CIGNA MEDICAL COVERAGE POLICIES - RADIOLOGY

Pediatric Neck Imaging Guidelines

Effective Date: February 1, 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.

Table of Contents

400 Buckwalter Place Boulevard, Bluffton, SC 29910 (800) 918-8924

General Guidelines (PEDNECK-1)

Guideline Page

400 Buckwalter Place Boulevard, Bluffton, SC 29910 (800) 918-8924

Procedure Codes Associated with Neck Imaging

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MRI	CPT®
MRI Orbit, Face, Neck without contrast	70540
MRI Orbit, Face, Neck with contrast (rarely used)	70542
MRI Orbit, Face, Neck without and with contrast	70543
MRI Temporomandibular Joint (TMJ)	70336
Unlisted MRI procedure (for radiation planning or surgical software)	76498

MRA	CPT®
MRA Neck without contrast	70547
MRA Neck with contrast	70548
MRA Neck without and with contrast	70549

CT	CPT®
CT Maxillofacial without contrast (includes sinuses, jaw, and mandible)	70486
CT Maxillofacial with contrast (includes sinuses, jaw, and mandible)	70487
CT Maxillofacial without and with contrast (includes sinuses, jaw, and mandible)	70488
CT Neck without contrast (includes jaw, and mandible)	70490

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CT	CPT®
CT Neck with contrast (includes jaw, and mandible)	70491
CT Neck without and with contrast (includes jaw, and mandible)	70492
CT Guidance for Placement of Radiation Therapy Fields	77014
Unlisted CT procedure (for radiation planning or surgical software)	76497

CTA	CPT®
CTA Neck	70498

Ultrasound	CPT®
Ultrasound Soft tissues of head and neck (thyroid, parathyroid, parotid, etc.)	76536
Duplex scan of extracranial arteries; complete bilateral study	93880
Duplex scan of extracranial arteries; unilateral or limited study	93882
Non-invasive physiologic studies of extracranial arteries, complete bilateral study	93875
Ultrasound guidance for needle placement	76942

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General Guidelines (PEDNECK-1.0)

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- A pertinent clinical evaluation including a detailed history, physical examination, since the onset or change in symptoms, and appropriate laboratory studies should be performed prior to considering advanced imaging (CT, MRI, Nuclear Medicine), unless the individual is undergoing guideline-supported scheduled follow-up imaging evaluation. A meaningful technological contact (telehealth visit, telephone call, electronic mail or messaging) since the onset or change in symptoms can serve as a pertinent clinical evaluation.
- Unless otherwise stated in a specific guideline section, the use of advanced imaging to screen asymptomatic individuals for disorders involving the neck is not supported. Advanced imaging of the neck is only supported in individuals who have documented active clinical signs or symptoms of disease involving the neck.
- Unless otherwise stated in a specific guideline section, repeat imaging studies of the neck are not necessary unless there is evidence for progression of disease, new onset of disease, and/or documentation of how repeat imaging will affect individual management or treatment decisions.

Age Considerations (PEDNECK-1.1)

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- Many conditions affecting the neck in the pediatric population are different diagnoses than those occurring in the adult population. For those diseases which occur in both pediatric and adult populations, minor differences may exist in management due to individual age, comorbidities, and differences in disease natural history between children and adults.
- Individuals who are 18 years old or younger[11] should be imaged according to the Pediatric Neck Imaging Guidelines. Any conditions not specifically discussed in the Pediatric Neck Imaging Guidelines should be imaged according to the General Neck Imaging Guidelines. Individuals who are >18 years old should be imaged according to the General Neck Imaging Guidelines, except where directed otherwise by a specific guideline section.

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Modality General Considerations (PEDNECK-1.3)

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- MRI
  - MRI Orbit/Face/Neck is generally performed without and with contrast (CPT® 70543) unless the individual has a documented contraindication to gadolinium or otherwise stated in a specific guideline section.
  - Due to the length of time required for MRI acquisition and the need to minimize individual movement, sedation is usually required for almost all infants (except neonates) and young children (age <7 years) as well as older children with developmental delays. Sedation may be administered by oral, intravenous, and/or inhalational routes. In order to limit sedation time in this subdivision of pediatric individuals, the following should be considered:
    - MRI procedures can be performed without and/or with contrast use as supported by these condition-based guidelines. If intravenous access is indicated for sedation and there is no contraindication for using contrast, imaging without and with contrast may avoid repeating a study with sedation to perform an MRI with contrast if the initial study without contrast is inconclusive.
      - Recent evidence-based literature demonstrates the potential for gadolinium deposition in various organs including the brain, after the use of MRI contrast.
      - The U.S. Food and Drug Administration (FDA) has noted that there is currently no evidence to suggest that gadolinium retention in the brain is harmful and restricting gadolinium-based contrast agents (GBCAs) use is not warranted at this time. It has been recommended that GBCA use should be limited to circumstances in which additional information provided by the contrast agent is necessary and the necessity of repetitive MRIs with GBCAs should be assessed.
    - If studies of multiple body areas are supported by these clinical guidelines for the clinical condition being evaluated, MRI studies of all necessary body areas should be obtained concurrently in the same sedation session.
  - The presence of surgical hardware or implanted devices may preclude the use of MRI.
  - Coordination between provider and the imaging service can result in providing the best choice of radiologic studies for the pediatric individual.
- CT
  - CT Neck typically extends from the base of the skull to the upper thorax.

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        - A separate CPT® code for head imaging in order to visualize the skull base is not necessary.
        - In some cases, especially in follow-up of a known finding, it may be appropriate to limit the exam to the region of concern to reduce radiation exposure.
    - CT Neck is generally performed with contrast (CPT® 70491) unless the individual has a documented contraindication to CT contrast or otherwise stated in a specific guideline section.
    - CT Neck may be indicated for further evaluation of abnormalities suggested on prior US or MRI Procedures.
    - In general, CT Neck is appropriate when evaluating trauma, malignancy, and for preoperative planning.
    - CTA Neck (CPT® 70498) is indicated for evaluation of the vessels of the neck, especially with concern for dissection.
    - CT should not be used to replace MRI in an attempt to avoid sedation unless listed as a recommended study in a specific guideline section.
    - Coordination between the provider and the imaging service can result in the best choice of radiologic studies for the pediatric individual.
- Ultrasound
    - Ultrasound soft tissues of the neck (CPT® 76536) is indicated as an initial study for evaluating thyroid, parathyroid, parotid and other salivary gland lesions. Ultrasound is also used to further characterize adenopathy, palpable superficial masses, or swelling.
    - For those individuals who do require additional advanced imaging after ultrasound: ultrasound can be very beneficial in selecting the proper modality, body area, image sequences, and contrast level that will provide the most definitive information for the pediatric individual.
- 3D Rendering
    - 3D Rendering indications in pediatric neck imaging are identical to those in the general imaging guidelines. See **3D Rendering (Preface-4.1)** in the Preface Imaging Guidelines.

The guidelines listed in this section for certain specific indications are not intended to be all-inclusive; clinical judgment remains paramount and variance from these guidelines may be appropriate and warranted for specific clinical situations.

