Nontraumatic Aortic Disease
EVIDENCE TABLE

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
1. American College of Radiology. ACR Appropriateness Criteria®: chest pain, suggestive of acute coronary syndrome. Available at: http://www.acr.org/~/media/ACR/Documents/AppCriteria/Diagnostic/ChestPainSuggestiveAcuteCoronarySyndrome.pdf. Accessed 3 October 2012.	Review/Other-Dx	N/A	To review the literature and provide guidance on the appropriate use of imaging modalities in acute coronary syndrome.	Noninvasive imaging in this setting includes myocardial perfusion scanning, coronary CTA, and echocardiography. These tests may be performed as an intermediate step and may improve confidence regarding the safety of discharge from the emergency department.	4
2. American College of Radiology. ACR Appropriateness Criteria®: acute chest pain — suspected pulmonary embolism. Available at: http://www.acr.org/~/media/ACR/Documents/AppCriteria/Diagnostic/AcuteChestPainSuspectedPulmonaryEmbolism.pdf. Accessed 3 October 2012.	Review/Other-Dx	N/A	To review the literature and provide guidance on the appropriate use of imaging modalities in suspected pulmonary embolism.	MRI without MRA is probably not indicated in the routine evaluation of patients with suspected pulmonary embolism. It may rarely be useful in patients who have large central emboli, particularly if used in conjunction with MRI for other indications, such as cardiac morphologic evaluation.	4
3. American College of Radiology. ACR Appropriateness Criteria®: acute chest pain — suspected aortic dissection. Available at: http://www.acr.org/~/media/ACR/Documents/AppCriteria/Diagnostic/AcuteChestPainSuspectedAorticDissection.pdf. Accessed 3 October 2012.	Review/Other-Dx	N/A	To review the literature and provide guidance on the appropriate use of imaging modalities in suspected aortic dissection.	FDG-PET/CT may play a role in prognosticating the outcome in individuals diagnosed with aortic dissection, and in individuals diagnosed with aortic dissection. Further investigation is warranted.	4
4. American College of Radiology. ACR Appropriateness Criteria®: pulsatile abdominal mass, suspected abdominal aortic aneurysm. Available at: http://www.acr.org/~/media/ACR/Documents/AppCriteria/Diagnostic/PulsatileAbdominalMassSuspectedAAA.pdf. Accessed 3 October 2012.	Review/Other-Dx	N/A	To review the literature and provide guidance on the appropriate use of imaging modalities in pulsatile abdominal mass.	The consensus of the literature supports aortic US as the initial imaging modality of choice when a pulsatile abdominal mass is present. Noncontrast CT may be substituted in patients for whom US is not suitable.	4
5. American College of Radiology. ACR Appropriateness Criteria®: abdominal aortic aneurysm: interventional planning and follow-up. Available at: http://www.acr.org/~/media/ACR/Documents/AppCriteria/Diagnostic/AbdominalAorticAneurysmInterventionalPlanningAndFollowUp.pdf. Accessed 3 October 2012.	Review/Other-Dx	N/A	To review the literature and provide guidance on the appropriate use of imaging modalities in interventional planning of abdominal aortic aneurysm.	Ultimately, the imaging solution to endovascular aneurysm repair follow-up is likely not going to rest on one single modality. Rather, further investigation is needed for patient risk stratification. Appropriate imaging protocols involving combinations of various imaging modalities can then be optimized for each patient subset.	4

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6. Hagan PG, Nienaber CA, Isselbacher EM, et al. The International Registry of Acute Aortic Dissection (IRAD): new insights into an old disease. *JAMA* 2000; 283(7):897-903.	Observational-Dx	464 patients	To assess the presentation, management, and outcomes of acute aortic dissection.	CT was the initial imaging modality used in 61.1%. Overall in-hospital mortality was 27.4%. Mortality of patients with type A dissection managed surgically was 26%; among those not receiving surgery (typically because of advanced age and comorbidity), mortality was 58%. Mortality of patients with type B dissection treated medically was 10.7%. Surgery was performed in 20% of patients with type B dissection; mortality in this group was 31.4%.	3
7. Hennessy TG, Smith D, McCann HA, McCarthy C, Sugrue DD. Thoracic aortic dissection or aneurysm: clinical presentation, diagnostic imaging and initial management in a tertiary referral centre. *Ir J Med Sci* 1996; 165(4):259-262.	Observational-Dx	55 consecutive patients	To evaluate the clinical presentation, diagnostic imaging and initial management of thoracic aortic dissection or aneurysm in a tertiary referral center.	Chest radiography showed a widened mediastinum in 37 (67%) patients. Dissection was confirmed in 35 (64%) patients (13-DeBakey Type I, 6-Type II, and 14-Type III); 10 had nondissecting aneurysm. Contrast aortography was equally sensitive (884%) and more specific (100% vs 80%) than CT for detection of dissection. Surgical repair was performed on 24 patients with concomitant coronary artery bypass grafting in 6. At follow-up 33 patients were alive. Clinical diagnosis of thoracic aortic dissection or aneurysm may be difficult. Frequently more than one imaging modality may be required in order to provide all of the necessary information for optimal patient management.	3
8. Jagannath AS, Sos TA, Lockhart SH, Saddekni S, Sniderman KW. Aortic dissection: a statistical analysis of the usefulness of plain chest radiographic findings. *AJR* 1986; 147(6):1123-1126.	Observational-Dx	36 patients	To determine which findings were most useful in predicting aortic dissection.	Widening of the mediastinum ($P<.001$) and widening of the aortic knob ($P<.012$) were the only two radiographic features of significance in predicting dissection. In a stepwise multiple logistic regression model, the radiologists achieved an overall accuracy of 85%, a sensitivity of 81%, and a specificity of 89%. Although this illustrates the usefulness of plain chest radiographs in diagnosing aortic dissection, poor interobserver agreement dictates that further definitive investigation be undertaken.	2

