, Moayyedi P, Lacy BE, et al. American College of Gastroenterology monograph on the management of Irritable Bowel Syndrome and chronic idiopathic constipation. *The American Journal of Gastroenterology*. 2014;109(S1). doi:10.1038/ajg.2014.187.
11. Foley A, Burgell R, Barrett JS, Gibson PR. Management strategies for abdominal bloating and distension. *Gastroenterol Hepatol (NY)*. 2014;10(9):561-571.
12. Smalley W, Falck-Ytter C, Carrasco-Labra A, Wani S, Lytvyn L, Falck-Ytter Y. AGA clinical practice guidelines on the laboratory evaluation of functional diarrhea and diarrhea-predominant Irritable Bowel Syndrome in adults (IBS-D). *Gastroenterology*. 2019;157(3):851-854. doi:10.1053/j.gastro.2019.07.004.
13. Lacy BE, Pimentel M, Brenner DM, et. al. ACG clinical guideline: management of Irritable Bowel Syndrome. Am J *Gastroenterol*. 2021;116(1):17-44. doi:10.14309/ajg.0000000000001036.
14. Bharucha AD, Dorn SD, Lembo A, Pressman A. American Gastroenterological Association medical position statement on constipation. *Gastroenterology*. 2013;144:211-217. doi:10.1053/j.gastro.2012.10.029.

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GI Bleeding (AB-22)

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GI Bleeding (AB-22.1)

AB.GI.0022.1.A
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- CTA Abdomen (CPT® 74175), CTA Abdomen and Pelvis (CPT® 74174), or CT Abdomen and Pelvis with contrast (CPT® 74177) are indicated as initial evaluation for ANY of the following:
  - If therapeutic angiography is being considered
  - If colonoscopy cannot be performed in an individual with active lower GI bleeding
  - If endoscopy cannot be performed in an individual with active upper GI bleeding
  - If surgery is being considered for treatment of GI bleeding
  - GI bleeding and moderate to severe abdominal pain and/or tenderness
  - GI bleeding and hemodynamic instability
  - If there is concern for an aorto-enteric fistula (known or suspected aortic aneurysm, history of any type of aortic aneurysm repair)
- Meckel's scan (CPT® 78290) can be approved if bleeding is suspected from a Meckel's diverticulum.
- Gastrointestinal Bleeding Scintigraphy (CPT® 78278) can be considered if there is brisk active bleeding with negative endoscopy
- For TIPS placement, see: **Portal Hypertension (AB-26.3)**

Evidence Discussion

In individuals suspected of having GI bleeding, after initial endoscopic evaluation if feasible, the best imaging modality is CT or CTA of the abdomen and pelvis. Such imaging plays a crucial role in both diagnosis and management. Computed tomographic angiography (CTA) is more expedient and accurate at localizing the site of bleeding as compared to gastrointestinal bleeding scintigraphy (tagged RBC scintigraphy) which can be a useful alternative in the setting of active GI bleeding, especially if it is slow or intermittent. CTA is the exam of choice for potential causes of catastrophic bleeding such as aortoenteric fistula, transmural bowel injuries, and mesenteric hemorrhage. A Meckel's scan can be useful when bleeding is suspected from a Meckel's diverticulum.

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Small Bowel Bleeding Suspected (AB-22.2)

AB.GI.0022.2.C

v2.0.2025

- If small bowel bleeding is suspected as the source of bleeding, and if upper and lower endoscopies are negative:
  - Video capsule endoscopy (VCE) is performed prior to advanced imaging.
    - VCE is not required prior to advanced imaging if small bowel obstruction or stricture of the gastrointestinal tract is suspected, if there is dysphagia, or in individuals with implantable devices such as pacemakers or defibrillators.
  - CT Enterography (CPT® 74177) if upper and lower endoscopy are negative and if VCE is negative. If there is a contraindication to CT Enterography, MR Enterography (CPT® 74183 or CPT® 74183 and CPT® 72197) may be performed.
  - Note: Providers occasionally request a CT or MR Enterography prior to the administration of a VCE, in order to assess whether there is pathology that might impede passage of the capsule and cause retention. This is not supported as a routine procedure prior to VCE. However, guidance from the consensus group of the American College of Gastroenterology recommends that in individuals with obstructive symptomatology, imaging (MR Enterography or CT Enterography) should be performed prior to VCE. This group would also include high risk individuals with a known history of Crohn's Disease, known history of strictures or other obstruction, history of previous pelvic or abdominal radiation, or suspected tumor.
- Iron Deficiency Anemia
  - If the bleeding is determined to be non-gastrointestinal (e.g. hematuria or vaginal bleeding), refer to the appropriate guideline for these conditions.
  - If the source is determined to be gastrointestinal:
    - Upper endoscopy and colonoscopy should be performed, unless contra-indicated.
    - Small bowel video capsule endoscopy is next, if endoscopies are negative (unless contraindicated).
    - CT Abdomen and Pelvis with contrast (CPT® 74177), CT Enterography (CPT® 74177), or MR Enterography (CPT® 74183 or CPT® 74183 and CPT® 72197) (if CT Enterography is contraindicated) can be performed, if small bowel video capsule endoscopy is negative, or for further evaluation of abnormal video capsule findings. CT Enterography should be considered the test of choice given the lack of motion artifact and its superior spatial resolution.

- Meckel's scan (CPT® 78290) can be approved if bleeding is suspected from a Meckel's diverticulum.

Evidence Discussion

The goal of identifying the source of GI tract bleeding is to identify lesion, location, and ability to perform therapeutic intervention. Bleeding from the small bowel is uncommon, accounting for approximately 5–10% of all patients presenting with gastrointestinal (GI) bleeding. The initial diagnostic modality of choice is endoscopy or colonoscopy to help identify lesions and execute appropriate interventions.

Video capsule endoscopy (VCE) is considered a first-line modality for small bowel investigation. Its main advantages are that it is noninvasive and allows examination of the entire length of the small bowel in 70-90% patients with diagnostic yield of 38–83% in patients with suspected small bowel bleeding. The main utility of this test lies in its high positive (94–97%) and negative predictive value (83–100%) in the evaluation of GI bleeding. Findings on VCE leading to endoscopic or surgical intervention or a change in medical management have been reported in 37–87% of patients.

Computed tomographic enterography is indicated in patients with suspected obstruction before VCE or after negative VCE examinations, women who are pregnant, and patients who are unable to swallow the VCE capsule.

Cross-sectional imaging techniques optimized for imaging the small bowel are advantageous due to ability to see all bowel loops without superimposition and the visualization of extra-luminal structures. Enterography can be performed with either CT or MR. CT is more widely used in the setting of GI bleeding because of the superior temporal and spatial resolution compared with MR and is more widely available. CT can detect vascular and inflammatory abnormalities, which may be missed on VCE. Because of the small number of studies regarding MR enterography, this exam is not routinely recommended in lieu of CT enterography, but can be considered in patients aged <40 years because of lower radiation exposure.

References (AB-22)

v2.0.2025

1. Laing CJ, Tobias T, Rosenblum DI, Banker WL, et al. Acute gastrointestinal bleeding: emerging role of multidetector CT angiography and review of current imaging Techniques. *Radiographics.* 2007;27:1055-1070.
2. American Gastroenterological Association Medical Position Statement: Evaluation And Management Of Occult And Obscure Gastrointestinal Bleeding. *Gastroenterology*, 2000;118(1):197-200.
3. Barkun AN, Bardou M, Kuipers EJ, et al. International Consensus Upper Gastrointestinal Bleeding Conference Group. International Consensus Recommendations on the Management of Individuals with Nonvariceal Upper Gastrointestinal Bleeding. *Ann Intern Med*. 2010 Jan 19;152(2):101-13.
4. Wilkins T, Khan N, Nabh A, et al. Diagnosis and Management of Upper Gastrointestinal Bleeding. *Am Fam Physician*. 2012 Mar 1;85(5):469-76.
5. Strate LL, Gralnek IM. ACG Clinical Guideline. Management of Individuals with Acute Lower Gastrointestinal Bleeding. *Amer. J. Gastroenterol*. Advance Online Publication 1 March 2016.
6. Gerson l, et al. ACG Clinical Guideline: Diagnosis and Management of Small Bowel Bleeding. *Amer J Gastroenterol.* 2015;110:1265-1287.
7. Laine L, Jensen D. Management of Individuals with Ulcer Bleeding. *Am J. Gastroenterol* 2012;107:345-360.
8. Garcia-Tsao G, et al. Prevention and Management of Gastroesophageal Varices and Variceal Hemorrhage in Cirrhosis. *Amer J Gastroenterol.* 2007;102:2086-2102.
9. Short M and Domagalski J, Iron deficiency Anemia: Evaluation and Management. *Am. Fam. Physician*. 2013 Jan 15;87(2):98-104.
10. Garcia-Lopez S, Bermejo F. A guide to diagnosis of iron deficiency and iron deficiency anemia in Digestive Diseases. *World Journal of Gastroenterology.* 2009 Oct 7; 5(37):4638-4643.
11. Ghosh S. Investigating Iron Deficiency Anemia without Clinical Evidence of Gastrointestinal Blood Loss. *Canadian Journal of Gastroenterology*. 2012;26(10):686-686.
12. Raju GS, Gerson L, Das A, et al. American Gastroenterological Association (AGA) Institute medical position statement on obscure gastrointestinal bleeding. *Gastroenterology.* 2007;133:1694-1696.
13. Zuckerman GR, Prakash C, Askin MP, et al. AGA Technical review on the evaluation and management of occult and obscure gastrointestinal bleeding. Gastroenterology, 2000; 118:201-221.
14. Enns RA, Hookey L, Armstrong D, et al. Clinical Practice Guidelines for the Use of Video Capsule Endoscopy. *Gastroenterology*. 2017;152(3):497-514. doi:10.1053/j.gastro.2016.12.032.
15. Flemming J, Cameron S. Small bowel capsule endoscopy. *Medicine*. 2018;97(14). doi:10.1097/md.0000000000010148.
16. Technology status evaluation report on wireless capsule endoscopy. *Gastrointestinal Endoscopy*. 2014;79(5):805-815.
17. Imran H, Alexander JT, Jackson CD. Lower gastrointestinal hemorrhage. *JAMA*. 2024;331(19):1666-1667. doi:10.1001/jama.2023.25841
18. Sengupta N, Feuerstein JD, Jairath V, et al. Management of patients with acute lower gastrointestinal bleeding: An updated ACG guideline. *Am J Gastroenterol*. 2023;118(2):208-231. doi:10.14309/ajg.0000000000002130
19. Nagpal P, Dane B, Aghayev A, et. al. Expert Panels on Vascular and Gastrointestinal Imaging. ACR Appropriateness Criteria® Nonvariceal Upper Gastrointestinal Bleeding. Am Coll Radiol (ACR); 2024. https://acsearch.acr.org/docs/69413/Narrative/.
20. Pasha SF, Leighton JA, Das A, et al. Double-balloon enteroscopy and capsule endoscopy have comparable diagnostic yield in small-bowel disease: a meta-analysis. *Clin Gastroenterol Hepatol*. 2008;6(6):671-6. doi:10.1016/j.cgh.2008.01.005.
21. Rondonotti E, Villa F, Mulder CJ, et al. Small bowel capsule endoscopy in 2007: indications, risks and limitations. *World J Gastroenterol*. 2007;13:6140–6149.
22. Delvaux M, Fassler I, Gay G. Clinical usefulness of the endoscopic video capsule as the initial intestinal investigation in patients with obscure digestive bleeding: validation of a diagnostic strategy based on the patient outcome after 12 months. *Endoscopy*. 2004;36:1067–1073.
23. Pennazio M, Santucci R, Rondonotti E, et al. Outcome of patients with obscure gastrointestinal bleeding after capsule endoscopy: report of 100 consecutive cases. *Gastroenterology*. 2004;126:643–653.

24. Huprich JE, Fletcher JG, Fidler JL et al. Prospective blinded comparison of wireless capsule endoscopy and multiphase CT enterography in obscure gastrointestinal bleeding. *Radiology*. 2011;260:744–751.

Inflammatory Bowel Disease (AB-23)

Guideline Page

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IBD (Crohn's Disease or Ulcerative Colitis) (AB-23.1)

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- Suspected Crohn's Disease or Ulcerative Colitis
  - CT Abdomen and Pelvis with contrast (CPT® 74177) or CT Enterography (CPT® 74177) or MR Enterography (CPT® 74183 or CPT® 74183 and CPT® 72197) for ANY of the following:
    - History of malignancy with a likelihood or propensity to metastasize to abdomen
    - Fever (≥101 degrees Fahrenheit)
    - Elevated WBC >10,000, or above the upper limit of normal for the particular lab reporting the result
    - Palpable mass of clinical concern and/or without benign features
    - GI bleeding, overt or occult, not obviously hemorrhoidal
    - Abdominal tenderness documented as moderate or severe
    - Peritoneal signs, such as guarding or rebound tenderness
    - Suspected complication of bariatric surgery
    - Notation by the ordering provider that the patient has a "surgical abdomen"
    - Age >60 years with unintentional weight loss of ≥10 lbs. or ≥5% of body weight over 6 months or less, without an identifiable reason
  - Chronic diarrhea without the above signs or symptoms, see: **Diarrhea, Constipation, and Irritable Bowel (AB-21)**
  - CT Enterography (CPT® 74177) or MR Enterography (CPT® 74183 or CPT® 74183 and CPT® 72197) if none of the above signs or symptoms are present and request is for the evaluation of chronic abdominal pain associated with diarrhea due to a concern for inflammatory bowel disease if:
    - There is a positive family history of inflammatory bowel disease, **OR**
    - There are endoscopy or colonoscopy findings suggestive of inflammatory bowel disease, **OR**
    - Elevated inflammatory markers (fecal lactoferrin ≥4.0 ug/g, CRP >0.5 mg/dL, or fecal calprotectin ≥50 ug/g), **OR**
    - Diagnosis is still in doubt after colonoscopy and evaluation of inflammatory markers, and Crohn's disease is suspected
  - CT Abdomen and Pelvis with or without contrast (CPT® 74177 or CPT® 74176) can be performed prior to endoscopy if requested by or in consultation with the provider who will be performing the endoscopy.
- NOTE: Serologic markers

Serologic and genetic markers are currently under investigation with regards to their value in diagnosing inflammatory bowel disease, and are sometimes used as a screening test for IBD in which other examinations are negative. At the current time they are not considered suitable as a screening test for inflammatory bowel disease in patients with GI symptoms, and the routine use of serologic or genetic markers for the diagnosis of IBD is not indicated. Thus, an isolated positive marker result in a patient without any other findings to suggest IBD, especially in the presence of negative inflammatory markers and endoscopic examinations, is not, in and of itself, an indication for advanced imaging.

- Note: Serologic markers include anti-glycan antibodies, such as ASCA, ACCA, ALCA, AMCA, Anti-L, Anti-C, Anti-OmpC, Anti-Is, Anti-Cbir, pANCA, PAB, GAB

Background and Supporting Information

Studies have demonstrated the negative predictive value of a low fecal calprotectin and CRP with regards to inflammatory bowel disease. Chey, et al. in a meta-analysis demonstrated that a fecal calprotectin <40mcg/g or a CRP ≤0.5 mg/dl effectively excludes inflammatory bowel disease in patients with IBS. Katsinelos, et al. reviewed wireless capsule endoscopy results in patients with abdominal pain and diarrhea. The diagnostic yield of capsule endoscopy in patients with abdominal pain and diarrhea with positive inflammatory markers was 90.1%, and 0% in patients with abdominal pain and diarrhea with negative inflammatory markers. This led the Canadian Association of Gastroenterology to recommend against the use of capsule endoscopy in persons with chronic abdominal pain or diarrhea as their only symptoms and no evidence of biomarkers associated with Crohn's Disease, stating "CE (capsule endoscopy) is not warranted in most patients who present with chronic abdominal pain in the absence of positive tests for inflammatory markers or abnormal findings on endoscopy or imaging".

Evidence Discussion

In individuals with suspected inflammatory bowel disease, cross-sectional imaging can be performed after initial endoscopy is suggestive of inflammatory changes or if abnormal inflammatory markers concerning for IBD, or positive family history of IBD. Cross-sectional imaging methods such as computed tomography and magnetic resonance imaging are complementary to endoscopy, which allows diagnosis of disease when endoscopy is negative and diagnosis is still in doubt.

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Known IBD (AB-23.2)

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- CT Abdomen and Pelvis (CPT® 74177), CT Enterography (CPT® 74177), or MR Enterography (CPT® 74183 or CPT® 74181 and CPT® 72197 or CPT® 72195) for known Crohn's Disease or Ulcerative Colitis and ANY of the following:
  - Suspected complications including abscess, perforation, fistula, or obstruction
  - Monitoring response to therapy
  - To determine change in treatment
- MR Enterography is the test of choice for the follow up of young individuals with IBD given the lack of ionizing radiation and the need for lifetime follow up in many individuals.

Evidence Discussion

Cross-sectional imaging methods such as computed tomography and magnetic resonance imaging are utilized to evaluate IBD disease activity, extra-enteric complication and response to therapy with a great impact on patient management. Magnetic resonance imaging (MRI) has now emerged as suitable radiation-free alternative to CT imaging, with comparable diagnostic accuracy. The current consensus is that non-contrast only techniques such as DWI can be done, if requested.

MRE should be used preferentially in young patients and in patients in whom it is likely that serial exams will need to be performed, because of the absence of any radiation exposure.

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Perirectal/Perianal Disease (AB-23.3)

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This section is applicable to individuals with Crohn's disease. See: **Fistula in Ano (PV-21.1)** and **Perirectal Abscess (PV-21.2)** in the Pelvis Imaging Guidelines for non-Crohn's related perirectal and/or perianal fistulae

- Perirectal/Perianal Fistula:
  - MRI Pelvis without and with contrast (CPT® 72197)
  - Endoscopic ultrasound is preferential to CT in this setting.
  - CT Pelvis with contrast (CPT® 72193) is an inferior study in this setting, and should be used when MRI or Endoscopic ultrasound cannot be performed.
- Perirectal/Perianal Abscess:
  - MRI Pelvis without and with contrast (CPT® 72197)
  - CT Pelvis with contrast (CPT® 72193) is inferior but can be approved as an alternative if desired.

Evidence Discussion

Cross-sectional imaging methods such as magnetic resonance imaging and computed tomography are utilized to evaluate Crohn's related complications like perirectal and/or perianal fistulae or abscess. CT is useful in evaluating abscesses and inflammation; however, due to its limited resolution, defining fistulas may be difficult. MRI, which has better resolution, along with endoscopic ultrasound, are highly accurate in defining perianal and perirectal fistulas and are the preferred modalities for diagnosing fistulas secondary to Crohn's disease.

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Primary Sclerosing Cholangitis (PSC) (AB-23.4)

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- Primary Sclerosing Cholangitis:
  - MRCP can be considered to assess for PSC in those:
    - with IBD and any elevated liver study (including alkaline phosphatase, GGTP, bilirubin, AST, or ALT)
    - without IBD, but with persistent cholestatic liver tests. (See: **Abnormal Liver Chemistries (AB-30)**)
  - Ultrasound or MRI/MRCP can be done as surveillance for cholangiocarcinoma in individuals with PSC every 6 months.

Background and Supporting Information

Primary sclerosing cholangitis (PSC) is a chronic liver and biliary tract disease that can result in stricturing and fibrosis of the intra- and extra- hepatic biliary ducts, as well as end-stage liver disease. It is most often associated with inflammatory bowel disease. Biliary obstruction can occur anywhere along the biliary tree, resulting in cholangitis, and there is a high risk of the development of cholangiocarcinoma, which must be strongly considered in individuals with PSC and a dominant stricture, as well as an increased risk of gallbladder polyps and other malignancies. As such, imaging plays an important role in the diagnosis and follow-up of PSC.[5,6,7]

See: **Chronic Liver Disease, Cirrhosis and Screening for HCC (AB-26.1)**
Background and Supporting Information PSC (Primary Sclerosing Cholangitis) vs PBC (Primary Biliary Cholangitis)

Evidence Discussion

The diagnosis of Primary sclerosing cholangitis can be confirmed via magnetic resonance cholangiography (MRCP) when suspected, in individuals with IBD or in individuals with persistent cholestasis, in the absence of known IBD. Surveillance for cholangiocarcinoma in individuals with PSC can be done with regular cross-sectional imaging with ultrasound or MR every 6 months.

References (AB-23)

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1. Lichtenstein GR, Loftus EV, Isaacs KL, Regueiro MD, Gerson LB, Sands BE. ACG Clinical Guideline: Management of Crohn's Disease in Adults. *American Journal of Gastroenterology*. 2018;113(4):481-517. doi:10.1038/ajg.2018.27.
2. Hara AK, Leighton JA, Heigh RI, et al. Crohn Disease of the Small Bowel: Preliminary Comparison among CT Enterography, Capsule Endoscopy, Small-Bowel Follow-through, and Ileoscopy | *Radiology*.
3. Lin MF and Narra V. Developing role of magnetic resonance imaging in Crohn's disease. *Current Opinion in Gastroenterology*. 2008, 24(2):135-140.
4. Expert Panel on Gastrointestinal Imaging. ACR Appropriateness Criteria® Crohn's disease. American College of Radiology (ACR); Reviewed 2021.
5. Linder KD et al. ACG Clinical Guideline: Primary Sclerosing Cholangitis. *Amer J Gastroenterol*. 2015;110:646-659.
6. Razumilava, N. et al. Cancer Surveillance in individuals with primary sclerosing cholangitis. *Hepatology*. 2011;54: 842-1852.
7. Chapman R, Fevery J, Kalloo A, et al. Diagnosis and Management of Primary Sclerosing Cholangitis. *Hepatology.* 2010;51(2).
8. Katsinelos P, Fasoulas K, Beltsis A, et al. Diagnostic yield and clinical impact of wireless capsule endoscopy in patients with chronic abdominal pain with or without diarrhea: A Greek multicenter study. *European Journal of Internal Medicine*. 2011;22(5). doi:10.1016/j.ejim.2011.06.012.
9. Enns RA, Hookey L, Armstrong D, et al. Clinical Practice Guidelines for the Use of Video Capsule Endoscopy. *Gastroenterology*. 2017;152(3):497-514. doi:10.1053/j.gastro.2016.12.032.
10. Menees SB, Powell C, Kurlander J, Goel A, Chey WD. A Meta-Analysis of the Utility of C-Reactive Protein, Erythrocyte Sedimentation Rate, Fecal Calprotectin and Fecal Lactoferrin to Exclude Inflammatory Bowel Disease in Adults With IBS. *The American Journal of Gastroenterology*. 2015;110(3):444-454. doi:10.1038/ajg.2015.6.
11. Ziech M, Felt–Bersma R, Stoker J. Imaging of Perianal Fistulas. *Clinical Gastroenterology and Hepatology*. 2009;7(10):1037-1045. doi:10.1016/j.cgh.2009.06.030.
12. Berman L. Utility of magnetic resonance imaging in anorectal disease. *World Journal of Gastroenterology*. 2007;13(23):3153. doi:10.3748/wjg.v13.i23.3153.
13. Vogel JD, Johnson EK, Morris AM, et al. Clinical Practice Guideline for the Management of Anorectal Abscess, Fistula-in-Ano, and Rectovaginal Fistula. *Diseases of the Colon & Rectum*. 2016;59(12):1117-1133. doi:10.1097/dcr.0000000000000733.
14. Long MD, Sands BE. What Is the Role of the Inflammatory Bowel Disease Panel in Diagnosis and Treatment? *Clinical Gastroenterology and Hepatology*. 2018;16(5):618-620. doi:10.1016/j.cgh.2018.02.010
15. Magro F, Gionchetti P, Eliakim R, et al. Third European Evidence-based Consensus on Diagnosis and Management of Ulcerative Colitis. Part 1: Definitions, Diagnosis, Extra-intestinal Manifestations, Pregnancy, Cancer Surveillance, Surgery, and Ileo-anal Pouch Disorders. *Journal of Crohn's and Colitis*. 2017;11(6):649-670. doi:10.1093/ecco-jcc/jjx008.
16. Rubin DT, Ananthakrishnan AN, Siegel CA, Sauer BG, Long MD. ACG Clinical Guideline. Ulcerative Colitis in Adults. *The American Journal of Gastroenterology*. 2019;114(3):384-413. doi:10.14309/ajg.0000000000000152.
17. Smalley W, Falck-Ytter C, Carrasco-Labra A, Wani S, Lytvyn L, Falck-Ytter Y. AGA clinical practice guidelines on the laboratory evaluation of functional diarrhea and diarrhea-predominant Irritable Bowel Syndrome in adults (IBS-D). *Gastroenterology*. 2019;157(3):851-854. doi:10.1053/j.gastro.2019.07.004.
18. Assis DN, Bowlus CL. Recent advances in the management of primary sclerosing cholangitis. *Clinical Gastroenterology and Hepatology*. 2023;21:2065-2075. doi:10.1016/j.cgh.2023.04.004.
19. Chazouilleres O, Beuers U, Bergquist, et al. EASL clinical practice guidelines on sclerosing cholangitis. *Journal of Hepatology*. 2022;77:761-806. doi:10.1016/j.jhep.2022.05.011.
20. Seo N, Park SH, et al. MR Enterography for the evaluation of small-bowel inflammation in Crohn disease by using diffusion-weighted imaging without intravenous contrast material: a prospective noninferiority study. *Radiology*. 2016;278(3):762-772. doi:10.1148/radiol.2015150809.

21. Kim JS, Jang HY, Park SH, et al. MR Enterography assessment of bowel inflammation severity in Crohn disease using the MR index of activity score: modifying roles of DWI and effects of contrast phases. *AJR Am J Roentgenol*. 2017;208(5):1022-1029. doi:10.2214/AJR.16.17324.
22. Qiu Y, Mao R, Chen L, et al. Systematic review with meta-analysis: magnetic resonance enterography vs. computed tomography enterography for evaluating disease activity in small bowel Crohn's disease. *Aliment Pharmacol Ther*. 2014;40(2):134-46. doi:10.1111/apt.12815.
23. Soydan, L, et al. Can MR enterography and diffusion-weighted imaging predict disease activity assessed by simple endoscopic score for Crohn's disease? *Journal of the Belgian Society of Radiology*. 2019;103(1):10,1–9. doi:10.5334/jbsr.1521.

Celiac Disease (Sprue) (AB-24)

Guideline Page

Celiac Disease (AB-24.1)

AB.CD.0024.1.A

v2.0.2025

- CT Abdomen and Pelvis with contrast (CPT® 74177), CT Enteroclysis (CPT® 74176 or CPT® 74177), or CT Enterography (CPT® 74177), or MR Enterography (CPT® 74183, or CPT® 74183 and CPT® 72197) is appropriate for:
  - one-time study after initial, confirmed diagnosis of celiac disease
  - confirmed celiac disease and new or continued symptoms (e.g., bloating, diarrhea, abdominal pain, weight loss, distention, evidence of malabsorption, anemia) despite adherence to 6 months of a gluten free diet

Background and Supporting Information

- Celiac is an autoimmune disease in which the villi of the small intestine are damaged from eating gluten (found in wheat, barley, and rye).
- Complications of celiac disease include ulcerative jejunitis, lymphoma, and small intestinal adenocarcinoma.
- Diagnosis is made by blood testing[1]:
  - Anti-tissue transglutaminase antibody [anti-tTG], anti-endomysium antibody (EMA), total IgA count, CBC to detect anemia, ESR, C-reactive protein, complete metabolic panel, vitamin D, E, B12 levels.
- Endoscopy with biopsy of the small bowel is performed to confirm the diagnosis of celiac disease if anti-tTG and/or EMA tests are positive.
- Capsule endoscopy may be used to confirm diagnosis of celiac disease in individuals with positive serology and negative biopsy, or when there is contraindication to biopsy or EGD. See: *Celiac Disease (CAPEND-2)* in the Capsule Endoscopy guidelines.

Evidence Discussion

Serologic studies with antibody testing and upper endoscopy and small bowel biopsies are usually performed to confirm the diagnosis of celiac disease. The findings on standard barium examination are often not specific. Abdominal pain, bloating, diarrhea, and evidence of malabsorption are frequent symptoms of celiac disease, as well as indications for CT imaging. The use of standard CT abdominal imaging, as well as CT Enteroclysis and CT Enterography, allow for the noninvasive assessment of the small bowel to evaluate the extent of disease and identify complications of the disease (including ulcerative jejunoileitis, lymphoma, and small bowel tumors). Early diagnosis of these disorders allows specific treatment to be initiated to prevent increased morbidity and mortality. Added advantages of CT imaging for the diagnosis of celiac disease are simultaneous visualization of the small and large bowel, as well as visualization of mesenteric lymph nodes to determine the presence of mesenteric adenopathy.

References (AB-24)

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1. Rubio-Tapia A, Hill ID, Kelly CP, Calderwood AH, Murray JA. ACG Clinical Guidelines: Diagnosis and Management of Celiac Disease. *The American Journal of Gastroenterology*. 2013;108(5):656-676.
2. Weyenberg SJV, Mulder CJ, Waesberghe JHTV. Small Bowel Imaging in Celiac Disease. Digestive Diseases. 2015;33(2):252-259. doi:10.1159/000369516.
3. Radmard AR, Taheri APH, Nik ES, et al. MR enterography in nonresponsive adult celiac disease: Correlation with endoscopic, pathologic, serologic, and genetic features. *Journal of Magnetic Resonance Imaging*. 2017;46(4):1096-1106. doi:10.1002/jmri.25646.
4. Elsayes KM, Al-Hawary MM, Jagdish J, Ganesh HS, Platt JF. CT Enterography: Principles, Trends, and Interpretation of Findings. *RadioGraphics*. 2010;30(7):1955-1970. doi:10.1148/rg.307105052.
5. Green PHR, Paski S, Ko CW, Rubio-Tapia A. AGA clinical practice update on management of refractory celiac disease: expert review. *Gastroenterology*. 2022;163:1461-1469. doi:10.1053/j.gastro.2022.07.086.
6. Scholz,FJ, Afnan, J, Behr, SC. CT findings in adult celiac disease. *Radiographics*. 2011;31:977-992.
7. Penizzotto,A , Vespa, F, Gove,RL, et al. CT and MR enterography in the evaluation of celiac disease. *RadioGraphics*. 2024;44(4):230122.

CT Colonography (CTC) (AB-25)

Guideline Page

CTC (AB-25.1)

AB.CT.0025.1.A
v2.0.2025

Note: A screening CTC (CPT® 74263) can ONLY be used for an individual who is a candidate for average risk screening as defined below. It cannot be used for any other indication. If the request for a CTC is for any other reason than average risk screening, please refer to diagnostic CTC indications. A diagnostic CTC would be the appropriate code, if approvable, for any other reason than average risk screening. This would include surveillance for a history of colon polyps, the evaluation of a change in bowel habits, abdominal pain, bleeding, etc. Please refer to the definition below of an average-risk individual, as well as the circumstances for which a diagnostic CTC is appropriate.

- Screening CTC (CPT® 74263) for colorectal cancer is NOT indicated if:
  - FIT-DNA (multi-targeted stool DNA test) within the last 3 years, OR
  - colonoscopy within the last 10 years
- Screening CTC (CPT® 74263) can be approved every 5 years for colorectal cancer[1,2,3] for:
  - Average-risk individuals ages 45 to 75
    - Average risk is defined as:
      - no previously diagnosed colorectal cancer, or colonic adenomas, or inflammatory bowel disease involving the colon
  - Individuals between 76 to 85 if there is no history of a previously negative colonoscopy or CTC, or, if in the opinion of the provider, the benefits of screening outweigh the risks.
  - Individuals with a SINGLE first-degree relative diagnosed at age >60 years with colorectal cancer or an advanced adenoma can be screened with CTC beginning at age 40.
    - If there are 2 or more first degree relatives at any age with CRC or an advanced adenoma, or a first degree relative <60, the individual should be screened via colonoscopy, not CTC.
- Diagnostic CTC without contrast (CPT® 74261) can be approved for:
  - Failed conventional colonoscopy due to a known colonic lesion, structural abnormality, or technical difficulty, and/or
  - Conventional colonoscopy is medically contraindicated. Contraindications may include:[4]
    - Coagulopathy
    - Intolerance to sedation
    - Elderly ≥80 years of age
    - Recent (within the last 60 days) myocardial infarction (MI)

- Diagnostic CTC with contrast (CPT® 74262) can be approved if:
  - there is a known obstructing colorectal malignancy so that staging prior to surgery can be performed, if desired
  - there is a clearly stated indication for IV contrast to evaluate extra-colonic organs. When performed in this setting, a CTC with contrast will substitute for a CT Abdomen and Pelvis such that an additional CT Abdomen and Pelvis would generally not be needed.
- MRI Colonography: Currently, no published society-endorsed guideline with respect to colorectal cancer screening lists MRI Colonography as an alternative screening study. As such, requests for MRI Colonography would be considered investigational at this time. There is no specific CPT assigned for this procedure. It is sometimes requested as an MRI Abdomen and MRI Pelvis.