References (PEDNECK-1)

v1.0.2025

1. Siegel MJ. Neck sonography. In: *Pediatric Sonography.* 5th ed. Wolters Kluwer/Lippincott Williams & Wilkins; 2018:112-155.
2. Meier JD, and Grimmer JF. Evaluation and management of neck masses in children. *Am Fam Physician*. 2014; 89:353-358
3. Biassoni L, Easty M. Paediatric nuclear medicine imaging. *British Medical Bulletin*. 2017;123(1):127-148. doi:10.1093/bmb/ldx025
4. Bridges MD, Berland LL, Friedberg EB, et al. ACR Practice parameter for performing and interpreting magnetic resonance imaging (MRI). *American College of Radiology.* Revised 2017 (Resolution 10)
5. Karmazyn BK, John SD, Siegel MJ, et al. ACR–ASER–SCBT-MR–SPR Practice parameter for the performance of pediatric computed tomography (CT). American College of Radiology. Revised 2019 (Resolution 6)
6. Reighard C, Junaid S, Jackson WM, et al. Anesthetic Exposure During Childhood and Neurodevelopmental Outcomes: A Systematic Review and Meta-analysis. *JAMA Netw Open*. 2022;5(6):e2217427. Published 2022 Jun 1. doi:10.1001/jamanetworkopen.2022.17427
7. MacDonald A, Burrell S. Infrequently Performed Studies in Nuclear Medicine: Part 2. *Journal of Nuclear Medicine Technology*. 2009;37(1):1-13. doi:10.2967/jnmt.108.057851
8. Fraum TJ, Ludwig DR, Bashir MR, Fowler KJ. Gadolinium-based contrast agents: A comprehensive risk assessment. *Journal of Magnetic Resonance Imaging*. 2017;46(2):338-353. doi:10.1002/jmri.25625
9. Update on FDA approach to safety issue of gadolinium retention after administration of gadolinium-based contrast agents available at https://www.fda.gov/media/116492/download
10. Blumfield E, Swenson DW, Iyer RS, Stanescu AL. Gadolinium-based contrast agents — review of recent literature on magnetic resonance imaging signal intensity changes and tissue deposits, with emphasis on pediatric patients. *Pediatric Radiology*. 2019;49(4):448-457. doi:10.1007/s00247-018-4304-8
11. Implementation Guide: Medicaid State Plan Eligibility Eligibility Groups Mandatory Coverage Infants and Children under Age 19 Guidance Portal. https://www.hhs.gov/guidance/document/implementation-guide-medicaid-state-plan-eligibility-eligibility-groups-aeu-mandatory-2
12. Ho ML. Pediatric Neck Masses: Imaging Guidelines and Recommendations. *Radiol Clin North Am*. 2022;60(1):1-14. doi:10.1016/j.rcl.2021.08.001

Neck Masses (Pediatric) (PEDNECK-2)

Guideline Page

Neck Masses (Pediatric) (PEDNECK-2.1)

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- Evaluation of neck masses in pediatric individuals involves careful consideration of clinical history and accurate physical examination. The individual's age and knowledge of the anatomy and common lesions of the neck are very important in narrowing the differential diagnosis.
- Initial imaging of choice:
  - Ultrasound Neck (CPT® 76536)
    - Color Doppler ultrasound bilateral study of carotid arteries (CPT® 93880) **OR** Duplex unilateral study (CPT® 93882) is supported to evaluate the vasculature.
- For inconclusive ultrasound or to further delineate abnormalities on ultrasound:
  - MRI Orbit/Face/Neck without contrast (CPT® 70540) **OR**
  - MRI Orbit/Face/Neck without and with contrast (CPT® 70543) **OR**
  - CT Neck with contrast (CPT® 70491)
- For lymphadenopathy persisting for more than 4-weeks of treatment **OR** suspicion of complications such as abscess formation:
  - Ultrasound Neck (CPT® 76536) is indicated. See **Cervical Lymphadenopathy (PEDNECK-3.1)**.
- Congenital cervical cysts:
  - Ultrasound Neck (CPT® 76536) is supported for suspected cystic neck mass.
- Congenital cervical sinus, fistula, or cyst for preoperative planning:
  - MRI Orbit/Face/Neck without and with contrast (CPT® 70543) **OR**
  - CT Neck with contrast (CPT® 70491)
    - For fourth branchial cleft cyst/sinus/fistula- barium swallow is supported in addition to the above conventional imaging.
- Salivary gland nuclear imaging: **ONE** of the following is indicated for evaluation of parotid masses to allow preoperative diagnosis of Warthin's tumor:
  - Salivary Gland Nuclear Imaging (CPT® 78230) **OR**
  - Salivary Gland Nuclear Imaging with Serial Imaging (CPT® 78231) **OR**
  - Salivary Gland Function Study (CPT® 78232)
- Ranula (a cystic structure on the floor of the mouth):
  - CT Neck with contrast (CPT®70491) **OR**
  - MRI Orbit/Face/Neck without and with contrast (CPT® 70543) is supported, especially when there is concern for a "plunging" ranula (lesion extending into the submandibular space).[2]

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Background and Supporting Information

- Cervical lymphadenitis is common in children and follows most viral or bacterial infections of the ears, nose, and throat. No advanced imaging is necessary with uncomplicated lymph node enlargement.
- Congenital cervical cysts frequently present in children and include thyroglossal duct cyst (55% of cases), cystic hygroma (25%), branchial cleft cysts (16%), bronchogenic cyst (0.91%), and thymic cyst (0.3%).
- The most common malignant ENT tumors in children are lymphoma and rhabdomyosarcoma.

Differential Diagnosis of Neck Lesions by Anatomic Region:

- Subcutaneous tissues:
  - Teratoma (includes dermoid cysts)
    - Cervical teratomas are typically large bulky masses discovered at birth or in the first year of life.
    - Large lesions may cause stridor, dyspnea, or dysphagia.
    - Most teratomas arise in the anterior suprahyoid neck and may be midline or off midline in location and adjacent to or within a thyroid lobe.
  - Vascular malformations
  - Lipoma
  - Cellulitis
  - Plexiform neurofibromas
  - Keloid
  - Scar
  - Pilomatrixoma
  - Subcutaneous fat fibrosis (in neonates)
- Retropharyngeal space:
  - Abscess, cellulitis, adenitis
    - Usually involves children under age 6.
    - Individuals have history of upper respiratory tract infection followed by high fever, dysphagia, and neck pain.
  - Lymphadenopathy
  - Extension of goiter
  - Extension of pharyngeal tumor
- Retrovisceral space (posterior to the cervical esophagus):
  - Gastrointestinal duplication cysts (usually are diagnosed in first year of life).
- Pretracheal space (contains trachea, larynx, cervical esophagus, recurrent laryngeal nerves, and thyroid and parathyroid glands):
  - Thyroglossal duct cyst