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
9. Lin JS, Chang SC, Chen FJ, Chern MS. The half-moon sign. A useful roentgen sign of saccular aneurysm of the aortic arch. *Chest* 1996; 109(1):127-130.	Observational-Dx	57 patients	To evaluate the clinical usefulness of half-moon sign in aiding a diagnosis of saccular aneurysm of the aortic arch.	The half-moon sign was shown on the lateral chest radiographs in 5/10 patients with saccular aortic arch aneurysm but absent in 47 patients with fusiform aortic arch aneurysm. Furthermore, this roentgen sign was not seen on the lateral chest radiographs in 46 patients with nonvascular intrathoracic masses. In this selected population, the sensitivity and specificity of the half-moon sign in aiding a diagnosis of saccular aneurysm of the aortic arch were 50% and 100%, respectively.	2
10. Luker GD, Glazer HS, Eagar G, Gutierrez FR, Sagel SS. Aortic dissection: effect of prospective chest radiographic diagnosis on delay to definitive diagnosis. *Radiology* 1994; 193(3):813-819.	Observational-Dx	75 patients	To determine the effect of the interpretation of plain chest radiographs on the time to definitive diagnosis of aortic dissection.	Radiographic reports suggested that only 19 patients (25%) had an aortic dissection or thoracic aortic aneurysm or needed additional imaging of the aorta. No statistically significant correlation existed between interpretation of the chest radiographs and delay to diagnosis, type of dissection, availability of previously obtained images, or presence of characteristic clinical symptoms. Retrospective analysis showed that the chest radiographs of 36 patients (48%) contained sufficient findings to suggest the diagnosis. In five patients, failure to prospectively suggest dissection was associated with a delay to diagnosis of more than 24 hours.	4
11. von Kodolitsch Y, Nienaber CA, Dieckmann C, et al. Chest radiography for the diagnosis of acute aortic syndrome. *Am J Med* 2004; 116(2):73-77.	Observational-Dx	216 patients	To assess the diagnostic accuracy of routine chest radiography for the acute aortic syndrome (dissection, IMH, penetrating ulcer, or nondissecting aneurysm).	Chest radiography had a sensitivity of 64% (70/109) and a specificity of 86% (92/107) for aortic disease. Sensitivity was 67% (38/57) for overt aortic dissection, 61% (22/36) for nondissecting aneurysm, and 63% (10/16) for intramural hemorrhage or penetrating ulcer. However, sensitivity was lower for pathology confined to the proximal aorta (47% [21/45]) than for disease involving distal aortic segments (77% [49/64]). A receiver operating characteristic curve analysis of aortic diameters failed to identify a threshold for the diagnosis of aortic disease.	1

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
12. Klompas M. Does this patient have an acute thoracic aortic dissection? *JAMA* 2002; 287(17):2262-2272.	Review/Other-Dx	21 studies	To review the accuracy of clinical history taking, physical examination, and plain chest radiograph in the diagnosis of acute thoracic aortic dissection.	Most patients with thoracic aortic dissection have severe pain (pooled sensitivity, 90%) of sudden onset (sensitivity, 84%). The absence of sudden pain onset lowers the likelihood of dissection (negative likelihood ratio, 0.3; 95% CI, 0.2-0.5). On examination, 49% of patients have an elevated blood pressure, 28% have a diastolic murmur, 31% have pulse deficits or blood pressure differentials, and 17% have focal neurological deficits. Presence of a diastolic murmur does little to change the pretest probability of dissection (positive likelihood ratio, 1.4; 95% CI, 1.0-2.0), whereas pulse or blood pressure differentials and neurological deficits increase the likelihood of disease (positive likelihood ratio, 5.7 and 6.6-33.0, respectively). The plain chest radiograph results are usually abnormal (sensitivity, 90%); hence, the presence of a normal aorta and mediastinum decreases the probability of dissection (negative likelihood ratio, 0.3; 95% CI, 0.2-0.4). Combinations of findings increase the likelihood of disease.	4
13. Jaffe RB. Complete interruption of the aortic arch. 1. Characteristic radiographic findings in 21 patients. *Circulation* 1975; 52(4):714-721.	Observational-Dx	21 patients	To review the radiographs of patients to emphasize characteristic radiographic features previously not recognized.	Rib notching, when present, in association with the above findings indicates a stenotic or closed ductus arteriosus with collateral circulation through intercostal arteries to the descending aorta. The bilateral or unilateral location, right or left side, of the notching is dependent on the site of interruption and origin of the subclavian arteries and may permit differentiation into types and subtypes on chest radiograph.	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
14. Pickhardt PJ, Siegel MJ, Gutierrez FR. Vascular rings in symptomatic children: frequency of chest radiographic findings. *Radiology* 1997; 203(2):423-426.	Observational-Dx	41 children	To determine the relative frequency of radiographic findings in symptomatic children with vascular rings.	Findings on 39 lateral radiographs included increased retrotracheal opacity on 31 (79%), anterior tracheal bowing on 36 (92%), and tracheal narrowing on 30 (77%) radiographs. All findings were present on 24 (62%) radiographs. Findings on 41 frontal radiographs included right aortic arch on 35 (85%), distal tracheal indentation on 30 (73%), and right descending aorta on 27 (66%) radiographs. All findings were present on 20 (49%) radiographs. Four (10%) frontal radiographs were normal or indeterminate. The combination of frontal and lateral views showed at least one abnormality in every patient. No symptomatic patient with a vascular ring had a normal radiograph.	4
15. Leonard JC, Hasleton PS. Dissecting aortic aneurysms: a clinicopathological study. I. Clinical and gross pathological findings. *Q J Med* 1979; 48(189):55-63.	Observational-Dx	171 patients	To evaluate the clinical and pathologic findings of patients with dissecting aortic aneurysms.	Since treatment often varies with the site of dissection, aortography should be performed in most patients surviving the first few hours. Attention is drawn to the frequency (10.4 %) of multiple aortic lesions, and to the occasional aetiological significance of giant-cell arteritis, and, possibly, hypothyroidism.	4
16. Keren A, Kim CB, Hu BS, et al. Accuracy of biplane and multiplane transesophageal echocardiography in diagnosis of typical acute aortic dissection and intramural hematoma. *J Am Coll Cardiol* 1996; 28(3):627-636.	Observational-Dx	112 consecutive patients	To evaluate the diagnostic accuracy of biplane and multiplane TEE in patients with suspected aortic dissection, including IMH.	Biplane and multiplane TEE are highly accurate for prospective identification of the presence and site of aortic dissection, its ancillary findings and major complications in a large series of patients with varied aortic pathology. IMH carries a high complication rate and should be treated identically with aortic dissection.	3
17. Nienaber CA, von Kodolitsch Y, Nicolas V, et al. The diagnosis of thoracic aortic dissection by noninvasive imaging procedures. *N Engl J Med* 1993; 328(1):1-9.	Experimental-Dx	110 patients	To assess the safety and reliability of new noninvasive imaging methods as compared with aortography in the diagnosis of dissection of the thoracic aorta.	A noninvasive diagnostic strategy using MRI in all hemodynamically stable patients and TEE in patients who are too unstable to be moved should be considered the optimal approach to detecting dissection of the thoracic aorta. Comprehensive and detailed evaluation can thus be reduced to a single noninvasive diagnostic test in the investigation of suspected dissection of the thoracic aorta.	1