Background and Supporting Information

CT Colonography is routinely performed without contrast, and IV contrast is not needed in most cases

Evidence Discussion

When it comes to screening with CT colonography, guidelines differ regarding the best approach for colorectal cancer (CRC) screening in asymptomatic, average-risk individuals. Generally, CTC is not advised for screening in patients at an increased risk for CRC. This includes those with a history of adenomas or CRC, inflammatory bowel disease, or familial CRC syndromes.

CTC is comparable to colonoscopy in terms of sensitivity and specificity, takes only about 15 minutes, is non-invasive, and often requires no sedation. However, the cathartic agents recommended for CTC are the same as those for conventional colonoscopy. Additionally, CTC imaging is associated with considerable radiation exposure and detected polyps cannot be removed during the procedure. Therefore, those with positive findings on their CTC will require a follow-up colonoscopy.

Notably, the American Cancer Society and US Preventive Services Task Force recommend CTC for screening.

References (AB-25)

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1. Lin JS, Piper MA, Perdue LA, et al. Screening for Colorectal Cancer. *JAMA*, 2016;315(23):2576. doi:10.1001/jama.2016.3332.
2. Yee J, Kim DH, Rosen MP, et al. ACR Appropriateness Criteria® Colorectal cancer screening. Last review date: 2018.
3. Rex DK, Boland CR, Dominitz JA, et al. Colorectal Cancer Screening: Recommendations for Physicians and Patients From the U.S. Multi-Society Task Force on Colorectal Cancer. *Gastroenterology*. 2017;153(1):307-323. doi:10.1053/j.gastro.2017.05.013.
4. Yau TY, Alkandari L, Haaland B, Low W, Tan CH. Is intravenous contrast necessary for detection of clinically significant extracolonic findings in patients undergoing CT colonography? *The British Journal of Radiology*. 2014;87(1036):20130667. doi:10.1259/bjr.20130667.
5. Spada C, Stoker J, Alarcon O, et al. Clinical indications for computed tomographic colonography: European Society of Gastrointestinal Endoscopy (ESGE) and European Society of Gastrointestinal and Abdominal Radiology (ESGAR) Guideline. *Endoscopy*. 2014;46(10):897-915. doi:10.1055/s-0034-1378092.
6. ACR-SAR-SCBT-MR: Practice Parameter for the Performance of Computed Tomography (CT) Colonography in Adults. 2014.
7. Scalise P, Mantarro A, Pancrazi F, Neri E. Computed tomography colonography for the practicing radiologist: A review of current recommendations on methodology and clinical indications. *World Journal of Radiology*. 2016;8(5):472. doi:10.4329/wjr.v8.i5.472.
8. U.S. Preventative Services Task Force. Colorectal cancer: screening. Draft recommendation statement. October 27, 2020. https://uspreventiveservicestaskforce.org/uspstf/draft-recommendation/colorectal-cancer-screening3#fullrecommendationstart.
9. Wolf AMD, Fontham ETH, Church TR, et. al. Colorectal cancer screening for average-risk adults: 2018 guideline update from the American Cancer Society. CA. 2018;68(4):250-281. doi:10.3322/caac.21457.
10. Shaukat A, Kahi CJ, Burke CA, Rabeneck L, Sauer BG, Rex D. ACG clinical guidelines: colorectal cancer screening 2021. *Am J Gastroenterol*. 2021;116(3):458-479. doi:10.14309/ajg.0000000000001122.
11. O'connor B, Boakye-Ansa NK, Brown CA, et al. Predictors of CT colonography use: results from the 2019 national health interview cross-sectional survey. *J Am Coll Radiol*. 2022;19(7):874-880. doi:10.1016/j.jacr.2022.03.018.
12. Final Recommendation Statement. Colorectal Cancer: Screening. Effective 5/18/2021.https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/colorectal-cancer-screening#fullrecommendationstart. doi:10.7326/M23-0779.
13. Qaseem A, Harrod CS, Crandall CJ, Wilt TJ. Screening for colorectal cancer in asymptomatic average-risk adults: A guidance statement from the American College of Physicians (Version 2). *Annals of Internal Medicine*. 2023;176(8).

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Cirrhosis and Liver Screening for Hepatocellular Carcinoma (HCC); Ascites and Portal Hypertension (AB-26)

Guideline Page

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Chronic Liver Disease, Cirrhosis and Screening for HCC (AB-26.1)

AB.CL.0026.1.A

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- Note: for HCC surveillance in Budd-Chiari Syndrome/Hepatic Vein Thrombosis, see: **Hepatic Arteries and Veins (AB-43.1)**
- Ultrasound (CPT® 76700 or CPT® 76705) every 6 months for HCC screening is appropriate in the following circumstances:
  - All individuals, regardless of etiology, with cirrhosis or advanced fibrosis (e.g., Fibrosis Score F3 or greater on an elastography study, or results of a lab study such as FIB-4 or a biopsy indicative of severe activity or advanced fibrosis). See below for any exceptions.
  - All individuals with Hepatitis B, regardless of the presence of cirrhosis or advanced fibrosis.
  - See: **Hepatic Arteries and Veins (AB-43.1)** for individuals with Chronic Budd-Chiari Syndrome (BCS).
  - See: **Monitoring After Fontan Procedure (AB-26.4)** for individuals who have undergone the FONTAN procedure.
  - The presence of liver disease in the absence of advanced fibrosis or cirrhosis, with the exception for those circumstances indicated above, is not an indication for screening. This would include, for example, MASLD (metabolic dysfunction associated steatotic liver disease, formerly known as NAFLD), the presence of which is not an indication for screening in the absence of either advanced fibrosis or cirrhosis.
  - HCC screening may also be indicated in the use of medications or treatments which increase risk of HCC. See: **General Guidelines (AB-1.0)** for additional information.
- If liver nodule is identified on screening:
  - Less than 1cm
    - Repeat US in 3 months, then every 3 to 6 months
    - If stable for 2 years, then return to US every 6 months
  - Greater than or equal to 1cm
    - Multiphase CT Liver (either CPT® 74160 or CPT® 74170) or MRI Abdomen (CPT® 74183) should be performed.
      - If negative: Return to routine surveillance via US in 6 months.

  - If Li-RADS NC (non-categorizable): Repeat the same study or an alternative diagnostic imaging ≤3 months. (Note: non-categorizable refers to a technical problem with the study, such as image omission or severe degradation)
  - If Li-RADS 1 (definitely benign): Return to routine surveillance via US in 6 months.
  - If Li-RADS 2 (probably benign): CT or MRI in 6 months can be approved (US requests are approvable if desired). If unchanged, return to routine surveillance via US.
  - If Li-RADS 3 (intermediate): CT or MRI in 3-6 months, and can be repeated every 6 months 2 more times, for a total of 18 months from the initial finding. If no change by 18 months, return to US surveillance every 6 months.
  - If Li-RADS 4 (probable HCC): Repeat or alternative imaging in ≤3 months. If HCC confirmed: See: **Upper GI Cancers (ONC-14)** in the Oncology Imaging Guidelines.
  - If Li-RADS 5 (HCC confirmed): See: **Upper GI Cancers (ONC-14)** in the Oncology Imaging Guidelines.
  - If Li-RADS M (Malignant, not definitely HCC): Repeat or alternative imaging in ≤3 months, and follow appropriate Oncology guidelines upon diagnosis.

- Exceptions to the above algorithms:
  - Advanced imaging for surveillance may be substituted for US in the following circumstances:
    - Obesity (BMI >35)
    - Marked parenchymal heterogeneity noted on US.
    - Visualization limitations noted on US which could be technical (such as obscuration by intestinal gas, chest wall deformity, etc.), or those related to structural or parenchymal changes in the liver[19]
  - For individuals on the Liver Transplant list: See: **Liver Transplant, Pre-Transplant (AB-42.1)**
- Alpha-fetoprotein ≥20 ng/mL: Multiphasic CT or MRI Abdomen:
  - Further imaging should follow the above algorithm, depending on the findings of the CT or MRI.
  - If the initial CT or MRI does not reveal a lesion, but the AFP increases on subsequent testing, additional advanced imaging by CT or MRI may be approved.
- Contrast-Enhanced Ultrasound (CEUS)
  - Further studies are needed to assess the value of CEUS in this setting, and it is not medically necessary at this time.

Background and Supporting Information

When performed for liver lesion evaluation, a multiphase CT protocol may include non-contrast imaging as well as arterial, portal venous, and delayed-phase post-contrast

imaging. However, these protocols do not always require non-contrast imaging which may not provide additional information in many scenarios. Therefore, a multiphase CT for liver lesion evaluation can be requested as CPT® 74160 (CT Abdomen with contrast) or CPT® 74170 (CT Abdomen without and with contrast).

The American Association for the Study of Liver Diseases (AASLD) revised its guidelines with respect to surveillance for HCC in patients with cirrhosis in 2018. The recommended algorithm now includes either US alone or US with serum AFP every 6 months. It should be noted that "modification of this surveillance strategy based on the etiology of liver diseases or risk stratification models cannot be recommended at this time."[1]

In addition, the AASLD also issued a subsequent Practice Guidance in 2018 and this document forms the basis of these guidelines. The AASLD has adopted the Li-RADS classification of liver lesions with respect to HCC surveillance imaging for patients with advanced liver disease, and follow-up imaging protocols are based on this system. In view of this, the Li-RADS classification now informs imaging protocols used in this guideline.

Note: PSC (Primary Sclerosing Cholangitis) vs. PBC (Primary Biliary Cholangitis)

These 2 entities sound similar, and both are cholestatic, but they are different diseases, and as such have different monitoring requirements.

PSC is an idiopathic cholestatic disease characterized by chronic inflammation, progressive fibrosis, and stricturing of the *medium and large-sized* extra-hepatic or intra-hepatic bile ducts. Segmental bile duct dilation proximal to areas of stricturing creates the characteristic beaded appearance on a cholangiogram, such as MRCP. This may progress and eventually lead to cirrhosis as well. It is most commonly associated with inflammatory bowel disease. From a surveillance standpoint, PSC may be complicated by disease-associated malignancies, including cholangiocarcinoma, hepatocellular carcinoma, and pancreatic cancer. Thus, follow-up imaging in this setting is generally via MRCP +/- MRI Abdomen (CPT® 74181 or CPT® 74183) – See: **Primary Sclerosing Cholangitis (PSC) (AB-23.4)**.

PBC is a complex, chronic, and slowly progressive autoimmune liver disease that predominately affects women, and is characterized by cholestatic liver biochemistries as well as the presence of AMA (Anti-Mitochondrial Antibodies), and results in T-lymphocyte-mediated destruction of *small* intrahepatic bile ducts. This may ultimately lead to cirrhosis, and thus an increased risk of hepatocellular carcinoma. Because of this, surveillance via US screening protocols for HCC are followed in PBC.

It may be necessary, when the diagnosis of PBC is uncertain, for an MRCP to be performed in order to distinguish between PBC and PSC. However, MRI or MRCP is not used for serial monitoring for PBC, once the diagnosis is established. This is in

contradistinction to PSC, in which MRCP is used to surveil for cholangiocarcinoma, as discussed above.

Evidence Discussion

Ultrasound has several advantages over advanced imaging techniques such as computed tomography (CT) and magnetic resonance imaging (MRI). Ultrasound requires no ionizing radiation, is readily available, cost-effective, and often allows for same-day scheduling. The reproducibility of results has made it the initial modality of choice for imaging hepatobiliary conditions and screening for hepatocellular carcinoma (HCC) for the past 20 years. Ultrasound also helps to determine the next appropriate advanced imaging study - whether CT, MRI, or magnetic resonance cholangiopancreatography (MRCP) - along with contrast levels.

Disadvantages include image quality degradation due to bowel gas, challenges in acquiring an acoustic window, obesity, and sonographer inexperience.

Although emerging data may support CT and MRI-based liver surveillance, AASLD does not currently recommend their routine use in patients at risk for HCC. Studies from Asia suggest that both two-phase CT and hepatobiliary contrast-enhanced MRI are more sensitive for early-stage HCC detection compared to US-based surveillance, with sensitivities of 83% and 86% versus 28%–29%, respectively. However, neither CT nor MRI has been validated in Western patient cohorts without chronic viral hepatitis B. Additionally, CT-based surveillance raises concerns about radiation and contrast exposure, especially if conducted semiannually. Similarly, MRI contrast agents present concerns regarding radiology service capacity, patient acceptance, and cost-effectiveness.

Relative to surveillance, AASLD acknowledges the suboptimal performance of CT or MRI in accurately diagnosing HCC in lesions <1cm. AASLD recommends observing patients with sub-centimeter liver lesions on ultrasound by repeat short-interval surveillance using ultrasound and AFP in 3-6 months. Imaging by multiphase CT or contrast-enhanced MRI is advised for those with new or enlarging solid liver lesions >1 cm and patients with unequivocally elevated AFP independent of ultrasound results.

Ascites (AB-26.2)

AB.CL.0026.2.A

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- Abdominal ultrasound (CPT® 76700 or CPT® 76705) and/or Doppler (CPT® 93975) with diagnostic paracentesis required for all initial evaluations of ascites to determine the need for further or advanced imaging.
- Further advanced imaging is determined by the nature of etiology of the ascites (e.g., portal hypertension secondary to cirrhosis, malignancy such as ovarian or pancreatic, heart failure, etc.).
- Peritoneal-venous shunt patency study (CPT® 78291) is considered for evaluation of shunt patency and function in an individual with ascites.

Background and Supporting Information

- Guidance from the American Association for the Study of Liver Diseases (2021) indicates that the initial evaluation of patients with ascites should include a medical history, physical examination, abdominal US with Doppler, lab studies including CBC, Liver function tests, serum and urine electrolytes and paracentesis with ascitic fluid analysis, which then guides further management. They specifically note that "A diagnostic paracentesis should be performed in all patients with new-onset ascites that is accessible for sampling".

Evidence Discussion

According to AASLD guidance for ascites management, Doppler ultrasound is the preferred initial radiologic test. Ultrasound is highly sensitive for diagnosing ascites and does not expose patients to radiation. Depending on the analysis of the ascitic fluid, further imaging such as CT (to evaluate for malignancy or cirrhosis) or an echocardiogram (for heart failure) may be warranted. For patients with refractory ascites and a LaVeen Shunt, a nuclear peritoneal-venous shunt study is the recommended imaging choice.

Portal Hypertension (AB-26.3)

AB.CL.0026.3.A
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- For noninvasive abdominal imaging:
  - Abdominal US (CPT® 76700 or CPT® 76705) (including Duplex Doppler US [CPT® 93975] of the liver and upper abdomen) is required for all initial evaluations to assist in determining the cause (pre-hepatic [e.g. portal vein thrombosis, extrinsic compression from a tumor], intrahepatic [e.g. cirrhosis], and post-hepatic [e.g. hepatic vein thrombosis]). US is very accurate for detecting portal vein or hepatic vein thrombosis.
- For additional imaging indications, see: **Hepatic Arteries and Veins (AB-43.1)**
- TIPS (transjugular intrahepatic portosystemic shunt)
  - See: **Hepatic Arteries and Veins (AB-43.1)**
- Certain requests are made for advanced imaging to evaluate an individual with cirrhosis for the presence of esophageal varices. In general, and in the absence of a contraindication, endoscopy should be performed in individuals to assess for the presence of varices.

Background and Supporting Information

- Most cases of portal hypertension are caused by cirrhosis, and the most feared complication is that of esophageal variceal hemorrhage. Causes of portal hypertension can be divided into prehepatic (e.g. portal vein thrombosis, extrinsic compression from a tumor), intrahelpatic (e.g. cirrhosis) and post-hepatic (e.g. hepatic vein thrombosis) causes. The differentiation of some of these causes may require work-up which includes measurement of the hepatic venous pressure gradient (HVPG) which is considered the gold standard for the evaluation of portal hypertension.
- The gold standard for the assessment of portal hypertension is the Hepatic Venous Pressure Gradient (HPVG [pressure gradient between portal vein and the inferior vena cava]), which is an invasive test.

Evidence Discussion

Initial evaluation of patients suspected of portal hypertension (PH) should always include a detailed history and physical exam, as well as appropriate lab studies. Doppler ultrasound, which is noninvasive, may reveal changes in liver parenchyma and specific alterations in flow. Additionally, transient elastography (TE) should be performed if there is concern for advanced liver disease, as it can assess the degree of liver stiffness, which correlates with liver fibrosis. In cases of uncertainty, advanced imaging such as

a CT scan or MRI may be warranted, though the added cost and exposure to radiation should be considered.

Surrogate markers of clinically significant portal hypertension (CSPH) include the presence of gastroesophageal varices or portosystemic collaterals on cross-sectional abdominal imaging. In the absence of these markers, CSPH can be diagnosed through a liver biopsy to confirm cirrhosis or by measuring portal pressures directly, typically performed by an interventional radiologist. This technique measures the hepatic venous pressure gradient (HVPG), predicting the risk for complications. However, both liver biopsy and direct pressure measurements are invasive with associated risks and require local expertise.

Monitoring After Fontan Procedure (AB-26.4)

AB.CL.0026.4.A

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- Abdominal ultrasound (CPT® 76700 or CPT® 76705) and Doppler (CPT® 93975) every 6 months or per institution protocol
- MR Elastography (CPT® 76391) every 6 months
- If any sized lesions are detected on ultrasound:
  - MRI Abdomen without contrast, or without and with contrast (CPT® 74181 or CPT® 74183) with follow-up timeframes as requested
- If advanced fibrosis or cirrhosis is detected on any imaging modality:
  - HCC monitoring every 6 months after advanced fibrosis or cirrhosis is detected with MRI Abdomen without contrast, or without and with contrast (CPT® 74181 or CPT® 74183) is indicated.
- CT Abdomen and Pelvis with contrast, CT Abdomen with contrast, or other elastography techniques (i.e., Fibroscan) can be used to assess and monitor individuals with contraindications to MRI (e.g., pacemaker devices, etc.).

Background and Supporting Information

- Individuals with single-ventricle physiology who have undergone the Fontan Procedure which redirects venous blood flow to the pulmonary circulation invariably develop liver complications, which can include the development of nodules and cirrhosis secondary to the altered vascular anatomy, and thus are at risk for hepatocellular carcinoma. In addition, the congestive hepatopathy associated with the Fontan procedure makes differentiation of focal liver lesions from congestive changes more challenging than other cirrhotic conditions. Thus, most institutions use MRI rather than US for monitoring in the setting of cirrhosis. In addition, the evaluation for HCC is challenging due to the vascular changes associated with the Fontan procedure, because the typical HCC pattern of delayed venous-phase contrast washout may not be appreciated within the background congestive hepatopathy. Thus, biopsy is usually required. Also, distinguishing dysplastic lesions from true HCC based on LiRADS criteria is very challenging as well. There are no current society endorsed guidelines, and institutions may vary in the monitoring of chronic liver disease in this patient population. The above algorithm represents an accepted approach and is consistent with the consensus from the Fontan-Associated Liver Disease proceedings from the American College of Cardiology Shareholders Meeting (2015) as well as the consensus of a multidisciplinary group of American Society of Transplantation members (2020).

Evidence Discussion

Individuals with single-ventricle physiology who have undergone the Fontan Procedure which redirects venous blood flow to the pulmonary circulation invariably develop liver complications, which can include the development of nodules and cirrhosis secondary to the altered vascular anatomy, and thus are at risk for hepatocellular carcinoma. In addition, the congestive hepatopathy associated with the Fontan procedure makes differentiation of focal liver lesions from congestive changes more challenging than other cirrhotic conditions. Thus, most institutions use MRI rather than US for monitoring in the setting of cirrhosis. In addition, the evaluation for HCC is challenging due to the vascular changes associated with the Fontan procedure, because the typical HCC pattern of delayed venous-phase contrast washout may not be appreciated within the background congestive hepatopathy. Thus, biopsy is usually required. Also, distinguishing dysplastic lesions from true HCC based on LiRADS criteria is very challenging as well. There are no current society endorsed guidelines, and institutions may vary in the monitoring of chronic liver disease in this patient population. The above algorithm represents an accepted approach and is consistent with the consensus from the Fontan-Associated Liver Disease proceedings from the American College of Cardiology Shareholders Meeting (2015) as well as the consensus of a multidisciplinary group of American Society of Transplantation members (2020).

Also see evidence discussion for AB-26.1.

References (AB-26)

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1. Heimbach JK, Kulik LM, Finn RS, et al. AASLD guidelines for the treatment of hepatocellular carcinoma. *Hepatology*. 2017;67(1):358-380. doi:10.1002/hep.29086.
2. Benson AB, D'Angelica MI, Abrams T, et al. National Comprehensive Cancer Network (NCCN) Guidelines Version 1.2024 – April 9, 2024. Hepatocellular Carcinoma, available at: https://www.nccn.org/professionals/physician_gls/pdf/hcc.pdf. Referenced with permission from the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines™) for Hepatocellular Carcinoma, V1.2024 – April 9, 2024. © 2024 National Comprehensive Cancer Network, Inc. All rights reserved. The NCCN Guidelines™ and illustrations herein may not be reproduced in any form for any purpose without the express written permission of the NCCN. To view the most recent and complete version of the NCCN Guidelines™, go online to NCCN.org.
3. Ascites SR, Katz J. Portal Hypertension Imaging: Practice Essentials, Radiography, Computed Tomography. Published June 9, 2017.
4. Khanna R, Sarin SK. Non-cirrhotic portal hypertension – Diagnosis and management. *Journal of Hepatology*. 2014;60(2):421-441.
5. Marrero JA, Kulik LM, Sirlin CB, et al. Diagnosis, Staging, and Management of Hepatocellular Carcinoma: 2018 Practice Guidance by the American Association for the Study of Liver Diseases. *Hepatology*. 2018;68(2):723-750. doi:10.1002/hep.29913.
6. Diamond T, Ovchinsky N. Fontan-associated liver disease: Monitoring progression of liver fibrosis. *Clinical Liver Disease*. 2018;11(1):1-5. doi:10.1002/cld.681.
7. Daniels CJ, Bradley EA, Landzberg MJ, et al. Fontan-Associated Liver Disease. *Journal of the American College of Cardiology*. 2017;70(25):3173-3194. doi:10.1016/j.jacc.2017.10.045.
8. Munsterman ID, Duijnhouwer AL, Kendall TJ, et al. The clinical spectrum of Fontan-associated liver disease: results from a prospective multimodality screening cohort. *European Heart Journal*. 2018;40(13):1057-1068. doi:10.1093/eurheartj/ehy620.
9. Lindor KD, Bowlus CL, Boyer J, Levy C, Mayo M. Primary Biliary Cholangitis: 2018 Practice Guidance from the American Association for the Study of Liver Diseases. *Hepatology*. June 2018. doi:10.1002/hep.30145.
10. Primary Biliary Cirrhosis and Primary Sclerosing Cholangitis: a Review Featuring a Womens Health Perspective. *Journal of Clinical and Translational Hepatology*. 2014;2(4). doi:10.14218/jcth.2014.00024.
11. European Association for the Study of the Liver. EASL clinical practice guidelines on the management of ascites, spontaneous bacterial peritonitis, and hepatorenal syndrome in cirrhosis. *J Hepatol*. 2010;53(3)397-417. doi:10.1016/j.jhep.2010.05.004.
12. Aithal GP, Palaniyappan N, China L, et. al. Guidelines on the management of ascites in cirrhosis. *Gut*. 2020;Epub ahead of print;1-21. doi:10.1136/gutjnl-2020-321790.
13. Oey RC, van Buuren HR, de Man RA. The diagnostic work-up in patients with ascites: current guidelines and future prospects. *Neth J Med*. 2016;74(8):330-335.
14. Emamaullee J, Zaidi AN, Schiano T, et. al. Fontan-associated liver disease. Screening, management and transplant considerations. *Circulation*. 2020;142:519-604.
15. Biggins SW, Anglei P, Garcia-Tsao G, et. al. Diagnosis, evaluation, and management of ascites, spontaneous bacterial peritonitis and hepatorenal syndrome: 2021 practice guidance by the American Association for the Study of Liver Diseases. *Hepatology*. 2021;74(2):1014-1048.
16. Hemgenix. Package insert. CSL Behring LLC; 2022. https://www.fda.gov/media/163467/download.
17. Chavhan GB, Yoo S, Lam CZ, Khanna G. Abdominal imaging of children and young adults with Fontan circulation: pathophysiology and surveillance. *American Journal of Roentgenology*. 2021;217(1):207-217. doi:10.2214/AJR.20.23404.
18. National Bleeding Disorders Foundation Medical and Scientific Advisory Council. MASAC recommendations on screening for development of hepatocellular cancer in persons with hepatitis B and C. National Bleeding Disorders Foundation (New York, NY). Available at: https://www.bleeding.org/sites/default/files/document/files/270_HBCHVC.pdf.
19. Singal AG, Llovet JM, Yarchoan M, et al. AASLD practice guidance on prevention, diagnosis, and treatment of hepatocellular carcinoma. *Hepatology*. 2023;78:1922-1965. doi:10.1097/HEP.0000000000000466.

20. Conangla-Planes M, et al. Imaging diagnosis of portal hypertension. *Radiologia (Engl Ed)*. 2018;60(4):290-300.
21. Kaplan DE, Ripoll C, Thiele M, et al. AASLD practice guidance on risk stratification and management of portal hypertension and varices in cirrhosis. *Hepatology*. 2024;79(5):1180-1211. doi:10.1097/HEP.0000000000000647.
22. deFranchis R, Bosch J, Garcia-Tsao G, Reiberger T, Ripoll C.. Baveno VII – renewing consensus in portal hypertension. *J Hepatol*. 2022;76(4):959-974. doi:10.1016/j.jhep.2021.12.022.
23. Berzigotti A, et al. Noninvasive diagnostic and prognostic evaluation of liver cirrhosis and portal hypertension. *Disease Markers*. 2011;3:129-138.
24. Zhang B, Yang B, Tang Z. Randomized controlled trial of screening for hepatocellular carcinoma. *J Cancer Res Clin Oncol*. 2004;130(7):417-22. doi:10.1007/s00432-004-0552-0.
25. Kim H, An J, Park J, et al. MRI is cost effective for HCC surveillance in high-risk patients with cirrhosis. *Hepatology*. 2019;69:1599-1613.
26. Gupta P, Soundararajan R, Patel A, Kumar-M P, Sharma V, Kalra N. Abbreviated MRI for HCC screening: a systematic review and meta-analysis. *J Hepatol*. 2021;75:108-119.

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MR Cholangiopancreatography (MRCP) (AB-27)

MRCP (AB-27.1)

AB.MR.0027.1.A

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- MRCP (Magnetic Resonance Cholangio Pancreatography) is a non-invasive imaging procedure, which is used to visualize the biliary and pancreatic ductal system. It is used most often in the following circumstances:
  - Suspected gallstone pancreatitis (See: **Pancreatitis (AB-33)**)
  - Suspected biliary pain (See: **Right Upper Quadrant Pain (AB-2.3)** including Suspected Gallbladder Disease and **Epigastric Pain and Dyspepsia (AB-2.5)**)
  - Pancreatic cyst and pseudocyst evaluation (See: **Pancreatic Lesion (AB-31)**, and **Pancreatitis (AB-33)**)
  - Evaluation of abnormal liver chemistries (See: **Abnormal Liver Chemistries (AB-30.1)**)
  - Evaluation of the pancreas secondary to abdominal trauma with suspected duct injury or pseudocyst
  - Recurrent pancreatitis of unknown etiology (See: **Pancreatitis (AB-33)**)
  - Evaluation and follow-up of Primary Sclerosing Cholangitis (See: **Primary Sclerosing Cholangitis (PSC) (AB-23.4)**)
  - Evaluation of jaundice (See: **Abnormal Liver Chemistries (AB-30.1)**)
  - Evaluation of congenital anomalies of the cystic and hepatic ducts
  - Post-surgical biliary anatomy and complications (See: **Liver Transplant, Post-Transplant Imaging (AB-42.3)**)
  - For the further evaluation of ultrasound or CT findings of abnormally dilated biliary duct, dilated pancreatic duct, or enlargement or fullness of the pancreas.
- Code assignment for MRCP
  - In general, there is no specific CPT code to describe MRCP. To report an MRCP, one of the MRI Abdomen codes should be selected, depending on contrast needs (CPT® 74181, CPT® 74182, or CPT® 74183). There is also a level II HCPCS code for MCRP, S8037. Simultaneous billing of any of these codes is redundant and unnecessary.
  - Reporting or billing a *second* MRI code to represent the “MRCP portion” of the study is not supported. When this occurs, it is usually seen as two simultaneous MRI requests, an MRI Abdomen without and with contrast (CPT® 74183) AND an additional MRI Abdomen without contrast (CPT® 74181). This second MRI code, as noted, is not supported. Both the primary MRI Abdomen AND the MRCP portion of the study are covered by the single MRI Abdomen code (CPT® 74183).
  - Requests for 3D rendering (either CPT® 76376 or CPT® 76377) are approvable, if requested, in addition to the primary MRI Abdomen code (CPT® 74181, CPT® 74182, or CPT® 74183).

Evidence Discussion

Magnetic Resonance Cholangiopancreatography (MRCP) is the preferred imaging modality for assessing the biliary and pancreatic systems, offering soft tissue contrast resolution without ionizing radiation exposure. Literature highlights MRCP's high sensitivity and specificity in detecting various hepatobiliary pathologies, including choledocholithiasis, cholangitis, pancreatitis and pancreatic neoplasms. Moreover, MRCP provides detailed visualization of the pancreatic duct and biliary tree, facilitating accurate diagnosis and surgical planning. While ERCP is the gold standard for visualization of pancreaticobiliary ducts and provides opportunity for therapeutic intervention, MRCP is a non-invasive method that has gained wide acceptance for diagnostic evaluation.

Limitations around MRCP include its slower acquisition time with associated higher sensitivity to motion artifact, potential need for sedation, contraindications related to ferrous magnetic implants or foreign bodies, and relatively higher cost compared to alternate options, such as ultrasound or CT. Accessibility could also be an issue, potentially leading to diagnostic delays in some healthcare settings. Safety concerns mainly revolve around gadolinium-based contrast agents, particularly in patients with compromised renal function.

References (AB-27)

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1. Faerber EN, Benator RM, Browne LP, et al. American College of Radiology. ACR practice guideline for the performance of magnetic resonance imaging (MRI) of the abdomen. Reston (VA): American College of Radiology (ACR); 2010 (revised 2015).
2. Kaltenthaler EC, Walters SJ, Chilcott J, et al. MRCP compared to diagnostic ERCP for diagnosis when biliary obstruction is suspected: a systematic review. *BMC Medical Imaging*. 2006;6(1).
3. Griffin N, Charles-Edwards G, Grant LA. Magnetic resonance cholangiopancreatography: the ABC of MRCP. *Insights into Imaging*. 2011;3(1):11-21. doi:10.1007/s13244-011-0129-9.
4. McDonald RJ, McDonald JS, Kallmes DF, et al. Intracranial gadolinium deposition after contrast-enhanced MR imaging. *Radiology*. 2015;275(3):772-82.

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Gallbladder (AB-28)

Guideline Page

Gallbladder (AB-28.1)

AB.GP.0028.1.A
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- Findings on ultrasound or EUS suspicious for malignancy:
  - CT Abdomen with or without and with contrast (CPT® 74160 or CPT® 74170)
- Findings on ultrasound inconclusive for adenomyomatosis:
  - Contrast-Enhanced US (CEUS, CPT® 76978, CPT® 76979)
    - If US and CEUS are inconclusive for adenomyomatosis:
      - MRI Abdomen without and with contrast (CPT® 74183)
- For confirmed gallbladder malignancy:
  - See **Gallbladder and Biliary Tumors - Initial Work-up/Staging (ONC-14.6)** in the Oncology Imaging Guidelines

Gallbladder Polyps

- Individuals at increased risk for gallbladder malignancy (if surgery not chosen):
  - Age >50
  - Primary Sclerosing Cholangitis
  - Indian ethnicity
  - Sessile polyp or gallbladder wall thickening >4mm
- Increased risk for gallbladder malignancy:
  - Polyp <6 mm
    - Ultrasound at 6 months, then yearly for 5 years
  - Polyp 6-9 mm (If cholecystectomy is not chosen)
    - Ultrasound at 6 months, then yearly for 5 years
- No increased risk for gallbladder malignancy:
  - Polyp <6 mm
    - Ultrasound at 1, 3, and 5 years
  - Polyp 6-9 mm
    - Ultrasound at 6 months, and then yearly for 5 years
- Gallbladder polyp ≥10 mm:
  - Surgery recommended. If surgery not performed, follow guidelines for increased risk of gallbladder malignancy as noted above.
- Alternative Imaging:
  - Endoscopic ultrasound (EUS) may provide additional information in the diagnosis of gallbladder polyps. There is insufficient data that advanced imaging (CT or MRI) should be used ahead of conventional ultrasound in the investigation of gallbladder polyps.[1]

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Evidence Discussion

Transabdominal ultrasound is the preferred modality for surveillance of polyps, aiming for stability at the 5-year mark as an endpoint. There is insufficient data that advanced imaging (CT or MRI) should be used ahead of conventional ultrasound in the investigation of gallbladder polyps.