        - Thyroglossal duct cyst most commonly presents before the age of 20; 75% present as a midline mass and 43% of individuals present with an infected mass.
        - Usually presents as an enlarging, painless midline mass.
        - Thyroid carcinoma occurs in 1% of thyroglossal duct cysts.
    - Goiter
    - Laryngocele
    - Lymphadenopathy
    - Teratoma
    - Abscess
    - Ectopic thymus or cervical extension of normal thymus
- Danger space (closed space lying between the skull base and the posterior mediastinum and between the alar and prevertebral fasciae in a sagittal plane):
    - Cellulitis
    - Abscess
- Prevertebral space:
    - Neurenteric cyst
    - Cellulitis
    - Abscess
    - Spondylodiskitis
    - Lymphadenopathy
    - Paraganglioma
- Carotid sheath space:
    - Jugular vein thrombosis or phlebitis
    - Lymphadenopathy
    - Cellulitis
    - Abscess
    - Paraganglioma
- Parotid gland space:
    - Parotid lymphadenopathy
    - Retromandibular vein thrombosis
    - Parotiditis
    - Sialodochitis (inflammation of the salivary gland duct)
    - Salivary duct stone
    - Abscess
- Submandibular and sublingual spaces:
    - Cellulitis
    - Abscess
    - Sialadenitis

    - Thyroglossal duct cyst
    - Branchial cleft cyst
        - 90% of branchial abnormalities arise from the second branchial apparatus.
        - Second branchial cleft cysts are the most common branchial cleft cyst and usually present in individuals between 10 and 40 years as painless fluctuant masses.
        - They typically present as slowly growing, non-tender masses in the upper neck.
        - Most second branchial cleft cysts are located in the submandibular space, at the anteromedial border of the sternocleidomastoid muscle, lateral to the carotid space, or posterior to the submandibular gland.
        - Ranula – typically cystic masses in the floor of the mouth
- Masticator space (includes masseter and pterygoid muscles):
    - Venous or lymphatic malformation
    - Cellulitis
    - Abscess
    - Rhabdomyosarcoma
- Parapharyngeal space:
    - Cellulitis
    - Abscess
    - Neurogenic tumors (CN V, IX, XI and XII)
    - Paragangliomas
    - Neurofibromas
    - Lymphoma
    - Rhabdomyosarcoma
- Paravertebral space:
    - Cervical dermal sinus (epithelium lined dural tubes that connect the skin with the central nervous system or its covering)
    - Meningocele
    - Rhabdomyosarcoma
    - Lymphoma
    - Neuroblastoma
    - Neurofibroma
- Posterior cervical space:
    - Lymphadenopathy
    - Lymphatic malformation

Congenital Neck Masses:[1,5]

- Anterior neck masses
    - Branchial anomolies

        - Sinus: with either an internal (to the pharynx) or external (to the skin) opening
        - Fistula: with both an internal and external opening
        - Cyst: closed sac with no openings
    - First branchial anomalies
        - Typically sinus or cyst
        - Located anywhere from the external auditory canal to the region of the parotid gland, down to the level of the hyoid; may communicate with the preauricular soft tissue/parotid, parapharyngeal space or anterior triangle of the neck
            - Type I tract parallels the external auditory meatus.
            - Type II tract courses over the angle of mandible through the parotid ending near/within the external auditory canal bony cartilaginous junction.
    - Second branchial anomalies
        - The most common
        - Located from anterior neck in the region of the middle to lower two thirds of the sternocleidomastoid and the great vessels to the pharyngeal mucosa (tonsil)- a tract and/or cyst may occur anywhere along this path
    - Third branchial anomalies
        - Typically located from the low anterior neck to the base of the pyriform sinus
    - Fourth branchial anomalies
        - Potential tract from the low anterior neck to the thyroid gland or mediastinum
    - Cervical thymus
        - Ectopic thymic remnants can be found in the anterior neck (left more commonly than right) and extend deep (near the carotid sheath)- can connect to mediastinum or have cystic components.
- Midline
    - Ectopic Thyroid/Thyroglossal Duct Cysts
        - Anywhere from the tongue base to the mediastinum (a result of the normal embryologic pathway of the thyroid that fails to obliterate or reach its normal location in the lower neck)
- Just off the midline
    - Laryngocele
        - An abnormal dilation of the saccule of the larynx
            - Internal: within the thyroid cartilage
            - External: beyond the thyrohyoid membrane into the neck
- Anywhere within the neck
    - Teratomas
        - Tissue from all three germ cell layers (ectodermal, mesodermal and endodermal components) typically present as a firm mass, can have calcifications seen on imaging

- Dermoid cysts
  - Cysts with ectodermal and mesodermal structures (commonly lined by epidermis and containing epidermal appendages) typically in the midline/ submental region, but can be anywhere in the head and neck including orbit
- Epidermoid cysts
  - Cysts with only ectodermal components (with squamous material)
- Pilomatixoma
  - Lesion derived from hair matrix/follicles
- Vascular anomalies
  - Hemangiomas (most common)
    - Congenital: present at birth typically involute
    - Infantile: noted to have a rapid/proliferative phase followed by involution
  - High flow
    - Arterioveous malformations (AVM) and arteriovenous fistuas (AVF) tangle of vessels
  - Low flow
    - Venous lymphatic and capillary malformations
- Lymphatic malformations (lymphangiomas)
  - Result from a failure of lymph spaces to connect to the rest of the lymphatic system
    - Macrocystic: comprised of large cysts
    - Microcystic: comprised of smaller cysts typically more infiltrative, lending to difficult excision

Evidence Discussion

- Ultrasound, although operator dependent is utilized for the initial evaluation of pediatric neck masses, secondary to its availability, expense, lack of radiation, and avoidance of sedation.[1] Ultrasound is limited by poor depth of penetration when evaluating deeper abnormalities.[2]
- Contrast enhanced CT is supported for accessibility and availability, however exposes the patient to ionizing radiation.[1]
- MRI provides excellent soft tissue detail, without radiation, however, due to the time needed for complete imaging, anesthesia or sedation may be required.[1] Children under 6 years of age, children with developmental delays, or children with anxiety/ claustrophobia may require deep sedation in order to successfully perform a complete radiologic study.[3]

References (PEDNECK-2)