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
18. Sommer T, Fehske W, Holzknecht N, et al. Aortic dissection: a comparative study of diagnosis with spiral CT, multiplanar transesophageal echocardiography, and MR imaging. *Radiology* 1996; 199(2):347-352.	Observational-Dx	49 patients	To compare the usefulness of spiral CT, multiplanar TEE, and MRI in the diagnosis of thoracic aortic dissection and arch vessel involvement.	Spinal CT and multiplanar TEE are as valuable as MRI in the detection of thoracic aortic dissection. In the assessment of the supraaortic branches, spiral CT is superior ($P<.05$).	3
19. Shiga T, Wajima Z, Apfel CC, Inoue T, Ohe Y. Diagnostic accuracy of transesophageal echocardiography, helical computed tomography, and magnetic resonance imaging for suspected thoracic aortic dissection: systematic review and meta-analysis. *Arch Intern Med* 2006; 166(13):1350-1356.	Review/Other-Dx	1,139 total patients;16 studies	To review the diagnostic imaging accuracy of TEE, CT and MRI.	The pooled positive likelihood ratio appeared to be higher for MRI (positive likelihood ratio, 25.3; 95% CI, 11.1-57.1) than for TEE (14.1; 6.0-33.2) or helical CT (13.9; 4.2-46.0). If a patient had shown a 50% pretest probability of thoracic aortic dissection (high risk), he or she had a 93% to 96% post-test probability of thoracic aortic dissection following a positive result of each imaging test. If a patient had a 5% pretest probability of thoracic aortic dissection (low risk), he or she had a 0.1% to 0.3% post-test probability of thoracic aortic dissection following a negative result of each imaging test.	3
20. Kodolitsch Y, Krause N, Spielmann R, Nienaber CA. Diagnostic potential of combined transthoracic echocardiography and x-ray computed tomography in suspected aortic dissection. *Clin Cardiol* 1999; 22(5):345-352.	Observational-Dx	168 consecutive patients	To compare the diagnostic performance and reliability of the combined use of TTE and x-ray CT with TEE and/or MRI findings in the setting of suspected aortic dissection.	Sensitivity and specificity (95% and 91%, respectively) of combined TTE/x-ray CT evaluation were not different from TEE and/or MRI (100% and 96%, respectively). Thrombus formation, side-branch involvement, aortic regurgitation, pericardial effusion or mediastinal hematoma were also detected with similar sensitivities and specificities both by combined TTE/x-ray CT and TEE and/or MRI.	2
21. Vilacosta I, San Roman JA, Aragoncillo P, et al. Penetrating atherosclerotic aortic ulcer: documentation by transesophageal echocardiography. *J Am Coll Cardiol* 1998; 32(1):83-89.	Observational-Dx	194 patients	To describe the ability of TEE to document the presence of penetrating atherosclerotic aortic ulcers and their complications.	Aortic ulcers should be included in the differential diagnosis of chest or back pain, especially in elderly hypertensive patients. These ulcers and their complications may be recognized by TEE.	3

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22. Bossone E, Evangelista A, Isselbacher E, et al. Prognostic role of transesophageal echocardiography in acute type A aortic dissection. *Am Heart J* 2007; 153(6):1013-1020.	Observational-Dx	522 patients	To identify the prognostic value of TEE in medically and surgically treated patients with type A aortic dissection.	Model 1 identified age ≥70 years, any pulse deficit, renal failure, and hypotension/shock as independent predictors of death. Model 2 identified dissection flap confined to ascending aorta (odds ratio 0.2, 95% CI, 0.1-0.6) and complete thrombosis of false lumen (odds ratio 0.15, 95% CI, 0.03-0.86) as protective. In the medically treated group, mortality was 31% for subjects with a partially or completely thrombosed false lumen vs 66% in the presence of a patent false lumen.	4
23. Koschyk DH, Nienaber CA, Knap M, et al. How to guide stent-graft implantation in type B aortic dissection? Comparison of angiography, transesophageal echocardiography, and intravascular ultrasound. *Circulation* 2005; 112(9 Suppl):I260-264.	Observational-Dx	42 consecutive women	To compare angiography, TEE and IVUS.	TEE in conjunction with angiography appears to be advantageous and adds incremental information to safely guide stent-graft placement in type-B aortic dissection. Additional use of IVUS was found to be helpful in patients with complex anatomy and abdominal extension of the dissection.	3
24. Dohmen G, Kuroczynski W, Dahm M, et al. Value of echocardiography in patient follow-up after surgically corrected type A aortic dissection. *Thorac Cardiovasc Surg* 2001; 49(6):343-348.	Observational-Dx	62 patients	To assess the value of echocardiography to monitor patients after surgery for type A aortic dissection.	CT and MRI were superior to TEE in demonstrating aortic arch pathology, whereas TEE was more effective in showing the flow pattern and residual entry sites.	1
25. Cesare ED, Giordano AV, Cerone G, De Remigis F, Deusanio G, Masciocchi C. Comparative evaluation of TEE, conventional MRI and contrast-enhanced 3D breath-hold MRA in the post-operative follow-up of dissecting aneurysms. *Int J Card Imaging* 2000; 16(3):135-147.	Observational-Dx	29 patients	To verify the diagnostic potentialities of conventional MRI, breath-hold 3D contrast enhanced MRA and TEE in patients surgically treated for type A aortic dissection.	Concordance among TEE, conventional MRI and 3D contrast enhanced MRA was observed in the evaluation of aortic root (MRI vs 3D contrast enhanced MRA r = 0.93; MRI vs TEE r = 0.84; 3D contrast enhanced MRA vs TEE r = 0.84) and descending aorta (r = 0.94, 0.91 and 0.92, respectively). The interobserver variability was also very low. Inadequate agreement was observed for distal anastomosis. 3D contrast enhanced MRA was inadequate in the evaluation of periprosthetic thickening; r = 0.73 was obtained between MRI and TEE. For qualitative data: TEE was inadequate in the evaluation of the abdominal aorta and branches. 3D contrast enhanced MRA depicted supra-aortic vessel involvement in more cases than the other techniques.	3