Cholecystectomy is recommended for symptomatic patients, lesions that increase by more than 2 mm in size, and polypoid lesions in patients who are considered high risk.

There is no role for CT, MRI, or endoscopic ultrasound in the surveillance of polypoid lesions of the gallbladder. However, advanced imaging is useful in evaluation of ultrasound findings that are suspicious for malignancy. CT can help to demonstrate any bile duct dilation as well as assist in staging, planning, and management of any found malignancy.

Ultrasound is also the preferred modality for gallbladder adenomyomatosis. Bonatti, et al. state "the use of high-frequency probes and a precise focal depth adjustment enable correct identification and characterization of GA in the majority of cases" (2017). MRI is reserved only for instances of suspected gallbladder adenomyomatosis when ultrasound techniques are inconclusive.

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References (AB-28)

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1. Wiles R, Thoeni RF, Barbu ST, et al. Management and follow-up of gallbladder polyps. *European Radiology*. 2017;27(9):3856-3866. doi:10.1007/s00330-017-4742-y.
2. Andrén-Sandberg Å. Diagnosis and Management of Gallbladder Polyps. *North American Journal of Medical Sciences*. 2012;4(5):203. doi:10.4103/1947-2714.95897.
3. Mccain RS, Diamond A, Jones C, Coleman HG. Current practices and future prospects for the management of gallbladder polyps: A topical review. *World Journal of Gastroenterology*. 2018;24(26):2844-2852. doi:10.3748/wjg.v24.i26.2844.
4. Anderson MA, Appalaneni V, Ben-Menachem T, et al. The role of endoscopy in the evaluation and treatment of patients with biliary neoplasia. *Gastrointestinal Endoscopy*. 2013;77(2):167-174. doi:10.1016/j.gie.2012.09.029.
5. Bonatti M, Vezzali N, Lombardo F, et al. Gallbladder adenomyomatosis: imaging findings, tricks and pitfalls. *Insights Imaging*. 2017;8(2):243-253. doi:1007/s13244-017-0544-7.
6. Golse N, Lewin M, Rode A, Sebagh M, Mabrut J-Y. Gallbladder adenomyomatosis: diagnosis and management. *J Visc Surg*. 2017;154(5):345-353. doi:10.1016/j.jviscsurg.2017.06.004.
7. Stringer M, Ceylan H, Ward K, Wyatt J. Gallbladder polyps in children--classification and management. *J Pediatr Surg*. 2003;38(11):1680-4.

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Liver Lesion Characterization (AB-29)

Guideline Page

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Liver Lesion Characterization (AB-29.1)

AB.LL.0029.1.C
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Note: Advanced imaging approvals in this section refers to MRI Abdomen without and with contrast (CPT® 74183), CT Abdomen with contrast (CPT® 74160), CT Abdomen without and with contrast (CPT® 74170) and Contrast-Enhanced Ultrasound (CPT® 76978-initial lesion, CPT® 76979-additional lesions). In the following section, if only CT Abdomen with contrast (CPT® 74160) is noted as the appropriate study, it is because the American College of Radiology has determined that a prior without contrast study does not provide any added benefit. It should also be noted that a standard "triple-phase CT" liver does not involve a prior without contrast study (See: **CT Imaging (AB-1.2)**)

- **Low-risk** individuals defined as:
  - No known primary malignancy
  - No hepatic dysfunction (abnormal liver tests)
  - No known underlying chronic liver disease
  - No history of alcoholism, sclerosing cholangitis, choledochal cysts, hemochromatosis, or anabolic steroid use[2]
- High-risk individual would have one or more of the above conditions.
- Liver Lesion discovered on US:
  - Indeterminate Liver Lesion ≥1cm on initial imaging
    - No suspicion or evidence of extrahepatic malignancy or underlying liver disease
      - MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen with contrast (CPT® 74160) or Contrast-Enhanced US (CEUS, CPT® 76978, CPT® 76979)
    - Known history of an extrahepatic malignancy:
      - MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen with contrast or without and with contrast (CPT® 74160 or CPT® 74170)
    - Known history of chronic liver disease:
      - See: **Chronic Liver Disease, Cirrhosis, and Screening for HCC (AB-26.1)**
  - Indeterminate Liver Lesion <1cm on initial imaging
    - Known underlying chronic liver disease
      - See: **Chronic Liver Disease, Cirrhosis, and Screening for HCC (AB-26.1)**
    - Known history of an extrahepatic malignancy:
      - MRI Abdomen without and with contrast (CPT® 74183) is the preferred study.
      - Contrast-Enhanced US (CPT® 76978, CPT® 76979) is appropriate.

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- CT Abdomen is generally not the appropriate study in this scenario. In most circumstances, the resolution of CT does not allow for definitive characterization of lesions <1cm.

- Liver Lesion discovered on CT (non-contrast or single-contrast) or non-contrast MRI
  - Indeterminate, ≥1cm on initial imaging:
    - No suspicion or evidence of extrahepatic malignancy or underlying liver disease
      - Multiphase CT Abdomen with contrast (CPT® 74160), MRI Abdomen without and with contrast (CPT® 74183), or CEUS (CPT® 76978 and/or CPT® 76979)
    - Known history of an extrahepatic malignancy:
      - MRI Abdomen without and with contrast (CPT® 74183), CT Abdomen with contrast or without and with contrast (CPT® 74160 or CPT® 74170), or CEUS (CPT® 76978 or CPT® 76979)
    - Known chronic liver disease:
      - See: **Chronic Liver Disease, Cirrhosis, and Screening for HCC (AB-26.1)**
  - Indeterminate liver lesion <1cm on initial imaging:
    - Known history of an extrahepatic malignancy:
      - MRI Abdomen without and with contrast (CPT® 74183), Multiphase CT Abdomen (CPT® 74160), or CEUS (CPT® 76978 and/or CPT® 76979)
    - Known chronic liver disease:
      - See: **Chronic Liver Disease, Cirrhosis, and Screening for HCC (AB-26.1)**
- Additional scenarios and follow-up imaging for an Indeterminate lesion[2]:
  - Indeterminate lesion <1cm on US, CT, or MRI, **low-risk** individual (See above "Low-Risk individuals") and no suspicious imaging features noted on the study
    - No further imaging
  - Indeterminate lesion <1cm in **high-risk** individuals on US, CT, or unenhanced MRI (See above 'High Risk") not specifically dealt with in the above guidelines:
    - MRI Abdomen without and with contrast (CPT® 74183)
    - If, after MRI, the lesion remains indeterminate or not fully characterized
      - See: **Liver Metastases (ONC-31.2)**or malignancy-specific guidelines in the Oncology Imaging Guidelines
      - If **biopsy cannot be performed**, follow-up MRI can be obtained in 3-6 months. Additional imaging in this setting can be considered on an individual basis. This timeframe would also apply if the lesion is indeterminate and an MRI with Eovist is requested for further evaluation in this setting.
  - Most lesions ≥1cm can be categorized by MRI or histology. For lesions which have been categorized, regardless of size, see below.
- For the imaging of specific focal liver lesions[39]:
  - Suspected hepatic adenoma:
    - MRI is considered the best technique for characterization. Follow-up imaging can be CT Abdomen (CPT® 74160 or CPT® 74170) or MRI Abdomen (CPT®

74183) every 6 months for 2 years, and then annually, to establish any growth patterns and assess for malignant transformation.

- Hepatic Hemangioma (if not completely characterized on initial CT without a liver protocol):
  - Multiphase CT Abdomen (CPT® 74160 or CPT® 74170) or MRI Abdomen (CPT® 74183)
  - Follow-up imaging is indicated as follows:
    - In individuals with cirrhosis or chronic hepatitis B, continued imaging with multiphase CT Abdomen (CPT® 74160 or CPT® 74170) or MRI Abdomen (CPT® 74183) every 3-6 months for one year.
      - See also: **Chronic Liver Disease, Cirrhosis and Screening for HCC (AB-26.1)** for continued HCC surveillance
    - Giant hemangiomas (>4cm) can be followed by limited abdominal US in 6-12 months. If no change in size, no further follow-up is indicated, unless it becomes symptomatic.
    - See below for pre-operative considerations
- Focal Nodular Hyperplasia (FNH):
  - MRI Abdomen (CPT® 74183) or CT Abdomen (CPT® 74160 or CPT® 74170) to confirm a diagnosis of FNH. The use of Eovist contrast is often diagnostic in differentiating FNH from other lesions seen on MRI or CT.
  - Additional follow-up is annual US for 2 to 3 years in women diagnosed with FNH who are continuing to use oral contraceptives. Follow-up with CT (CPT® 74160 or CPT® 74170) or MRI (CPT® 74183) can be done if the lesion is not adequately visualized on US.
- Hepatic cysts:
  - Asymptomatic, simple cysts do not require additional follow-up.
  - For complicated cysts (US shows internal septations, fenestrations, calcifications, irregular walls, as well as the presence of daughter cysts):
    - CT Abdomen (CPT® 74160 or CPT® 74170) or MRI Abdomen (CPT® 74183) can be performed

- Additional indications for advanced imaging (MRI Abdomen or CT Abdomen):
  - If documented that a percutaneous liver biopsy is to be considered if imaging is atypical or inconclusive.[1]
  - Fatty liver (hepatic steatosis) on US with a focal liver lesion.
  - **If there is a technical limitation to US (e.g. marked heterogeneity, or other specifically noted technical limitations of US such as obscuration by intestinal gas, chest wall deformity, etc.)[4]
  - For suspected liver metastases, see: **Liver Metastases (ONC-31.2)** in the Oncology Imaging Guidelines

- Preoperative studies for individuals with large hemangiomas or adenomas considered for resection:
  - MRA Abdomen (CPT® 74185) or CTA Abdomen (CPT® 74175) can be considered
- For Indeterminate Lesions ≥1cm in categories for which defined guidelines do not exist (i.e., underlying chronic liver disease, **Chronic Liver Disease, Cirrhosis, and Screening for HCC (AB-26.1)**, underlying malignancy, **Liver Metastases (ONC-31.2)** or the specific malignancy in the Oncology Imaging Guidelines, hepatic adenoma, etc.) a biopsy should be considered when the findings from advanced imaging are inconclusive. In clinical situations when a biopsy cannot be performed (such as a medical contraindication or a liver transplant candidate due to the risk of needle-tract seeding), or is inconclusive, a short-term surveillance MRI can be performed in 3-4 months to monitor lesion stability.
- This can be repeated every 6 months, as necessary in this scenario.[1] This timeframe would also apply if an MRI with Eovist is requested for short-term follow-up of an indeterminate lesion imaged on MRI Abdomen without and with contrast performed with other contrast, such as gadolinium. An exception would be if the differential is between FNH vs. hepatic adenoma or other benign lesions. FNH follow-up is yearly, and hepatic adenoma would require a 6 month follow-up study; if the differential of the lesion is between FNH and hepatic adenoma, then the follow-up study should be 6 months.

Evidence Discussion

For further characterization of a liver lesion seen on other imaging, CT offers high spatial resolution and rapid image acquisition, making it suitable for initial characterization of liver lesions. CT can be highly accurate in establishing whether or not a liver lesion is benign.

MRI provides superior soft tissue contrast and multi-parametric capabilities, facilitating further tissue characterization when needed (particularly small lesions). Nonetheless, the use of gadolinium-based contrast agents in MRI poses safety concerns, including the risk of nephrogenic systemic fibrosis (NSF) in patients with impaired renal function. For patients with a history of malignancy outside the liver, MRI is more accurate at differentiating between benign and malignant lesions. Thus, CT is not recommended over MRI in this scenario.

Fatty Liver (Metabolic Associated Steatotic Liver Disease (MASLD), formerly known as NAFLD) (AB-29.2)

AB.LL.0029.2.A

v2.0.2025

- Fatty liver (hepatic steatosis) incidentally discovered on imaging (US/CT/MRI) or suspected:
  - Magnetic Resonance Elastography (MRE) (CPT® 76391)
    - See: **Liver Elastography (AB-45)** for MRE indications
  - Magnetic Resonance-Protein Density Fat Fraction (MRI-PDFF, usually requested as CPT® 74181 or 74183), MR Spectroscopy (MR-S, CPT® 76390), and the multiparametric MRI referred to as Liver Multiscan (LMS, Category III CPT® code 0648T or 0649T) for evaluation of fatty liver disease:
    - With regards to the above procedures, their main current utility is in assessing response to therapy in clinical trials. Their role in clinical practice, or with what frequency one would image, has not been defined. In view of this, they are experimental and investigational at this time.
  - HCC Screening for Fatty Liver with cirrhosis or advanced fibrosis:
    - See: **Chronic Liver Disease, Cirrhosis, and Screening for HCC AB-26.1)**
  - MRI or CT for the further evaluation of incidentally discovered fatty liver on US, in the absence of a specific finding needing further characterization such as a nodule, is generally not indicated. See: **Liver Lesion Characterization and Additional Indications for Advanced Imaging AB-29.1**. In addition, the finding of fatty liver alone on CT with contrast does not require MRI for confirmation.
  - Requests for imaging studies to screen individuals at high-risk for MASLD (formerly known as NAFLD) (e.g., diabetes or obesity) or for screening family members of individuals with MASLD is not approvable at this time.[3]

Evidence Discussion

Fatty liver is often detected incidentally by ultrasound, CT, or MRI performed for other indications. Fat detected in the liver may have many causes including medications, starvation, excessive alcohol intake, other chronic medical illnesses, and metabolic syndrome. Non-Alcoholic Fatty Liver Disease (NAFLD), now known as Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD), is the most common cause of steatotic (fatty) liver. NALFD (used throughout henceforth) can often lead to serious liver injury (non-alcoholic steatohepatitis: NASH) and complications of cirrhosis. Therefore,

monitoring using additional imaging modalities may be indicated, in addition to other non-invasive tests.

For those individuals where fatty liver is incidentally discovered on imaging (US/CT/MRI) or in conditions where NAFLD is suspected, Magnetic Resonance Elastography (MRE) may be indicated.

Other procedures, such as Magnetic Resonance-Protein Density Fat Fraction, MR Spectroscopy, and the multiparametric MRI referred to as Liver Multiscan may be ordered for evaluation of fatty liver disease but their main current utility is in assessing response to therapy in clinical trials and are considered investigational.

Requests for imaging studies to screen individuals at high-risk for NAFLD (e.g., diabetes or obesity) or for screening family members of individuals with NAFLD is not approvable at this time.

Polycystic Liver Disease (AB-29.3)

AB.LL.0029.3.A
v2.0.2025

- Polycystic Liver Disease
  - Defined as >20 cysts, or the presence of cysts occupying ½ the volume of the hepatic parenchyma.
  - Most commonly seen as an extra-renal manifestation of Autosomal Dominant Polycystic Kidney Disease, though may occur as Autosomal Dominant Polycystic Liver Disease.
  - Imaging:
    - For prognostication purposes MRI Abdomen (CPT® 74183) or CT Abdomen (CPT® 74160 or CPT® 74170) can be performed initially to assess liver volume.
    - At this time, there is no evidence that the asymptomatic patient requires surveillance imaging or monitoring.
    - Suspected complications such as cyst rupture or hemorrhage (manifested by acute pain in the upper abdomen):
      - MRI Abdomen (CPT® 74183) or CT Abdomen (CPT® 74160 or CPT® 74170)

Evidence Discussion

Ultrasonography is the first step in diagnosing polycystic liver disease (PLD). Abdominal ultrasound to screen for PLD should be offered to all patients diagnosed with autosomal dominant polycystic kidney disease (ADPKD). Imaging follow up is not routinely indicated or recommended in asymptomatic patients. CT Abdomen or MRI Abdomen may be indicated in symptomatic patients to assess the extent of PLD/cyst burden and to assess the liver volume. MRI or CT can be used in PLD to evaluate the distribution of cysts within the liver parenchyma and the relation to hepatic vasculature. Ultrasound or MRI Abdomen may be used to diagnose cyst hemorrhage, when suspected. CT Abdomen is not recommended to diagnose cyst hemorrhage. CT may detect gas or calcification but is less accurate for assessing cyst contents. There is no need to screen family members of patients with PLD for the presence of hepatic cysts unless symptoms are present. Screening for intracranial aneurysms is not recommended for patients with PCLD. Routine post treatment imaging is not indicated.

Isolated or Incidental Hepatomegaly (AB-29.4)

AB.LL.0029.4.A
v2.0.2025

- Initial imaging of hepatomegaly discovered or suspected on physical examination:
  - US Abdomen (CPT® 76700 or CPT® 76705) and Duplex (CPT® 93975 or CPT® 93976)
- Further evaluation of abnormalities on initial ultrasound that require further characterization:
  - Refer to specific guidelines for the abnormality detected on US
    - Fatty liver (liver steatosis), see: **Fatty Liver (Metabolic Associated Steatotic Liver Disease (MASLD), formerly known as NAFLD) (AB-29.2)**
    - Hepatic lesion, see: **Liver Lesion Characterization (AB-29.1)**
- Hepatomegaly discovered on ultrasound and no indeterminate abnormalities:
  - Medical workup, including lab studies such as liver tests, and history and physical should be performed to assess for suspected underlying disease (e.g. infiltrative disease such as amyloid, lymphoma, etc.)
    - Lab abnormalities and/or symptoms of a specific disease process should follow imaging studies outlined in the guideline for that disease process.
    - Advanced imaging in the absence of symptoms or lab abnormalities indicative of an underlying disorder is not indicated.

Background and Supporting Information

As noted by the AASLD "…imaging tests, such as ultrasound, computed tomography (CT), and MR, do not reliably reflect the spectrum of liver histology in patients with NAFLD." In addition, "MR imaging, either by spectroscopy or by proton density fat fraction is an excellent noninvasive modality for quantifying hepatic fat and is being widely used in NAFLD clinical trials…..However, the utility of noninvasively quantifying HS (hepatic steatosis) in patients with NAFLD in routine clinical care is limited".[3]

- Hints for liver lesion imaging:
  - Imaging accuracy:
    - A non-contrast CT is less sensitive than ultrasound
    - A non-contrast MRI is better than a non-contrast CT, but inadequate to define the etiology of a lesion
    - Triple-phase scanning is essential in characterizing a liver lesion
- How to interpret the radiologist's descriptors:

- Hemangioma:
  - Hyperechoic
  - Peripheral nodular enhancement
  - Fills in from the periphery (nodular centripedal fill-in on venous and delayed phases)
- Focal nodular hyperplasia:
  - Homogenous enhancement
  - Washout. No delayed rim enhancement
  - Central scar (with fibrous-appearing septae radiating from the scar)
  - MRI specifics:
    - Homogenous on T1
    - Scar hyperintense on T2
    - Uniformly hyperintense with contrast
- Hepatic adenoma:
  - Irregular enhancement
  - Fat-containing
  - Washout
  - Central hemorrhage
  - No rim enhancement
  - No central scar
  - MRI specifics: Hyperintense signal on T1 and T2-weighted imaging with intra-lesional lipid
- Hepatocellular carcinoma:
  - HCC's are hypervascular and receive 100% of their blood supply from the hepatic artery, whereas the liver parenchyma receives 30% from the hepatic artery and 70% from the portal vein, and this discrepancy can be exploited during imaging.
  - Dynamic imaging via MRI and CT follows tumor density with time after IV contrast bolus.
  - During the early arterial phase: HCC appears brighter than surrounding liver (hyperintense) due to hepatic arterial supply.
  - May have a necrotic central region
  - Washes out rapidly
  - Delayed post-contrast phase: rim enhancement (a "tumor capsule")
- Focal fat (pseudo-mass)
  - Area with sharply demarcated borders
  - Absence of mass effect of surrounding architecture
  - Vessels can course through the region
  - No rim enhancement

- No central scar

Evidence Discussion

Hepatomegaly (enlarged liver) can be detected by physical exam and imaging studies, such as ultrasound, CT, MRI and nuclear medicine studies. An enlarged or palpable liver does not always indicate primary liver disease, so advanced imaging should be directed by history, other physical findings and laboratory results.

An enlarged liver can be caused by:

- Primary liver disease (hepatitis, alcoholic liver disease, NAFLD (non-alcoholic fatty liver disease), other causes of liver inflammation
- Metastatic or primary liver tumors
- Infiltrative disease (such as amyloidosis, infiltrative lymphoma)
- Impaired venous outflow (such as right heart failure, Budd-Chiari syndrome)
- Storage disorders (such as Gaucher Disease, Alpha-1 antitrypsin deficiency)
- Polycystic liver disease
- Other less common causes

Initial imaging studies should be chosen based on history, physical exam, laboratory studies and prior imaging studies. Usually, ultrasound of the abdomen and/or duplex scan would be the initial tests. Advanced imaging, such as CT or MRI are likely to be indicated based on findings based on specific guidelines based on the abnormality detected on ultrasound.

References (AB-29)

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1. Lalani T, Rosen MP, Blake MA, Baker ME, et al. Expert Panel on Gastrointestinal Imaging. ACR Appropriateness Criteria® liver lesion -- initial characterization. American College of Radiology (ACR), 2014.
2. Gore RM, Pickhardt PJ, Mortele KJ, et al. Management of Incidental Liver Lesions on CT: A White Paper of the ACR Incidental Findings Committee. *Journal of the American College of Radiology*. 2017;14(11):1429-1437. doi:10.1016/j.jacr.2017.07.018.
3. Chalasani N, Younossi Z, Lavine JE, et al. The diagnosis and management of nonalcoholic fatty liver disease: Practice guidance from the American Association for the Study of Liver Diseases. *Hepatology*. 2017;67(1):328-357. doi:10.1002/hep.29367.
4. Heimbach JK, Kulik LM, Finn RS, et al. AASLD guidelines for the treatment of hepatocellular carcinoma. *Hepatology*. 2017;67(1):358-380. doi:10.1002/hep.29086.
5. Albrecht T. Dynamic Vascular Pattern of Focal Liver Lesions with Contrast-Enhanced Ultrasound: Latest Results with SonoVue. *Contrast-Enhanced Ultrasound in Clinical Practice*:1-22. doi:10.1007/88-470-0357-1_1.
6. Nolsøe CP, Lorentzen T. International guidelines for contrast-enhanced ultrasonography: ultrasound imaging in the new millennium. *Ultrasonography*. 2016;35(2):89-103. doi:10.14366/usg.15057.
7. Greenbaum LD. Foreword to Guidelines and Good Clinical Practice Recommendations for Contrast Enhanced Ultrasound (CEUS) in the Liver – Update 2012. *Ultrasound in Medicine & Biology*. 2013;39(2):186. doi:10.1016/j.ultrasmedbio.2012.09.021.
8. Chalasani N, Younossi Z, Lavine JE, et al. The Diagnosis and Management of Non-alcoholic Fatty Liver Disease: Practice Guideline by the American Gastroenterological Association, American Association for the Study of Liver Diseases, and American College of Gastroenterology. *Gastroenterology*. 2012;142(7):1592-1609. doi:10.1053/j.gastro.2012.04.001.
9. Chandok N. Polycystic liver disease: a clinical review. *Annals of Hepatology*. 2012;11(6):819-826. doi:10.1016/s1665-2681(19)31406-1.
10. Cnossen WR, Drenth JP. Polycystic liver disease: an overview of pathogenesis, clinical manifestations and management. *Orphanet Journal of Rare Diseases*. 2014;9(1):69. doi:10.1186/1750-1172-9-69.
11. Aerts RMV, Laarschot LFVD, Banales JM, Drenth JP. Clinical management of polycystic liver disease. *Journal of Hepatology*. 2018;68(4):827-837. doi:10.1016/j.jhep.2017.11.024.
12. Schiffman, Mitchell. Director, Liver Institute of Virginia. Assessment of Liver Masses. Presentation at 2019 American College of Gastroenterology Hepatology School and Eastern Regional Postgraduate Course. Washington, DC, June 7-9, 2019.
13. Aytaman, Ayse. Hepatocellular Carcinoma. Presentation at 2019 American College of Gastroenterology Hepatology School and Eastern Regional Postgraduate Course. Washington, DC, June 7-9, 2019.
14. Singal, Amit. Approach to Liver Lesions: Abnormal Sonogram, Please Evaluate. Medical Director, Liver Tumor Program, UT Southwestern Medical College. Presentation at 2019 American College of Gastroenterology Hepatology School and Eastern Regional Postgraduate Course. Washington, DC, June 7-9, 2019.
15. Bell, Daniel. Et. al. Hepatocellular Carcinoma *Radiopedia*
16. Marrero JA, Kulik LM, Sirlin CB, et al. Diagnosis, Staging, and Management of Hepatocellular Carcinoma: 2018 Practice Guidance by the American Association for the Study of Liver Diseases. *Hepatology*. 2018;68(2):723-750. doi:10.1002/hep.29913.
17. Castera L, Friedrich-Rust M, Loomba R. Noninvasive Assessment of Liver Disease in Patients With Nonalcoholic Fatty Liver Disease. *Gastroenterology*. 2019;156(5). doi:10.1053/j.gastro.2018.12.036
18. Chartampilas E. Imaging of nonalcoholic fatty liver disease and its clinical utility. *Hormones*. 2018;17(1):69-81. doi:10.1007/s42000-018-0012-x
19. EASL–EASD–EASO Clinical Practice Guidelines for the management of non-alcoholic fatty liver disease. Journal of Hepatology. 2016;64(6):1388-1402. doi:10.1016/j.jhep.2015.11.004
20. Caussy C, Reeder SB, Sirlin CB, Loomba R. Noninvasive, Quantitative Assessment of Liver Fat by MRI-PDFF as an Endpoint in NASH Trials. *Hepatology*. 2018;68(2):763-772. doi:10.1002/hep.29797

21. American College of Radiology ACR Appropriateness Criteria® Liver Lesion-Initial Characterization Revised 2020. https://acsearch.acr.org/docs/69472/Narrative/.
22. National Institute for Health and Care Excellence (NICE-UK). Liver Multiscan for Liver Diagnosis. Medtech Innovation Briefing 26April2019.
23. Breiman R, Beck J, Korobkin M, et al. Volume determinations using computed tomography. *AJR Am J Roentgenol*. 1982;138:329–33.
24. McNeal G, Maynard W, Branch R, et al. Liver volume measurements and three-dimensional display from MR images. *Radiology*. 1988;169:851–4.
25. Heymsfield S, Fulenwider T, Nordlinger B, et al. Accurate measurement of liver, kidney, and spleen volume and mass by computerized axial tomography. *Ann Intern Med*. 1979;90:185–7.
26. Gosink B, Leymaster C. Ultrasonic determination of hepatomegaly. *J Clin Ultrasound.* 1981;9:37–44.
27. Kratzer W, Fritz V, Mason RA, et al. Factors affecting liver size: a sonographic survey of 2080 subjects. *J Ultrasound Med.* 2003;22:1155.
28. Kudo M. Riedel's lobe of the liver and its clinical implication. *Intern Med.* 2000;39:87.
29. Loloi J, Patel A, McDevitt P, et al. How Strongly Do Physical Examination Estimates and Ultrasonographic Measurements of Liver Size Correlate? A Prospective Study. *Am J Med*. 2019;32:103.
30. Karlo C, Reiner CS, Stolzmann P, et al. CT- and MRI-based volumetry of resected liver specimen: comparison to intraoperative volume and weight measurements and calculation of conversion factors. *Eur J Radiol.* 2010;75:e107.
31. Farraher SW, Jara H, Chang KJ, et al. Liver and spleen volumetry with quantitative MR imaging and dual-space clustering segmentation. *Radiology.* 2005;237:322.
32. Rinella ME, Neuschwander-Tetri BA, Siddiqui MS, et al . AASLD practice guidance on the clinical assessment and management of nonalcoholic fatty liver disease. *Hepatology*. 2023;77(5):1797-1835.
33. Mavilia MG, et al., Differentiating cystic liver lesions: a review of imaging modalities, diagnosis and management. *J Clin Transl Hepatol*. 2018;6(2):208-216.
34. Chandok N. Polycystic liver disease: a clinical review. *Ann Hepatol*. 2012;11(6):819–8264.
35. Gevers TJG, Drenth JPH. Diagnosis and management of polycystic liver disease. *Nat Rev Gastroenterol Hepatol.* 2013;10(2):101–108.
36. van Aerts RMM, Van de Laarschot LFM, Banales JM, Drenth JPH. Clinical management of polycystic liver disease. *J Hepatol*. 2018;68(4):827–837.
37. Drenth J, Barten T, Hartog H, et al. EASL clinical practice guidelines on management of cystic liver diseases. *J Hepatol*. 2022;77(4):1083–1108.
38. Wong MYW, McCaughan GW, Strasser SI. An update on the pathophysiology and management of polycystic liver disease. *Expert Rev Gastroenterol Hepatol*. 2017;11(6):569–581.
39. Frenette C, Mendiratta-Lala M, Salgia R, et al. ACG clinical guideline: focal liver lesions. *The American Journal of Gastroenterology*. 2024;119(7):1235-1271. doi:10.14309/ajg.0000000000002857.

Abnormal Liver Chemistries (AB-30)

Guideline Page

Abnormal Liver Chemistries (AB-30.1)

AB.LC.0030.1.A
v2.0.2025

Elevated AST and/or ALT (>33 IU/l for males, >25 IU/l for females) and other LFTs are normal or Hepatocellular pattern of elevation (AST and ALT disproportionately elevated to ALKP):

- <2X normal:
  - Repeat lab after 3 weeks and discontinuation of medications associated with elevated LFTs (such as statins, niacin, sulfa, rifampin, tetracycline, estrogen) if applicable.
  - If LFTs remain elevated: Abdominal US (CPT® 76700 or CPT® 76705)
    - Above studies do not explain the cause of the elevated transaminases AND HAV IgG, HBsAg, HBcAb, HBsAb, HCV Ab, iron panel (may include ferritin, serum iron, iron-binding capacity, or transferrin saturation) have been performed and are inconclusive:
      - CT Abdomen with contrast (CPT® 74160)
- 2 to 15X normal:
  - Abdominal US (CPT® 76700 or CPT® 76705)
    - Above studies do not explain the cause of the elevated transaminases AND HAV IgG, HBsAg, HBcAb, HBsAb, HCV Ab, iron panel (may include ferritin, serum iron, iron-binding capacity, or transferrin saturation) have been performed and are inconclusive:
      - CT Abdomen with contrast (CPT® 74160)
- >15X normal:
  - Abdominal US with Doppler (CPT® 76700 or CPT® 76705 and CPT® 93975) OR
  - CT Abdomen with contrast (CPT® 74160) OR
  - CT Abdomen and Pelvis with contrast (CPT® 74177)
    - Above studies do not explain the cause of the elevated transaminases AND HAV IgG, HBsAg, HBcAb, HBsAb, HCV Ab, iron panel (may include ferritin, serum iron, iron-binding capacity, or transferrin saturation) have been performed and are inconclusive:
      - MRI Abdomen without and with contrast (CPT® 74183) and/or MRCP (CPT® 74181)

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- If the findings suggest chronic liver disease, see: **Chronic Liver Disease, Cirrhosis and Screening for HCC (AB-26.1)**
- If the findings suggest hemochromatosis, see: **Hereditary (Primary) Hemochromatosis (HH) and Other Iron Storage Disease (AB-11.2)**

Elevated alkaline phosphatase level (or GGT), and other LFTs are normal or Cholestatic pattern of elevation (ALKP elevated disproportionately to AST and ALT)

- If isolated ALKP elevation, GGT should be obtained for confirmation of hepatic etiology, prior to imaging.
- If ALKP is elevated with other LFTs, no confirmatory test is necessary.
    - Confirmed hepatic etiology of elevated ALKP:
        - Abdominal or RUQ ultrasound (CPT® 76700 or CPT® 76705)
            - Dilated biliary ducts on US:
                - MRCP
        - No dilated biliary ducts on US:
            - Anti-mitochondrial antibody (AMA) should be checked prior to advanced imaging.
                - If AMA is negative, and ALKP >2X ULN:
                    - MRCP
                - If AMA is negative, and ALKP 1 to 2X ULN:
                    - observe for 6 months
                    - if ALKP remains elevated after 6 months: MRCP
- CT Abdomen with contrast (CPT® 74160) if the above studies are unrevealing or individual cannot undergo MRCP.