v1.0.2025

1. Ho ML. Pediatric Neck Masses: Imaging Guidelines and Recommendations. *Radiol Clin North Am*. 2022;60(1):1-14. doi:10.1016/j.rcl.2021.08.001
2. Brown RE, Harave S. Diagnostic imaging of benign and malignant neck masses in children-a pictorial review. *Quant Imaging Med Surg*. 2016;6(5):591-604. doi:10.21037/qims.2016.10.10
3. Jung SM. Drug selection for sedation and general anesthesia in children undergoing ambulatory magnetic resonance imaging. *Yeungnam Univ J Med*. 2020;37(3):159-168. doi:10.12701/yujm.2020.00171
4. Siegel MJ. Neck sonography. In: *Pediatric Sonography*. 5th ed. Wolters Kluwer/Lippincott Williams & Wilkins; 2018:112-155
5. Geddes G, Butterly MM, Patel SM, Marra S. Pediatric Neck Masses. *Pediatrics in Review*. 2013;34(3):115-125. doi:10.1542/pir.34-3-115
6. Ludwig BJ, Wang J, Nadgir RN, Saito N, Castro-Aragon I, Sakai O. Imaging of Cervical Lymphadenopathy in Children and Young Adults. American Journal of Roentgenology. 2012;199(5):1105-1113. doi:10.2214/ajr.12.8629
7. Rizzi MD, Wetmore RF, Potsic WP. Differential diagnosis of neck masses. In: Lesperance MM, Flint PW, eds. *Cummings Pediatric Otolaryngology*, Philadelphia: Saunders Company, 2015:245-254
8. Bansal AG, Oudsema R, Masseaux JA, Rosenberg HK. US of Pediatric Superficial Masses of the Head and Neck. *RadioGraphics*. 2018;38(4):1239-1263. doi:10.1148/rg.2018170165
9. Kelly TG, Faulkes SV, Pierre SK, et al. Imaging submandibular pathology in the paediatric patient. *Clinical Radiology.* 2015;70(7):774-786. doi:10.1016/j.crad.2015.03.003
10. Collins B, Stoner JA, Digoy GP. Benefits of ultrasound vs. computed tomography in the diagnosis of pediatric lateral neck abscesses. *International Journal of Pediatric Otorhinolaryngology*. 2014;78(3):423-426. doi:10.1016/j.ijporl.2013.11.034
11. MacDonald A, Burrell S. Infrequently Performed Studies in Nuclear Medicine: Part 2. *Journal of Nuclear Medicine Technology*. 2009;37(1):1-13. doi:10.2967/jnmt.108.057851
12. Stern JS, Ginat DT, Nicholas JL, Ryan ME. Imaging of Pediatric Head and Neck Masses. *Otolaryngologic Clinics of North America*. 2015;48(1):225-246. doi:10.1016/j.otc.2014.09.015
13. Expert Panel on Neurologic Imaging:, Aulino JM, Kirsch CFE, et al. ACR Appropriateness Criteria® Neck Mass-Adenopathy. *J Am Coll Radiol*. 2019;16(5S):S150-S160. doi:10.1016/j.jacr.2019.02.025
14. Riva G, Sensini M, Peradotto F, Scolfaro C, Rosa GD, Tavormina P. Pediatric neck masses: how clinical and radiological features can drive diagnosis. *European Journal of Pediatrics*. 2019;178(4):463-471. doi:10.1007/s00431-018-3305-9

Cervical Lymphadenopathy (PEDNECK-3)

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Imaging (PEDNECK-3.1)

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- Painful acute lymphadenopathy and other painful neck masses (including neck "swelling") should be treated with a trial of conservative therapy for at least 4-weeks, including antibiotics if appropriate.
  - If there is improvement with conservative treatment, advanced imaging is not indicated.
  - Ultrasound (CPT® 76536) is indicated for any of the following:
    - Initial evaluation of persistent lymphadenopathy following 4-weeks of treatment/ observation **OR**
    - Unexplained fever (temperature ≥100.4°F) and there is clinical concern for suppurative lymphadenopathy/neck abscess
- For inconclusive ultrasound/to further characterize abnormalities found on ultrasound:
  - MRI Orbit/Face/Neck without contrast (CPT® 70540) **OR**
  - MRI Orbit/Face/Neck without and with contrast (CPT® 70543) **OR**
  - CT Neck with contrast (CPT® 70491)
- If systemic symptoms or other clinical findings suggest malignancy, see **Pediatric Lymphomas (PEDONC-5)** in the Pediatric and Special Populations Oncology Imaging Guidelines.

Background and Supporting Information

- Both MRI and CT are superior to ultrasound for defining the relationship of an abscess to adjacent structures, particularly the airway; and detecting posterior cervical, mediastinal and intracranial extension.
- Inflammatory lymph nodes from acute lymphadenitis are usually painful, tender and mobile, frequently associated with upper respiratory infection, pharyngitis or dental infection.
- Occasionally, sarcoidosis or toxoplasmosis and Human immunodeficiency virus (HIV) can cause inflammatory lymphadenopathy as well.

Evidence Discussion

- Ultrasound can be used not only as an initial imaging modality, but also as a follow up/serial exam in cases without pathologic features such as loss of fatty hilum and firmness or supraclavicular location is not present.[1]
- Ultrasound has the benefit of being able to be used to serially evaluate the pediatric patient with cervical adenopathy without the need for sedation/anesthesia and without exposure to radiation.[1]

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- Both CT and MRI can provide additional information that may assist with surgical planning. CT is low risk but involves radiation exposure, while MRI does not involve radiation, but requires more time to complete the study and possibly sedation.[1]

References (PEDNECK-3)

v1.0.2025

1. Harris JE, Patel NN, Wai K, Rosbe KW. Management of Pediatric Persistent Asymptomatic Cervical Lymphadenopathy. *Otolaryngol Head Neck Surg*. 2024;170(1):69-75. doi:10.1002/ohn.420
2. Ludwig BJ, Wang J, Nadgir RN, et al. Imaging of cervical lymphadenopathy in children and young adults. *Am J Roentgenol*. 2012 Nov; 199 (5):1105-1113
3. Nolder AR. Paediatric cervical lymphadenopathy. *Current Opinion in Otolaryngology & Head and Neck Surgery*. Published online December 2013:567-570. doi:10.1097/moo.0000000000000003
4. Chadha M, Yang Z, Ellika S. Imaging in Nontraumatic Pediatric Head and Neck Emergencies. *Journal of Pediatric Neurology*. 2017;15(05):263-293. doi:10.1055/s-0037-1604238
5. Rosenberg TL, Nolder AR. Pediatric Cervical Lymphadenopathy. *Otolaryngologic Clinics of North America*. 2014;47(5):721-731. doi:10.1016/j.otc.2014.06.012
6. Weinstock MS, Patel NA, Smith LP. Pediatric Cervical Lymphadenopathy. *Pediatrics in Review.* 2018;39(9):433-443. doi:10.1542/pir.2017-0249
7. Expert Panel on Neurologic Imaging:, Aulino JM, Kirsch CFE, et al. ACR Appropriateness Criteria® Neck Mass-Adenopathy. *J Am Coll Radiol*. 2019;16(5S):S150-S160. doi:10.1016/j.jacr.2019.02.025
8. Ho ML. Pediatric Neck Masses: Imaging Guidelines and Recommendations. *Radiol Clin North Am*. 2022;60(1):1-14. doi:10.1016/j.rcl.2021.08.001

Dystonia/Torticollis (PEDNECK-4)

Guideline Page

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Dystonia/Torticollis (PEDNECK-4.1)

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Infants under 12 Months of Age (Congenital Muscular Torticollis/Fibromatosis Colli)

- Ultrasound Neck (CPT® 76536) is indicated as the initial study.
  - If Ultrasound is Positive→ No further imaging is needed since diagnosis is defined.
  - If Ultrasound is Negative or to further evaluate for other structural causes:
    - CT Neck with contrast (CPT® 70491) **OR**
    - MRI Orbit/Face/Neck without contrast (CPT® 70540) **OR**
    - MRI Orbit/Face/Neck without and with contrast (CPT® 70543)

Background and Supporting Information

- Individuals usually present by 2-weeks of life with an anterior neck mass, which is commonly right sided (75% of cases). A history of a traumatic breech or forceps delivery is common.