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26. Williams DM, Lee DY, Hamilton BH, et al. The dissected aorta: part III. Anatomy and radiologic diagnosis of branch-vessel compromise. *Radiology* 1997; 203(1):37-44.	Observational-Dx	62 patients	To determine the anatomic, hemodynamic, and radiologic characteristics of branch-vessel compromise in patients with aortic dissection.	IVUS and manometric findings clarify the mechanisms of branch-vessel compromise after aortic dissection and provide a rational guide for percutaneous treatment.	3
27. Wei H, Schiele F, Meneveau N, et al. The value of intravascular ultrasound imaging in diagnosis of aortic penetrating atherosclerotic ulcer. *EuroIntervention* 2006; 1(4):432-437.	Observational-Dx	15 consecutive patients	To evaluate the value of IVUS imaging in diagnosis of PAU.	The width of PAU detected by CT was significantly wider than that of PAU not detected by CT (1.33+/-0.67cm vs 0.43+/-0.27cm, P=0.027). Two of five PAUs omitted by initial CT were confirmed by follow-up CT or MRI. During follow up, three PAUs, including two of those overlooked by CT, developed into aneurysms. IVUS imaging is a safe examination, and more sensitive than spiral CT to diagnose PAU.	1
28. Hu W, Schiele F, Meneveau N, et al. Value of intravascular ultrasound imaging in following up patients with replacement of the ascending aorta for acute type A aortic dissection. *Chin Med J (Engl)* 2008; 121(21):2139-2143.	Observational-Dx	16 consecutive patients	To assess the potential use of IVUS imaging in this setting.	In following-up patients with replacement of the ascending aorta for acute type A aortic dissection, IVUS imaging can provide complete information of the replaced graft and the residual dissection. So, IVUS imaging may be considered when the four current frequently used imaging modalities cannot supply sufficient information or there are some discrepancies between them.	1
29. Fernandez JD, Donovan S, Garrett HE, Jr., Burgar S. Endovascular thoracic aortic aneurysm repair: evaluating the utility of intravascular ultrasound measurements. *J Endovasc Ther* 2008; 15(1):68-72.	Observational-Dx	33 patients	To compare IVUS and CT measurements of aortic diameter for the determination of stent-graft sizes used in TEVAR.	IVUS measurements of the thoracic aorta were larger than CT measurements 66% of the time. However, there are 2 concerns with IVUS: off-center measurements distort the image and tangential measurements on a curve do not reflect a true centerline diameter. Thus, off-center IVUS measurements or those taken in the tortuous portion of the aorta may not be as accurate as centerline CT measurements.	2
30. Schertler T, Frauenfelder T, Stolzmann P, et al. Triple rule-out CT in patients with suspicion of acute pulmonary embolism: findings and accuracy. *Acad Radiol* 2009; 16(6):708-717.	Observational-Dx	125 patients	To prospectively investigate the diagnostic value of triple rule-out CT in patients suspected of having acute pulmonary embolism.	Triple rule-out CT was normal in 53 (42%) patients. Overall sensitivity, specificity, and PPV and NPV of triple rule-out CT for cardiovascular disease were 100% (95% CI, 90%-100%), 98% (95% CI, 94%-100%), 95% (95% CI, 82%-99%), and 100% (95% CI, 97%-100%, respectively).	1

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31. Hayter RG, Rhea JT, Small A, Tafazoli FS, Novelline RA. Suspected aortic dissection and other aortic disorders: multi-detector row CT in 373 cases in the emergency setting. *Radiology* 2006; 238(3):841-852.	Observational-Dx	373 evaluations	To retrospectively review the authors' experience with multi-detector row CT for detection of aortic dissection in the emergency setting.	Overall, 112 findings were interpreted as positive for acute aortic disorder, an alternative finding, or both at CT. No interpretations were false-positive, one was false-negative, 67 were true-positive, and 304 were true-negative. Sensitivity, specificity, PPV, NPV, and accuracy were 99% (67/68), 100% (304/304), 100% (67/67), 99.7% (304/305), and 99.5% (371/373), respectively.	3
32. Hayashi H, Matsuoka Y, Sakamoto I, et al. Penetrating atherosclerotic ulcer of the aorta: imaging features and disease concept. *Radiographics* 2000; 20(4):995-1005.	Review/Other-Dx	N/A	To discuss and illustrate the concept of PAU of the aorta as well as its course, imaging appearances, prognosis, and management.	Differentiation of PAU from other causes of aortic disease such as aortic dissection, aortic aneurysm, and spontaneous aortic rupture is difficult or impossible in some cases. Because critical cases of PAU cannot be identified on the basis of initial imaging findings, careful follow-up is needed in affected patients, particularly during the 1st month after onset.	4
33. Kazerooni EA, Bree RL, Williams DM. Penetrating atherosclerotic ulcers of the descending thoracic aorta: evaluation with CT and distinction from aortic dissection. *Radiology* 1992; 183(3):759-765.	Observational-Dx	16 patients	To evaluate penetrating atherosclerotic ulcers of the descending aortic dissection.	These findings did not correlate with the need for surgery. 8/9 conservatively treated patients were asymptomatic after treatment with antihypertensive medication. Contiguous dynamic contrast-enhanced CT of the aorta enables distinction of ulceration from dissection, which is particularly important in the hemodynamically unstable patient because the surgical management of ulceration is more extensive than that for aortic dissection.	4
34. Park GM, Ahn JM, Kim DH, et al. Distal aortic intramural hematoma: clinical importance of focal contrast enhancement on CT images. *Radiology* 2011; 259(1):100-108.	Observational-Dx	107 patients	To investigate the prevalence, fate, and effect of focal contrast enhancement lesion within the hematoma on contrast material-enhanced CT images in patients with distal aortic IMH.	The 1-, 3-, 5-, and 7-year survival rates were 96.3% ± 1.8, 95.2% ± 2.1, 87.9% ± 3.4, and 80.7% ± 4.4, respectively. Patients with IMH progression showed lower survival rates than those without (P=.028). While no significant difference in the overall survival rates could be demonstrated in patients with and those without focal contrast enhancement (P=.442), our study had only 17% power to detect a difference of 10%. Initial maximal aortic diameter was the only factor associated with survival rates (hazard ratio = 1.129; 95% CI: 1.063, 1.199). The optimal cutoff for prediction of mortality within 7 years was 41 mm.	4