Isolated elevated bilirubin (no other LFTs elevated)

- Elevation is unconjugated, and no other LFT elevations:
    - No advanced imaging
- Elevation is conjugated
    - RUQ ultrasound
        - Dilated biliary ducts on ultrasound:
            - MRCP
        - No dilated biliary ducts on US:

- Anti-mitochondrial antibody (AMA) should be checked prior to advanced imaging
    - AMA negative and elevation persists or is unexplained:
        - MRCP or liver biopsy
- CT Abdomen with contrast (CPT® 74160) if the above studies are unremarkable or the individual cannot undergo MRCP.

Clinical jaundice, no known predisposing condition

- Abdominal ultrasound (CPT® 76700 or CPT® 76705)
    - For further imaging, follow guideline for elevated bilirubin
- Clinical jaundice, suspected mechanical obstruction based on clinical condition or laboratory values (e.g., known choledocholithiasis, acute and chronic pancreatitis, suspected stricture from a recent invasive procedure, previous biliary surgery, suspected tumor):
    - CT Abdomen with contrast (CPT® 74160) or MRI and/or MRCP (CPT® 74183 or CPT® 74181)
- US findings suggesting mechanical biliary obstruction, non- diagnostic or technically limited US (e.g., large amounts of intestinal gas, obesity with BMI >35):
    - CT Abdomen with contrast (CPT® 74160) or MRI and/or MRCP (CPT® 74183 or CPT® 74181)

Additional considerations

- For individuals with elevated LFTs and suspicion of sclerosing cholangitis, such as those with IBD, see: **Primary Sclerosing Cholangitis (PSC) (AB-23.4)**.
- For individuals with elevated LFTs and history of underlying malignancy, please refer to the specific oncology guidelines, when appropriate.
- Requests for additional advanced imaging (CT, MRI, etc.) are based on the prior imaging results, as appropriate to the finding (for example, if a lesion is identified that needs further characterization, refer to liver lesion imaging as per **Liver Lesion Characterization (AB-29.1)**)

Background and Supporting Information

- The standard laboratory tests commonly referred to as “LFTs” include bilirubin, alkaline phosphatase (alkphos or ALKP), aspartate transaminase (AST), alanine transaminase (ALT), and gamma-glutamyl transferase (GGT).
- The major patterns of elevation which affect work-up are:
- Hepatocellular (AST and ALT disproportionately elevated to ALKP)
- Cholestatic (ALKP elevated disproportionately to AST and ALT)

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- Mixed pattern (ALKP, AST, and ALT all elevated)
- Isolated hyperbilirubinemia (elevated bilirubin and normal ALKP, ALT and AST)
- "R" Ratio
  - "R" Ratio: The so-called "R" ratio can be used to determine whether a pattern of multiple elevated liver chemistries is predominately cholestatic or hepatocellular in origin
  - R=(ALT/Upper limit of normal (ULN))/(ALKPH/ULN ALKPH)
    - If the "R" ratio:
      - >5 = hepatocellular
      - <2 = cholestatic
      - 2-5 = mixed pattern
  - For hepatocellular, use AST or ALT elevation guidelines
  - For cholestatic, use ALKPH elevation guidelines
  - Use ULN for ALT as noted above, and ULN for alkphos based on the individual lab report

Evidence Discussion

Liver blood tests look at how well the liver is functioning and can indicate whether there is any damage or inflammation inside the liver. Obtaining liver chemistries for both screening and diagnostic purposes are essential. When abnormalities are found they will frequently direct the provider to obtain further diagnostic testing including advanced imaging.

A liver blood test looks at the chemicals (enzymes), proteins and other substances made by the liver to assess whether levels of any of these are abnormal. The major initial tests are for alanine transaminase, aspartate transaminase, alkaline phosphatase, and gamma-glutamyl transpeptidase.

Repeating abnormal tests helps to confirm damage to the liver.

The synthetic function of the liver can be assessed by evaluating levels of albumin and vitamin-dependent clotting factors.

Iron storage, autoimmune, infectious, cholestatic, hepatocellular, drug induced, and other liver diseases are identified, followed, and diagnosed with the help of abnormal liver chemistries.

Liver chemistries are an essential part of the non-invasive diagnosis and management of liver disease.

References (AB-30)

v2.0.2025

1. Kwo P, et al. ACG Clinical Guideline: Evaluation of Abnormal Liver Chemistries. *Am J Gastroenterol* 2017; 112:18-35.
2. O'Shea RS, Dasarathy S, McCullough AJ. ACG practice guidelines: alcoholic liver disease. *American Journal of Gastroenterology*. 2010;105:14-32.
3. Hindman NM, Arif-Tiwari H, Kamel IR, et al. ACR Appropriateness Criteria® Jaundice. Available at: https://acsearch.acr.org/docs/69497/Narrative/. American College of Radiology.
4. American College of Radiology ACR Appropriateness Criteria® Jaundice, Revised 2018.
5. EASL Clinical Practice Guidelines: Management of cholestatic liver diseases. *Journal of Hepatology*. 2009;51(2):237-267. doi:10.1016/j.jhep.2009.04.009.
6. Fargo, MV, et.al, Evaluation of Jaundice in Adults. Am Fam Physician, 2017;95(3):164-68.
7. Aronsohn A, Gondal B. A Systematic Approach to Patients with Jaundice. *Seminars in Interventional Radiology*. 2016;33(04):253-258. doi:10.1055/s-0036-1592331.
8. Arif-Tiwari H, Porter KK, Kamel IR, et al. ACR Appropriateness Criteria® Abnormal Liver Function Tests. Available at https://acsearch.acr.org/docs/3158167/Narrative. American College of Radiology.
9. Kalas MA, Chavez L, Leon M, Taweesedt PT, Surani S. Abnormal liver enzymes: A review for clinicians. *World J Hepatol*. 2021;13(11):1688-1698. doi:10.4254/wjh.v13.i11.1688.

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Pancreatic Lesion (AB-31)

Guideline Page

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Pancreatic Cystic Lesions (AB-31.1)

AB.PC.0031.1.A
v2.0.2025

Screening studies for pancreatic cancer can be considered in those who are considered high risk in the following guideline: **Pancreatic Cancer (ONC-13)** in the Oncology Imaging Guidelines.

- Note:
  - Individuals who are not medically fit for surgery should not undergo further surveillance of incidentally found pancreatic cysts, irrespective of size.
  - Surveillance should be discontinued if an individual is no longer a surgical candidate. However, follow-up imaging can be performed if requested for a symptomatic cyst (such as the development of jaundice secondary to cyst), in which palliative treatment might be available.
- This guideline applies to the following pancreatic cystic lesions:
  - Intraductal papillary mucinous neoplasms (IPMN)
  - Mucinous cystic neoplasms (MCN)
  - Serous Cystadenomas (SCA)
  - Solid-pseudopapillary neoplasms (SPN)
- Pancreatic Cyst seen on Imaging-Initial Management:
  - MRI Abdomen (CPT® 74183) and/or MRCP are the tests of choice for initial evaluation.
    - Both MRI Abdomen and MRCP may be performed, but only one CPT® 74183 should be used, not two.
  - CT Pancreatic protocol (CPT® 74160) or EUS are alternatives in patients who are unable to undergo MRI.
  - Indeterminate cysts may benefit from a second imaging modality or EUS prior to proceeding with surveillance. MRI/MRCP can be approved to better characterize the lesion, without reference to the timeframe for follow-up imaging, if a previous US or CT Abdomen has been performed.
  - Radiographic diagnosis of a non-neoplastic cyst or classic features of a serous cystadenoma
    - No further imaging
  - If any of the following are present the individual should proceed to EUS + FNA and depending on findings, surgical consultation:
    - Main duct >5mm
    - Cyst ≥3cm
    - Change in main duct caliber with upstream atrophy

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    - If EUS does not reveal findings of main duct involvement, patulous ampulla, cytology with high-grade dysplasia or pancreatic malignancy, or a mural nodule, then follow up MRI should performed in 6 months.

- Pancreatic Cyst Follow up Imaging
  - If high risk features (See below High Risk Considerations and Features) are not present, then the next follow-up imaging proceeds as follows:
    - Cyst <1cm: MRI in 2 years
    - Cyst 1-<2cm: MRI in 1 year
    - Cyst 2-3cm: if cyst is not clearly an IPMN or MCN then proceed with EUS. If it is an IPMN or MCN, then MRI at 6-12 months.
    - If the cyst is determined to be a serous cystadenoma, then no further evaluation unless symptomatic.
- Additional Surveillance for a presumed IPMN or MCN (imaging from time of presentation):
- (Note: MRCP or MRI/MRCP is the preferred modality for surveillance due to non-invasiveness, lack of radiation, and improved delineation of the main pancreatic duct. In addition, since the timeframes for surveillance imaging are based on the size of the cyst as well as characteristics such as the presence or absence of high-risk features, it is necessary to have an adequate description of these findings from the previous imaging study, either by inclusion of the previous imaging report, or an adequate description of the findings. Finally, the date of the previous study is needed so that the appropriate timing for the next study can be determined.)
  - Cyst <1cm
    - MRI every 2 years for 4 years.
    - If stable after 4 years consider lengthening of interval imaging.
    - If increase in cyst size, then MRI or EUS in 6 months.
    - If stable, repeat again in 1 year and if stable return to MRI every 2 years.
  - Cyst 1-<2cm
    - MRI yearly for 3 years
    - If stable for 3 years, then change to MRI every 2 years for 4 years
    - If stable after the additional 4 years, consider lengthening of interval for surveillance.
    - If increase in cyst size, repeat MRI in 6 months. If stable, repeat MRI in 1 year and if remains stable, resume original surveillance schedule.
  - Cyst 2-<3cm
    - MRI every 6-12 months for 3 years
    - If stable after 3 years, change to MRI every year for 4 years
    - If remains stable, consider lengthening of surveillance interval
  - Cyst ≥3cm
    - MRI alternating with EUS every 6 months for 3 years

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        - If stable for 3 years, increase interval to MRI alternating with EUS yearly for 4 years.
        - If remains stable, consider lengthening of surveillance interval.
        - If increase in cyst size, EUS + FNA
    - Additional considerations
        - Individuals with asymptomatic cysts that are diagnosed as pseudocysts on initial imaging and clinical history, or are determined to be serous cystadenomas, do not require further evaluation.
        - High-Risk Considerations and Features
            - Individuals with IPMNs or MCNs with new onset or worsening diabetes
            - Rapid increase in cyst size (>3mm/year) during surveillance may have an increased risk of malignancy and should undergo a short-interval MRI or EUS.
            - Additional high-risk features which may prompt early evaluation are:
                - jaundice secondary to the cyst
                - acute pancreatitis secondary to the cyst
                - significantly elevated CA 19-9
                - presence of a mural nodule or solid component either within the cyst or in the pancreatic parenchyma
                - dilation of the main pancreatic duct >5mm
                - focal dilation of the pancreatic duct concerning for main duct IPMN or an obstructing lesion
                - IPMNs or MCNs measuring ≥3cm in diameter
                - presence of high-grade dysplasia or pancreatic cancer on cytology. In this circumstance, imaging should be at the discretion of the provider.
- Post-op surveillance
    - Surgically resected serous cystadenomas, pseudocyst, or other benign cyst:
        - No additional imaging after resection.
    - Surgically resected mucinous cystic neoplasms (MCNs) without an associated pancreatic malignancy (can have low, intermediate, or high-grade dysplasia):
        - No additional post-op surveillance.
    - Surgically resected MCNs with invasive cancer:
        - Standard surveillance-based pancreatic cancer guidelines (See: **Pancreatic Cancer-Surveillance/Follow-up (ONC-13.5)** in the Oncology Imaging Guidelines) for 5 years. No surveillance required after 5 years.
    - Surgically resected IPMNs
        - IPMN with cancer
            - Pancreatic cancer surveillance guidelines (See: **Pancreatic Cancer-Surveillance/Follow-up (ONC-13.5)**in the Oncology Imaging Guidelines)

        - IPMN with high-grade dysplasia
            - MRI Abdomen (CPT® 74183) or EUS every 6 months
        - IPMN with low- or intermediate-grade dysplasia
            - MRI Abdomen (CPT® 74183) every 2 years
    - Surgically resected solid-pseudopapillary neoplasm with negative margins:
        - MRI Abdomen (CPT® 74183) yearly for 5 years.
- See: **MR Cholangiopancreatography (MRCP) (AB-27)** for coding guidelines for MRCP.

Evidence Discussion

- Some pancreatic cystic lesions have malignant potential and need to be followed by either advanced imaging, endoscopic ultrasound, or both.
- Advanced imaging includes MRI, MRCP, and CT imaging as these modalities are most effective in characterizing these lesions. MRI abdomen or MRCP are the initial studies of choice. The American Gastroenterological Association states, "MRI is the preferred surveillance imaging modality over computed tomography because MRI does not expose the patient to radiation and better demonstrates the structural relationship between the pancreatic duct and associated cyst. Also, MRI is less invasive than EUS" (2015). Thus, CT is reserved as an alternative for individuals who are unable to undergo MRI.
- Follow-up imaging may or may not be recommended based on the nature of the cystic lesion, the size, or change in size of the lesion and how rapidly the size of the lesion changes. Smaller lesions with no concerning characteristics or changes undergo less surveillance due to the small absolute risk of malignancy. concerning features such as rapid increase in size have increased risk of malignancy and therefore undergo more frequent or longer-term surveillance intervals.

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Incidental Pancreatic Mass or Suspected Metastatic Disease to Pancreas (AB-31.2)

AB.PC.0031.2.A

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- CT Abdomen with contrast with dual phase imaging (CPT® 74160), or MRI Abdomen without and with contrast (CPT® 74183).
- Note: A pancreatic protocol CT involves scan acquisition during a parenchymal and portal venous phase, each of which are post-contrast administration.

Evidence Discussion

Dual phase, MDCT (multidetector CT) scans play a critical role in diagnosing and staging pancreatic cancers. MR and EUS can be used in groups of patients where CT scan results are inconclusive in tumor localization and/or staging, particularly in vascular involvement.

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References (AB-31)

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1. Vege SS, Ziring B, Jain R, et al. and the Clinical Guidelines Committee Guideline American Gastroenterological Association Institute guideline on the diagnosis and management of asymptomatic neoplastic pancreatic cysts. *Gastroenterol*. 2015 Apr;148(4):819-822.
2. Elta GH, Enestvedt BK, Sauer BG, Lennon AM. ACG Clinical Guideline: Diagnosis and Management of Pancreatic Cysts. *The American Journal of Gastroenterology*. 2018;113(4):464-479. doi:10.1038/ajg.2018.14.
3. Tempero MA, Malafa MP, Al-Hawary M, et al. National Comprehensive Cancer Network (NCCN) Guidelines Version 1.2020 – November 26, 2019. Pancreatic adenocarcinoma, available at: https://www.nccn.org/professionals/physician_gls/pdf/pancreatic.pdf. Referenced with permission from the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines™) for Pancreatic adenocarcinoma V 1.2020 – November 26, 2019. © 2019 National Comprehensive Cancer Network, Inc. All rights reserved. The NCCN Guidelines™ and illustrations herein may not be reproduced in any form for any purpose without the express written permission of the NCCN. To view the most recent and complete version of the NCCN Guidelines™, go online to NCCN.org.
4. American College of Radiology ACR Appropriateness Criteria® Staging of Pancreatic Ductal Adenocarcinoma. New 2017. https://acsearch.acr.org/docs/3099847/Narrative/.
5. Gijón de la Santa L, Pérez Retortillo JA, Miguel AC, Klein LM. Radiology of pancreatic neoplasms: an update. *World J Gastrointestinal Oncol.* 2014;6(9):330-343. doi:10.4251/wjgo.v6.i9.330.
6. Muthusamy VR. ASGE clinical guideline on the role of endoscopy in the diagnosis and treatment of cystic pancreatic neoplasms. *Gastrointestinal Endoscopy*. 2016;84(1):1-9.

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Pancreatic Pseudocysts (AB-32)

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Pancreatic Pseudocysts (AB-32.1)

AB.32.1.A
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See: **Acute Pancreatitis (AB-33.1)** or **Chronic Pancreatitis (AB-33.2)**

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Pancreatitis (AB-33)

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Acute Pancreatitis (AB-33.1)

AB.PX.0033.1.A
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- Knowledge base:
  - Acute pancreatitis (2 of 3 of the following criteria):
    - Characteristic abdominal pain (typically epigastric or left upper quadrant pain with radiation to the back, chest, or flank)
    - Amylase or lipase >3 times the upper limit of normal
    - Radiographic evidence of pancreatitis on cross-sectional imaging
  - Early Phase takes place in the first week
    - Goals of imaging:[1]
      - Establish the correct diagnosis or provide an alternative diagnosis.
      - Establish the etiology.
      - Stage the morphologic severity.
      - Assess for complications in patients who deteriorate or fail to improve.
  - Late phase can last weeks to months thereafter
    - Goals of imaging:[1]
      - Monitor established pancreatic collections.
      - Delineate the presence of symptomatic and asymptomatic complications.
      - Guide interventional procedures.
  - Etiologies of pancreatitis:
    - Gallstones and alcohol account for 75-80% of all causes[1].
    - Hypercalcemia, hypertriglyceridemia, medications, a benign or malignant obstruction, pancreatic mass, genetic causes (hereditary pancreatitis), autoimmune pancreatitis (IgG4), infectious etiologies, ischemia secondary to vascular disease, anatomic abnormalities (e.g., pancreas divisum), physiologic abnormalities (Sphincter of Oddi dysfunction), idiopathic causes.
  - Complications:
    - Early Phase:[2]
      - Generally manifests as a systemic inflammatory response
      - In the first week, imaging findings correlate poorly with clinical severity[1]
      - Advanced imaging is most useful when performed 5-7 days after admission, when local complications have developed and pancreatic necrosis can be clearly defined.
      - IEP = acute interstitial edematous pancreatitis
      - Necrotizing Pancreatitis
    - Late Phase:[2]

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  - APFC (Acute peripancreatic fluid collection) occurs during the first 4 weeks. If it does not resolve within 4 weeks, it can become organized and develop into a pseudocyst, which contains only fluid with no nonliquefied components.
  - Walled-off necrosis (sequelae of necrotizing pancreatitis): inhomogenous nonliquefied components, encapsulated with a wall.
- Note: Most cases of pancreatitis are mild. More severe cases are usually hospitalized and imaging is performed in that setting. The majority of imaging requests are for the initial evaluation of suspected pancreatitis in individuals with epigastric pain, and then the follow-up imaging of discharged individuals with respect to complications experienced during the hospitalization, to further elucidate the etiology of the pancreatitis if this was not previously established, or to evaluate continued post-discharge symptoms.
- The presence of any red flag findings per **General Guidelines (AB-1.0)** precludes adjudication based on any other criteria.
- Imaging:
  - Initial imaging for suspicion of pancreatitis (typical symptoms, <48 to 72 hours, first-time presentation)[3]
    - Abdominal ultrasound (CPT® 76700 or CPT® 76705)
      - Purpose is to establish the presence/absence of gallstones and biliary ductal dilation.
      - Doppler ultrasound (CPT® 93975) can be approved to assess vasculature, if requested.
    - If ultrasound or CT is performed and is nondiagnostic due to technical limitation (obesity, overlying gas, etc.):
      - MRI/MRCP (CPT® 74183 or CPT® 74181)
      - CT Abdomen and Pelvis with contrast (CPT® 74177) or CT Abdomen with contrast (CPT® 74160) if ultrasound is nondiagnostic and MRI/MRCP cannot be performed.
    - In suspected acute biliary pancreatitis and/or cholangitis (dilated ducts or choledocholithiasis on ultrasound, elevated liver chemistries with a negative ultrasound, suspicion of cholangitis (classic triad is RUQ pain, fever, and jaundice))[4]
      - MRI/MRCP (CPT® 74183 or CPT® 74181)
  - Initial imaging with atypical signs and symptoms when diagnoses other than pancreatitis are being considered (e.g., bowel perforation, bowel ischemia):
    - CT Abdomen and Pelvis with contrast (CPT® 74177) or CT Abdomen with contrast (CPT® 74160)
    - MRI/MRCP* (CPT® 74181 or CPT® 74183) can be considered for pregnant patients (non-contrast), or those with renal insufficiency (without or without and with depending on request).

- Follow-up imaging (late phase and thereafter):
  - Continued or worsening symptoms:
    - CT Abdomen and Pelvis with contrast (CPT® 74177), CT Abdomen with contrast (CPT® 74160) or MRI and/or MRCP (CPT® 74183 or CPT® 74181)
  - Follow-up of known pancreatic or peri-pancreatic fluid collections (including pseudocysts), to follow-up symptomatic collections, or for interventional planning:
    - MRI/MRCP (CPT® 74183 or CPT® 74181) or CT Abdomen and Pelvis (CPT® 74177)
      - Note: If requested, CT Abdomen with contrast (CPT® 74160) or Abdominal ultrasound (CPT® 76705 or CPT® 76700) can be approved.

    (Note: Frequency or intervals for additional follow-up is not defined and depends on clinical circumstances, response to therapy, etc.)
  - If, despite initial imaging, the etiology of the pancreatitis is still in doubt:
    - MRI/MRCP (CPT® 74183 or CPT® 74181) or CT Abdomen and Pelvis with (CPT® 74177)
      - Note: If requested, CT Abdomen with contrast (CPT® 74160) can be approved.
- Acute recurrent pancreatitis
  - Abdominal ultrasound (CPT® 76705 or CPT® 76700)
  - MRI/MRCP (CPT® 74183 or CPT® 74181)
  - CT Abdomen and Pelvis with contrast (CPT® 74177)
  - See: **Chronic Pancreatitis (AB-33.2)**

Background and Supporting Information

- *NOTE: While MRI/MRCP will give better evaluation of the pancreatic parenchyma as well as biliary and pancreatic ducts, it does NOT provide coverage and adequate evaluation of the bowel to assess alternative diagnoses such as bowel ischemia or perforation.

Evidence Discussion

Abdominal imaging is useful to confirm the diagnosis of acute pancreatitis (AP). As per 2024 ACG Guidelines, abdominal ultrasound should be performed as the initial imaging study in patients with AP to evaluate for biliary pancreatitis. Advanced imaging should be reserved for patients in whom the diagnosis is unclear. When ultrasound results are inconclusive due to overlying bowel gas or other patient factors, or when amylase and/or lipase levels remain elevated, CT or MRI should be considered as the next step. Although contrast-enhanced CT offers over 90% sensitivity and specificity in diagnosing acute pancreatitis, its routine use is not recommended since the diagnosis is clear in many patients who typically experience a mild, uncomplicated course.

In patients who fail to improve after 48–72 hours, exhibiting persistent symptoms such as pain, fever, nausea/vomiting, and inability to tolerate oral feeding, imaging studies like CT or MRI/MRCP are recommended. These are used to assess local complications, including necrotizing pancreatitis or pancreatic or peri-pancreatic fluid collections. Although MRI takes more time and can be challenging for claustrophobic patients, it offers advantages for those with contrast allergies or renal insufficiency. Additionally, MRI can more accurately detect stones in the common bile duct (CBD) and diagnose pancreatic duct disease or follow up on symptomatic fluid collections.

Chronic Pancreatitis (AB-33.2)

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- If chronic pancreatitis is suspected:
  - Initial imaging:
    - CT Abdomen with contrast or without and with contrast (CPT® 74160 or CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183)
      - If diagnostic criteria are met (pancreatic calcification in combination with pancreatic atrophy and/or dilated pancreatic duct):
        - No further imaging indicated (See below regarding worsening symptoms)
    - If initial CT is inconclusive or nondiagnostic of chronic pancreatitis:
      - MRI/MRCP with secretin enhancement (CPT® 74183 or CPT® 74181), OR
      - Endoscopic ultrasound (EUS)
    - If EUS is inconclusive, pancreatic function testing and/or ERCP can be performed
    - Note: If abdominal ultrasound is requested at any stage for evaluation of chronic pancreatitis, this can be approved in lieu of advanced imaging
  - If initial imaging fails to confirm chronic pancreatitis, but the clinical suspicion remains, the above testing can be repeated in 6 months.
- Known chronic pancreatitis with worsening symptoms or pain
  - CT Abdomen with or without and with contrast (CPT® 74160 or CPT® 74170), MRI/MRCP (CPT® 74183 or CPT® 74181) or Abdominal ultrasound (CPT® 76700 or CPT® 76705) can be approved
  - Note: Possible etiologies of worsening pain include:
    - peptic ulcer disease
    - GI cancers
    - pseudocysts
    - duodenal or common bile duct obstruction
    - pancreatic duct stone or strictures
    - inflammatory masses at the head of the pancreas
- For pre-surgical planning or post-surgical evaluation for treatment of complications of chronic pancreatitis
  - CT Abdomen with or without and with contrast (CPT® 74160 or CPT® 74170), or MRI/MRCP (CPT® 74183 or CPT® 74181) or Abdominal ultrasound (CPT® 76700 or CPT® 76705)
- Routine screening for pancreatic cancer in chronic pancreatitis
  - As noted in the American College of Gastroenterology Clinical Guideline for Chronic Pancreatitis [13] “There is a lack of evidence to suggest that performing

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screening examinations on patients with CP (chronic pancreatitis) to detect malignancy is beneficial…..Although the overall prevalence of pancreatic malignancy is increased in patients with CP, there are no RCTs (randomized controlled trials), systematic reviews, or meta-analyses to support screening this patient population for pancreatic malignancy." As such, the ACG Guideline concludes "At this time there is no definitive benefit to screen patients with CP for pancreatic ductal adenocarcinoma. This is based on the invasive and costly nature of testing, the inherent difficulty in screening given the structural changes of CP, and the inability to alter in many cases the natural history of the disease even if malignancy is detected at an early stage."

- Therefore, routine surveillance to monitor for the occurrence of pancreatic cancer in individuals with chronic pancreatitis is not supported at this time. For other indications for imaging in chronic pancreatitis, see the above. For pancreatic cancer screening guidelines in inherited syndromes, including hereditary pancreatitis, see: **Screening Studies for Pancreatic Cancer (ONC-13.1)** in the Oncology Imaging Guidelines

Background and Supporting Information

- Clinical signs of chronic pancreatitis include history of alcohol use, abdominal pain, weight loss, steatorrhea, malabsorption, recurrent pancreatitis, fatty food intolerance, low fecal elastase.

Evidence Discussion

CT or MRI is used as first-line diagnostic imaging for chronic pancreatitis (CP) as they are both universally available, reproducible, and valid when compared to other imaging modalities. While ultrasound has been used for many years as a non-invasive and inexpensive method to evaluate the pancreas, there are considerable limitations that limit its diagnostic utility.

Due to its discrepancy in cost, availability, invasiveness, and objectivity, as well as its low specificity, endoscopic ultrasound (EUS) should be used only if the diagnosis is still in question after cross-sectional imaging is performed.

Patients with early CP may have completely normal conventional MRCP/MRI studies, and only the secretin stimulation will depict the mildly abnormal pancreatic duct compliance.

When the diagnosis of CP cannot be made following standard cross-sectional imaging or EUS, secretin-enhanced MRCP is suggested as it allows for better visualization of the main- and side-branch ducts by stimulating release of bicarbonate from the pancreatic duct cells and allows for quantification of the degree of filling into the duodenum which may correlate with the severity of CP and also help quantify the degree of exocrine pancreatic function. It does carry a high cost, which is why it is recommended to be used

only when diagnosis is not confirmed with first-line testing. However, EUS does carry poor interobserver agreement, and definitive diagnosis is felt to also require advanced radiologic imaging. It is also a more invasive procedure. For this reason, there are also practice guidelines that advocate for the use of MRI/MRCP with secretin enhancement prior to EUS.

While multiple other imaging modalities, such as contrast-enhanced EUS, ERCP, transcutaneous ultrasonography, and pancreatic elastography have been used to establish the diagnosis of CP, high-quality RCT evidence is not available to warrant their inclusion as first-line diagnostic tests for CP.

Exocrine Pancreatic Insufficiency (AB-33.3)

AB.PX.0033.3.A
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- The presence of any red flag findings per **General Guidelines (AB-1.0)** precludes adjudication based on any other criteria.
- Pancreatic Insufficiency
  - The initial evaluation for pancreatic insufficiency should include one of the following laboratory results:
    - Elevation in fecal fat
    - Fecal elastase <200 mcg/g
    - Serum trypsinogen <20ng/mL
  - CT Abdomen with (CPT® 74160) or without and with contrast (CPT® 74170) or MRI/MRCP (CPT® 74183 or 74181) for the evaluation of suspected pancreatic insufficiency:
    - for suspected pancreatic insufficiency with any one of the above laboratory findings
  - For suspected pancreatic insufficiency due to known chronic pancreatitis, see: **Chronic Pancreatitis (AB-33.2)**
  - For suspected pancreatic insufficiency due to known cystic fibrosis, see: **(PEDAB-16)** and **(PEDCH-5.1)**
  - For suspected pancreatic cancer, see: **Pancreatic Cancer – Suspected/ Diagnosis (ONC-13.2)**

Background and Supporting Information

- Exocrine pancreatic insufficiency (EPI) reflects reduced pancreatic enzymes with resulting maldigestion/malabsorption. When intraduodenal levels of lipase fall below 5-10% of normal output, individuals may manifest with abdominal pain, bloating/ cramping, flatulence, and progressive steatorrhea.

Evidence Discussion

Fecal elastase is the most appropriate initial test for exocrine pancreatic insufficiency (EPI) with a level <100 ug/g of stool providing good evidence of EPI, and levels of 100-200 ug/g being indeterminate for EPI. It is an indirect measurement that is simple, noninvasive, and relatively non-expensive. While direct measurements of pancreatic secretions in to the duodenum are accurate, they are invasive, time-consuming and a more significant burden to the patient than this indirect test.

Quantitative fecal fat testing is generally not practical for routine clinical use.

While cross-sectional imaging methods such as CT and MRI/MRCP cannot be used to solely identify EPI, they play an important role in the diagnosis of both benign and malignant pancreatic disease, and can also identify gross pancreatic structural changes. Cross-sectional imaging is thus useful for diagnosing underlying pancreatic disease as well as abnormalities that may support an EPI diagnosis.

EPI develops in more than half of patients with chronic pancreatitis, 27-62% of patients with relapsing acute pancreatitis, 85% of patients with cystic fibrosis, and 50-92% of patients with unresectable pancreatic ductal adenocarcinoma. It is seen in 40-50% of patients with resectable pancreatic ductal adenocarcinoma before treatment and 65% after treatment. It should thus be suspected in these patients.

Asymptomatic Elevation of Pancreatic Enzymes (AB-33.4)

AB.PX.0033.4.A
v2.0.2025

- If there is the incidental elevation of amylase or lipase:
  - If isolated amylase elevation, prior to imaging, the source of the elevation should be confirmed as pancreatic by the performance of amylase isoenzymes demonstrating that the source is not salivary, or the absence of macroamylase should be ascertained by blood test.
  - If the lipase is elevated alone or in combination with an elevated amylase, or If the amylase is confirmed as pancreatic in origin:
    - Abdominal Ultrasound can be performed initially.
    - If US is inconclusive, nondiagnostic, or the elevated pancreatic enzymes persist:
      - MRI/MRCP can be performed (CPT® 74183). Note: It is best performed as a secretin-stimulation test in this setting.
      - Note: CT Abdomen (pancreatic protocol, CPT® 74160) can be performed if there is a contraindication to MRI.
  - If the pancreatic enzyme elevation persists at one year, either of the above studies can be repeated.

Evidence Discussion

Abdominal imaging is required for the differential evaluation of elevated serum amylase and/or lipase levels and can confirm the diagnosis of acute pancreatitis. Biliary duct dilation and stone disease are readily apparent on an ultrasound, which should be performed as the initial imaging study.

When ultrasound results are inconclusive due to overlying bowel gas or other patient factors, or when amylase and/or lipase levels remain elevated, CT or MRI should be considered as the next step. Although contrast-enhanced CT offers over 90% sensitivity and specificity in diagnosing acute pancreatitis, its routine use is not recommended since the diagnosis is clear in many patients who typically experience a mild, uncomplicated course.