Children and Adults (Acquired Torticollis)

- Initial evaluation with recent trauma, and low suspicion of injury:
  - Plain radiographs of the cervical spine
    - To identify fracture or malalignment if plain radiographs are inconclusive or in individuals with a high-risk mechanism of cervical spine injury within the last 3 months (see below**):
      - CT Neck with contrast (CPT® 70491) **AND/OR**
      - CT Cervical Spine without contrast (CPT® 72125) is supported.
- In the clinical setting of cervical spine trauma with an associated neurologic deficit:
  - MRI Cervical Spine without contrast (CPT® 72141) is supported.
- In the absence of trauma, to identify underlying abscess, bony, muscular, vascular, or neurologic causes, ONE of the following is supported:
  - CT Neck with contrast (CPT® 70491), **OR**
  - CT Cervical Spine without contrast (CPT® 72125), **OR**
  - MRI Cervical Spine without contrast (CPT® 72141), **OR**
  - MRI Orbit/Face/Neck without and with contrast (CPT® 70543), **OR**
  - MRA Neck without and with contrast (CPT® 70549)
    - Positive→ Further advanced imaging is not required if a local cause has been identified.

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  - Negative→ MRI Brain without and with contrast (CPT® 70553) is supported to exclude CNS cause.

**High-risk mechanisms of cervical spine injury may include:

- Head trauma and/or maxillofacial trauma
- Pedestrian in a motor vehicle accident
- Fall from above standing height
- Diving accident
- Head-on motor vehicle collision without/with airbag deployment
- Rollover motor vehicle collision
- Ejection from the vehicle in a motor vehicle collision
- High speed of the vehicle at the time of collision
- Not wearing a seatbelt/shoulder harness in a motor vehicle collision
- Individuals with ankylosing spondylitis are at high-risk of cervical spine fractures even with minor direct/indirect trauma to the cervical spine which can result in quadriparesis/quadriplegia

Background and Supporting Information

- Injury or inflammation involving the sternocleidomastoid or trapezius muscles is the most common cause of acquired torticollis in children.
- Torticollis or cervical dystonia is an abnormal twisting of the neck in which the head is rotated or twisted. Acute causes are most common. Children with deep space neck infections present with torticollis approximately 50% of the time.[7] Other causes are variable and may be congenital, acquired (caused by trauma, juvenile idiopathic arthritis, or neoplasm), or idiopathic.

Evidence Discussion

- Ultrasound is the initial method of evaluation of suspected fibromatosis colli. Ultrasound has a sensitivity of 100% and the advantages of being readily available as well as avoiding sedation and radiation.[1]
- Standard x-rays are the initial imaging modality after trauma, but can be technically challenging due to head position.[2,3]
- Both CT and MRI assist in diagnosing non traumatic torticollis as a result of atlantoaxial subluxation; CT has the advantage of being readily available, however exposes the child to radiation, while MRI provides better soft tissue detail such as spinal cord compression but may require sedation/anesthesia due to the length of the study.[3]

References (PEDNECK-4)

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1. Oliveira JC, Abreu MS, Gomes FM. Sternocleidomastoid tumour in neonate: *fibromatosis colli*. *BMJ Case Rep*. 2018;2018:bcr2017223543. Published 2018 Jan 10. doi:10.1136/bcr-2017-223543
2. Haque S, Bilal Shafi BB, Kaleem M. Imaging of torticollis in children. *Radiographics*. 2012;32(2):557-571. doi:10.1148/rg.322105143
3. Wenger KJ, Hattingen E, Porto L. Magnetic Resonance Imaging as the Primary Imaging Modality in Children Presenting with Inflammatory Nontraumatic Atlantoaxial Rotatory Subluxation. *Children (Basel)*. 2021;8(5):329. Published 2021 Apr 23. doi:10.3390/children8050329
4. Dudkiewicz I, Ganel A, Blankstein A. Congenital Muscular Torticollis in Infants: Ultrasound-Assisted Diagnosis and Evaluation. *Journal of Pediatric Orthopaedics*. 2005;25(6):812-814. doi:10.1097/01.bpo.0000184648.81109.75
5. Suhr MC, Oledzka M. Considerations and intervention in congenital muscular torticollis. *Current opinion in pediatrics*. 2015;27(1):75-81. doi:10.1097/MOP.0000000000000175
6. Expert Panel on Pediatric Imaging:, Kadom N, Palasis S, et al. ACR Appropriateness Criteria® Suspected Spine Trauma-Child. *J Am Coll Radiol*. 2019;16(5S):S286-S299. doi:10.1016/j.jacr.2019.02.003
7. Demongeot N, Akkari M, Blanchet C, et al. Pediatric deep neck infections: Clinical description and analysis of therapeutic management. *Arch Pediatr*. 2022;29(2):128-132. doi:10.1016/j.arcped.2021.11.011

Dysphagia (PEDNECK-5)

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Dysphagia (PEDNECK-5.1)

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- Dysphagia imaging indications in pediatric individuals are very similar to those for adult individuals. See **Dysphagia and Upper Digestive Tract Disorders (Neck-3.1)** in the Neck Imaging Guidelines.
- For concern of foreign body ingestion as the etiology of dysphagia initial imaging:
  - X-rays of the neck and chest are supported.[7]
- For dysphagia associated with chest pain and difficulty swallowing both solids and liquids or gastroesphageal reflux:
  - Esophageal motility study (CPT® 78258) is indicated.
- For a suspected anatomical variant such as a vascular ring, right sided aortic arch, or double arch noted on chest radiography (which can be associated with dysphagia):
  - CTA Chest (CPT® 71275) **OR**
  - MRA Chest (CPT® 71555) is supported.

Evidence Discussion

- X-rays are supported as the initial evaluation of foreign body ingestion in children. Plain films provide the advantage being readily available to detect radiopaque foreign bodies or other pathologic findings.[1]
- Chest CT and MRI provide information regarding anatomy and possible external compression resulting in dysphagia, but require the use of contrast and possible sedation.[1]

References (PEDNECK-5)

v1.0.2025

1. Lanzoni G, Sembenini C, Gastaldo S, et al. Esophageal Dysphagia in Children: State of the Art and Proposal for a Symptom-Based Diagnostic Approach. *Front Pediatr*. 2022;10:885308. Published 2022 Jun 24. doi:10.3389/fped.2022.885308
2. Kakodkar K, Schroeder JW. Pediatric Dysphagia. *Pediatric Clinics of North America*. 2013;60(4):969-977. doi:10.1016/j.pcl.2013.04.010
3. Stagnaro N, Rizzo F, Torre M, Cittadini G, Magnano G. Multimodality imaging of pediatric airways disease: indication and technique. *La radiologia medica*. 2017;122(6):419-429. doi:10.1007/s11547-017-0737-7
4. Dodrill P, Gosa MM. Pediatric Dysphagia: Physiology, Assessment, and Management. Annals of Nutrition and Metabolism. 2015;66(5):24-31. doi:10.1159/000381372
5. Sommburg O, Helling-Bakki A, Alrajab A, et al. Assessment of Suspected Vascular Rings and Slings and/or Airway Pathologies Using Magnetic Resonance Imaging Rather Than Computed Tomography. *Respiration*. 2018;97(2):108-118. doi:10.1159/000492080.
6. Lawlor CM, Choi S. Diagnosis and Management of Pediatric Dysphagia: A Review. *JAMA Otolaryngol Head Neck Surg*. 2020;146(2):183-191. doi:10.1001/jamaoto.2019.3622
7. Leinwand K, Brumbaugh DE, Kramer RE. Button Battery Ingestion in Children: A Paradigm for Management of Severe Pediatric Foreign Body Ingestions. *Gastrointest Endosc Clin N Am* . 2016;26(1):99- 118. doi:10.1016/j.giec.2015.08.003