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35. Moon MC, Greenberg RK, Morales JP, et al. Computed tomography-based anatomic characterization of proximal aortic dissection with consideration for endovascular candidacy. *J Vasc Surg* 2011; 53(4):942-949.	Observational-Dx	162 patients	To evaluate CT-based anatomic characterization of proximal aortic dissection with consideration for endovascular candidacy.	59 scans (77%) were of adequate quality to allow assessment of anatomic suitability for treatment with an endograft. In all cases, the dissection plane was detectable, yet the primary intimal fenestration was identified in only 41% of the studies. Scans showed 24 patients (32%) appeared to be anatomically amenable to such a repair (absence of valvular involvement, appropriate length and diameter of proximal sealing regions, lack of need to occlude coronary vasculature). Of the 42 scans that were determined not to be favorable for endovascular repair, the most common exclusion finding was the absence of a proximal landing zone (n=15; 36%).	3
36. Givehchian M, Kramer U, Miller S, et al. Aortic root remodeling: functional MRI as an accurate tool for complete follow-up. *Thorac Cardiovasc Surg* 2005; 53(5):267-273.	Observational-Dx	22 patients	To evaluate the potential of functional MRI as a single examination for complete follow-up of these patients.	Mean graft diameter (mean +/- SD) was 30 +/- 3.7, 33 +/- 3.4, 36.5 +/- 1.5, 37 +/- 2.8, and 38.3 +/- 2.8 mm at 1, 12, 24, 36, and 74 months, respectively, indicating a significant increase of graft diameter (P<0.0001). Mean regurgitant fraction as determined by MRI was 14 +/- 7, 12 +/- 9, 13 +/- 9, 15 +/- 7, and 14 +/- 9 % at 1, 12, 24, 36, and 74 months, respectively. Flow based grading of aortic insufficiency by MRI correlated well with color Doppler echocardiography (P<0.0001).	3
37. Jacobs NM, Godwin JD, Wolfe WG, Moore AV, Jr., Breiman RS, Korobkin M. Evaluation of the grafted ascending aorta with computed tomography. Complications caused by suture dehiscence. *Radiology* 1982; 145(3):749-753.	Review/Other-Dx	14 patients	To evaluate grafted ascending aorta with CT.	In a series of 14 asymptomatic postoperative patients studied by CT, the authors detected leakage of contrast material around the graft in 6 patients, 2 of whom required re-operation to correct suture dehiscence. CT is a noninvasive and sensitive method of postoperative evaluation of patients who have undergone an aortic graft.	4
38. Mathieu D, Keita K, Loisance D, Cachera JP, Rousseau M, Vasile N. Postoperative CT follow-up of aortic dissection. *J Comput Assist Tomogr* 1986; 10(2):216-218.	Observational Dx	52 patients	To evaluate postoperative CT follow-up of aortic dissection.	CT demonstrated the aortic graft in 45 patients. Persistent patency of a false lumen was observed in 40 cases. In one case, CT demonstrated extension of the dissection. No rupture or thoracic pseudoaneurysm was noted in our series.	3

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39. Eggebrecht H, Thompson M, Rousseau H, et al. Retrograde ascending aortic dissection during or after thoracic aortic stent graft placement: insight from the European registry on endovascular aortic repair complications. *Circulation* 2009; 120(11 Suppl):S276-281.	Observational-Dx	48 patients	To estimate the incidence of retrograde ascending aortic dissection after TEVAR and to describe patient and procedural characteristics, the current clinical management of retrograde ascending aortic dissection, and patient outcomes.	Outcome was fatal in 20/48 patients (42%). Causes of retrograde ascending aortic dissection included the stent graft itself (60%), manipulation of guide wires/sheaths (15%), and progression of underlying aortic disease (15%). The incidence of retrograde ascending aortic dissection was low (1.33%) in the present analysis with high mortality (42%). Patients undergoing TEVAR for type B dissection appeared to be most prone for the occurrence of retrograde ascending aortic dissection. This complication occurred not only during the index hospitalization but after discharge up to 1,050 days after TEVAR.	4
40. Livi U, Piccoli G, Ciccarese G, et al. Stent-grafting of the thoracic aorta: feasibility and early results in acute and chronic lesions. *J Cardiovasc Med (Hagerstown)* 2007; 8(7):504-510.	Observational-Dx	51 patients	To evaluate surgical pathologies of the thoracic aorta using a less invasive endovascular approach.	The 30-day mortality rate was 3.8%, one death in the group of chronic (1.9%) and one in the group of acute lesion (1.9%). The survival rate in the follow-up period was 92.4% at 6 months. CTA confirmed exclusion of the lesion in 25 out of 27 chronic patients, whereas type I and II endoleaks were detected in two patients treated with a secondary procedure. In addition, two patients with an acute type B aortic dissection presented with early endoleaks. The overall rate of complications was 10%. No other endoleaks or deaths were observed at later follow-up.	3
41. Pua U, Tay KH, Tan BS, et al. CT appearance of complications related to thoracic endovascular aortic repair (TEVAR): a pictorial essay. *Eur Radiol* 2009; 19(5):1062-1068.	Review/Other-Dx	N/A	A pictorial essay to illustrate the CT appearance of post-TEVAR complications encountered in the authors' institution and to highlight their significance.	TEVAR is a recognized treatment for various diseases involving the thoracic aorta. Patients treated with TEVAR require lifelong surveillance for potential complications, with CT being highly utilized in most centers. Endoleak is the most common complication and can be detected using CT. However, other complications such as stent strut perforations and end organ ischemia can also be detected on CT.	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
42. Small JH, Dixon AK, Coulden RA, Flower CD, Housden BA. Fast CT for aortic dissection. *Br J Radiol* 1996; 69(826):900-905.	Observational-Dx	81 patients	To evaluate fast CT for aortic dissection.	Overall sensitivity for aortic dissection was 96.2% and specificity was 96.4%. When 78 confident reports alone were considered, both sensitivity and specificity reached 100%. Reconstruction of data at 100 ms intervals allowed discrimination between artifacts in the ascending aorta and type A dissections. CT can often be used as the single investigation prior to surgery for acute type A dissections.	3
43. Yoshida S, Akiba H, Tamakawa M, et al. Thoracic involvement of type A aortic dissection and intramural hematoma: diagnostic accuracy--comparison of emergency helical CT and surgical findings. *Radiology* 2003; 228(2):430-435.	Observational-Dx	57 patients	To assess the accuracy of various findings at emergency helical CT for the evaluation of thoracic involvement of type A aortic dissection and type A IMH and to compare these findings with those at surgical confirmation.	For the detection of aortic dissection or IMH of the thoracic aorta, the accuracy of helical CT was 100%. The sensitivity, specificity, and accuracy, respectively, were 82%, 100%, and 84% for an entry tear; 95%, 100%, and 98% for arch branch vessel involvement; and 83%, 100%, and 91% for pericardial effusion. These values were all 100% for aortic arch anomalies.	3
44. Choi SH, Choi SJ, Kim JH, et al. Useful CT findings for predicting the progression of aortic intramural hematoma to overt aortic dissection. *J Comput Assist Tomogr* 2001; 25(2):295-299.	Observational-Dx	29 patients	To assess useful CT findings for predicting the progression of aortic IMH to aortic dissection.	7/8 cases of type A aortic IMH and 3/21 cases of type B aortic IMH progressed to aortic dissection. The type of aortic IMH, maximum thickness of hematoma, compression of true lumen, and pericardial or pleural effusion were significantly different in Groups I and II.	3
45. Lee YK, Seo JB, Jang YM, et al. Acute and chronic complications of aortic intramural hematoma on follow-up computed tomography: incidence and predictor analysis. *J Comput Assist Tomogr* 2007; 31(3):435-440.	Observational-Dx	107 consecutive patients	To ascertain the incidence of acute and chronic complications of aortic IMH and to analyze the predictors of the development of each complication.	The maximum thickness of a hematoma on the initial CT is the significant factor predicting the development of aortic dissection and aortic aneurysm. Patients with type A IMH and ulcerlike projection, as revealed by initial and short-term follow-up CT examinations, should be carefully followed up with subsequent CT examination to monitor the development of an aortic aneurysm, which is a relatively common chronic complication of IMH.	3