References (AB-33)

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1. Imaging Assessment of Etiology and Severity of Acute Pancreatitis. The Pancreapedia: Exocrine Pancreas Knowledge Base. doi:10.3998/panc.2016.31.
2. Foster BR, Jensen KK, Bakis G, Shaaban AM, Coakley FV. Revised Atlanta Classification for Acute Pancreatitis: A Pictorial Essay—Erratum. *RadioGraphics*. 2019;39(3):912-912. doi:10.1148/rg.2019194003.
3. ACR Appropriateness Criteria: Acute Pancreatitis. Rev. 2019.
4. Greenberg JA, Hsu J, Bawazeer M, et al. Clinical practice guideline: management of acute pancreatitis. *Canadian Journal of Surgery*. 2016;59(2):128-140. doi:10.1503/cjs.015015.
5. Testoni PA. Acute recurrent pancreatitis: Etiopathogenesis, diagnosis and treatment. *World Journal of Gastroenterology*. 2014;20(45):16891. doi:10.3748/wjg.v20.i45.16891.
6. Pan G, Wan MH, Xie K-L, et al. Classification and Management of Pancreatic Pseudocysts. *Medicine*. 2015;94(24). doi:10.1097/md.0000000000000960.
7. Oconnor OJ, Buckley JM, Maher MM. Imaging of the Complications of Acute Pancreatitis. *American Journal of Roentgenology*. 2011;197(3). doi:10.2214/ajr.10.4339.
8. Conwell DL, Lee LS, Yadav D, et al. American Pancreatic Association Practice Guidelines in Chronic Pancreatitis. *Pancreas*. 2014;43(8):1143-1162. doi:10.1097/mpa.0000000000000237.
9. Löhr JM, Dominguez-Munoz E, Rosendahl J, et al. United European Gastroenterology evidence-based guidelines for the diagnosis and therapy of chronic pancreatitis (HaPanEU). *United European Gastroenterology Journal*. 2017;5(2):153-199. doi:10.1177/2050640616684695.
10. Forsmark CE. Management of Chronic Pancreatitis. *Gastroenterology*. 2013;144(6). doi:10.1053/j.gastro.2013.02.008.
11. Duggan SN, Chonchubhair HMN, Lawal O, O'Connor DB, Conlon KC. Chronic pancreatitis: A diagnostic dilemma. *World Journal of Gastroenterology*. 2016;22(7):2304-2313. doi:10.3748/wjg.v22.i7.2304.
12. Conwell DL, Wu BU. Chronic Pancreatitis: Making the Diagnosis. *Clinical Gastroenterology and Hepatology*. 2012;10(10):1088-1095. doi:10.1016/j.cgh.2012.05.015.
13. Gardner TB, Adler DG, Forsmark CE, Sauer BG, Taylor JR, Whitcomb DC. ACG Clinical Guideline: Chronic Pancreatitis. The American Journal of Gastroenterology. 2020;115(3):322-339. doi:10.14309/ajg.0000000000000535.
14. Capurso G, Traini M, Piciucchi M, Signoretti M, Arcidiacono PG. Exocrine pancreatic insufficiency: prevalence, diagnosis, and management. *Clin Exp Gastroenterol*. 2019;12:129-39. doi:10.2147/CEG.S168266.
15. Forsmark CE. Diagnosis and management of exocrine pancreatic insufficiency. *Curr Treat Options Gastroenterol*. 2018;16(3):306-315. doi:10.1007/s11938-018-0186-y.
16. Singh VK, Yadav D, Garg PK. Diagnosis and management of chronic pancreatitis: a review. *JAMA*. 2019;322(4):2422-34. doi:10.1001/jama.2019.19411.
17. Durie P, Baillargeon J-D, Bouchard S, Donnellan F, Zepeda-Gomez S, Teshima C. Diagnosis and management of pancreatic exocrine insufficiency (PEI) in primary care: consensus guidance of a Canadian expert panel. *Curr Med Res Opin*. 2018;34(1):25-33. doi:10.1080/03007995.2017.1389704.
18. Lohr J, Oliver M, Frulloni L. Synopsis of recent guidelines on pancreatic exocrine insufficiency. *United European Gastroenterol J*. 2013;1(2):79-83. doi:10.1177/2050640613476500.
19. Gonoi W, Hayashi TY, Hayashi N, Abe O. Association between chronic asymptomatic pancreatic hyperenzynemia and pancreatic ductal anomalies: a magnetic resonance cholangiopancreatography study. *Abdom Radiol (NY)*. 2019;44(2):2494-2500. doi:10.1007/s00261-019-02004-4.
20. Mariani A. Chronic asymptomatic pancreatic hyperenzynemia: is it a benign anomaly or a disease? *JOP: Journal of the Pancreas*. 2010;11(2):95-8. doi:10.6092/1590-8577/3840.
21. Tenner S, Vege SS, Sheth SG, et al. American College of Gastroenterology guidelines: management of acute pancreatitis. *Am J Gastroenterol*. 2024;119:419-437. doi:10.14309/ajg.0000000000002645.
22. Banks PA, Bollen TL, Dervenis C, et al. Classification of acute pancreatitis – 2012: revision of Atlanta classification and definitions by international consensus. *Gut*. 2013;62:102-111.
23. Al-Haddad M, Wallace MB. Diagnostic approach to patients with acute idiopathic pancreatitis, what should be done? *World J Gastroenterol*. 2008;14:1007–1010.

Spleen (AB-34)

Guideline Page

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Spleen (AB-34.1)

AB.SP.0034.1.C
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- Incidental splenic findings on US:
  - CT Abdomen (CPT® 74170) or MRI Abdomen (CPT® 74183) can be obtained.
- Incidental splenic findings on CT or MRI:
  - Imaging is diagnostic of a benign lesion (simple cyst, hemangioma) or characteristics are benign-appearing (homogeneous, low attenuation, no enhancement, smooth margins):
    - No follow-up imaging
  - Imaging characteristics are not diagnostic:
    - Prior imaging available:
      - One year stability: no follow up imaging
      - Lack of stability: consider MRI if not done, biopsy, or PET/CT (CPT® 78815).
    - No prior imaging:
      - No known malignancy:
        - Suspicious imaging features: (suggesting possible malignancy)
          - MRI Abdomen (CPT® 74183) if not already done or biopsy
          - If MRI still inconclusive and biopsy is not feasible then PET/CT (CPT® 78815) can be considered.
        - Indeterminate imaging features: (equivocal but not suspicious for malignancy)
          - Follow up MRI Abdomen (CPT® 74183) in 6 and 12 months.
      - Known malignancy:
        - <1 cm: follow up MRI Abdomen (CPT® 74183) in 6 and 12 months.
        - ≥1 cm: consider MRI Abdomen (CPT® 74183) if not done, biopsy
          - If MRI still inconclusive and biopsy is not feasible then PET/CT (CPT® 78815) can be considered.
        - (See diagnosis-specific in the Oncology Imaging Guidelines).
- Clinically detected splenomegaly
  - Abdominal US (CPT® 76700 or CPT® 76705) should be the first imaging study to evaluate splenic size.
  - If splenomegaly is confirmed, the following evaluation is indicated prior to advanced imaging:
    - CBC, evaluation of the peripheral blood smear, LFTs, UA, chest x-ray, HIV testing.
      - CT Abdomen without and with contrast or with (CPT® 74170 or CPT® 74160) can be performed if the etiology of the splenomegaly remains unexplained.

- MRI Abdomen (CPT® 74183) can be considered for pregnant patients, or individuals with iodinated contrast allergy.

Background and Supporting Information

Our current guidelines are consistent with ACR recommendations for the follow-up of incidental splenic masses. It is noteworthy, however, that a recent study from Beth Israel Deaconess Medical Center in which the authors retrospectively reviewed 379 patients who were found to have an incidental splenic mass on CT found that in patients without a history of malignancy, constitutional symptoms of fever or weight loss, or left upper quadrant or epigastric pain (205/379) there were 2 incidences of malignancy. However, in both of these cases the splenic masses were neither isolated nor indeterminate findings as the CTs demonstrated disease in other locations. An isolated splenic malignancy (which can occur but is very rare) was found only in 2 patients and both of these had constitutional symptoms. Thus, the authors claim that “the isolated and incidentally found splenic mass is of unlikely clinical significance, regardless of its appearance”, They concluded that “in patients with an incidental splenic mass identified at imaging and with the absence of a history of malignancy, fever, weight loss, or pain in the left upper quadrant or epigastrium, such masses are highly likely to be benign regardless of their appearance. Additional imaging or follow-up is not warranted, even if the mass does not show the appearance of simple cyst. Further work-up is only needed if the splenic mass is seen in conjunction with other findings worrisome for malignancy”. These authors challenge the use of the ACR guidelines.

Evidence Discussion

- Splenomegaly is usually the result of systemic disease, and diagnostic studies should be directed toward identifying the etiology. Ultrasound is the preferred modality for documentation of splenomegaly found on physical exam. If the etiology of the splenomegaly is determined (benign or malignant), follow-up imaging would be addressed relative to that disease process.
- The accuracy, cost-effectiveness, and lack of radiation make abdominal ultrasonography a first-line step for confirmation of size.
- Both CT and MRI are valid studies for initial evaluation and follow-up of indeterminate splenic lesions due to the non-specific hypoechogenicity found on ultrasound. These should be performed both with and without contrast to improve diagnosis of a solid organ lesion. Nuclear medicine imaging is rarely needed but has a role in detection of accessory splenic lesions.
- There is no evidence-based data supporting the use of serial CT or MRI scans to monitor individuals with incidental splenic lesions that have benign characteristics or lesions that are stable after one year.

Trauma – Spleen (AB-34.2)

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- Ultrasound Abdomen (CPT® 76700 or CPT® 76705) and Pelvis (CPT® 76856 or CPT® 76857) or CT[3,4,5] Abdomen and Pelvis without and with contrast (CPT® 74178) or with contrast (CPT® 74177) for ANY of the following:
  - Blunt abdominal trauma with suspected splenic rupture, or
  - Suspected post-procedural injury, or
  - Individuals with penetrating trauma to the left upper quadrant. See: **Blunt Abdominal Trauma (AB-10)**

Background and Supporting Information

Splenomegaly is usually the result of systemic disease, and diagnostic studies are directed toward identifying the causative disease. Complete blood count with differential, LFT's, and peripheral blood smear examination are often performed prior to considering advanced imaging. There is no evidence-based data to support performing serial CT or MRI to follow individuals with incidental splenic lesions.

Evidence Discussion

Spleen being a vascular organ, prompt diagnosis and management of potentially life-threatening bleeding is the primary goal. Emergency splenectomy remains a life-saving procedure; hence, the goal of imaging is to utilize abdominal imaging to determine injury to organs and vasculature with speed and accuracy. Thus, CT and ultrasound (US) are the primary imaging methods to determine splenic injury.

US is useful in trauma patients as it is able to rapidly determine the presence of fluid in peritoneal space. However, it cannot rule out injury to organs with accuracy.

CT scan has increased sensitivity and specificity for organ and vascular injury and for identifying patients a surgical approach. CT is highly sensitive for identifying significant intra-abdominal pathology (97 to 98 percent sensitivity and 97 to 99 percent specificity).

Although a noncontrast CT scan may demonstrate sub-capsular hematoma or hemoperitoneum, a contrast-enhanced CT is better able to demonstrate parenchymal and vascular injuries.

MRI is not recommended as an imaging study of choice because it is time-consuming to perform and is not as readily accessible as the imaging methods mentioned above (especially in hemodynamically unstable patients).

References (AB-34)

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1. Heller M et. al. Managing Incidental Findings on Abdominal and Pelvic CT and MRI, Part 3. Journal of the American College of Radiology, Vol. 10, Issue 11, Pages 833-839, Nov. 2013.
2. Thut D et. al. A diagnostic approach to splenic lesions. Appl. Radiology 2017; 46 (2): 7-22(B)
3. Saboo SS, Krajewski KM, O'Regan KN, et al. Spleen in haematological malignancies: spectrum of imaging findings. *British Journal of Radiology*. 2012;85:81-92 2012.
4. Benter T, Klühs L, Teichgräber U. Sonography of the spleen. *J Ultrasound Med.* 2011;30:1281-93.
5. Killeen KL, Shanmuganathan K, Boyd-Kranis R, et al. CT findings after embolization for blunt splenic trauma. *J Vasc Interv Radiol.* Feb 2001;12(2):209-14.
6. Naulet P, Wassel J, Gervaise A, et al. Evaluation of the value of abdominopelvic acquisition without contrast injection when performing a whole body CT scan in a patient who may have multiple trauma. *Diagn Interv Imaging*. 2013;94(4):410-7.
7. Boscak AR, Shanmuganathan K, Mirvis SE, et al. Optimizing trauma multidetector CT protocol for blunt splenic injury: need for arterial and portal venous phase scans. *Radiology*. 2013;268(1):79-88.
8. Royal HD, Brown ML, Drum DE. Society of Nuclear Medicine Procedure guideline for hepatic and splenic imaging 3.0, version 3.0, approved July 20, 2003.
9. Siewert B, Millo NZ, Sahi K, et al. The incidental splenic mass at CT: does it need further work-up? An observational study. *Radiology*. 2018;287(1):156-166. doi:10.1148/radiol.2017170293.
10. Sommer A, Mendez AM. Splenomegaly: diagnosis and management in adults. *Am Fam Physician*. 2021;104(3):271-276.
11. Vanhoenacker FM, Op de Beeck B, De Schepper AM, et al. Vascular disease of the spleen. *Semin Ultrasound CT MR*. 2007;28:35–51.

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Indeterminate Renal Lesion (AB-35)

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Indeterminate Renal Lesion – General Information (AB-35.0)

AB.RL.0035.0.A
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For acute flank pain, rule out renal stone, see: **Flank Pain, Rule Out or Known Renal/ Ureteral Stone (AB-4)**

Indeterminate Renal Lesion (AB-35.1)

RL.AB.0035.1.A
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- Incidental Renal Mass on Ultrasound
  - If categorized as simple cyst or Bosniak I or II, no further imaging.
  - Otherwise, CT Abdomen without and with contrast (CPT® 74170), MRI Abdomen without and with contrast (CPT® 74183), or Contrast-Enhanced Ultrasound (CPT® 76978 for one lesion, and CPT® 76979 if there are additional lesions).
- CT Abdomen without and with contrast (CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183) can be approved for further characterization if the original study reveals incomplete visualization of a renal lesion (for example, if only partially visualized on a CT Chest).
- Incidental Renal Mass on Non-Contrast CT
  - If characterized as heterogeneous (thick or irregular wall, mural nodule, septa, or calcification):
    - Considered indeterminate. MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen without and with contrast (CPT® 74170)
  - If characterized as homogeneous (thin or imperceptible wall, NO mural nodule, septa, or calcification):
    - 10 to 20 HU (Hounsfield units)
      - Likely benign, not fully characterized: no further work-up
    - 21 to 69 HU
      - Indeterminate: MRI or CT Abdomen without and with contrast (CPT® 74183 or CPT® 74170)
    - ≥70 HU
      - Hemorrhagic or proteinaceous cyst, unlikely to be neoplastic: no further work-up
  - If characterized as TSTC (too small to characterize) and homogeneous:
    - If labeled likely benign cyst, not fully characterized:
      - No further work-up
    - If labeled inconclusive based on subjective evaluation:
      - Considered indeterminate. MRI Abdomen without and with contrast (CPT® 74183) (preferred) or CT Abdomen without and with contrast (CPT® 74170) ideally within 6-12 months but no sooner than 6 months.
- Incidental Renal Mass on Contrast-Enhanced CT
  - If characterized as heterogeneous: thick or irregular wall, mural nodule, septa or calcification:

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        - Considered indeterminate. MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen without and with contrast (CPT® 74170)
    - If characterized as homogeneous: thin or imperceptible wall, NO mural nodule, septa or calcification:
        - 10 to 20 HU
            - No further work-up
        - >20 HU (solid or complicated cystic mass)
            - Considered indeterminate. MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen without and with contrast (CPT® 74170)
    - If characterized as TSTC, homogeneous:
        - If labeled likely benign cyst, not fully characterized:
            - No further work-up
        - If labeled inconclusive based on subjective evaluation:
            - Considered indeterminate. MRI Abdomen without and with contrast (CPT® 74183) (preferred), or CT Abdomen without and with contrast (CPT® 74170) ideally within 6-12 months but no sooner than 6 months.
- Incidental cystic renal mass on CT or MRI without and with contrast (completely characterized, and does NOT contain fat)
    - Bosniak I (benign simple) or II (minimally complicated)
        - No further work-up
    - Bosniak IIF
        - CT Abdomen without and with contrast (CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183) at 6 and 12 months, then yearly for 5 years
        - If no changes for 5 years, cyst is considered benign and of no clinical significance
    - Bosniak III or IV should be referred for additional management or if chosen, active surveillance see: **Surveillance (ONC-17.4)** in the Oncology Imaging Guidelines
- Incidental solid renal mass or incidental mass too small to characterize evaluated on CT or MRI without and with contrast and does NOT contain fat
    - TSTC
        - If labeled likely benign cyst:
            - No further work-up
        - If labeled inconclusive based on subjective evaluation:
            - MRI Abdomen without and with contrast (CPT® 74183) (preferred), or CT Abdomen without and with contrast (CPT® 74170) ideally within 6-12 months but no sooner than 6 months.
    - If solid mass <1.0cm
        - MRI Abdomen without and with contrast (CPT® 74183) (preferred), or CT Abdomen without and with contrast (CPT® 74170) beginning at 6 months, then yearly for 5 years

        - If stable at 5 years (average growth ≤3mm per year): No further work-up
        - If mass shows growth (≥4mm per year) or morphologic change: refer for management, consider renal biopsy. If biopsy is technically challenging or relatively contraindicated, a T2 weighted image MRI Abdomen without and with contrast (CPT® 74183) can be performed
    - Solid mass 1.0-4.0cm:
        - Considered a small renal neoplasm: refer for management, consider biopsy. If biopsy is technically challenging or relatively contraindicated, a T2 weighted imaging MRI Abdomen without and with contrast (CPT® 74183) can be performed. If active surveillance chosen due to limited life expectancy or co-morbidities, see: **Surveillance (ONC-17.4)** in the Oncology Imaging Guidelines
    - Solid renal mass >4.0cm
        - Considered a renal neoplasm: refer for management, or biopsy. If biopsy is technically challenging or relatively contraindicated, a T2 weighted image MRI Abdomen without and with contrast (CPT® 74183) can be performed. If active surveillance chosen due to limited life expectancy or co-morbidities, see: **Surveillance (ONC-17.4)** in the Oncology Imaging Guidelines
- Incidental renal mass containing fat (contains a region of interest measuring <-10 HU on CT)
    - No calcification angiomyolipoma (AML)
        - Solitary and without documentation of growth:
            - <4cm: no further work-up
                - If no prior imaging study for comparison, one follow-up MRI Abdomen (CPT® 74183) or CT Abdomen (CPT® 74170) can be repeated in 6-12 months to assess for any growth.
            - ≥4cm, and considered an AML with potential for clinical symptoms: refer for management.
        - Multiple lesions or growth documented based on old studies:
            - Refer for management. If active surveillance chosen due to limited life expectancy or co-morbidities, see: **Surveillance (ONC-17.4)** in the Oncology Imaging Guidelines.
    - With calcification (suspected renal cell carcinoma):
        - CT Abdomen without and with contrast (CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183) if only a non-contrast CT has been performed. If active surveillance chosen due to limited life expectancy or co-morbidities, see: **Surveillance (ONC-17.4)** in the Oncology Imaging Guidelines.
- Active Surveillance: For all Active Surveillance indications, see: **Surveillance (ONC-17.4)** in the Oncology Imaging Guidelines

NOTE: PET/CT or PET/MRI are not recommended because their role evaluating the incidental renal mass is limited.[1]

Bosniak Classification:

I- Benign simple cyst with a hairline thin wall without septa, calcification, or solid component. Homogeneous near-water attenuation density (10 to 20 HU) without enhancement.

II- Benign minimally complicated cyst that may contain a few hairline thin septa that may have “perceived” but not measurable enhancement. Fine calcification or a segment of slightly thickened calcification may be present in the wall or septa. Also, a well-marginated nonenhancing homogeneous mass <3cm with density above simple fluid attenuation (hyperdense cyst).

IIF- Usually benign complicated renal cyst with multiple hairline thin septa or minimal smooth thickening of the wall or septa. Wall or septa may contain thick and nodular calcification and may have “perceived” but not measurable enhancement. Also, a well-marginated intrarenal nonenhancing mass >3cm with density above simple fluid.

III -Indeterminate complicated cystic renal mass with thickened irregular walls or septa that have measurable enhancement.

IV-Malignant cystic renal mass with enhancing soft tissue components (cystic renal cell carcinoma).

From the Journal of the American College of Radiology[1]

Evidence Discussion

Advantages of Ultrasound includes universal availability, portability, and lack of ionizing radiation. Doppler ultrasound can distinguish between cystic and solid lesions, as well as characterize the quality, presence, and velocity of flow. Therefore, ultrasound can classify a lesion as either a simple cyst or a Bosniak I or II, eliminating the need for further imaging.

The American Urological Association recommends that patients with a solid or complex cystic renal mass obtain high quality, multiphase, cross-sectional abdominal imaging to optimally characterize any renal lesion seen on ultrasound, or found incidentally on other imaging studies or non-contrast enhanced abdominal imaging.

Advanced imaging techniques such as computer tomography (CT) and magnetic resonance imaging (MRI) offer excellent 3-dimensional resolution. CT scans expose patients to a significant dose of ionizing radiation; however, their rapid image acquisition reduces the potential for motion artifacts. In contrast, MRI provides better soft tissue contrast resolution than CT and does not involve ionizing radiation exposure. Yet, its longer imaging times make it prone to motion artifacts and may necessitate sedation. Additionally, MRIs are contraindicated for individuals with non-MRI compliant implants or ferromagnetic foreign bodies.

Pre-operative Assessment (AB-35.2)

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- Pre-operative assessment for robotic kidney surgery
  - If not previously performed:
    - CT Abdomen without and with contrast (CPT® 74170) OR
    - MRI Abdomen without and with contrast (CPT® 74183)
  - CTA Abdomen (CPT® 74175) or CTA Abdomen and Pelvis (CPT® 74174) OR
  - MRA Abdomen (CPT® 74185), or MRA Abdomen and Pelvis (CPT® 74185 and CPT® 72198)

Evidence Discussion

Advanced imaging techniques such as computer tomography (CT) and magnetic resonance imaging (MRI) offer excellent 3-dimensional resolution. CT scans expose patients to a significant dose of ionizing radiation; however, their rapid image acquisition reduces the potential for motion artifacts. In contrast, MRI provides better soft tissue contrast resolution than CT and does not involve ionizing radiation exposure. Yet, its longer imaging times make it prone to motion artifacts and may necessitate sedation. Additionally, MRIs are contraindicated for individuals with non-MRI compliant implants or ferromagnetic foreign bodies.

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References (AB-35)

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1. Herts BR, Silverman SG, Hindman NM, et al. Management of the Incidental Renal Mass on CT: A White Paper of the ACR Incidental Findings Committee. *Journal of the American College of Radiology*. 2018;15(2):264-273. doi:10.1016/j.jacr.2017.04.028.
2. Finelli A, Ismaila N, Russo P. Management of Small Renal Masses: American Society of Clinical Oncology Clinical Practice Guideline Summary. *Journal of Oncology Practice*. 2017;13(4):276-278. doi:10.1200/jop.2016.019620**.**
3. Campbell S, Uzzo RG, Allaf ME, et al. Renal Mass and Localized Renal Cancer: AUA Guideline. *The Journal of Urology*. 2017;198(3):520-529. doi:10.1016/j.juro.2017.04.100.
4. Zhao PT, Richstone L, Kavoussi LR. Laparoscopic partial nephrectomy. *International Journal of Surgery*. 2016;36:548-553. doi:10.1016/j.ijsu.2016.04.028.
5. Lane BR, Campbell SC, Gill IS. 10-Year Oncologic Outcomes After Laparoscopic and Open Partial Nephrectomy. *Journal of Urology*. 2013;190(1):44-49. doi:10.1016/j.juro.2012.12.102.
6. Barr RG, Peterson C, Hindi A. Evaluation of Indeterminate Renal Masses with Contrast-enhanced US: A Diagnostic Performance Study. *Radiology*. 2014;271(1):133-142. doi:10.1148/radiol.13130161.
7. Nicolau C, Buñesch L, Paño B, et al. Prospective evaluation of CT indeterminate renal masses using US and contrast-enhanced ultrasound. *Abdominal Imaging*. 2014;40(3):542-551. doi:10.1007/s00261-014-0237-3.
8. Zarzour JG, Lockhart ME, West J, et al. Contrast-Enhanced Ultrasound Classification of Previously Indeterminate Renal Lesions. *Journal of Ultrasound in Medicine*. 2017;36(9):1819-1827. doi:10.1002/jum.14208.
9. Campell SC, Clark PE, Chang SS et al. Renal mass and localized renal cancer: evaluation, management, and follow-up: AUA guideline part I. *J Urol.* 2021;206:199.
10. Campbell SC, Uzzo RG, Karam JA, et al. Renal mass and localized renal cancer: evaluation, management, and follow-up: AUA guideline: part II. *J Urol.* 2021;206:209.

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Renal Failure (AB-36)

Guideline Page

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Renal Failure (AB-36.1)

AB.PCRF.0036.1.C

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- Ultrasound kidney and bladder (CPT® 76770 or CPT® 76775), preferably with Doppler (CPT® 93975 or CPT® 93976), is the preferred imaging study for the evaluation of acute or chronic renal failure[1].
- MRA Abdomen (CPT® 74185) can be utilized when there is suspected[1]:
  - renal vein/caval thrombosis
  - renal artery stenosis as cause of renal failure
  - MRA with contrast may be contraindicated in severe renal failure or individuals on dialysis due to the risk of gadolinium agents in causing nephrogenic systemic sclerosis.
- CT Abdomen without contrast (CPT® 74150) is not needed except to rule out ureteral obstruction or retroperitoneal mass.[1]

Evidence Discussion

The main role of imaging is to detect treatable causes of renal failure such as ureteral obstruction or renovascular disease and to evaluate renal size and morphology. Ultrasound is the modality of choice for initial imaging, with duplex Doppler reserved for suspected renal artery stenosis or thrombosis. ACR appropriateness criteria states that ultrasound contrast media are not nephrotoxic, ultrasound has the greatest diagnostic value in the detection of hydronephrosis, and ultrasound is highly sensitive for hydronephrosis and bladder distention. It also allows for evaluation of general information about the kidney such as size and shape. CT may be appropriate, particularly for urinary tract obstruction. CT is useful in determining the cause of hydronephrosis by demonstrating if mass or obstruction is present and at what level in the urinary tract. MRA is useful when renovascular causes of failure are suspected. MRA has shown to be able to detect renal artery stenosis. However, the use of iodinated and gadolinium-based contrast should be evaluated critically depending on specific patient factors and cost-benefit ratio.

Tc-99m dimercaptosuccinic acid (DMSA) scintigraphy is ideal for functional renal cortical imaging and is most useful for detection of focal renal parenchymal abnormalities and scars in the setting of acute or chronic pyelonephritis or for differential renal function.

Tc-99m mercaptoacetyltriglycine (MAG3) is the most frequently used renal tubular agent, specifically to quantify renal tubular extraction.

References (AB-36)

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1. Papnicolaou N, Francis IR, Casalino DD, Arellano RS, et al. Expert Panel on Urologic Imaging. ACR Appropriateness Criteria® renal failure. American College of Radiology (ACR); 2008.
2. National Kidney Foundation. KDOQI Clinical Practice Guidelines for Chronic Kidney Disease: Evaluation, Classification, and Stratification. 2012. *Am J Kidney Disease*, 2002;39(2 Supp 1):S1-S266.
3. Kim C, Becker M, Grant F, et al., ACR–SPR Practice Guideline for the Performance of Renal Scintigraphy. Revised 2017. The American College of Radiology.
4. Expert Panel on Urologic Imaging. American College of Radiology Appropriateness Criteria – Renal Failure.

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Renovascular Hypertension (AB-37)

Renovascular Hypertension (AB-37.1)

AB.37.1.A
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- See: **Renovascular Hypertension/Renal Artery Stenosis (PVD-6.6)** in the Peripheral Vascular Disease Imaging Guidelines

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Polycystic Kidney Disease (AB-38)

Guideline Page

Polycystic Kidney Disease (AB-38.1)

AB.PK.0038.1.A
v2.0.2025

- Retroperitoneal ultrasound[1] (CPT® 76770 or CPT® 76775) can be performed for:
  - suspected polycystic kidney disease
  - screening individuals at risk for autosomal dominant polycystic disease (ADPKD)
    - In the absence of any clinical change, follow-up screening is not indicated if a screening ultrasound was performed at age 40 or later and was negative for any cysts (The negative predictive value of an ultrasound in this age group is 100% for both PKD1 and PKD2, if no cysts are identified.).
    - If an initial ultrasound is negative for any cysts, a follow-up ultrasound can be performed at the discretion of the ordering provider for individuals <40 years of age.
- MRI Abdomen without contrast (CPT® 74181) can be performed:
  - if a cystic renal lesion is detected in an individual at-risk of PKD, for prognostic purposes
  - for volume averaging (Total Kidney Volume – TKV) prior to treatment for PKD (Jynarque, tolvaptan)
    - Optimal follow-up imaging intervals in this setting have not yet been established. Requests for follow-up imaging can be considered on a case-by-case basis.

Background and Supporting Information

- Ultrasound is very effective in establishing a diagnosis of ADPKD, though may miss early small cysts. However, the negative predictive value in the various age groups of a negative ultrasound is as follows:
  - ≥40: 100% for PKD1 and PKD2
  - 30-39: 100% for PKD1 and 96.8% for PKD2
  - 5-29: 99.1% for PKD1 and 83.5% for PKD2
- In addition, the preferable advanced imaging study is MRI Abdomen without contrast (CPT® 74181). This is because of the increased risk of gadolinium-induced nephrogenic fibrosis in individuals with PKD.

Evidence Discussion

Screening studies are important for individuals at risk for polycystic kidney disease, as well as imaging protocols to assess and monitor renal parenchyma and evolving cysts, which can predict patient outcomes.

Screening protocols that utilize ultrasonography, a readily available and safe imaging modality, can reliably quantify and characterize renal cysts, aiding in the diagnosis of

ADPKD. A negative ultrasound result has a high negative predictive value for excluding ADPKD.

After diagnosis, advanced imaging may be indicated to assess total kidney volume, and to characterize cystic renal lesions, such as before treatment/procedures.

Given the significant association with CKD, contrast (both gadolinium and iodine-based) would preferentially be avoided for both CT and MR. The choice of advanced imaging would typically be magnetic resonance imaging without contrast unless the benefits outweigh the risks.

References (AB-38)

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1. Chapman AB, Devuyst O, Eckardt K-U, et al. Autosomal-dominant polycystic kidney disease (ADPKD): executive summary from a Kidney Disease: Improving Global Outcomes (KDIGO) Controversies Conference. *Kidney International*. 2015;88(1):17-27. doi:10.1038/ki.2015.59.
2. Belibi FA, Edelstein CL. Unified Ultrasonographic Diagnostic Criteria for Polycystic Kidney Disease. *Journal of the American Society of Nephrology*. 2008;20(1):6-8. doi:10.1681/asn.2008111164.
3. Chebib FT, Torres VE. Autosomal Dominant Polycystic Kidney Disease: Core Curriculum 2016. *American Journal of Kidney Diseases*. 2016;67(5):792-810. doi:10.1053/j.ajkd.2015.07.037.
4. Gastel MDAV, Messchendorp AL, Kappert P, et al. T1 vs. T2 weighted magnetic resonance imaging to assess total kidney volume in patients with autosomal dominant polycystic kidney disease. *Abdominal Radiology*. 2017;43(5):1215-1222. doi:10.1007/s00261-017-1285-2.
5. Alam A, Dahl NK, Lipschutz JH, et al. Total Kidney Volume in Autosomal Dominant Polycystic Kidney Disease: A Biomarker of Disease Progression and Therapeutic Efficacy. *American Journal of Kidney Diseases*. 2015;66(4):564-576. doi:10.1053/j.ajkd.2015.01.030.

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Hematuria and Hydronephrosis (AB-39)

Guideline Page

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Hematuria with Urinary Tract Infection (UTI) (AB-39.1)

AB.HH.0039.1.A

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- Individuals suspected to have a UTI as the etiology of microscopic hematuria should be treated for the UTI and should then undergo repeat urinalysis to confirm resolution of the hematuria. If the hematuria persists following treatment, proceed with the risk-based evaluation as per **Asymptomatic Hematuria (AB-39.2)**.
- Also see: **Urinary Tract Infection (UTI) (AB-40)** for additional imaging considerations.