Thyroid and Parathyroid (PEDNECK-6)

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Thyroid Masses or Nodules (PEDNECK-6.1)

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- For the initial study for evaluation of thyroid masses, diffuse thyroid enlargement, or nodules in pediatric individuals:
  - Ultrasound Neck (CPT® 76536) is indicated.
- **For a normal or elevated TSH** with any solitary or suspicious thyroid nodule noted on imaging or physical exam:
  - Fine needle aspiration (FNA) under ultrasound guidance (CPT® 76942) is indicated.
- **For a low TSH:**
  - Nuclear thyroid scintigraphy (either CPT® 78013 or CPT® 78014) is indicated.
    - Hyperfunctioning nodules should be treated surgically but may also undergo FNA under ultrasound guidance (CPT® 76942) if suspicious in appearance and not being treated surgically.
    - Hypofunctioning nodules should undergo FNA under ultrasound guidance (CPT® 76942).
- For lymph node assessment if cervical lymph node imaging was not performed at the time of the initial diagnostic thyroid ultrasound:
  - Repeat imaging with Ultrasound Neck (CPT® 76536) is supported.
- For preoperative planning in individuals with large or fixed masses, vocal cord paralysis, or bulky cervical or supraclavicular adenopathy:
  - CT Neck without contrast (CPT® 70490) **OR**
  - CT Neck with contrast (CPT® 70491) **OR**
  - MRI Orbit/Face/Neck without contrast (CPT® 70540) **OR**
  - MRI Orbit/Face/Neck without and with contrast (CPT® 70543) is supported.
  - In addition, for individuals with substernal extension of the thyroid, pulmonary symptoms or abnormalities on recent chest x-ray:[26]
    - CT Chest without contrast (CPT® 71250) **OR**
    - CT Chest with contrast (CPT® 71260) is supported.
- If any biopsy reveals thyroid carcinoma, See **Thyroid Cancer (ONC-6)** in the Oncology Imaging Guidelines.
- Repeat ultrasound (CPT® 76536) and/or FNA under ultrasound guidance (CPT® 76942) is indicated 3-6 months following initial biopsy if the initial biopsy shows inadequate, or non-diagnostic findings.

  - Repeat ultrasound (CPT® 76536) is indicated in 6-12 months if the nodule is stable and/or FNA is benign.
  - The nodule should be treated surgically if growing or the FNA is not benign.
- Repeat ultrasound (CPT® 76536) is indicated 6-12 months following initial biopsy if the initial biopsy shows benign findings.
  - Repeat ultrasound (CPT® 76536) is indicated every 1-2 years if the nodule is stable.
  - Repeat FNA under ultrasound guidance (CPT® 76942) or be treated surgically if the nodule is growing or concerning new findings are present.
  - Benign nodules that have been surgically resected do not require routine imaging follow up in the absence of clinical or laboratory changes suggesting recurrence.
- If the initial biopsy shows indeterminate or suspicious findings, surgery is recommended.

Evidence Discussion

- Ultrasound is used as the initial evaluation for thyroid abnormalities, and follow up as it is noninvasive, radiation free, inexpensive, very sensitive and does not require sedation to complete.[1,2]
- Fine needle biopsy in pediatric thyroid nodules has a sensitivity of 94% and specificity of 100%.[3]
- Both CT and MRI can be valuable in preoperative evaluation of thyroid disease for determining involvement of lymph nodes or adjacent structures. However iodine based contrasts can lead to suppression of radioactive iodine thyroid uptake thus postponing radioiodine treatment, and favoring the use of MRI.[1]

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Hyperthyroidism (PEDNECK-6.2)

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- For the initial study for evaluation of hyperthyroidism:
  - Ultrasound Neck (CPT® 76536) is supported.
    - If a nodule or mass is discovered on ultrasound, the individual should be imaged according to **Thyroid Masses or Nodules (PEDNECK-6.1)**.
- For all other individuals with documented hyperthyroidism:
  - Thyroid uptake nuclear imaging (either CPT® 78012 or CPT® 78014) is supported.

Background and Supporting Information

- Common causes are Graves' disease and autoimmune disorders (lupus, rheumatoid arthritis, and Sjögren syndrome).

Evidence Discussion

- Ultrasound is used as the initial evaluation for thyroid abnormalities, and follow up as it is noninvasive, radiation free, inexpensive, very sensitive and does not require sedation to complete.[1,2]
- The use of a radioactive iodine uptake scan, (although involves ionizing radiation exposure) is supported if the diagnosis is unclear after ultrasound and laboratory evaluation have been completed.[4,5]

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Hypothyroidism (PEDNECK-6.3)

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- For the initial study for evaluation of hypothyroidism:
  - Ultrasound Neck (CPT® 76536) is supported.
    - If a nodule or mass is discovered on ultrasound, the individual should be imaged according to **Thyroid Masses or Nodules (PEDNECK-6.1)**.
- For individuals with documented congenital hypothyroidism, thyroid uptake nuclear imaging (either CPT® 78012 or CPT® 78014) is indicated.

Background and Supporting Information

- Causes of pediatric hypothyroidism include thyroid congenital dysgenesis, dyshormonogenesis autoimmune thyroiditis, Hashimoto thyroiditis, subacute thyroiditis, and abnormality in the pituitary gland or hypothalamus. Congenital hypothyroidism is usually diagnosed in the neonate on a routine perinatal screening examination.

Evidence Discussion

- Ultrasound is used as the initial evaluation for thyroid abnormalities, and follow up as it is noninvasive, radiation free, inexpensive, very sensitive and does not require sedation to complete.[1,2]
- The use of a radioactive iodine uptake scan, (although involves ionizing radiation exposure) is supported if the diagnosis is unclear after ultrasound and laboratory evaluation have been completed.[4,5]

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Parathyroid Imaging (PEDNECK-6.4)

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- Parathyroid imaging indications in pediatric individuals are the same as those for adult individuals. See **Parathyroid Imaging (Neck-8.3)** in the Neck Imaging Guidelines.