Nontraumatic Aortic Disease
EVIDENCE TABLE

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
46. Lin MP, Chang SC, Wu RH, Chou CK, Tzeng WS. A comparison of computed tomography, magnetic resonance imaging, and digital subtraction angiography findings in the diagnosis of infected aortic aneurysm. *J Comput Assist Tomogr* 2008; 32(4):616-620.	Observational-Dx	21 patients	To characterize imaging findings from CT, MRI, and angiogram in patients with infected aortic aneurysm.	Maximal diameters were >10 cm in 2 patients (10%), 5 to 10 cm in 11 (52%), and <5 cm in 8 (38%). Average diameters were 6.5 cm in the aortic arch, 5.3 cm in the descending thoracic aorta and 5.1 cm in the abdominal aorta. Obvious aortic wall calcification occurred in 19 patients (90%). Other features included disrupted calcification (n=15; 71%), prominent and irregular wall thickening (n=17; 81%), periaortic soft tissue mass (n=15; 71%), rim enhancement (n=18; 86%), periaortic gas (n=7; 33%), periaortic stranding and fluid retention (n=14; 67%), periaortic hematoma (n=3; 14%), adjacent bone destruction (n=1; 5%), pleural effusion (n=12; 57%), and associated dissecting aneurysm (n=2; 10%).	3
47. Macedo TA, Stanson AW, Oderich GS, Johnson CM, Panneton JM, Tie ML. Infected aortic aneurysms: imaging findings. *Radiology* 2004; 231(1):250-257.	Observational-Dx	29 patients	To determine the imaging characteristics of infected aortic aneurysms.	Aneurysms were located in the ascending aorta (n=2, 6%), descending thoracic aorta (n=7, 23%), thoracoabdominal aorta (n=6, 19%), paravisceral aorta (n=2, 6%), juxtarenal aorta (n=3, 10%), infrarenal aorta (n=10, 32%), and renal artery (n=1, 3%). Two patients had two infected aortic aneurysms. CT revealed 25 saccular (93%) and two fusiform (7%) aneurysms with a mean diameter at initial discovery of 5.4 cm (range, 1-11 cm). Para-aortic soft-tissue mass, stranding, and/or fluid was present in 13 (48%) of 27 aneurysms, and early periaortic edema with rapid aneurysm progression and development was present in three (100%) patients with sequential studies.	4

Nontraumatic Aortic Disease
EVIDENCE TABLE

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
48. Batt M, Haudebourg P, Planchard PF, Ferrari E, Hassen-Khodja R, Bouillanne PJ. Penetrating atherosclerotic ulcers of the infrarenal aorta: life-threatening lesions. *Eur J Vasc Endovasc Surg* 2005; 29(1):35-42.	Review/Other-Dx	8 cases	To analyze the incidence, clinical features, natural history, and treatment of PAU of the abdominal aorta.	Diagnosis is usually made by CT (66%) (n=6) that demonstrates a PAU in 35% (n=16) of cases, a subadventitial pseudoaneurysm in 28% (n=13), and rupture in 37% (n=17). An IMH is observed in 9% (n=4) of cases. There were no cases of aortic dissection in this series. Calcifications of the abdominal aorta were frequent (56%) (n=26); while intra-aortic mural thrombus was found in 24% of cases (n=11), and 46% of patients (n=21) had an associated aneurysm. Twelve patients were treated medically while 34 underwent surgery (one postoperative death).	4
49. Lu TL, Huber CH, Rizzo E, Dehmeshki J, von Segesser LK, Qanadli SD. Ascending aorta measurements as assessed by ECG-gated multi-detector computed tomography: a pilot study to establish normative values for transcatheter therapies. *Eur Radiol* 2009; 19(3):664-669.	Observational-Dx	77 patients	To provide an insight into normative values of the ascending aorta in regards to novel endovascular procedures using ECG-gated multi-detector CTA.	Mean distances (mm) were: from the plane passing through the proximal insertions of the aortic valve cusps to the right brachio-cephalic artery 92.6 +/- 11.8, from the plane passing through the proximal insertions of the aortic valve cusps to the proximal coronary ostium 12.1 +/- 3.7, and between both coronary ostia 7.2 +/- 3.1, minimal arc of the ascending aorta from left coronary ostium to right brachio-cephalic artery 52.9 +/- 9.5, and the fibrous continuity between the aortic valve and the anterior leaflet of the mitral valve 14.6 +/- 3.3, coefficients of variation 13%-43%. Mean aortic valve area was 582.0 +/- 131.9 mm(2). The variation of the antero-posterior and transverse diameters of the ascending aorta during the cardiac cycle were 8.4% and 7.3%, respectively. Results showed large inter-individual variations in diameters and distances but with limited intra-individual variations during the cardiac cycle. A personalized approach for planning endovascular devices must be considered.	3

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EVIDENCE TABLE

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
50. Ocak I, Lacomis JM, Deible CR, Pealer K, Parag Y, Knollmann F. The aortic root: comparison of measurements from ECG-gated CT angiography with transthoracic echocardiography. *J Thorac Imaging* 2009; 24(3):223-226.	Observational-Dx	68 patients	To compare the measurements of the aortic root obtained from ECG-gated CTA to the measurements obtained from TTE.	The average aortic root diameter measured by TTE was 33 +/- 4.1 mm; on CTA it was 36.9 +/- 3.8 mm. The median difference between the 2 measurements was 3.9 mm which was significant (P<0.0001). In patients whose aortic root measurements with CTA were normal, the TTE measurements were also normal. However, in the group of patients with dilated aortic roots by CTA, TTE measurements were significantly lower and many were normal. In the group of patients with dilated aortic root by TTE, the CTA measurements of the aortic root were similarly increased.	4
51. Li N, Beck T, Chen J, et al. Assessment of thoracic aortic elasticity: a preliminary study using electrocardiographically gated dual-source CT. *Eur Radiol* 2011; 21(7):1564-1572.	Observational-Dx	56 subjects	To gain a new insight into the elastic properties of the thoracic aorta in patients without aortic diseases using ECG-gated dual-source CT.	Aortic diameter changes were noted throughout the cardiac cycle. The maximum average diameter was seen at an RR interval of 24.02 +/- 4.99% for the ascending aorta and 25.63 +/-4.77% for the descending aorta. The minimum was at 93.5 +/- 4.04% for the ascending aorta and 96.6 +/- 4.58% for the descending aorta. There was an age-dependent decrease in elasticity, while different correlation coefficients were found between various age groups and different elastic parameters.	3