Background and Supporting Information

- Signs and symptoms of UTI: urinary frequency, burning on urination, urgency, dysuria, positive urine leukocyte esterase, presence of WBCs in the urine, fever, elevated WBC as per the testing laboratory's range

Evidence Discussion

An individual who is diagnosed with microscopic hematuria, defined by the American Urological Association guidelines as 3 or more RBC/HPF, and is found to have a concomitant urinary tract infection should have a repeat urinalysis to confirm resolution of the hematuria based on the AUA guidelines.

If microscopic hematuria persists after treatment of the infection, the patient should undergo risk assessment based on the AUA guidelines which provide guidance on the use of advanced imaging.

Asymptomatic Hematuria (AB-39.2)

AB.HH.0039.2.A
v2.0.2025

- Microscopic hematuria is defined as ≥3 red blood cells per high power field. Hematuria is NOT defined as a positive dipstick. A positive dipstick should prompt a microscopic examination. A positive dipstick is not considered as defining microhematuria.
- Prior to imaging, individuals should be stratified into low, intermediate, or high risk, based on the following criteria[7]
  - Low risk (individual meets ALL criteria listed)
    - Women <50 years of age or Men <40 years of age
    - Never smoker or <10 pack years
    - 3-10 RBC/HPF on a single urinalysis
    - No additional risk factors for urothelial cancer:
      - Irritative lower urinary tract symptoms
      - Prior pelvic radiation therapy
      - Prior cyclophosphamide/ifosfamide chemotherapy
      - Family history of urothelial cancer or Lynch Syndrome
      - Occupational exposures to benzene chemicals or aromatic amines (e.g. rubber, petrochemicals, dyes)
      - Chronic indwelling foreign body in the urinary tract
  - Intermediate risk (individual meets any one of these criteria)
    - Women age 50-59 years, Men age 40-59 years
      - 10-30 pack years of smoking
      - 11-25 RBC.HPF on a single urinalysis
      - Low-risk individual with no prior evaluation and 3-10 RBC/HPF on repeat urinalysis
      - Any one of the Additional risk factors for urothelial cancer (see above)
  - High-risk (individual meets any one of these criteria)
    - Women or Men ≥60 years
    - >30 pack-years of smoking
    - >25 RBC/HPF on a single urinalysis
    - History of gross hematuria
- Low- or intermediate-risk individuals:
  - Renal ultrasound (combined with cystoscopy)
    - Note: Low-risk individuals may opt for observation with repeat urinalysis within 6 months. If no imaging was performed initially, and follow-up urinalysis reveals persistent hematuria with 3-10 RBC/HPF the individual may be imaged

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according to Intermediate-Risk criteria. If >10 RBC/HPF, they should be imaged according to High-risk guidelines.

- High-risk individuals
  - CT Urogram (CPT® 74178) (3D imaging is appropriate if requested)
    - If CT is contraindicated, MR Urography may be performed (CPT® 74183 and 72197)
      - If both CT and MR are contraindicated due to contrast, non-contrast CT urography or renal ultrasound should be performed. See also: **Pregnancy Considerations for Imaging (AB-1.12)**.
- Persistent microscopic hematuria if previously evaluated by renal ultrasound
  - Imaging as per High-risk individuals above
- Hematuria in individuals with inherited risk factors for renal cortical tumors
  - Renal ultrasound or
  - CT Abdomen without and with contrast (CPT® 74170) or
  - MRI Abdomen without and with contrast (CPT® 74183)
  - Note: Inherited risk factors include:
    - Von-Hippel-Lindau
    - Birt-Hogg-Dube
    - Hereditary Papillary RCC
    - Hereditary Leiomyomatosis Renal Cell Cancer
    - Tuberous Sclerosis
- Follow-up
  - Individuals with a negative hematuria evaluation who undergo repeat urinalysis
    - If repeat urinalysis is negative:
      - No further workup
    - If repeat urinalysis demonstrates persistent hematuria
      - Repeat imaging as requested (Renal Ultrasound or CT urography)
- NOTE: 3-D Reconstruction enhances a CT Urogram. Requests for 3-D reconstruction (CPT® 76377 or 76376) for a CT Urogram can be approved.

Evidence Discussion

- Low-risk patients with microscopic hematuria may opt for a repeat urinalysis prior to proceeding to a workup. Intermediate-risk and high-risk patients should undergo a workup with upper and lower tract imaging.
  - Upper tract imaging with renal ultrasound is the standard for low and intermediate patients given the overall low rate of malignancy detected in patients with microscopic hematuria. Renal ultrasound is noninvasive, readily available, and carries no risk of ionizing radiation while demonstrating a high sensitivity for renal masses and hydronephrosis.

  - Upper tract imaging for high risk patients should include advanced imaging with urography (CT with/without contrast is preferred with associated 3D rendering if requested). MR Urogram (MR Abdomen and Pelvis with/without contrast) can be performed if CT is contraindicated.
  - Patients with severe renal dysfunction, dye allergy, or other reasons where both CT and MRI are contraindicated should undergo renal ultrasound or non-contrast CT paired with retrograde pyelography.
- Individuals with microhematuria with family history of renal cell carcinoma or known genetic renal tumor syndrome should undergo upper tract imaging (renal ultrasound, CT or MR Urography) regardless of risk category.
- An individual with previous negative workup with persistent microscopic hematuria may undergo repeat upper tract imaging.

Hematuria and Flank Pain (Suspicion for Renal/ureteral Stones) (AB-39.3)

AB.HH.0039.3.A

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- CT Abdomen and Pelvis without contrast (CPT® 74176) or CT Urogram (CPT® 74178)
- NOTE:
  - 3-D Reconstruction enhances a CT Urogram. Requests for 3-D reconstruction (CPT® 76377 or CPT® 76376) for a CT Urogram can be approved.
  - US abdomen or retroperitoneum can be performed in lieu of a CT for any of the above indications

Evidence Discussion

- Individuals with flank pain presenting with either microscopic or gross hematuria should undergo advanced imaging with CT of the abdomen and pelvis.
  - The choice of contrast is at the discretion of the provider and may differ for individuals with previous history or high risk of nephrolithiasis and individuals with a higher risk of malignancy.
  - 3D reconstruction of CT Urography may be performed as requested.
  - Alternatively, the provider may request abdominal or retroperitoneal ultrasound in lieu of a CT initially.

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Hydronephrosis of Unexplained or Indeterminate Cause[3, 4] (AB-39.4)

AB.HH.0039.4.A
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- CT Urogram (CPT® 74178)
- NOTE:
  - 3-D Reconstruction enhances a CT Urogram. Requests for 3-D reconstruction (CPT® 76377 or CPT® 76376) for a CT Urogram can be approved.
  - US abdomen or retroperitoneum can be performed in lieu of a CT for any of the above indications
- Individuals with known uncomplicated hydronephrosis, neurogenic bladder, myelomeningocele (open spinal dysraphism), or spina bifida can have follow-up/ surveillance imaging with Retroperitoneal Ultrasound (CPT® 76770) every 6 to 12 months.

Evidence Discussion

- A new diagnosis of hydronephrosis without a known cause should undergo further workup. Advanced imaging with CT Urography with 3D reconstruction may be performed if requested to evaluate the course of the urinary tract for obstruction.
- Alternatively, the provider may request abdominal or retroperitoneal ultrasound in lieu of a CT initially.
- Patients with known chronic, uncomplicated hydronephrosis or patients with neurogenic bladder (spina bifida or other neurologic conditions) may undergo surveillance imaging with retroperitoneal ultrasound every 6-12 months to monitor for progression or development of hydronephrosis to prevent renal deterioration.

References (AB-39)

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1. Ramchandani P, Kisler T, Francis IR, Casalino DD, et al. Expert Panel on Urologic Imaging. ACR Appropriateness Criteria® hematuria. American College of Radiology (ACR); 2014.
2. Cohen RA, Brown RS. Microscopic hematuria. New England Journal of Medicine, 2003; 348:2330-2338.
3. Kolbeck K, Ray C Jr, Lorenz J, et al. Expert Panel on Interventional Radiology. ACR Appropriateness Criteria® radiologic management of urinary tract obstruction. American College of Radiology (ACR); 2013.
4. Expert Panel on Urologic Imaging. ACR Appropriateness Criteria® acute onset flank pain - suspicion of stone disease (urolithiasis). American College of Radiology (ACR), 2015:11.
5. Raman SP, Horton KM, Fishman EK. MDCT Evaluation of Ureteral Tumors: Advantages of 3D Reconstruction and Volume Visualization. *American Journal of Roentgenology*. 2013;201(6):1239-1247. doi:10.2214/ajr.13.10880.
6. Coplen D. Diagnosis, Evaluation and Follow-Up of Asymptomatic Microhematuria (AMH) in Adults: AUA Guideline. *Yearbook of Urology*. 2013;2013:1-2. Reviewed and Validity Confirmed 2016 doi:10.1016/j.yuro.2013.07.019.
7. Georgieva MV, Wheeler SB, Erim D, et al. Comparison of the Harms, Advantages, and Costs Associated With Alternative Guidelines for the Evaluation of Hematuria. *JAMA Internal Medicine*. 2019;179(10):1352. doi:10.1001/jamainternmed.2019.2280.
8. Barocas D, Boorjian S, Alvarez R, et. al. Microhematuria: AUA/SUFU guideline. *J Urol*. 2020;204:778.

Urinary Tract Infection (UTI) (AB-40)

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Urinary Tract Infection (AB-40.0)

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These guidelines refer to UTI without Hematuria.

For UTI with Hematuria, see: **Hematuria and Hydronephrosis (AB-39)**

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Upper (Pyelonephritis) (AB-40.1)

AB.UT.0040.1.A

v2.0.2025

- CT Abdomen and Pelvis without and with contrast (CPT® 74178) or CT Abdomen and Pelvis with contrast (CPT® 74177) if[1]:
  - suspected complicated: diabetes, immune-compromised, history of stones, prior renal surgery, or fever ≥101 F (≥38.5 C)
  - not responding to therapy after 3 days
  - recurrent pyelonephritis (at least 1 prior pyelonephritis)
  - males with first time UTI, or recurrent UTI without etiology
- MRI Abdomen without or with and without contrast (CPT® 74181 or CPT® 74183)
  - Elevated creatinine
- Pregnant individuals should be evaluated initially by renal ultrasound[2] (CPT® 76770 or CPT® 76775) and if further imaging is necessary, MRI Abdomen and Pelvis[3] without contrast (CPT® 74181 and CPT® 72195).

Evidence Discussion

- Pyelonephritis is a clinical diagnosis and advanced imaging is often not beneficial according to guidance from the American College of Radiology and the American Urological Association, as a majority of patients will clinically improve with appropriate antibiotic therapy.
- Advanced imaging may be indicated with contrasted CT (urography if requested) in patients with complicated clinical pictures which may include immunocompromised patients or those with diabetes mellitus, history of nephrolithiasis, prior renal surgery, or those with fever. All males with urinary tract infection are considered to have a complicated urinary tract infection and thus advanced imaging may be considered.
- Alternative imaging with MRI of the abdomen and pelvis with and without contrast may be performed if renal dysfunction is present.
- If an individual is unresponsive to therapy after 3 days, or if there is at least one prior episode of pyelonephritis, advanced imaging may be indicated. Pregnant patients are considered high risk for complications from pyelonephritis, however first line imaging should be with renal ultrasound to avoid ionizing radiation exposure. If further imaging is felt necessary, MRI of the abdomen and pelvis without contrast may be performed.

Lower (AB-40.2)

AB.UT.0040.2.A
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- CT Abdomen and Pelvis without and with contrast (CPT® 74178) if[3]:
  - suspected complicated: diabetes or immunocompromised or history of stones or prior renal surgery, or fever ≥101 F (≥38.5 C)
  - not responding to therapy after 3 days
  - males with first time UTI or recurrent UTI without etiology
  - recurrent UTI ≥3 per year
  - recommendation by or in consultation with a urologist or specialist
- MRI Abdomen and MRI Pelvis without or with and without contrast (CPT® 74181 and CPT® 72195 or CPT® 74183 and CPT® 72197) can be approved if requested when ALL of the following apply:
  - Criteria (as above) for CT Abdomen and Pelvis without and with contrast are met, AND
  - Elevated creatinine
- See: **Periurethral Cysts and Urethral Diverticula (PV-13)** in the Pelvis Imaging Guidelines

Evidence Discussion

- Advanced imaging for a lower urinary tract infection is not beneficial in most clinical scenarios according to guidance from the American College of Radiology and the American Urological Association, as few patients with cystitis will progress to an upper urinary tract infection.
- CT of the abdomen and pelvis with and without contrast may be indicated in the context of a complicated urinary tract infection, recurrent urinary tract infections (greater than 3 episodes in one year), or if recommended by a urologist or specialist.
- Complicated urinary tract infections may include immunocompromised patients or those with diabetes mellitus, history of nephrolithiasis, prior renal surgery, or those with fever. All males with urinary tract infection are considered to have a complicated urinary tract infection and thus advanced imaging may be considered.
- Alternative imaging with MRI of the abdomen and pelvis with and without contrast may be performed if renal dysfunction is present.

References (AB-40)

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1. Expert Panel on Urologic Imaging. ACR Appropriateness Criteria® acute pyelonephritis. American College of Radiology (ACR); 2012.
2. Delzell JE, Lefevre ML. Urinary tract infections during pregnancy. *American Family Physician*, 2000;61(3):713-720.
3. Lazarus E, Casalino DD, Remer EM, Arellano RS, et al. Expert Panel on Urologic Imaging. ACR Appropriateness Criteria® recurrent lower urinary tract infection in women. American College of Radiology (ACR); 2014.
4. Davis R, Jones JS, Barocas DA, et al. Diagnosis, Evaluation and Follow-Up of Asymptomatic Microhematuria (AMH) in Adults: AUA Guideline. *Journal of Urology*. 2012;188(6s):2473-2481. doi:10.1016/j.juro.2012.09.078.
5. Silverman SG, Leyendecker JR, Amis ES. What Is the Current Role of CT Urography and MR Urography in the Evaluation of the Urinary Tract? *Radiology*. 2009;250(2):309-323. doi:10.1148/radiol.2502080534.
6. Hooton TM. Uncomplicated Urinary Tract Infection. *New England Journal of Medicine*. 2012;366(11):1028-1037. doi:10.1056/nejmcp1104429.
7. Suskind AM, Saigal CS, Hanley JM, Lai J, Setodji CM, Clemens JQ. Incidence and Management of Uncomplicated Recurrent Urinary Tract Infections in a National Sample of Women in the United States. *Urology*. 2016;90:50-55. doi:10.1016/j.urology.2015.11.051.
8. Gupta K, Hooton TM, Naber KG, et al. International Clinical Practice Guidelines for the Treatment of Acute Uncomplicated Cystitis and Pyelonephritis in Women: A 2010 Update by the Infectious Diseases Society of America and the European Society for Microbiology and Infectious Diseases. *Clinical Infectious Diseases*. 2011;52(5). doi:10.1093/cid/ciq257.
9. Anger J, Lee U, Ackerman AL, et al. Recurrent Uncomplicated Urinary Tract Infections in Women: AUA/CUA/SUFU Guideline. *Journal of Urology*. 2019;202(2):282-289. doi:10.1097/ju.0000000000000296.

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Patent Urachus (AB-41)

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Patent Urachus (AB-41.1)

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See: **Patent Urachus (PV-23.1)** in the Pelvis Imaging Guidelines

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Transplant (AB-42)

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Liver Transplant, Pre-Transplant (AB-42.1)

AB.TX.0042.1.A
v2.0.2025

- Individuals **WITHOUT hepatocellular carcinoma (HCC)** referred to a transplant center for liver transplant evaluation can undergo advanced imaging as follows:
  - Per the transplant institution's protocol, OR
  - Per the studies and intervals listed below:

Imaging Study	Interval	Comments
Both of the following US studies: ◦ Abdominal US (CPT® 76700 or CPT® 76705) and ◦ Doppler (CPT® 93975)	◦ Every 6 months	
ONE of the following abdomen/pelvis advanced imaging studies: ◦ CT Abdomen (CPT® 74160 or CPT® 74170) ◦ MRI Abdomen (CPT® 74183)	◦ Annually ▪ Individuals with known cholangiocarcinoma may have more frequent repeat of studies at left per institution's protocol	
Additional abdomen/ pelvis advanced imaging, for individuals on the transplant list with known Primary Sclerosing Cholangitis (PSC): ◦ MRCP (See: **MRCP (AB-27.1)** for acceptable CPT® codes)	◦ Per the transplant institution's protocol	

Imaging Study	Interval	Comments
◦ CT Chest with or without contrast (CPT® 71260 or CPT® 71250)	◦ One-time ▪ Individuals with known cholangiocarcinoma may have more frequent repeat of studies at left per institution's protocol	◦ Repeat studies based on clinical indications per **Chest Imaging Guidelines**
ONE of the following: ◦ MRI Bone Marrow Blood Supply (CPT® 77084) or ◦ Bone scan (CPT® 78306)	◦ One-time	
Echocardiography with ONE of the following: ◦ CPT® 93306 (preferred) ◦ CPT® 93307 ◦ CPT® 93308	◦ Annually	See: **CD-2.1**, **CD-2.2** for descriptions of CPTs or further indications
CT Coronary angiography (CCTA) (CPT® 75574)	◦ Annually	See: **CD-4.1**, **CD-4.3**, **CD-4.4** for descriptions of CPTs or further indications
Stress imaging in place of but not in addition to CT Coronary angiography (CCTA) - ONE of the following: ◦ CPT® 93350 ◦ CPT® 93351 ◦ CPT® 78452 ◦ CPT® 75563 ◦ CPT® 78492 ◦ CPT® 78431	◦ Annually	See: **CD-1.6**, **CD-2.6**, **CD-3.1**, **CD-5.1**, **CD-6.1**, **CD-6.2** for descriptions of CPTs or further indications

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Imaging Study	Interval	Comments
For individuals with systemic amyloidosis: ◦ Cardiac MRI – ONE of the following: ▪ CPT® 75557 ▪ CPT® 75561 ◦ If Cardiac MRI is contraindicated or indeterminate, ONE of the following SPECT studies may be performed: ▪ CPT® 78803 ▪ CPT® 78830	◦ One-time	See: **CD-5.1**, **CD-5.2**, **CD-3.7**, **CD-3.8** for descriptions of CPTs or further indications
If required to further assess CAD seen on a recent CCTA that is of uncertain physiologic significance, CT-FFR (Noninvasive estimated coronary fractional flow reserve derived from coronary computed tomography angiography) with ONE of the following: ◦ CPT® 0501T ◦ CPT® 75580	◦ One-time	See: **CD-4.1**, **CD-4.5** for descriptions of CPTs or further indications

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Imaging Study	Interval	Comments
In place of CT Coronary angiography or stress imaging for initial pre-transplant evaluation, OR If CT Coronary angiography and/or CT-FFR or stress imaging is abnormal WITH addition of right heart catheterization if requested for evaluation of pulmonary hypertension: ◦ Left heart catheterization or left and right heart catheterization with ONE of the following: ▪ CPT® 93458 ▪ CPT® 93454 ▪ CPT® 93460 ▪ CPT® 93456 ◦ Or if prior CABG, with ONE of the following: ▪ CPT® 93459 ▪ CPT® 93455 ▪ CPT® 93461 ▪ CPT® 93457	◦ One-time	Repeat studies as per **CD-7.1**, **CD-7.3.5**, **CD-7.4.2**, **CD-7.5** for descriptions of CPTs or further indications
ONE of the following, for vascular evaluation in anticipation of transplant: ◦ CTA (CPT® 74175) ◦ MRA Abdomen (CPT® 74185)	◦ One-time	

Imaging Study	Interval	Comments
ANY of the following may be performed immediately prior to transplant: ◦ Abdominal US (CPT® 76700 or CPT® 76705) AND Doppler (CPT® 93975) ◦ CT Abdomen (CPT® 74160 or CPT® 74170) OR MRI Abdomen (CPT® 74183) ◦ CT Abdomen and Pelvis (CPT® 74177) or CT Pelvis (CPT® 72193) ◦ CTA (CPT® 74175) OR MRA Abdomen (CPT® 74185)	◦ Once, immediately prior to transplant	

- Individuals **WITH hepatocellular carcinoma (HCC)** referred to a transplant center for liver transplant evaluation can undergo advanced imaging as follows:
  - Per the transplant institution's protocol, OR
  - Per the studies and intervals listed below:

Imaging Study	Interval	Comments
Both of the following US studies: ◦ Abdominal US (CPT® 76700 or CPT® 76705) and ◦ Doppler (CPT® 93975)	◦ Every 6 months	

Imaging Study	Interval	Comments
ONE of the following abdomen/pelvis advanced imaging studies: ◦ CT Abdomen (CPT® 74160 or CPT® 74170) ◦ MRI Abdomen (CPT® 74183)	◦ Every 3 months ▪ Can be approved at interval as requested according to the transplant center's protocol for waitlisted individuals under active locoregional therapy to control tumor growth (i.e., tumor ablation)	
◦ CT Chest with contrast (CPT® 71260)	◦ Every 6 months ▪ Can be approved at interval as requested according to the transplant center's protocol for waitlisted individuals under active locoregional therapy to control tumor growth (i.e., tumor ablation)	
◦ Bone Scan (CPT® 78306)	◦ Every 6 months	
Echocardiography with ONE of the following: ◦ CPT® 93306 (preferred) ◦ CPT® 93307 ◦ CPT® 93308	◦ Annually	See: **CD-2.1**, **CD-2.2** for descriptions of CPTs or further indications
CT Coronary angiography (CCTA) (CPT® 75574)	◦ Once in 3 years	See: **CD-4.1**, **CD-4.3**, **CD-4.4** for descriptions of CPTs or further indications

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Imaging Study	Interval	Comments
Stress imaging in place of but not in addition to CT Coronary angiography (CCTA) - ONE of the following: ◦ CPT® 93350 ◦ CPT® 93351 ◦ CPT® 78452 ◦ CPT® 75563 ◦ CPT® 78492 ◦ CPT® 78431	◦ Annually	See: **CD-1.6**, **CD-2.6** , **CD-3.1**, **CD-5.1**, **CD-6.1**, **CD-6.2** for descriptions of CPTs or further indications
For individuals with systemic amyloidosis: ◦ Cardiac MRI – ONE of the following: ▪ CPT® 75557 ▪ CPT® 75561 ◦ If Cardiac MRI is contraindicated or indeterminate, ONE of the following SPECT studies may be performed: ▪ CPT® 78803 ▪ CPT® 78830	◦ One-time	See: **CD-5.1**, **CD-5.2**, **CD-3.7**, **CD-3.8** for descriptions of CPTs or further indications

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Imaging Study	Interval	Comments
If required to further assess CAD seen on a recent CCTA that is of uncertain physiologic significance, CT-FFR (Noninvasive estimated coronary fractional flow reserve derived from coronary computed tomography angiography) with ONE of the following: ◦ CPT® 0501T ◦ CPT® 75580	◦ One-time	See: **CD-4.1**, **CD-4.5** for descriptions of CPTs or further indications

Imaging Study	Interval	Comments
In place of CT Coronary angiography or stress imaging for initial pre-transplant evaluation, OR If CT Coronary angiography and/or CT-FFR or stress imaging is abnormal WITH addition of right heart catheterization if requested for evaluation of pulmonary hypertension: ◦ Left heart catheterization or left and right heart catheterization with ONE of the following: ▪ CPT® 93458 ▪ CPT® 93454 ▪ CPT® 93460 ▪ CPT® 93456 ◦ Or if prior CABG, with ONE of the following: ▪ CPT® 93459 ▪ CPT® 93455 ▪ CPT® 93461 ▪ CPT® 93457	◦ One-time	Repeat studies as per **CD-7.1**, **CD-7.3.5**, **CD-7.4.2**, **CD-7.5**

Imaging Study	Interval	Comments
ANY of the following may be performed immediately prior to transplant: ◦ Abdominal US (CPT® 76700 or CPT® 76705) AND Doppler (CPT® 93975) ◦ CT Abdomen (CPT® 74160 or CPT® 74170) OR MRI Abdomen (CPT® 74183) ◦ CT Abdomen and Pelvis (CPT® 74177) or CT Pelvis (CPT® 72193) ◦ CTA (CPT® 74175) OR MRA Abdomen (CPT® 74185) ◦ MRI Bone Marrow Blood Supply (CPT® 77084)	◦ Once, immediately prior to transplant	

Liver Transplant, Living Donor Pre-Transplant Imaging (Donor Imaging) (AB-42.2)

AB.TX.0042.2.A

v2.0.2025

- CT Abdomen or MRI Abdomen (CPT® 74160, or CPT® 74170, or CPT® 74183) to assess liver anatomy and volumetrics.
- MRCP to assess biliary anatomy (See: **MRCP (AB-27.1)** for proper coding)
- CTA or MRA Abdomen (CPT® 74175 or CPT® 74185) to assess vascular anatomy
- For donor imaging post-transplant, imaging is indicated per transplant center protocol. If no transplant center protocol exists, see condition-specific guideline appropriate to the individual's signs and symptoms.

Evidence Discussion

Living donor liver transplantation (LDLT) has become a widely accepted solution to alleviate the ongoing shortage of cadaveric livers for deceased donor liver transplantation (DDLT). Radiologic evaluation plays a crucial role in assessing both donor candidates and recipients to confirm their eligibility and determine the most suitable surgical approach.

A comprehensive pre-operative assessment of the vascular, liver volume, and biliary anatomy is vital for the safe and successful harvesting, transplantation, and long-term success of the graft. Computed tomography (CT) and magnetic resonance imaging (MRI) are the preferred imaging techniques for this purpose. These cross-sectional methods offer detailed views of the vascular and biliary structures, assess the hepatic parenchyma, and enable volumetric analysis.

LDLT evaluation typically combine MRI/MRCP and CT to leverage the higher spatial resolution of CT for arterial evaluation and the superior soft tissue, parenchymal and biliary analysis provided by MRI. Besides examining the liver parenchyma for abnormalities such as steatosis, a detailed evaluation of the hepatic volume, vascular and biliary system for significant anatomic variants is essential, as these variants can influence surgical techniques and outcomes for both recipients and donors.

Liver Transplant, Post-Transplant Imaging (AB-42.3)

AB.TX.0042.3.A
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- Cardiac Imaging:
  - See: **Transplant Patients (CD-1.6)** in the Cardiac Imaging Guidelines
- Suspected post-operative complications:
  - Vascular thrombosis (suspected hepatic artery thrombosis)
    - Doppler ultrasound (CPT® 93975)
    - CTA or MRA Abdomen (CPT® 74175 or CPT® 74185)
  - Suspicion of biliary anastomotic strictures:
    - MRCP (See: **MRCP (AB-27.1)** for appropriate CPT codes)
    - Vascular imaging as above for vascular thrombosis may also be requested and approved for this indication
  - Other suspected post-operative complications (e.g., infection, etc.)
    - Imaging as requested by the transplant institution or team
- Transplant individuals without prior HCC or cholangiocarcinoma:
  - Routine post-transplant imaging is not indicated.
  - If cirrhosis develops post-transplant:
    - See: **Cirrhosis and Liver Screening for Hepatocellular Carcinoma (HCC) (AB-26.1)**, **Ascites (AB-26.2)**, and **Portal Hypertension (AB-26.3)** for HCC screening guidelines.
  - Fibrosis assessment post-liver transplant:
    - Transient elastography (CPT® 91200), which is the most studied modality in this setting.
- Surveillance after transplant for HCC:
  - Based on RETREAT score
    - 0 points: No additional screening needed
    - 1-3 points: CT or MRI Abdomen (CPT® 74160, or CPT® 74170, or CPT® 74183) and CT Chest (CPT® 71260 or CPT® 71250) every 6 months for 2 years.
    - 4 points: CT or MRI Abdomen (CPT® 74160, or CPT® 74170, or CPT® 74183) and CT Chest (CPT® 71260 or CPT® 71250) every 6 months for 5 years
    - ≥5 points: CT or MRI Abdomen (CPT® 74160, or CPT® 74170, or CPT® 74183) and CT Chest (CPT® 71260 or CPT® 71250) every 3 months for 2 years, then every 6 months between the 2nd and 5th years.
- If there is a suspicion of recurrent tumor based on clinical findings and/or sequentially increasing AFP:

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  - CT Abdomen (CPT® 74160 or CPT® 74170) or MRI Abdomen (CPT® 74183)
- Imaging after transplant for primary sclerosing cholangitis (PSC):
  - Suspected recurrence of PSC;
    - MRCP (See: **MRCP (AB-27.1)** for proper coding)
- Imaging after transplant for cholangiocarcinoma:
  - Liver ultrasound (CPT® 76705 or CPT® 76700) or MRI Abdomen and MRCP (CPT® 74183) every 6 months for 5 years post-transplantation.
  - CT Chest (CPT® 71250 or CPT® 71260) every 6 months for 5 years post-transplantation

Background and Supporting Information

Consensus guidelines regarding post-transplant surveillance imaging have not yet been established. There have been recent attempts to establish evidence-based guidelines, including the development of the RETREAT score, validated recently in a study conducted at University of California, San Francisco, Mayo Clinic-Rochester, and Mayo Clinic-Jacksonville. This scoring system has been adopted for use by UCSF and guides post-transplant imaging for individuals who have undergone transplant for HCC.

The RETREAT score is a protocol used to estimate the risk of tumor recurrence after liver transplantation in patients who have been transplanted for the treatment of hepatocellular carcinoma. It is comprised of three factors which are assessed before and after transplant. Points are assigned based on criteria which include the alpha-fetoprotein level before liver transplantation, the presence or absence of microvascular invasion, and the sum of the diameter of the largest viable tumor and the number of viable nodules on pathologic examination of the explant liver. The RETREAT score is calculated as follows:

Risk Factor	Score
Alpha-fetoprotein level before LT	
0-20	0
21-99	1
100-999	2
≥1000	3
Microvascular invasion present	2

Risk Factor	Score
Sum of the diameter of the largest viable tumor and the number of viable nodules	
0	0
1.1-4.9	1
5.0-9.9	2
≥10	3

Evidence Discussion

Clinical manifestations of liver transplant complications can be subtle and non-specific and medical imaging plays an important role. Often, a rise in liver enzymes is the earliest sign of graft problems, allowing for timely clinical intervention to protect allograft function.

Throughout the lifetime of a post liver transplant patient, complications affecting the liver allograft could be caused by vascular and biliary complications, immune-mediated injury, drug-related issues, infectious complications, and recurrence of the primary liver disease.

Thus, managing these patients depends on a thorough clinical history, symptoms, laboratory data, and imaging studies; at times multiple imaging modalities are required.

There is no specific consensus of what type, or when a post liver transplant patient will need or require an imaging test and it typically depends on post liver transplant imaging protocols specific to a transplant centre, or abnormal laboratory tests.

However, as standard practice, ultrasound sonography plus colour-Doppler ultrasound examination is routinely performed at 24–48 h, on the 7th day and 21st day (Mayo Clinic protocol), and on the first and third month after transplantation to evaluate the liver parenchyma and vascular structures integrity. The frequency and indication vary between transplant centres, and post-transplant protocols.

In addition, testing is performed anytime there is an unexpected change in liver enzymes potentially including additional testing such as CT imaging and MR imaging techniques, including contrast-enhanced CT or MR angiography and MR cholangiography to further evaluate the transplanted liver. These tests can reveal abnormalities in vascular structures, bile ducts, liver parenchyma, and extrahepatic tissues.

In the case of a history of pre-liver transplant hepatocellular carcinoma (HCC), even with adherence to Milan criteria, HCC recurs post-LT in 10%–15% and is the most common cause of death in this population.

A multicenter analysis has proposed and validated a risk stratification score, Risk Estimation of Tumor Recurrence After Transplant (RETREAT), which incorporates AFP at LT, vascular invasion, the sum of the largest viable tumor diameter, and number of viable tumors on explant.

RETREAT stratifies 5-year recurrence risk from <3% in patients without viable tumor on explant or microvascular invasion and AFP <20ng/ml (i.e., RETREAT 0) up to 75% in the highest-risk patients (RETREAT≥5).

In this population, because the two most common sites of post-transplant recurrence are the lung (#40%) followed by the liver (33%), surveillance is advised. The AASLD advises surveillance for detection of post-transplant HCC recurrence using multiphasic contrast-enhanced abdominal CT or MRI and chest CT scan. The optimal timing and duration of post-transplant surveillance is uncertain; however, risk scores may be considered to guide decisions.