References (PEDNECK-6)

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1. Iakovou I, Giannoula E, Sachpekidis C. Imaging and Imaging-Based Management of Pediatric Thyroid Nodules. *J Clin Med*. 2020;9(2):384. Published 2020 Feb 1. doi:10.3390/jcm9020384
2. Chun S, Lee YS, Yu J. Thyroid imaging study in children with suspected thyroid dysgenesis. *Ann Pediatr Endocrinol Metab*. 2021;26(1):53-59. doi:10.6065/apem.2040120.060
3. Partyka KL, Huang EC, Cramer HM, Chen S, Wu HH. Histologic and clinical follow-up of thyroid fine-needle aspirates in pediatric patients. *Cancer Cytopathol*. 2016;124(7):467-471. doi:10.1002/cncy.21713
4. Dimachkieh AL, Kazahaya K, Chelius DC Jr. Assessment and Management of Thyroid Disease in Children. *Otolaryngol Clin North Am*. 2019;52(5):957-967. doi:10.1016/j.otc.2019.06.009
5. Silva CT, Navarro OM. Pearls and Pitfalls in Pediatric Thyroid Imaging. *Semin Ultrasound CT MR*. 2020;41(5):421-432. doi:10.1053/j.sult.2020.05.007
6. Waguespack SG, Huh WW, and Bauer AJ. Endocrine tumors. In: Pizzo PA, Poplack DG, eds. *Principles and Practices of Pediatric Oncology*. 7th ed. Wolters Kluwer. Philadelphia, PA. 2016:919-945
7. Wassner AJ, Smith JR. Hypothyroidism. In: Kliegman RM, St. Geme JW III, Blum NJ, Shah SS, Tasker RC, Wilson KM, eds. *Nelson Textbook of Pediatrics*, 21st ed. 2020:2914-2922
8. Smith JR, Wassner AJ. Thyroid nodule. In: Kliegman RM, St. Geme JW III, Blum NJ, Shah SS, Tasker RC, Wilson KM, eds. *Nelson Textbook of Pediatrics*, 21st ed. 2020:2936-2937
9. Wassner AJ, Smith JR. Thyroiditis. In: Kliegman RM, St. Geme JW III, Blum NJ, Shah SS, Tasker RC, Wilson KM, eds. *Nelson Textbook of Pediatrics*, 21st ed. 2020:2923-2925
10. Smith JR, Wassner AJ. Thyrotoxicosis. In: Kliegman RM, St. Geme JW III, Blum NJ, Shah SS, Tasker RC, Wilson KM, eds. *Nelson Textbook of Pediatrics*, 21st ed.2020:2928-2934
11. Doyle DA. Hypoparathyroidism. In: Kliegman RM, St. Geme JW III, Blum NJ, Shah SS, Tasker RC, Wilson KM, eds. *Nelson Textbook of Pediatrics*, 21st ed. 2020:2945-2948
12. Doyle DA. Hyperparathyroidism. In: Kliegman RM, St. Geme JW III, Blum NJ, Shah SS, Tasker RC, Wilson KM, eds. *Nelson Textbook of Pediatrics*, 21st ed. 2020:2950-2953
13. Francis GL, Waguespack SG, Bauer AJ, et al. Management Guidelines for Children with Thyroid Nodules and Differentiated Thyroid Cancer. *Thyroid*. 2015;25(7):716-759. doi:10.1089/thy.2014.0460
14. Essenmacher AC, Joyce PH, Kao SC, et al. Sonographic Evaluation of Pediatric Thyroid Nodules. *RadioGraphics*. 2017;37(6):1731-1752. doi:10.1148/rg.2017170059
15. Williams JL, Paul DL, Bisset G. Thyroid disease in children: part 1. *Pediatric Radiology*. 2013;43(10):1244-1253. doi:10.1007/s00247-013-2735-9
16. Williams JL, Paul D, Bisset G. Thyroid disease in children: part 2. *Pediatric Radiology*. 2013;43(10):1254-1264. doi:10.1007/s00247-013-2707-0
17. Papendieck P, Gruñeiro-Papendieck L, Venara M, et al. Differentiated Thyroid Cancer in Children: Prevalence and Predictors in a Large Cohort with Thyroid Nodules Followed Prospectively. *The Journal of Pediatrics*. 2015;167(1):199-201. doi:10.1016/j.jpeds.2015.04.041
18. Ross DS, Burch HB, Cooper DS, et al. 2016 American Thyroid Association Guidelines for Diagnosis and Management of Hyperthyroidism and Other Causes of Thyrotoxicosis. *Thyroid*. 2016;26(10):1343-1421. doi:10.1089/thy.2016.0229
19. Donangelo I, and Braunstein GD. Update on subclinical hyperthyroidism. *Am Fam Physician*. 2011; 83 (8):933-938.
20. Gharib H, Papini E, Garber JR, et al. American Association Of Clinical Endocrinologists, American College Of Endocrinology, And Associazione Medici Endocrinologi medical guidelines for clinical practice for the diagnosis and management of thyroid nodules-2016 update. *Endocrine Practice*. 2016;22(Supplement 1):1-60. doi:10.4158/ep161208.gl
21. Bilezikian JP, Brandi ML, Eastell R, et al. Guidelines for the Management of Asymptomatic Primary Hyperparathyroidism: Summary Statement from the Fourth International Workshop. *The Journal of Clinical Endocrinology & Metabolism*. 2014;99(10):3561-3569. doi:10.1210/jc.2014-1413

22. Greenspan BS, Dillehay G, Intenzo C, et al. SNM Practice Guideline for Parathyroid Scintigraphy 4.0. Journal of Nuclear Medicine Technology. 2012;40(2):111-118. doi:10.2967/jnmt.112.105122
23. Sung, Jin Yong. "Parathyroid Ultrasonography: The Evolving Role of the Radiologist." *Ultrasonography* 34, no. 4 (2015): 268-74. doi:10.14366/usg.14071
24. ACR–SPR PRACTICE PARAMETER FOR THE PERFORMANCE OF PARATHYROID SCINTIGRAPHY—White paper, revised 2019. https://www.acr.org/-/media/ACR/Files/Practice-Parameters/parathyroidscint.pdf
25. ACR Appropriateness Criteria Parathyroid Adenoma, published April 2021. https://acsearch.acr.org/docs/3158171/Narrative/
26. Hanson MA, Shaha AR, Wu JX. Surgical approach to the substernal goiter. *Best Pract Res Clin Endocrinol Metab*. 2019;33(4):101312. doi:10.1016/j.beem.2019.101312
27. Xing Z, Qiu Y, Zhu J, Su A, Wu W. Diagnostic performance of adult-based ultrasound risk stratification systems in pediatric thyroid nodules: a systematic review and meta-analysis. *Front Endocrinol (Lausanne)*. 2023;14:1187935. Published 2023 May 12. doi:10.3389/fendo.2023.1187935

Esophagus (PEDNECK-7)

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Esophagus (PEDNECK-7.1)

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- Esophagus imaging indications in pediatric individuals are very similar to those for adult individuals. See **Dysphagia and Upper Digestive Tract Disorders (Neck-3.1)** in the Neck Imaging Guidelines.
- Pediatric-specific imaging considerations include the following:
  - For suspected foreign body ingestion or impaction:
    - Plain x-rays are the initial imaging.[8]
    - Ultrasound Neck (CPT® 76536) can be approved for evaluation of upper esophageal foreign bodies.
    - See **Dysphagia and Upper Digestive Tract Disorders (Neck-3.1)**.
  - For evaluating congenital atresia with associated tracheoesophageal fistula:
    - Esophagram is supported.
  - For evaluation of suspected congenital malformations with inconclusive x-rays or esophagram:
    - CT Neck with contrast (CPT® 70491) **AND/OR**
    - CT Chest with contrast (CPT® 71260)
      - 3D rendering (CPT® 76376 or CPT® 76377) is supported for preoperative planning in complex cases.
  - Plain radiographs alone usually suffice for the diagnosis of other types of esophageal atresia and a contrast examination of the esophagus is not warranted but may be indicated for post-operative evaluation.