Nontraumatic Aortic Disease
EVIDENCE TABLE

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
52. Schernthaner RE, Stadler A, Beitzke D, et al. Dose modulated retrospective ECG-gated versus non-gated 64-row CT angiography of the aorta at the same radiation dose: comparison of motion artifacts, diagnostic confidence and signal-to-noise-ratios. *Eur J Radiol* 2012; 81(4):e585-590.	Experimental-Dx	60 consecutive patients	To compare ECG-gated and non-gated CTA of the aorta at the same radiation dose, with regard to motion artifacts, diagnostic confidence and signal-to-noise-ratios.	Dose-modulated ECG-gating showed statistically significant advantages over non-gated CTA, with regard to motion artifacts (P<0.001) and diagnostic confidence (P<0.001), at the aortic valve, at the origin of the coronary arteries, and at the dissection membrane, with a significant correlation (P<0.001) between motion artifacts and diagnostic confidence. At the aortic wall, however, ECG-gated CTA showed statistically significant fewer motion artifacts (P<0.001), but not a statistically significant higher diagnostic confidence (P=0.137) compared to non-gated CTA. At the supra-aortic vessels and the descending aorta, the ECG-triggering showed no statistically significant differences with regard to motion artifacts (P=0.861 and 0.526, respectively) and diagnostic confidence (P=1.88 and 0.728, respectively). The effective dose of ECG-gated CTA (23.24mSv; range, 18.43-25.94mSv) did not differ significantly (P=0.051) from that of non-gated CTA (24.28mSv; range, 19.37-29.27mSv).	2

Nontraumatic Aortic Disease
EVIDENCE TABLE

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
53. Krishnam MS, Tomasian A, Deshpande V, et al. Noncontrast 3D steady-state free-precession magnetic resonance angiography of the whole chest using nonselective radiofrequency excitation over a large field of view: comparison with single-phase 3D contrast-enhanced magnetic resonance angiography. *Invest Radiol* 2008; 43(6):411-420.	Observational-Dx	30 consecutive patients	To evaluate the feasibility of 3D SSFP MRA using nonselective radiofrequency excitation in the assessment of cardiac morphology, thoracic aorta, main pulmonary, and proximal coronary arteries.	On SSFP MRA, readers 1 and 2 graded 233 (97.1%) and 234 (97.5%) coronary arterial segments and cardiac chambers, and 275 (91.7%) and 278 (92.7%) noncoronary arterial segments with diagnostic definition (grades 2 and 3) (k = 0.86). On conventional contrast enhanced-MRA, readers 1 and 2 graded 10 (4.2%) and 12 (5%) coronary arterial segments and cardiac chambers, and 272 (90.7%) and 270 (90%) noncoronary arterial segments with diagnostic definition (grades 2 and 3) (k = 0.89). Segmental visibility was higher for aortic root, pulmonary trunk, proximal coronary arteries, and heart chambers (P<0.001), and lower for supra-aortic arteries (P<0.001) on SSFP MRA for each reader. Signal-to-noise ratio and contrast-to-noise ratio values were higher for aortic root and aorta on SSFP MRA (P<0.001 for both). No significant difference existed between signal-to-noise ratio and contrast-to-noise ratio values for the other vascular segments and cardiac chambers on SSFP and contrast enhanced-MRA (P>0.05 for all). The 2 readers demonstrated vascular stenosis and dilatation/aneurysm in 7 and 35 segments on both datasets, respectively.	1
54. Krishnam MS, Tomasian A, Malik S, Desphande V, Laub G, Ruehm SG. Image quality and diagnostic accuracy of unenhanced SSFP MR angiography compared with conventional contrast-enhanced MR angiography for the assessment of thoracic aortic diseases. *Eur Radiol* 2010; 20(6):1311-1320.	Observational-Dx	50 consecutive patients	To determine the image quality and diagnostic accuracy of 3D unenhanced SSFP MRA for the evaluation of thoracic aortic diseases.	Abnormal aortic findings, including aneurysm (n=47), coarctation (n=14), dissection (n=12), aortic graft (n=6), IMH (n=11), mural thrombus in the aortic arch (n=1), and penetrating aortic ulcer (n=9), were confidently detected on both datasets. Sensitivity, specificity, and diagnostic accuracy of SSFP MRA for the detection of aortic disease were 100% with CE-MRA serving as a reference standard. Image quality of the aortic root was significantly higher on SSFP MRA (P<0.001) with no significant difference for other aortic segments (P>0.05). Signal-to-noise ratio and contrast-to-noise ratio values were higher for all segments on SSFP MRA (P<0.01).	1