Beyond allograft-related complications, metabolic syndrome, cardiovascular disease, renal dysfunction, and malignancies are leading causes of morbidity and mortality in this patient population. These patients will require cardiovascular evaluation, breast cancer, and lung cancer surveillance per individual risk and transplant centre expert team recommendations as some patient could carry a slightly higher risk than the non-transplant population.

Post-Transplant Lymphoproliferative Disorder (PTLD) (AB-42.4)

AB.TX.0042.4.A

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- CT Chest/Abdomen/Pelvis with contrast (CPT® 71260 and CPT® 74177) for known or suspected PTLD.
- Additional evaluation of suspected PTLD is the same as the evaluation of lymphoma. See: **Diffuse Large B Cell Lymphoma (DLBCL) (ONC-27.2)** in the Oncology Imaging Guidelines for further recommendations
- There is insufficient evidence to support the routine use of imaging to screen for PTLD.

Background and Supporting Information

- Post-transplant lymphoproliferative disease (PTLD) is a major complication of solid organ transplantation and the spectrum ranges from benign hyperplasia to malignant lymphoma. It has an incidence of 1-20%, and is usually related to Epstein-Barr virus infection in the setting of immunosuppression.

Evidence Discussion

For suspected PTLD advanced imaging studies are extremely helpful. CT Chest/Abdomen/Pelvis with contrast are the mainstay for known or suspected PTLD. PTLD generally is rapid growing and small ill-defined masses of lymphoid tissue cannot be initially identified on sonography. Since PTLD has the potential of being reversed by decreasing immunosuppression, early detection with more advanced imaging can very beneficial.

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Kidney Transplant, Pre-Transplant Imaging Studies (AB-42.5)

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Pre-Transplant Evaluation (Per Institution Protocol)

- Individuals referred to a transplant center for kidney or kidney-pancreas transplant evaluation can undergo advanced imaging as follows:
  - Per the transplant institution's protocol, OR
  - Per the studies and intervals listed below:

Imaging Study	Interval	Comments
ONE of the following abdomen/pelvis imaging studies: • CT Abdomen and Pelvis without contrast (CPT® 74176) • CT Abdomen and Pelvis with contrast (CPT® 74177) • CTA Abdomen (CPT® 74175 • CTA Abdomen and Pelvis (CPT® 74174) • CTA Pelvis (CPT® 72191)	One-time	
ONE of the following echocardiography studies: • CPT® 93306 (preferred) • CPT® 93307 • CPT® 93308	Annual	See also: **Transthoracic Echocardiography (TTE) - Indications/ initial evaluation (CD-2.2)** for descriptions of CPTs or further indications

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Imaging Study	Interval	Comments
ONE of the following stress imaging studies: • CPT® 93350 • CPT® 93351 • CPT® 78452 • CPT® 75563 • CPT® 78492 • CPT® 78431	Annual	See also: **Transplant (CD-1.6)**, **Stress Echocardiography (Stress Echo) (CD-2.7)**, **Myocardial Perfusion Imaging (MPI) - Coding (CD-3.1)**, **Cardiac MRI - Coding (CD-5.1)**, **Cardiac PET - Coding (CD-6.1)**, **Cardiac PET - Perfusion - Indications (CD-6.2)** for descriptions of CPTs or further indications

Additional Pre-Transplant Evaluation (Per Indication)

Individuals referred to a transplant center for kidney or kidney-pancreas transplant evaluation can undergo the following additional advanced imaging when the listed indications are met:

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Indication	Imaging Study	Interval	Comments
• 20 pack-year history of smoking	ONE of the following: • CT Chest without contrast (CPT® 71250) • CT Chest with contrast (CPT® 71260)	One-time	For lung cancer screening with Low Dose Computed Tomography (LDCT), see: **U.S. Preventative Services Task Force: Lung Cancer Screening (Commercial and Medicaid) (CH-33.1)** or **National Coverage Determination (NCD) for Lung Cancer Screening with Low Dose Computed Tomography (LDCT) (210.14) (CH-33.2)** for Low-Dose CT Chest without contrast
• Autosomal dominant polycystic kidney disease	ONE of the following: • MRA Head (CPT® 70544, 70545, or 70546) • CTA Head (CPT® 70496)	One-time	Repeat imaging as per **Intracranial Aneurysms (HD-12.1)**
• History of stroke, or • History of TIA, or • Carotid bruit on exam	ONE of the following: • Carotid duplex bilateral study (CPT® 93880 or CPT® 73882)	One-time	Repeat imaging as per **Initial Imaging (PVD-3.1)**

Indication	Imaging Study	Interval	Comments
• Presence of systemic amyloidosis	ONE of the following cardiac MRI studies: • CPT® 75557 • CPT® 75561	One-time	See also: **Cardiac MRI - Coding (CD-5.1)**, **Cardiac MRI - Indications (excluding Stress MRI)(CD-5.2)** for descriptions of CPTs or further indications
BOTH of the following: • Presence of systemic amyloidosis AND • Cardiac MRI is either contraindicated or indeterminate	ONE of the following nuclear medicine studies: • CPT® 78803 • CPT® 78830	One-time	See also: **Myocardial Tc-99m Pyrophosphate Imaging (CD-3.7)**, **Cardiac Amyloidosis (CD-3.8)** for descriptions of CPTs or further indications
• In place of stress imaging for initial pre-transplant evaluation, or • Stress imaging is positive for ischemia	ONE of the following heart catheterization: • CPT® 93458 • CPT® 93454 • If prior CABG: ◦ CPT® 93459 ◦ CPT® 93455	One-time	Repeat imaging as per **Diagnostic Heart Catheterization - Code Sets (CD-7.1)**and **Evaluation of structural heart disease (CD-7.3.5)**

Kidney Donor Nephrectomy or Pre-Transplant Nephrectomy

Indication	Imaging Study	Comments
• Individuals being evaluated for living kidney donation, or • Individual is planning removal of one or both kidneys	ONE of the following: • CTA Abdomen (CPT® 74175) • MRA Abdomen (CPT® 74185) • MRI Abdomen without and with contrast (CPT® 74183)	For CTA and MRA, 3D rendering is included with the original study

Evidence Discussion

Individuals being assessed for kidney or kidney-pancreas transplant require advanced imaging of the abdomen and/or pelvis either with or without contrast (to include angiography). This allows assessment of any intra-abdominal pathology, which may complicate transplantation. MR angiography may be indicated for assessment of the native kidneys when considering pre-transplant nephrectomy. Patients may also be assessed according to the standardized imaging protocol of the transplant center.

Although there is some debate regarding coronary artery disease (CAD) screening and transplant outcomes, a preoperative cardiac workup is essential for prognostication given the significant association with chronic kidney disease (CKD) and CAD. This may include a transthoracic echocardiogram as well as a stress echocardiogram and/or cardiac catheterization.

Cardiac MRI can be performed in individuals with systemic amyloidosis, as cardiac involvement is the leading cause of morbidity and mortality. If the MRI is indeterminate or contraindicated, myocardial Tc-99m pyrophosphate imaging may be performed.

Patients with an extensive smoking history of greater than 20 pack-years may undergo CT of the chest (either with or without contrast), which is guided by evidence of the National Lung Screening Trial to reduce risk of mortality.

Any individual with a history of transient ischemic attack (TIA) or stroke may undergo a carotid duplex study for preoperative assessment. Individuals with autosomal dominant polycystic kidney disease (ADPKD) may undergo MR or CT angiography of the head to screen for aneurysms.

Individuals being assessed for kidney donation should have advanced abdominal imaging with CT or MR angiography to assess kidney size and vasculature.

Kidney Transplant, Post-Transplant (AB-42.6)

AB.TX.0042.6.A
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- Ultrasound of transplanted kidney:
  - Current ultrasound imaging protocols of the transplanted kidney commonly include a Doppler study and are coded as CPT® 76776.
    - Do not report non-invasive vascular codes CPT® 93975 and CPT® 93976 in conjunction with CPT® 76776.
  - Ultrasound of the transplanted kidney performed without duplex Doppler should be reported as a limited retroperitoneal ultrasound (CPT® 76775).

Evidence Discussion

- Imaging evaluation of the transplanted kidney may be necessary for routine surveillance or to allow for early diagnosis of post-transplant complications or graft dysfunction.
- The preferred initial imaging is duplex ultrasound with Doppler as this provides readily-available, reliable imaging which is non-invasive and does not require the use of ionizing radiation nor intravenous contrast.

Heart Transplant (AB-42.7)

AB.TX.0042.7.A

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- See: **Transplant Patients (CD-1.6)** in the Cardiac Imaging Guidelines

References (AB-42)

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1. Carruso S, Miraglia R, et al. Imaging in liver transplantation. *World Journal of Gastroenterology*.2009;15(6):675-683.
2. Pomfret E, Washburn K, Wald C, et al. Report of a national conference on liver allocation in patients with hepatocellular carcinoma in the United States. *Liver Transplant*. 2010;16(3):262-78.
3. Sahani D, Mehta A, Blake M, et al. Preoperative hepatic vascular evaluation with CT and MR angiography: implications for surgery. *RadioGraphics*.2004;24:1367-1380. 2017.
4. Cincinnati Children's Hospital Medical Center. Evidence based clinical practice guideline for management of EBV-associated post-transplant lymphoproliferative disease (PTLD) in solid organ transplant.
5. Liu, D. et al. Evidence-Based Surveillance Imaging Schedule After Liver Transplantation for Hepatocellular Carcinoma Recurrence. *Transplantation* 2017. Jan;101(1): 107-111
6. Lucey, Michael, et al. Long-Term Management of the Successful Adult Liver Transplant: 2012 Practice Guideline by AASLD and the American Society of Transplantation.
7. Mehta N, Heimbach J, Harnois DM, et al. Validation of a Risk Estimation of Tumor Recurrence After Transplant (RETREAT) Score for Hepatocellular Carcinoma Recurrence After Liver Transplant. *JAMA Oncology*. 2017;3(4):493. doi:10.1001/jamaoncol.2016.5116.
8. Filgueira NA. Hepatocellular carcinoma recurrence after liver transplantation: Risk factors, screening and clinical presentation. *World Journal of Hepatology*. 2019;11(3):261-272. doi:10.4254/wjh.v11.i3.261.
9. Xu M, Doyle MM, Banan B, et al. Neoadjuvant Locoregional Therapy and Recurrent Hepatocellular Carcinoma after Liver Transplantation. *Journal of the American College of Surgeons*. 2017;225(1):28-40. doi:10.1016/j.jamcollsurg.2017.03.015.
10. Cai L, Yeh BM, Westphalen AC, Roberts JP, Wang ZJ. Adult living donor liver imaging. *Diagnostic and Interventional Radiology*. 2016;22(3):207-214. doi:10.5152/dir.2016.15323.
11. Liu D, Chan ACY, Fong DYT, Lo C-M, Khong P-L. Evidence-Based Surveillance Imaging Schedule After Liver Transplantation for Hepatocellular Carcinoma Recurrence. *Transplantation*. 2017;101(1):107-111. doi:10.1097/tp.0000000000001513.
12. Bajer L, Slavcev A, Macinga P, et al. Risk of recurrence of primary sclerosing cholangitis after liver transplantation is associated with de novo inflammatory bowel disease. *World Journal of Gastroenterology*. 2018;24(43):4939-4949. doi:10.3748/wjg.v24.i43.4939.
13. Ligeti K, Müller LP, Müller-Tidow C, Weber T. Risk factors, diagnosis, and management of posttransplant lymphoproliferative disorder: improving patient outcomes with a multidisciplinary treatment approach. T*ransplant Research and Risk Management*. 2017;Volume 9:1-14. doi:10.2147/trrm.s84744.
14. Aghayev A, Gupta S, Dabiri BE, Steigner ML. Vascular imaging in renal donors. *Cardiovascular Diagnosis and Therapy*. 2019;9(S1). doi:10.21037/cdt.2018.11.02.
15. Sawinski D, Locke JE. Evaluation of Kidney Donors: Core Curriculum 2018. *American Journal of Kidney Diseases*. 2018;71(5):737-747. doi:10.1053/j.ajkd.2017.10.018.
16. Kidney Disease: Improving Global Outcomes (KDIGO) Kidney Transplant Candidate Work Group. KDIGO Clinical Practice Guideline on the Evaluation and Management of Candidates for Kidney Transplantation. *Transplantation*. 2020;104: S1 – S103.
17. Cheng XS, VanWagner LB, Costa SP, et al. Emerging evidence on coronary heart disease screening in kidney and liver transplantation candidates: a scientific statement from the American Heart Association. *Circulation*. 2022;146:e299–e324. doi.org/10.1161/CIR.0000000000001104.
18. Kumamaru KK, Kondo T, Kumamaru H, et al. Repeat coronary computed tomographic angiography in patients with a prior scan excluding significant stenosis. *Circ Cardiovasc Imaging*. 2014;7:788-795. doi.org/10.1161/CIRCIMAGING.113.001549.
19. VanWagner LB, Harinstein ME, Runo JR, et al. Multidisciplinary approach to cardiac and pulmonary vascular disease risk assessment in liver transplantation: An evaluation of the evidence and consensus recommendations. *Am J Transplant*. 2018;18:30–42. doi.org/10.1111/ajt.14531.

20. Löffler AI, Gonzalez JA, Sundararaman SK, et al. Coronary computed tomography angiography demonstrates a high burden of coronary artery disease despite low-risk nuclear studies in pre–liver transplant evaluation. *Liver Transplantation*. 2020; 26(11):1398–1408. doi.org/10.1002/lt.25869.
21. Harding-Theobald E, Kriss M. Evaluation and management of abnormal liver enzymes in the liver transplant recipient: When, why, and what now? *Clin Liver Dis (Hoboken)*. 2023;21(6):178-186.
22. Hernandez Mdel P, Martin P, Simkins J. Infectious complications after liver transplantation. *Gastroenterol Hepatol (NY)*. 2015;11:741–53.
23. Delgado-Moraleda JJ, Ballester-Vallés C, Marti-Bonmati L. Role of imaging in the evaluation of vascular complications after liver transplantation. *Insights Imaging*. 2019;78:10.
24. Singh AK, Nachiappan AC, Verma HA, et al. Postoperative imaging in liver transplantation: what radiologists should know. *RadioGraphics*. 2010;30(2):339-351.
25. Girometti R, Como G, Bazzocchi M, Zuiani C. Post-operative imaging in liver transplantation: State-of-the-art and future perspectives. *World J Gastroenterol*. 2014;20(20):6180-6200.
26. Di Martino M, Rossi M, Mennini G, et al. Imaging follow-up after liver transplantation. *Br J Radiol*. 2016;89(1064):20151025.
27. Lucey MR, Terrault N. Long-term management of the successful adult liver transplant: 2012 practice guideline by the American Association for the Study of Liver Diseases and the American Society of Transplantation Liver Transplantation. 2013;19(1):3-26.
28. Singh S, Watt KD. Long-term medical management of the liver transplant recipient: what the primary care physician needs to know. *Mayo Clin Proc*. 2012;87(8):779-90.
29. Singal AG, Llovet JM, Yarchoan M, et al. AASLD Practice Guidance on prevention, diagnosis, and treatment of hepatocellular carcinoma. *Hepatology*. 2023;78(6):1922-1965.
30. Agostini C, Buccianti S, Risaliti M, et al. Complications in post-liver transplant patients. *J Clin Med*. 2023;12(19):6173.
31. Berry PA, Melendez HV, Wendon JA. Postoperative care of the liver-transplant patient. *Surgical Intensive Care Medicine*. 2010:629–38.
32. Ito K, Siegelman ES. MR imaging of complications after liver transplantation. *American Journal of Roentgenology*. 2000;175(4):943-1191.
33. Brookmeyer CE, Bhatt S, Fishman EK, Sheth S. Multimodality imaging after liver transplant: top 10 important complications. *RadioGraphics*. 2022;42(3):702-721.
34. Mohan R, Rice J. A practical approach to extrahepatic cancer screening before and after liver transplant. *Clin Liver Dis (Hoboken)*. 2023;21(6):169-172.
35. Keshtkar A, Karbasian F, Reihani H, et. al. A pediatric case series of catastrophic gastrointestinal complications of posttransplant lymphoproliferative disease with increasing incidence, high association with coronavirus disease 2019, higher mortality, and a plea for early endoscopy to prevent late fatal outcome. *J Med Case Rep*. 2023;17(1):396.
36. Keshtkar A, Karbasian F, Reihani H, et al. *J Med Case Rep*. 2023;17(1):396. doi:10.1186/s13256-023-04123-5.
37. Lee M, Abousaud A, Harkins RA, et al. Important considerations in the diagnosis and management of post-transplant lymphoproliferative disorder. *Curr Oncol Rep*. 2023;25(8):883-895.
38. Dharnidharka VR, Webster AC, Martinez OM, Preiksaitis JK, Leblond V, Choquet S. Post-transplant lymphoproliferative disorders. *Nat Rev Dis Primers*. 2016;2:15088. doi:10.1038/nrdp.2015.88.
39. Marcelis L, Tousseyn T. The tumor microenvironment in post-transplant lymphoproliferative disorders. *Cancer Microenviron*. 2019;12(1):3-16. doi:10.1007/s12307-018-00219-5.
40. Morscio J, Tousseyn T. Recent insights in the pathogenesis of post-transplantation lymphoproliferative disorders. *World J Transplant*. 2016;6(3):505-16. doi:10.5500/wjt.v6.i3.505.
41. Styczynski J, van der Velden W, Fox CP, et al. Sixth European Conference on Infections in Leukemia, a joint venture of the Infectious Diseases Working Party of the European Society of Blood and Marrow Transplantation (EBMT-IDWP), the Infectious Diseases Group of the European Organization for Research and Treatment of Cancer (EORTC-IDG), the International Immunocompromised Host Society (ICHS) and the European Leukemia Net (ELN). Management of Epstein-Barr Virus infections and post-transplant lymphoproliferative disorders in patients after allogeneic hematopoietic stem cell transplantation: Sixth European Conference on Infections in Leukemia (ECIL-6) guidelines. *Haematologica*. 2016;101(7):803-11. doi:10.3324/haematol.2016.144428.
42. Marie E, Navallas M, Navarro OM, et al. Posttransplant Lymphoproliferative disorder in children: a 360-degree perspective. *Radiographics*. 2020;40(1):241-265. doi:10.1148/rg.2020190103.

43. Vrachliotis TG, Vaswani KK, Davies EA, Elkahammas EA, Bennett WF, Bova JG. CT findings in posttransplantation lymphoproliferative disorder of renal transplants. *AJR Am J Roentgenol*. 2000;175(1):183-8. doi:10.2214/ajr.175.1.1750183.
44. Martin P, DiMartini A, Feng S, Brown Jr. R, Fallon M. Evaluation for liver transplantation in adults: 2013 practice guideline by the American Association for the Study of Liver Diseases and the American Society of Transplantation. *Hepatology*. 2014;59(3):p 1144-1165. doi:10.1002/hep.26972.
45. Hashem B. El-Serag, MD, MPH, Surveillance for hepatocellular carcinoma: in whom and how? *Therap Adv Gastroenterol.* 2011;4(1):5–10.
46. Kubota K, Ina H, Okada Y, Irie T. Growth rate of primary single hepatocellular carcinoma: determining optimal screening interval with contrast enhanced computed tomography. *Dig Dis Sci*. 2003;48: 581–586.
47. Bacon BR, Adams PC, Kowdley KV, Powell LW, Tavill AS. Diagnosis and management of hemochromatosis: 2011 Practice Guideline by the American Association for the Study of Liver Diseases. *Hepatology*. 2011;54(1):328-343. doi:10.1002/hep.24330.
48. Moawad AW, Elsayes KM, Benamar F, Rao K, Sun J, Szklaruk J. Value of follow-up chest computed tomography in the surveillance of patients with hepatocellular carcinoma. *J Hepatocell Carcinoma*. 2020;7:331-335. doi:10.2147/JHC.S280175.
49. Bowlus CL, Arrivé L, Bergquist A, et al. AASLD practice guidance on primary sclerosing cholangitis and cholangiocarcinoma. *Hepatology*. 2023;77(2):p 659-702. doi: 10.1002/hep.32771.
50. Lindor KD, Bowlus CL, Boyer J, Levy C, Mayo M. Primary biliary cholangitis: 2018 practice guidance from the American Association for the Study of Liver Diseases. *Hepatology*. 2019;69(1):394-419. doi:10.1002/hep.30145.
51. Colli A, Fraquelli M, Casazza G, et al. Accuracy of ultrasonography, spiral CT, magnetic resonance, and Alpha-fetoprotein in diagnosing hepatocellular carcinoma: a systematic review: CME. *American Journal of Gastroenterology*. 2006;101(3):513–523.
52. Adam R, McMaster P, O'Grady JG, et al. Evolution of liver transplantation in Europe: report of the European Liver Transplant Registry. *Liver Transpl*. 2003;9:1231–1243.
53. Baskiran A, Kahraman AS, Cicek IB, Sahin T, Isik B, Yilmaz S. Preoperative evaluation of liver volume in living donor liver transplantation. *North Clin Istanb*. 2017;5(1):1-5.
54. Borhani AA, Khaled M, Elsayes MD. Imaging evaluation of living liver donor candidates: techniques, protocols, and anatomy. *RadioGraphics*. 2021; 41:1572–1591.
55. Vernuccio F, Whitney SA, Ravindra K, Marin D. CT and MR imaging evaluation of living liver donors. *Abdom Radiol (NY)*. 2021;46(1):17-28.
56. Hennedige T, Anil G, Madhavan K. Expectations from imaging for pre-transplant evaluation of living donor liver transplantation. *World J Radiol*. 2014;6(9):693-707.

Hepatic and Abdominal Arteries (AB-43)

Guideline Page

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Hepatic Arteries and Veins (AB-43.1)

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- Portal Vein Thrombosis (PVT):
  - Doppler US (CPT® 93975) is the initial noninvasive modality for the diagnosis of Portal Vein Thrombosis
  - CT Abdomen with contrast (CPT® 74160 or 74170 – 4 phase CT), MRI Abdomen without and with contrast (CPT® 74183) or CTA Abdomen (CPT® 74175)
    - to assess the extension of thrombus into the mesenteric veins when Doppler US (or other imaging, such as abdominal US) is positive for PVT
    - to exclude tumor thrombus among individuals with cirrhosis who develop new portal and/or mesenteric vein thrombosis
    - for continued concern for PVT (for example in an individual with a hypercoagulable state or abdominal malignancy) if Doppler US is negative or inconclusive
  - To assess for development of intestinal ischemia among individuals with known portal and/or mesenteric vein thrombosis (MVT) (e.g., development of fever, rebound, leukocytosis, elevated serum lactate levels):
    - In lieu of the above imaging modalities, if requested: CT Abdomen and Pelvis with contrast (CPT® 74177).
  - For suspicion of portal hypertensive or portal cavernoma cholangiopathy in individuals with known PVT or MVT (cholestatic liver chemistry profile (See **Abnormal Liver Chemistries (AB-30.1)**), known portal cavernoma, extrahepatic biliary abnormalities on imaging):
    - MRCP (CPT® 74183 or CPT® 74181)

(Note: Portosystemic collaterals in the region surrounding the common bile duct in individuals with chronic PVT can be associated with common bile duct obstruction.)

- For routine follow-up of PVT:
  - US/Doppler every 6 months. If these are reported as not providing adequate visualization, CT Abdomen (CPT® 74160), MRI Abdomen (CPT® 74183), or CTA Abdomen (CPT® 74175), can be performed.
- For follow-up of PVT being treated with anticoagulation:
  - US/Doppler, CT Abdomen (CPT® 74160), MRI Abdomen (CPT® 74183), or CTA Abdomen (CPT® 74175) in 3-6 months.
  - Further follow-up every 6 months with US/Doppler unless these are reported as not providing adequate visualization, in which case any of the above studies can be approved.
- TIPS (transjugular intrahepatic portosystemic shunt)

- Pre-procedure evaluation:
  - Abdominal US, including Doppler (CPT® 76700 and/or CPT® 93975), Multiphase CT Abdomen (CPT® 74160 or CPT® 74170), Multiphase CTA Abdomen (CPT® 74175), Multiphase MRA Abdomen (CPT® 74185), or MRI Abdomen liver protocol (CPT® 74183)
  - Echocardiogram (CPT® 93306) (see: **Transthoracic Echocardiography (TTE) – Indications/Initial Evaluation (CD-2.2)**)
- For routine follow-up to monitor stent patency:
  - US with Doppler (CPT® 93975) 7-14 days after shunt creation, and then at 3 months, 6 months, and then every 6 months thereafter.
    - Note: If requested earlier than the above intervals because of a clinical deterioration or suspicion of stent occlusion, the Doppler can be approved.
- If Doppler imaging is indeterminate or if there is a negative Doppler with clinical signs of worsening portal hypertension:
  - Multiphase CT Abdomen (CPT® 74160 or CPT® 74170), Multiphase CTA Abdomen (CPT® 74175), Multiphase MRA Abdomen (CPT® 74185), or MRI Abdomen liver protocol (CPT® 74183)
- Echocardiogram (CPT® 93306) is indicated for the following:
  - One time post-procedure for routine follow up
  - Any time post-procedure:
    - for new signs or symptoms
    - for concern for new or worsening pulmonary hypertension
    - See also: **Frequency of Echocardiography Testing (CD-2.3)** in the Cardiac Imaging Guidelines

- Budd-Chiari Syndrome
  - Primary Budd-Chiari Syndrome (BCS) is due to thrombotic obstruction of the hepatic venous outflow tract, and Secondary BCS is caused by malignant tumors or extrinsic compression of the hepatic vein. Guidelines refer to Primary BCS.
    - LI-RADS assessment should not be applied to individuals <18 years old or those with cirrhosis from congenital hepatic fibrosis or secondary to vascular disorders (e.g., Budd-Chiari syndrome, chronic portal vein occlusion, cardiac congestion, hereditary hemorrhagic telangiectasia).
  - Doppler US (CPT® 93975) is the initial diagnostic test for the evaluation of BCS.
  - CT Abdomen with contrast (CPT® 74160), or MRI Abdomen without and with contrast (CPT® 74183) or CTA Abdomen (CPT® 74175)
    - to assess thrombus extension
    - to rule out tumor thrombus
    - to assess response to anticoagulation therapy
    - if there is high suspicion of BCS despite a negative or inconclusive Doppler US

        - to additionally assess indeterminate hepatic nodules detected on the prior US (any of the above studies or CT Abdomen without and with contrast CPT® 74170)
    - For pre-operative evaluation of anticipated interventional vascular therapies or TIPS:
        - Abdominal US, including Doppler (CPT® 76700 and/or CPT® 93975), Multiphase CT Abdomen (CPT® 74160 or CPT® 74170), Multiphase CTA Abdomen (CPT® 74175), Multiphase MRA Abdomen (CPT® 74185), or MRI Abdomen liver protocol (CPT® 74183)
    - For HCC Surveillance in patients with chronic BCS:
        - Abdominal US (CPT® 76700 or CPT® 76705) and serum alpha-fetoprotein every 6 months
        - Triphasic CT Abdomen (CPT® 74160 or CPT® 74170), or MRI Abdomen (CPT® 74183) for the evaluation of hepatic nodules seen on US or AFP ≥15 ng/ml.
        - The LiRADS reporting system does not apply to HCC surveillance in this population, due to the vascular origin of many of the hepatic imaging abnormalities.
- Hereditary Hemorrhagic Telangiectasia (HHT)
    - Note: The liver may be involved in individuals with HHT, and artery-to-vein or vein-to-vein shunting may occur resulting in liver vascular malformations (LVMs).
    - Screening the liver for LVMs is not indicated. As per recent ACG Guidelines[6] "There is no evidence to suggest that making a diagnosis in an asymptomatic patient has clinical benefits or prevents death".
    - For symptoms suggestive of LVMs (including an audible bruit or palpable thrill over the hepatic region on physical examination, abnormal liver tests) or for the development of signs or symptoms of heart failure, biliary ischemia, hepatic encephalopathy, mesenteric ischemia, or portal hypertension:
        - CT Abdomen (CPT® 74160), CTA Abdomen (CPT® 74175), MRI Abdomen with and without (CPT® 74183), MRCP (CPT® 74183), or MRA Abdomen (CPT® 74185)
- CTA Abdomen and Pelvis (CPT® 74174), or CTA Abdomen (CPT® 74175) or MRA Abdomen (CPT® 74185) additional indications:
    - Evaluation of portal and hepatic veins prior to or following surgical intervention for the treatment of portal hypertension (See: **Portal Hypertension (AB-26.3)**)
    - Evaluation of hepatic vasculature prior to and following embolization procedure (See: **Hepatocellular Carcinoma (HCC) – Restaging/Recurrence (ONC-14.4)**and **Hepatocellular Carcinoma (HCC) – Surveillance/Follow-up (ONC-14.5)** and **Liver Metastases (ONC-31.2)** in the Oncology Imaging Guideline)
    - Evaluation of hepatic vasculature prior to planned hepatectomy (See: **Liver Transplant, Pre-Transplant (AB-42.1)**)

  - Evaluation of liver donor (See: Liver Transplant, **Living Donor Pre-Transplant Imaging (Donor Imaging) (AB-42.2)** for specific guidance)
- Hepatic arterial aneurysms:
  - See: **Visceral Artery Aneurysm (PVD-6.5)** in the Peripheral Vascular Disease Imaging Guidelines

Background and Supporting Information

Primary Budd-Chiari Syndrome is due to thrombotic occlusion of the hepatic venous outflow tract. Most individuals have an underlying prothrombotic condition such as a myeloproliferative disease, an inherited thrombophilia (e.g. Factor V Leiden), a systemic disease such as vasculitis, or hormonal factors, such as recent oral contraceptive use. Secondary Budd-Chiari Syndrome is caused by malignant tumors or extrinsic compression of the hepatic veins.

Evidence Discussion

- In cases of Primary Budd-Chiari syndrome, Doppler ultrasound is widely used to evaluate hepatic/portal vasculature. Ultrasonographic evaluation is associated with advantages such as high sensitivity and specificity, and also high positive and negative predictive values.
- Advantages of Doppler ultrasound include low cost, wide availability, and lack of radiation exposure.
- One disadvantage of Doppler ultrasound is its limited ability to evaluate certain anatomies. For instance, it may not be able to detect the extension of portal vein thrombus into splanchnic vessels.
- CT scan is highly accurate in evaluating hepatic vasculature, with sensitivity, specificity, PPV and NPV in the range of 90-99%.
- Advantages of CT scan include better visualization of structures, such as thrombus extension. Another advantage of CT is that it allows for concomitant evaluation of bowel.
- CT scan has drawbacks such as higher cost, radiation exposure, and potential complications from the use of contrast, when compared to ultrasound.
- MRI and MRA may be more appropriate as alternative to CT. Advantages include lack of radiation and a "better safety profile." Disadvantages include longer image acquisition time, higher cost, and various technical limitations., including signal loss, overestimation of stenoses, and contraindications/complications related to implanted metallic devices.
- Pre-TIPS (Transjugular Intrahepatic Portosystemic Shunt), endovascular variceal obliteration or embolization, should ideally include cross-sectional imaging to have an adequate anatomical map of the portal vein and hepatic veins.

Abdominal Veins Other than Hepatic and Portal Veins (AB-43.2)

AB.HA.0043.2.A

v2.0.2025

- CTA Abdomen and Pelvis (CPT® 74174), or CTA Abdomen (CPT® 74175) or MRA Abdomen (CPT® 74185) if ONE of the following:
  - Nephrotic syndrome
  - Renal vein thrombosis
  - Mesenteric vein thrombosis
- Suspicion of iliac vein thrombus when a lower extremity duplex or abdominal duplex is inconclusive or equivocal, see: **Acute Deep Venous Thrombosis (DVT) (PVD 12.2)**
- Suspicion of inferior vena cava thrombus when a lower extremity duplex or abdominal duplex is inconclusive or equivocal, see: **Acute Deep Venous Thrombosis (DVT) (PVD 12.2)**

Evidence Discussion

- Computed Tomography Angiography (CTA) is a diagnostic imaging test that can assess both arterial and venous structures, as well as nonvascular structures in cases of venous thrombosis. By combining the evaluation of both vascular and nonvascular findings, it is possible to achieve a sensitivity of 96% and a specificity of 90-94% when assessing for mesenteric venous obstruction.
- In cases of chronic mesenteric venous thrombosis, duplex ultrasound can be a helpful tool for diagnosis. However, due to potential technical difficulties such as overlying bowel gas or limited acoustic windows, imaging may not always be possible. In such cases, a CTA scan may be a better option as it allows for a more comprehensive evaluation of both vascular and intestinal structures.
- Contrast-enhanced Magnetic Resonance Angiography (MRA) has been shown to provide a vascular assessment that is comparable to catheter angiography.
- Compared to catheter angiography, MRA is less invasive, cheaper, and does not expose patients to ionizing radiation.
- Various MRA techniques allow for quantification of blood flow as well as evaluation of oxygen saturation, which are not possible with CTA.
- MRA is less dependent on the operator compared to vascular ultrasound and is less prone to limitations related to patient body habitus or overlying bowel gas.
- Disadvantages of MRA are motion artifact and risk of nephrogenic systemic fibrosis with gadolinium exposure in patients with severe renal insufficiency.

