

Evidence Discussion (PVI.103.A)

Abdominal Aorta

The three most common pathology types occurring in the abdominal aorta are aneurysm, dissection and occlusion. Aortic dissection within the abdomen is often an extension of a thoracic dissection and should follow thoracic aortic imaging and treatment recommendations for acute cases.¹ Chronic abdominal aortic dissections may degenerate into aneurysms over time and should be followed according to standard abdominal aneurysm intervention recommendations.² Occlusive disease within the aorta often involves the mesenteric vessels as well as the adjacent iliac arteries and should follow imaging and treatment guidelines for lower extremity occlusive disease.³

Abdominal aortic aneurysmal disease is usually asymptomatic and discovered incidentally. Symptomatic aortic aneurysms are at high risk for rupture with a significant mortality risk and should be treated emergently with imaging and intervention as indicated. Chronic aneurysms require periodic monitoring to determine their rupture risk.⁴ There are certain criteria for repair:

- Abdominal aorta ≥ 5 cm in asymptomatic patients documented by imaging
- Abdominal aortic aneurysm of any size ≥ 3 cm in a patient with a thoracoabdominal aneurysm in which the thoracic aortic aneurysm is ≥ 6 cm documented by imaging
- Mycotic aneurysm of any size documented by imaging or elevated WBC or positive culture
- Patients with a growth rate of ≥ 0.5 cm/yr in an aorta that is between 3cm to 5 cm in diameter
- Patients with a small aneurysm between 3cm and 5 cm with extensive mural thrombus that is embolizing to the lower extremities

The anatomic location of abdominal aortic aneurysms allows ultrasound to be used as a primary imaging modality in most cases for surveillance. Ultrasound uses no radiation or contrast, can be performed in an outpatient setting and is cost-effective. CT/MR imaging is usually reserved for intervention planning or for cases where ultrasound has been found to have technical limitations related to body habitus or other structural issues.^{5,6}

Clinical decision-making for the treatment of chronic aneurysms takes into account the risk of rupture based on size and the morbidity of repair including cardiopulmonary events, renal dysfunction, stroke, limb loss, infection and death. Endovascular aortic repair has become the predominant approach for cases that meet for intervention.^{7,8} Open aortic repair tends to have higher perioperative risks and is usually reserved for anatomically challenging cases for both aneurysmal and occlusive disease. Endovascular repairs have lower perioperative risks, but they do require additional postoperative surveillance as they have a higher rate of technical complications.⁹ Endovascular intervention planning does require preoperative imaging with CT/MR for proper device selection.

Additional factors that may warrant abdominal aortic imaging and intervention include saccular or mycotic aneurysm formation, penetrating ulcer, trauma, connective tissue disease and familial/genetic disorders that predispose patients to dissection and aneurysm formation.¹⁰ Abdominal aortic aneurysms may be isolated; however, they may extended into the pelvis to include the iliac arteries. Concomitant repair of aortic and iliac segments is frequently indicated due to their proximity.¹¹

References

1. van Bogerijen GH, Tolenaar JL, Rampoldi V, et al. Predictors of aortic growth in uncomplicated type B aortic dissection. *J Vasc Surg.* 2014 Apr;59(4):1134-43. doi: 10.1016/j.jvs.2014.01.042.
2. Chaikof EL, Dalman RL, Eskandari MK, et al. The Society for Vascular Surgery practice guidelines on the care of patients with an abdominal aortic aneurysm. *J Vasc Surg.* 2018;67(1). doi:10.1016/j.jvs.2017.10.044.
3. Anderson JL, Halperin JL, Albert N, et al. Management of Patients with Peripheral Artery Disease (Compilation of 2005 and 2011 ACCF/AHA Guideline Recommendations).. *J Am Coll Cardiol.* 2013;61(14):1555-1570. doi:10.1016/j.jacc.2013.01.004
4. [Collard M, Sutphin PD, Kalva SP, et al. Expert Panel on Vascular Imaging. ACR Appropriateness Criteria® Abdominal Aortic Aneurysm Follow-up (without Repair). *J Am Coll Radiol.* 2019;16(5S):S2-S6. doi:10.1016/j.jacr.2019.02.005.
5. Bonci G, Steigner ML, et al. ACR Appropriateness Criteria® Thoracic Aorta Interventional Planning and Follow-Up. *J Am Coll Radiol.* 2017;14(11S):S570-S583. doi:10.1016/j.jacr.2017.08.042.
6. Kalva SP, Dill KE, et al. ACR Appropriateness Criteria® nontraumatic aortic disease. *J Thorac Imaging.* 2014;29(5):W85-W88. doi:10.1097/RTI.000000000000107.
7. Antoniou GA, Antoniou SA, Torella F. Editor's Choice - Endovascular vs. Open Repair for Abdominal Aortic Aneurysm: Systematic Review and Meta-analysis of Updated Peri-operative and Long Term Data of Randomised Controlled Trials. *Eur J Vasc Endovasc Surg.* 2020 Mar;59(3):385-397. doi:10.1016/j.ejvs.2019.11.030.
8. Canning P, Tawfik W, Whelan N, Hynes N, Sultan S. Cost-effectiveness analysis of endovascular versus open repair of abdominal aortic aneurysm in a high-volume center. *J Vasc Surg.* 2019 Aug;70(2):485-496. doi:10.1016/j.jvs.2018.11.018.
9. Smith T, Quencer KB. Best Practice Guidelines: Imaging Surveillance After Endovascular Aneurysm Repair. *American Journal of Roentgenology.* 2020;214(5):1165-1174. doi:10.2214/ajr.19.22197
10. Albornoz G, Coady MA, Roberts M, et al. Familial thoracic aortic aneurysms and dissections--incidence, modes of inheritance, and phenotypic patterns. *Ann Thorac Surg.* 2006;82(4):1400-1405. doi:10.1016/j.athoracsur.2006.04.098
11. Sakamoto I, Sueyoshi E, Hazama S, et al. Endovascular treatment of iliac artery aneurysms. *Radiographics* October 2005;25:S213-S227.