Evidence Discussion

- The initial evaluation for possible foreign body ingestion is plain x-rays, because of their availability and affordability.[1]
- Esophagram, in the setting of esophageal atresia with tracheoesophageal fistula allows for diagnosis of the condition through the use of a nasogastric tube being withdrawn while instilling contrast material.[1]
- Chest x ray is used as the initial evaluation of the mediastinum when concerns are present for a congenital abnormality, because of availability and affordability[1] Evaluation of vascular ring or sling includes an esophagram, For further evaluation CT is favored over MRI secondary to availability, expedited time and cost.[2,3]

References (PEDNECK-7)

v1.0.2025

1. Choi G, Je BK, Kim YJ. Gastrointestinal Emergency in Neonates and Infants: A Pictorial Essay. *Korean J Radiol*. 2022;23(1):124-138. doi:10.3348/kjr.2021.0111
2. Liszewski MC, Ciet P, Winant AJ, Lee EY. Magnetic Resonance Imaging of Pediatric Lungs and Airways: New Paradigm for Practical Daily Clinical Use. *J Thorac Imaging*. 2024;39(1):57-66. doi:10.1097/RTI.0000000000000707
3. Kapur S, Bhalla AS, Jana M. Pediatric Chest MRI: A Review. *Indian J Pediatr*. 2019;86(9):842-853. doi:10.1007/s12098-018-02852-w
4. Hryhorczuk AL, Lee EY, Eisenberg RL. Esophageal Abnormalities in Pediatric Patients. *American Journal of Roentgenology*. 2013;201(4):W519-W532. doi:10.2214/ajr.12.9291
5. Seekins JM, et al. Esophagus congenital and neonatal abnormalities. In: Coley B, Saunders E, eds. *Caffey's Pediatric Diagnostic Imaging*. Philadelphia, PA. 2013:12
6. Ellis WE. Esophagus: Congenital and Neonatal Abnormalities. In: Coley B, ed. *Caffey's Pediatric Diagnostic Imaging*, 13th Edition. Philadelphia, PA. 2018:901-910
7. Mori T, Nomura O, Hagiwara Y. Another Useful Application of Point-of-Care Ultrasound. *Pediatric Emergency Care*. 2019;35(2):154-156. doi:10.1097/pec.0000000000001729
8. Leinwand K, Brumbaugh DE, Kramer RE. Button Battery Ingestion in Children: A Paradigm for Management of Severe Pediatric Foreign Body Ingestions. *Gastrointest Endosc Clin N Am*. 2016;26(1):99-118. doi:10.1016/j.giec.2015.08.003

Trachea (PEDNECK-8)

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Trachea (PEDNECK-8.1)

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- Trachea imaging indications in pediatric individuals are similar to those for adult individuals. See **Imaging of the Larynx, Trachea, and Bronchus (Neck-9.1)** in the Neck Imaging Guidelines.
- Pediatric-specific imaging considerations include the following:
  - For evaluation of suspected congenital malformations if x-rays are inconclusive:
    - CT Neck with contrast (CPT® 70491) **AND/OR**
    - CT Chest with contrast (CPT® 71260) are supported.
      - 3D rendering (CPT® 76376 or CPT® 76377) is supported for preoperative planning in complex cases.
      - CT Chest (either without contrast CPT® 71250 or with contrast CPT® 71260) is not routinely performed to evaluate foreign body aspiration, but it may be considered in complicated cases or when bronchoscopy is being considered.[1,3]

Evidence Discussion

- Chest x-ray, because of its availability and affordability, is generally regarded as the initial imaging study in evaluating possible foreign body aspiration. Chest x-ray has a sensitivity of 62-88% and a specificity of 30-97% of detecting airway foreign bodies.[1,2]
- CT may play a role in diagnosing foreign body aspiration in children with non-specific complaints such as fever, and cough. CT of the chest has a 99% sensitivity and 92% specificity in detecting airway foreign bodies and can play role in the patient with an unclear or atypical clinical picture.[1]
- Chest x-ray is used as the initial evaluation of the mediastinum when concerns are present for a congenital abnormality. For further evaluation CT is favored over MRI secondary to availability, expedited time and cost.[4]

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References (PEDNECK-8)

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1. El Khoury P, Makhoul M, El Hadi C, Haber C, Rassi S. CT Scan in Children Suspected of Foreign Body Aspiration: A Systematic Review and Meta-analysis. *Otolaryngol Head Neck Surg*. 2024;170(1):1-12. doi:10.1002/ohn.433
2. Sekioka A, Koyama M, Fukumoto K, Nomura A, Urushihara N. Subtle Crucial X-Ray Findings in Pediatric Foreign Body Aspiration. *Cureus*. 2021;13(5):e14898. Published 2021 May 8. doi:10.7759/cureus.14898
3. Wang Y, Sun Y, Zhang H, Yang X, Song X. Comprehensive Analysis of the Diagnosis and Treatment of Tracheobronchial Foreign Bodies in Children. *Ear Nose Throat J*. 2023;102(10):661-666. doi:10.1177/01455613211023019
4. Liszewski MC, Ciet P, Winant AJ, Lee EY. Magnetic Resonance Imaging of Pediatric Lungs and Airways: New Paradigm for Practical Daily Clinical Use. *J Thorac Imaging*. 2024;39(1):57-66. doi:10.1097/RTI.0000000000000707
5. Pugmire BS, Lim R, Avery LL. Review of Ingested and Aspirated Foreign Bodies in Children and Their Clinical Significance for Radiologists. *RadioGraphics*. 2015;35(5):1528-1538. doi:10.1148/rg.2015140287
6. Lee EY, Restrepo R, Dillman JR, Ridge CA, Hammer MR, Boiselle PM. Imaging Evaluation of Pediatric Trachea and Bronchi: Systematic Review and Updates. *Seminars in Roentgenology*. 2012;47(2):182-196. doi:10.1053/j.ro.2011.12.002
7. Lee EY. Lower large airway disease. In: Coley B, ed. *Caffey's Pediatric Diagnostic Imaging*. Philadelphia, PA. 2018;486-494.
8. Semple T, Calder A, Owens CM, Padley S. Current and future approaches to large airways imaging in adults and children. *Clinical Radiology*. 2017;72(5):356-374. doi:10.1016/j.crad.2017.01.012
9. Stagnaro N, Rizzo F, Torre M, Cittadini G, Magnano G. Multimodality imaging of pediatric airways disease: indication and technique. *La radiologia medica*. 2017;122(6):419-429. doi:10.1007/s11547-017-0737-7