Renal Vein Thrombosis (AB-43.3)

AB.HA.0043.3.A
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- MRA Abdomen (CPT® 74185) if ONE of the following:
  - Nephrotic syndrome
  - ◦ Proteinuria – 3 grams or more in 24 hours
  - Lupus nephritis
  - ◦ Hypercoagulable state, ONE of the following:
    - ▪ Antiphospholipid antibodies
    - ▪ Behçet's syndrome
    - ▪ Protein C deficiency
    - ▪ Protein S deficiency

Evidence Discussion

- Computed Tomography Angiography (CTA) is a diagnostic imaging test that can assess both arterial and venous structures, as well as nonvascular structures in cases of venous thrombosis. By combining the evaluation of both vascular and nonvascular findings, it is possible to achieve a sensitivity of 96% and a specificity of 90-94% when assessing for mesenteric venous obstruction.
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- Compared to catheter angiography, MRA is less invasive, cheaper, and does not expose patients to ionizing radiation.
- Various MRA techniques allow for quantification of blood flow as well as evaluation of oxygen saturation, which are not possible with CTA.
- MRA is less dependent on the operator compared to vascular ultrasound and is less prone to limitations related to patient body habitus or overlying bowel gas.
- Disadvantages of MRA are motion artifact and risk of nephrogenic systemic fibrosis with gadolinium exposure in patients with severe renal insufficiency.

References (AB-43)

v2.0.2025

1. American College of Radiology (ACR), North American Society for Cardiovascular Imaging (NASCI), Society for Pediatric Radiology (SPR). ACR-NASCI-SPR practice guideline for the performance of pediatric and adult body magnetic resonance angiography (MRA).Am Coll Radiol. Revised 2020.
2. Nghiem HV, Winter TC III, Mountford MC, et al. Evaluation of the portal venous system before liver transplantation: value of phase-contrast MR angiography. *AJR*. 1995;164:871-878.
3. American Association for the Study of Liver Disease (AASLD). ASSLD practice guidelines: the role of transjugular intrahepatic protosystemic shunt (TIPS) in the management of portal hypertension. *Hepatology*, 2010;51:1-16.
4. Lee SS, Kim TK, Byun JH, et al. Hepatic arteries in potential donors for living related liver transplantation: evaluation with multi–detector row CT angiography. *Radiology*. 2003; 227:391-399.
5. Simonetto DA, Singal AK, Garcia-Tsao G, Caldwell SH, Ahn J, Kamath PS. ACG Clinical Guideline. *The American Journal of Gastroenterology*. 2020;115(1):18-40. doi:10.14309/ajg.0000000000000486.
6. Boyer TD, Haskal ZJ. The role of transjugular intrahepatic portosystemic shunt (TIPS) in the management of portal hypertension: Update 2009. *Hepatology*. 2009;51(1):306-306. doi:10.1002/hep.23383.
7. Kapoor B, Sands M, Copelan A. Transjugular Intrahepatic Portosystemic Shunt: Indications, Contraindications, and Patient Work-Up. *Seminars in Interventional Radiology*. 2014;31(03):235-242. doi:10.1055/s-0034-1382790.
8. Dariushnia SR, Haskal ZJ, Midia M, et al. Quality Improvement Guidelines for Transjugular Intrahepatic Portosystemic Shunts. *Journal of Vascular and Interventional Radiology*. 2016;27(1):1-7. doi:10.1016/j.jvir.2015.09.018.
9. Margini C, Berzigotti A. Portal vein thrombosis: the role of imaging in the clinical setting. *Dig Liver Dis*. 2017;49(2):113-120. doi:10.1016/j.dld.2016.11.013.
10. Northup PG, Garcia-Pagan JC, Garcia-Tsao G, et. al. Vascular liver disorders, portal vein thrombosis, and procedural bleeding in patients with liver disease: 2020 practice guidance by the American Association for the Study of Liver Diseases. *Hepatology*. 2020;73(1):366-413. doi:10.1002/hep.31646.
11. Humbert M, Kovacs G, Hoeper MM, et. al. 2022 ESC/ERS guidelines for the diagnosis and treatment of pulmonary hypertension. *European Respiratory Journal*. 2022;61(3). doi:10.1183/13993003.00879-2022.
12. Boike JR, Thornburg BG, Asrani SK, et. al. North American practice-based recommendations for transjugular intrahepatic portosystemic shunts in portal hypertension. *Clinical Gastroenterology and Hepatology*. 2022;20(8):1636-1662.e36. doi:10.1016/j.cgh.2021.07.018.
13. Billey C, Billet S, Robic MA, et. al. A prospective study identifying predictive factors of cardiac decompensation after transjugular intrahepatic portosystemic shunt: the Toulouse algorithm. *Hepatology*. 2019;70(6):1928-1941. doi:10.1002/hep.30934.
14. Chopard R, Albertsen IE, Piazza G. Diagnosis and treatment of lower extremity venous thromboembolism: a review. *JAMA*. 2020;324(17):1765-1776.
15. Needleman L, Cronan JJ, Lilly MP, et. al. Ultrasound for lower extremity deep venous thrombosis. multidisciplinary recommendations from the Society of Radiologists in Ultrasound Consensus Conference. *Circulation*. 2018;137:1505–1515.
16. Sloves J, Almeida J. Venous duplex ultrasound protocol for iliocaval disease. *J Vasc Surg Venous Lymphat Disord*. 2018;6(6):748-757.
17. Lee EW, Eghtesad B, Garcia-Tsao G, et al. AASLD practice guidance on the use of TIPS, variceal embolization, and retrograde transvenous obliteration in the management of variceal hemorrhage. *Hepatology*. 2024;79(1):224-250.
18. Björck M, Koelemay M, Acosta S, et al. Editor's choice – management of the diseases of mesenteric arteries and veins. Clinical practice guidelines of the European Society of Vascular Surgery (ESVS). *Eur J Vasc Endovasc Surg*. 2017;53:460-510.
19. Ginsburg M, Obara P, Lambert D, et al. Expert Panels on Vascular Imaging and Gastrointestinal Imaging: ACR Appropriateness Criteria ® Imaging of Mesenteric Ischemia. *J Am Coll Radiol*. 2018;15(11S):S332-40.

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Guideline Page

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Liver Elastography (AB-45)

Guideline Page

Liver Elastography (AB-45)

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- Initial staging of liver fibrosis in suspected fatty liver disease (hepatic steatosis):
  - Transient Elastography or Vibration-Controlled Transient Elastography (VCTE, e.g. Fibroscan) (CPT® 91200) is the initial imaging modality
    - Typically repeated within a 3-year period. If repeat transient elastography fails, see MRE criteria below[23]
  - Magnetic Resonance Elastography (MRE, CPT® 76391) can be approved for ANY of the following:
    - Transient Elastography failure despite use of an XL-probe, OR BMI ≥35
    - Conflict between clinical picture and transient elastography results (e.g., individual with portal hypertension but VCTE suggests no fibrosis)
    - VCTE liver stiffness measurement of ≥8 kPa
    - FIB 4 score of >2.67
    - Liver biopsy demonstrates fibrosis stage F2-F4
- Special considerations for MRE:
  - For MRE requests in the setting of hemochromatosis, see: **Hereditary (Primary) Hemochromatosis (HH) and Other Iron Storage Diseases (AB-11.2)**)
  - Note: The correct CPT code for MR Elastography is CPT® 76391. It is a stand-alone code and it does not require an additional CPT code such as MRI Abdomen (CPT® 74183).
  - An additional MRI Abdomen code should only be approved if there is another appropriate indication for it, other than the Elastography study (for example, MRE for fibrosis scoring in MASLD (formerly known as NAFLD) due to a BMI ≥35, AND further evaluation of an indeterminate hepatic lesion).
- The use of other ultrasound elastographic codes (CPT® 76981, CPT® 76982, and CPT® 76983) is not medically necessary at this time.

Background and Supporting Information

- For the assessment of cirrhosis in individuals with hepatitis C, the AGA noted that MRE has little to no increase in identifying cirrhosis, but had poorer specificity and thus higher false-positive rates than VCTE. In view of this, the AGA concluded that MRE has a poorer diagnostic performance in this setting, compared to VCTE. In their recommendations for the assessment of fibrosis in chronic liver disease, VCTE was recommended over MRE with the exception of MASLD (formerly known as NAFLD) in high-risk populations, in which MRE resulted in a lower rate of false positives compared to VCTE. This was considered a conditional recommendation with a low quality of evidence.

- Transient Elastography (VCTE) is the most studied elastography technique and informs multiple evidence-based guidelines with respect to fibrosis scoring. No national evidence-based guideline recommends the use of either ARFI or real-time tissue elastography (RTTE) over the use of VCTE for any clinical protocol, nor is there direct evidence that ARFI or RTTE improves health outcomes over and above VCTE.
- Vibration-Controlled Transient Elastography (VCTE) (e.g. Fibroscan, CPT® 91200) may be considered appropriate to assess for advanced fibrosis and cirrhosis in conditions including:
  - Hepatitis C
  - Hepatitis B
  - Chronic alcoholic liver disease
  - All other chronic liver diseases
- FIB-4 index is calculated as follows[22]:
  - FIB-4 = (Age in years x AST level)/(Platelet count x √ of ALT)

Evidence Discussion

Targeted screening of populations at increased risk for advanced liver disease is advised to identify and manage those with clinically significant fibrosis.

Although liver biopsy remains the reference standard for the grading and staging of nonalcoholic steatohepatitis (NASH), it has important limitations related to risk, cost, and sampling error. Noninvasive biomarkers are emerging as valuable tools for predicting adverse liver-related outcomes.

The most validated laboratory-based fibrosis biomarker is FIB-4, which outperforms other calculations in its ability to identify patients with a low probability of advanced fibrosis. A FIB-4 score > 2.67 is associated with a high risk of advanced fibrosis.

Liver stiffness is a physical characteristic of the liver that increases with fibrosis severity. Vibration Controlled Transient Elastography (VCTE), e.g., Fibroscan, is the most commonly used method to assess liver stiffness. Transient elastography (VCTE) is the most studied elastography technique and informs multiple evidence-based guidelines with respect to fibrosis scoring. No national evidence-based guideline recommends the use of either ARFI or real-time tissue elastography (RTTE) over the use of VCTE for any clinical protocol, nor is there direct evidence that ARFI or RTTE improves health outcomes over and above VCTE. VCTE-derived liver stiffness measurement (LSM) of < 8 kPa can be used to rule out advanced fibrosis, especially if used with FIB-4. An LSM between 8 and 12kPa may be associated with fibrotic NASH, and a value > 12 kPa is associated with a high likelihood of advanced fibrosis.

For the assessment of cirrhosis in individuals with hepatitis C, the American Gastroenterological Association (AGA) noted that MRE has little to no increase in identifying cirrhosis, but had poorer specificity and thus higher false-positive rates than VCTE. In view of this, the AGA concluded that MRE has a poorer diagnostic performance in this setting, compared to VCTE. In their recommendations for the assessment of fibrosis in chronic liver disease, VCTE was recommended over MRE with the exception of NAFLD in high-risk populations, in which MRE resulted in a lower rate of false positives compared to VCTE.

Magnetic Resonance Elastography (MRE) is more sensitive than VCTE in detecting fibrosis stage ≥ 2 and is considered the most accurate noninvasive, imaging-based biomarker of fibrosis in NAFLD. Although MRE is not the first-line approach for risk stratification, it becomes an important tool when clinical uncertainty exists, concomitant cross-sectional imaging is needed, there is a discrepancy between the clinical picture and VCTE results, or when VCTE is unavailable. MRE is also useful when VCTE is limited by BMI ≥ 35 or when use of an XL probe has failed. Among patients with cirrhosis, baseline LSM by MRE most accurately predicts future risk of hepatic decompensation and death.

References (AB-45)

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1. American Gastroenterologic Association Institute guideline on the role of elastography in the evaluation of liver fibrosis. *Gastroenterology*. 2017:152:1536-1543.
2. Conti CB, Cavalcoli F, Fraquelli M, Conte D, Massironi S. Ultrasound elastographic techniques in focal liver lesions. *World Journal of Gastroenterology*. 2016;22(9):2647. doi:10.3748/wjg.v22.i9.2647**.**
3. The diagnosis and management of nonalcoholic fatty liver disease: Practice guidance from the American Association for the Study of Liver Diseases. *Clinical Liver Disease*. 2018;11(4):81-81. doi:10.1002/cld.722.
4. Li Q, Dhyani M, Grajo JR, Sirlin C, Samir AE. Current status of imaging in nonalcoholic fatty liver disease. *World Journal of Hepatology*. 2018;10(8):530-542. doi:10.4254/wjh.v10.i8.530.
5. Imajo K, Kessoku T, Honda Y, et al. Magnetic Resonance Imaging More Accurately Classifies Steatosis and Fibrosis in Patients With Nonalcoholic Fatty Liver Disease Than Transient Elastography. *Gastroenterology*. 2016;150(3). doi:10.1053/j.gastro.2015.11.048.
6. Chalasani N, Younossi Z, Lavine JE, et al. The diagnosis and management of nonalcoholic fatty liver disease: Practice guidance from the American Association for the Study of Liver Diseases. *Hepatology*. 2017;67(1):328-357. doi:10.1002/hep.29367.
7. Vuppalanchi R, Siddiqui MS, Natta MLV, et al. Performance characteristics of vibration-controlled transient elastography for evaluation of nonalcoholic fatty liver disease. *Hepatology*. 2017;67(1):134-144. doi:10.1002/hep.29489.
8. Castera L, Friedrich-Rust M, Loomba R. Noninvasive assessment of liver disease in patients with nonalcoholic fatty liver disease. *Gastroenterology*. 2019;156(5). doi:10.1053/j.gastro.2018.12.036.
9. Kanwal F, Shubrook JH, Adams LA, et. al. Clinical care pathways for the risk stratification and management of patients with nonalcoholic fatty liver disease. *Gastroenterology*. 2021;161(5):1657-1669.
10. Long MT, Noureddin M, Lim JK. AGA Clinical practice update: Diagnosis and management of nonalcoholic fatty liver disease in lean individuals: Expert review. *Gastroenterology*. 2022;163(3):764-774.e1.
11. Muraj S, Ahmed A, Kim D. Recent epidemiology of nonalcoholic fatty liver disease. *Gut Liver*. 2021;15(2):206-216. doi:10.5009/gnl20127.
12. Sanyal AJ, Van Natta ML, Clark J, et. al. Prospective Study of outcomes in adults with nonalcoholic fatty liver disease. *N Engl J Med*. 2021;385:1559-1569 doi:10.1056/NEJMoa2029349.
13. Cusi K, Isaacs S, Barb D, et. al. American Association of Clinical Endocrinology clinical practice guideline for the diagnosis and management of nonalcoholic fatty liver disease in primary care and endocrinology clinical settings. *Endocr Pract*. 2022;28(5):528-562. doi:10.1016/j.eprac/2022.03.010.
14. Mantovani A, Dalbeni A. Treatments for NAFLD: state of the art. *Int J Mol Sci*. 2021;22(5):2350. doi:10.3390/ijms22052350.
15. Selvaraj EA, Mózes EF, Jayaswal ANA, et al. Diagnostic accuracy of elastography and magnetic resonance imaging in patients with NAFLD: a systemic review and meta-analysis. *J Hepatol*. 2021;(75):770-785. doi:10.1016/j.jhep.2021.04.044.
16. Imajo K, Honda Y, Kobayashi T, et. al. Direct comparison of US and MR elastography for staging liver fibrosis in patients with nonalcoholic fatty liver disease. *Clin Gastro Hepatol*. 2022;20:908-917. doi:10.1016/j.cgh.2020.12.016.
17. Ajmera A, Nguyen K, Tamaki N, et. al. Prognostic utility of magnetic resonance elastography and MEFIB index in predicting liver-related outcomes and mortality in individuals at risk of and with nonalcoholic fatty liver disease. *Therap Adv Gastroenterol*. 2022;(15):1-13.doi:10.1177/17562848221093869.
18. Younossi ZM, Noureddin M, Bernstein D, et. al. Role of noninvasive tests in clinical gastroenterology practices to identify patients with nonalcoholic steatohepatitis at high risk of adverse outcomes: expert panel recommendations. *Am J Gastroenterol*. 2021;116(2):254-262. doi:10.14309/ajg0000000000001054.
19. Orci LA, Sanduzzi-Zamparelli M, Caballol B, et. al. Incidence of hepatocellular carcinoma in patients with nonalcoholic fatty liver disease: a systemic review, meta-analysis, and meta-regression. *Clin Gastroenterol Hepatol*. 2022;20(2):283-292. doi:10.1016/j.cgh.2021.05.002.
20. Sterling RK, Lissen E, Clumeck N, et. al. Development of a simple noninvasive index to predict significant fibrosis patients with HIV/HCV co-infection. *Hepatology*. 2006;43:1317-1325.

21. Gidener T, Dierkhising RA, Mara KC, et. al. Change in serial liver stiffness measurement by magnetic resonance elastography and outcomes in NAFLD. *Hepatology*. 2023;77(1):268-274. doi:10.1002/hep.32594.
22. Sterling RK, Duarte-Rojo A, Patel K, et al. AASLD practice guideline on imaging-based on non-invasive liver disease assessments of hepatic fibrosis and steatosis. *Hepatology*. 2024. Online ahead of print. doi:10.1097/HEP.0000000000000843.
23. Jophlin LL, Singal AK, Bataller R, et al. ACG clinical guideline: alcohol-associated liver disease. *Am J Gastroenterol*. 2024;119:30-54. Doi:10.14309/ajg.0000000000002572.
24. Loomba R, et al. The 20% rule of NASH progression: the natural history of advanced fibrosis and cirrhosis caused by NASH. *Hepatology*. 2019;70(6):1885-1888.
25. Farrell A, et al. Epidemiology of non-alcoholic fatty liver disease-related hepatocellular carcinoma: a western perspective. *Hepatoma Res*. 2020;(6):18.
26. Rinella, ME, Neuschwander-Tetri,BA, et al., AASLD Practice Guidance on the clinical assessment and management of nonalcoholic fatty liver disease. *Hepatology*. 2023:77:1797-1839.

Hiccups (AB-46)

Guideline Page

Hiccups (AB-46.0)

AB.HI.0046.0.A

v2.0.2025

- Note: Hiccups may be associated with cerebrovascular disease, brain tumors, and intracranial injury, though it would be very rare for hiccups to be the only presenting symptom of serious neurologic disease. If concern is expressed for neurologic involvement, please see the appropriate guideline in HD imaging (e.g., **Neuromyelitis Optica and NMO Spectrum Disorders (HD-16.2)** and **Anti-MOG syndromes (HD-16.3)**)
- Hiccups <48 hours without any localizing or specific symptoms:
  - No advanced imaging
- Hiccups ≥48 hours:
  - History and physical examination, laboratory and CMP and baseline chest x-ray
  - Abnormal or negative chest x-ray with symptoms referable to the chest:
    - CT Chest with contrast (CPT® 71260)
  - Lab or history/physical findings suggest a gastrointestinal etiology:
    - CT Abdomen with contrast (CPT® 74160)

Evidence Discussion

If there are additional signs or symptoms to evaluate, further testing is indicated. CT Chest and/or bronchoscopy is the study of choice for evaluation wheezing, dyspnea, abnormal chest radiography, or abnormal pulmonary function tests. MRI Brain and/or lumbar puncture are indication for potential central nervous system causes. Evaluation of esophageal and other symptoms is performed with upper endoscopy, esophageal manometry, and/or CT Abdomen. Cardiac etiologies may be evaluated with EKG & Echo.

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References (AB-46)

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1. *British Journal of General Practice*. Hiccups. A Common Problem with Some Unusual Causes and Cures: 2016;66(652):584-586.
2. Steger M, Schneemann M, Fox M. Systemic review: the pathogenesis and pharmacological treatment of hiccups. *Alimentary Pharmacology & Therapeutics*. 2015;42(9):1037-1050. doi:10.1111/apt.13374.
3. Pooran N, Lee D, Sideridis K. Protracted hiccups due to severe erosive esophagitis: a case series. *J Clin Gastroenterol*. 2006;40:183.
4. Brañuelas Quiroga J, Urbano García J, Bolaños Guedes J. Hiccups: a common problem with some unusual causes and cures. *Br J Gen Pract*. 2016;66:584-586.
5. Yamazaki Y, Sugiura T, Kurokawa K. Sinister hiccups. Lancet. 2008; 371:1550.
6. Bredenoord AJ. Management of belching, hiccups, and aerophagia. *Clinical Gastroenterology & Hepatology*. 2013;11(1):6-12.

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Retroperitoneal Fibrosis (AB-47)

Guideline Page

Retroperitoneal Fibrosis (AB-47.0)

AB.RP.0047.0.A
v2.0.2025

- Individuals diagnosed with retroperitoneal fibrosis:
  - ONE of the following every 3 months until stability demonstrated:
    - CT Abdomen and Pelvis with contrast (CPT® 74177)
    - MRI Abdomen and Pelvis without contrast (CPT® 74181 and CPT® 72195)
    - MRI Abdomen and Pelvis with and without contrast (CPT® 74183 and CPT® 72197)
    - Retroperitoneal or Abdominal ultrasound (CPT® 76770 or CPT® 76700) can be approved if requested.
  - After stability established repeat imaging can be approved every 6 months.
  - Requests for non-contrasted studies in individuals with renal insufficiency is appropriate. Gadolinium may induce nephrogenic systemic fibrosis in individuals with moderate or severe renal insufficiency, especially if the GFR is <30 ml/min.
  - Additional imaging:
    - CT Chest (CPT® 71260) can also be performed upon initial diagnosis if requested, to further evaluate for the possibility of malignancy as an underlying etiology.
- PET/CT (CPT® 78815)
  - Can be considered initially, after diagnosis, to establish avidity patterns to assess for the likelihood of malignancy and for stratification for the likelihood of response to steroids.
  - Follow-up can be considered if there is documentation of an anticipated therapeutic change based on the results (such as a change in immunosuppression therapy or stent removal).
- Methysergide-induced retroperitoneal fibrosis:
  - Methysergide for migraine treatment is generally no longer available but is rarely being used at some centers. It has a known complication of retroperitoneal fibrosis.
  - Individuals can be screened at baseline and then every 6 months with ONE of the following:
    - CT Abdomen and Pelvis with contrast (CPT® 74177)
    - CT Abdomen and Pelvis without contrast (CPT® 74176)
    - MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197)
    - MRI Abdomen and Pelvis without contrast (CPT® 74181 and CPT® 72195)
    - Retroperitoneal ultrasound (CPT® 76770 or CPT® 76775)

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Background and Supporting Information

Retroperitoneal fibrosis is a rare disease, and may be idiopathic (IgG4 or non-IgG-4 related) or secondary. Secondary causes include malignancy, infections, previous radiation therapy, previous abdominal surgery, drugs such as methysergide, and biologic agents.

Evidence Discussion

- Ultrasound may be used as a screening tool, but has low sensitivity and is often insufficient to distinguish retroperitoneal fibrosis from other abdominal masses.
- CT and MR allow for characterizing morphology and extent of retroperitoneal fibrosis both at initial diagnosis and in treatment monitoring. It also helps to define the involved vascular structures, and can visualize disease in other abdominal viscera that may be associated with retroperitoneal fibrosis. CT may have advantages in imaging availability and imaging time. MR may have advantages in avoiding ionizing radiation and improved soft tissue characterization.
- PET may be used to evaluate metabolic activity and may be of value after diagnosis to characterize active inflammation versus malignancy and to document response to treatment. The role of PET scan in establishing a diagnosis is limited due to the potential for nonspecific uptake.
- Follow-up may be appropriate every 3-12 months to access disease status and response to therapy.

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References (AB-47)

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1. Retroperitoneal Fibrosis Clinical Presentation: History and Physical Examination. Retroperitoneal Fibrosis Clinical Presentation: History and Physical Examination. https://emedicine.medscape.com/article/458501-clinical. Published May 30, 2019.
2. Vaglio A, Maritati F. Idiopathic Retroperitoneal Fibrosis. *Journal of the American Society of Nephrology*. 2016;27(7):1880-1889. doi:10.1681/asn.2015101110.
3. Runowska M, Majewski D, Puszczewicz M. Retroperitoneal fibrosis – the state-of-the-art. *Reumatologia/ Rheumatology*. 2016;5:256-263. doi:10.5114/reum.2016.63667.
4. Urban M, Palmisano A, Nicastro M, Corradi D, Buzio C, Vaglio A. Idiopathic and secondary forms of retroperitoneal fibrosis: A diagnostic approach. La Revue de Médecine Interne. 2015;36(1):15-21. doi:10.1016/j.revmed.2014.10.008.
5. EMA restricts methysergide use, concern over fibrosis. *Reactions Weekly*. 2014;1491(1):2-2. doi:10.1007/s40278-014-9172-x.
6. Fendler WP, Eiber M, Stief CG, Herrmann K. A PET for All Seasons: 18 F-Fluorodeoxyglucose to Characterize Inflammation and Malignancy in Retroperitoneal Fibrosis? *European Urology*. 2017;71(6):934-935. doi:10.1016/j.eururo.2017.01.019.
7. Gu L, Wang Y, Zhang X. Re: Archie Fernando, James Pattison, Catherine Horsfield, David D'Cruz, Gary Cook, Tim O'Brien. [18F]-Fluorodeoxyglucose Positron Emission Tomography in the Diagnosis, Treatment Stratification, and Monitoring of Patients with Retroperitoneal Fibrosis: A Prospective Clinical Study. *Eur Urol* 2017;71:926–33. *European Urology*. 2017;72(2). doi:10.1016/j.eururo.2017.02.029.
8. Łoń I, Wieliczko M, Lewandowski J, Małyszko J. Retroperitoneal fibrosis is still an underdiagnosed entity with poor prognosis. *Kidney and Blood Pressure Research*. 2022;47(3):151-62.
9. Peisen F, Thaiss WM, Ekert K, et al. Retroperitoneal fibrosis and its differential diagnoses: the role of radiological imaging. I*nRöFo-Fortschritte auf dem Gebiet der Röntgenstrahlen und der bildgebenden Verfahren*. 2020;192(10):929-936).
10. Urban ML, Palmisano A, Nicastro M, Corradi D, Buzio C, Vaglio A. Idiopathic and secondary forms of retroperitoneal fibrosis: a diagnostic approach. *La Revue de medecine interne*. 2015;36(1):15-21.
11. Vaglio A, Maritati F. Idiopathic retroperitoneal fibrosis. *J Am Soc Nephrol*. 2016;27(7):1880-9. doi:10.1681/ASN.2015101110.
12. Kermani TA, Crowson CS, Achenbach SJ, Luthra HS. Idiopathic retroperitoneal fibrosis: a retrospective review of clinical presentation, treatment, and outcomes. *Mayo Clin Proc*. 2011;86(4):297-303. doi:10.4065/mcp.2010.0663.

Fistulae (AB-48)

Guideline Page

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Fistulae (AB-48)

AB.FD.0048.A
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- Suspected enteric fistulae
  - ONE of the following is indicated:
    - MR Enterography (CPT® 74183 or CPT® 74181 and CPT® 72197 or CPT® 72195), or
    - CT Enterography or CT Abdomen and Pelvis with contrast (CPT® 74177), or
    - MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197)
- Suspected colovesical fistulae
  - ONE of the following is indicated:
    - CT Abdomen and Pelvis without contrast (CPT® 74176), or
    - MR Enterography (CPT® 74183 or CPT® 74181 and CPT® 72197 or CPT® 72195), or
    - MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197)
- Enterocutaneous fistulae
  - Suspected enterocutaneous fistulae or surgical planning of known complex fistulae:
    - ONE of the following is indicated:
      - CT Abdomen and Pelvis with contrast (CPT® 74177), or
      - MR Enterography (CPT® 74183 or CPT® 74181 and CPT® 72197 or CPT® 72195), or
      - MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT®72197)
- Complicated diverticulitis with fistula, see: **Acute/Persistent (Non-Chronic) Lower Abdominal Pain (AB-2.2)**
- Perianal/perirectal fistulae and abscess related to Crohn's disease, see: **Perirectal/ Perianal Disease (AB-23.3)**
- Other fistulae related to Crohn's disease, see: **Known IBD (AB-23.2)**
- Perianal/perirectal fistulae NOT related to Crohn's disease, see: **Fistula in Ano (PV-21.1)** in the Pelvis Imaging Guidelines
- For colovaginal, rectovesicular, rectovaginal, or urinary-vaginal communicating fistulae, see: **Pelvic Fistula (PV-21.3)** in the Pelvis Imaging Guidelines
- For pilonidal cyst, see: **Pilonidal Cyst (PV-21.4)** in the Pelvis Imaging Guidelines

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Background and Supporting Information

- Examples of gastrointestinal fistulae include tracheo- and broncho-esophageal, entero-cutaneous, entero-enteric, entero-colic, entero-vesical, colo-vesical, recto-vaginal, perianal, and aorto-enteric.
- Etiologies of fistulae include: complication of inflammatory disease (e.g., Diverticulitis, Crohn's disease), complication of surgical procedures (which are the most common cause of intestinal fistula, comprising more than half of all fistulae), obstetric injury (e.g., recto-vaginal, ano-vaginal), malignancy, radiation, non-surgical injuries, and foreign bodies.

Evidence Discussion

Magnetic resonance imaging (MRI) and small intestine contrast enhanced ultrasonography (SICUS) have now emerged as suitable radiation-free alternatives to CT imaging, with comparable diagnostic accuracy. MRI is often considered the imaging modality of choice for evaluation of fistulae owing to its superior soft-tissue contrast and ability to provide surgeons with the highest quality information derived from just one study, including anatomic location of fistulae and associated pelvic pathology.

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References (AB-48)

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1. Expert Panel on Gastrointestinal Imaging. ACR Appropriateness Criteria® Crohn's disease. American College of Radiology (ACR); Reviewed 2021.
2. Lichtenstein GR, Loftus EV, Isaacs KL, Regueiro MD, Gerson LB, Sands BE. ACG Clinical Guideline: Management of Crohn#s Disease in Adults. *American Journal of Gastroenterology*. 2018;113(4):481-517. doi:10.1038/ajg.2018.27.
3. Gribovskaja-Rupp I, Melton GB. Enterocutaneous fistula: proven strategies and updates. *Clin Colon Rectal Surg*. 2016;29(2):130.
4. Qiu Y, Mao R, Chen L, Li H, He Y, Zeng R, Li P, Chen H. Systematic review with meta-analysis: magnetic resonance enterography vs. computed tomography enterography for evaluating disease activity in small bowel Crohn's disease. *Aliment Pharmacol Ther*. 2014;40(2):134-46. doi:10.1111/apt.12815.
5. Panes J, Bouhnik Y, Reinisch W, et al. Imaging techniques for assessment of inflammatory bowel disease: joint ECCO and ESGAR evidence-based consensus guidelines. *J Crohn's Colitis*. 2013;7:556-585.
6. Jensen, Kjeldsen J, Rafaelsen S R, Nathan T. Diagnostic accuracies of MR enterography and CT enterography in symptomatic Crohn's disease. *Scand J Gastroenterol*. 2011;46:1449-1457.
7. Greer MC, Taylor SA. Perianal imaging in Crohn disease: current status with a focus on MRI, from the AJR Special Series on imaging of inflammation. *AJR Am J Roentgenol*. 2022;218(5):781-792. doi:10.2214/AJR.21.26615.
8. Scharitzer M, Koizar B, Vogelsang H, et al. Crohn's disease: prevalence, MR features, and clinical significance of enteric and colonic sinus tracts. *Eur Radiol*. 2020;30(10):5358-5366. doi:10.1007/s00330-020-06935-1.
9. Guimarães LS, Greer MC, Dillman JR, Fletcher JG. Magnetic resonance in Crohn's disease: diagnosis, disease burden, and classification. *Magn Reson Imaging Clin N Am*. 2020;28(1):31-44. doi:10.1016/j.mric.2019.08.003.
10. Tang YZ, Booth TC, Swallow D, et al. Imaging features of colovesical fistulae on MRI. *Br J Radiol*. 2012;85(1018):1371-5. doi:10.1259/bjr/55871151.

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