Nontraumatic Aortic Disease
EVIDENCE TABLE

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
55. Pereles FS, McCarthy RM, Baskaran V, et al. Thoracic aortic dissection and aneurysm: evaluation with nonenhanced true FISP MR angiography in less than 4 minutes. *Radiology* 2002; 223(1):270-274.	Observational-Dx	29 consecutive patients	To retrospectively evaluate single-shot true FISP and cine true FISP MRI of the thoracic aorta for the diagnosis of aortic dissection or aneurysm.	Nonenhanced true FISP MRI alone was 100% accurate for determining the presence or absence of dissection or aneurysm.	2
56. Yucel EK, Steinberg FL, Egglin TK, Geller SC, Waltman AC, Athanasoulis CA. Penetrating aortic ulcers: diagnosis with MR imaging. *Radiology* 1990; 177(3):779-781.	Review/Other-Dx	7 patients	To evaluate the diagnosis of penetrating aortic ulcers with MRI.	MRI was superior to angiography in depicting the extent of intramural thrombus, although one ulceration diagnosed at angiography was missed at MRI. MRI was superior to CT in differentiating acute IMH from atherosclerotic plaque and chronic intraluminal thrombus, although it did not depict displaced intimal calcification in one patient with extensive IMH.	4
57. Nienaber CA, von Kodolitsch Y, Brockhoff CJ, Koschyk DH, Spielmann RP. Comparison of conventional and transesophageal echocardiography with magnetic resonance imaging for anatomical mapping of thoracic aortic dissection. A dual noninvasive imaging study with anatomical and/or angiographic validation. *Int J Card Imaging* 1994; 10(1):1-14.	Observational-Dx	35 consecutive patients	To compare the diagnostic accuracy of 2D and color-coded Doppler echocardiography using the conventional TTE and TEE with MRI for the exact morphologic evaluation and anatomical mapping of the thoracic aorta.	The results of each diagnostic method were validated independently against the 'gold standard' of intraoperative findings (n=17), necropsy (n=4) or contrast angiography (n=22). Compared to conventional TTE both TEE and MRI were more reliable in detecting aortic dissections (TTE vs TEE: $P<0.02$; TTE vs MRI: $P<0.01$) and associated epiphenomena. Moreover, the reliability of TTE decreased significantly from proximal to distal segments of the aorta, e.g. from the ascending segment to the arch ($P<0.05$) and to the descending aorta ($P<0.005$), whereas the sensitivities of both TEE and MRI were excellent irrespective of the site of dissection.	1
58. Liu Q, Lu JP, Wang F, Wang L, Tian JM. Three-dimensional contrast-enhanced MR angiography of aortic dissection: a pictorial essay. *Radiographics* 2007; 27(5):1311-1321.	Review/Other-Dx	N/A	A pictorial essay to illustrate 3D contrast-enhanced MRA of aortic dissection.	In clinical practice, contrast-enhanced MRA can provide high-quality imaging data suitable for 3D reconstructions. It also has excellent spatial and contrast resolution and allows studies to be performed in multiple vascular phases, making it valuable for the diagnosis and classification of aortic dissection and in providing information that is helpful for treatment planning. 3D contrast-enhanced MRA with postprocessing is a fast, accurate, and noninvasive technique that may prove to be the optimal imaging modality in medically stable patients with aortic dissection.	4

Nontraumatic Aortic Disease
EVIDENCE TABLE

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
59. Kawel N, Jhooti P, Dashti D, et al. MR-imaging of the thoracic aorta: 3D-ECG- and respiratory-gated bSSFP imaging using the CLAWS algorithm versus contrast-enhanced 3D-MRA. *Eur J Radiol* 2012; 81(2):239-243.	Observational-Dx	14 patients	To compare a contrast-enhanced-3D-MRA with the ECG- and respiratory gated 3D balanced steady state free precession sequence using the CLAWS algorithm with respect to acquisition time, image quality, signal-to-noise ratio and contrast-to-noise ratio.	Image quality achieved with the 3D-balanced steady state free precession-CLAWS was scored significantly better than with the contrast-enhanced-3D-MRA for the aortic annulus (P=0.003), the sinuses of Valsalva (P=0.001), the proximal coronary arteries (P=0.001) and the sinotubular junction (P=0.001). Effective acquisition time for the 3D-balanced steady state free precession-CLAWS and corrected acquisition time (corrected for imaging parameters) was significantly longer compared to the contrast-enhanced-3D-MRA (P=0.004 and P=0.028). Signal-to-noise ratio and contrast-to-noise ratio were significantly higher for the contrast-enhanced-3D-MRA (P=0.007 and P=0.001).	3
60. Farhat F, Attia C, Boussel L, et al. Endovascular repair of the descending thoracic aorta: mid-term results and evaluation of magnetic resonance angiography. *J Cardiovasc Surg (Torino)* 2007; 48(1):1-6.	Observational-Dx	23 patients	To evaluate the mid-term results of the Talent stent-graft in the different indications of aortic disease and the use of MRA in the diagnosis of complications.	Endovascular treatment was completed successfully in all patients with no conversion to open repair. There was no intraoperative mortality. The mean operative time was 38 +/- 7 min. Primary success rate was 100%. We didn't have perioperative mortality. The mean follow-up period was 15 +/- 5 months. The survival rate was 97% (n=22). Regression of the aneurysmal size was observed in 70% (n=16). MRA diagnosed 3 over 4 postoperative endoleaks that were not diagnosed with the CT-scan, and did not interfere with the nitinol structure of the stent-graft.	2

Nontraumatic Aortic Disease
EVIDENCE TABLE

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
61. Ming Z, Yumin Z, Yuhua L, Biao J, Aimin S, Qian W. Diagnosis of congenital obstructive aortic arch anomalies in Chinese children by contrast-enhanced magnetic resonance angiography. *J Cardiovasc Magn Reson* 2006; 8(5):747-753.	Observational-Dx	416 patients	To evaluate the accuracy of contrast-enhanced MRA for the diagnosis of congenital obstructive aortic arch anomalies in children and compare it with TTE and other MRI techniques (ECG gated T1-weighted spin-echo imaging and gradient-echo cine imaging).	The diagnostic sensitivity, specificity and accuracy of contrast-enhanced MRA for congenital obstructive aortic arch anomalies were 98% (208/213), 99% (201/203) and 98% (409/416), respectively. The diagnostic sensitivity, specificity and accuracy of TTE were 88% (187/213), 92% (186/203) and 90% (373/416), respectively. The diagnostic sensitivity, specificity and accuracy of other MRI techniques (ECG gated T1-weighted spin-echo imaging and gradient-echo cine imaging) were 89% (189/213), 84% (170/203) and 86% (359/416), respectively.	3
62. Kuehl H, Eggebrecht H, Boes T, et al. Detection of inflammation in patients with acute aortic syndrome: comparison of FDG-PET/CT imaging and serological markers of inflammation. *Heart* 2008; 94(11):1472-1477.	Observational-Dx	33 patients	To assess the impact of PET/CT and serological markers of inflammation to identify patients at high risk for disease progression.	11 (33%) of 33 patients showed elevated tracer uptake within the aortic pathology, whereas 22 patients were PET-negative. In 23 patients a CRP level exceeding 1.0 mg/dl or a D-dimer level >250 microg/l was found. The follow-up time was 224 (195) days. 9/11 PET-positive patients (82%) showed progression of acute aortic syndrome. In contrast, 55% of PET-negative patients showed stable disease or regression during the follow-up period. Kaplan-Meier analysis showed a clear, but not yet significant trend to longer survival in PET-negative patients, whereas elevated CRP and D-dimers did not allow for distinguishing of high-risk patients.	3

Nontraumatic Aortic Disease
EVIDENCE TABLE

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
63. Walter MA, Melzer RA, Schindler C, Muller-Brand J, Tyndall A, Nitzsche EU. The value of [18F]FDG-PET in the diagnosis of large-vessel vasculitis and the assessment of activity and extent of disease. *Eur J Nucl Med Mol Imaging* 2005; 32(6):674-681.	Observational-Dx	26 consecutive patients	To investigate the value of FDG-PET in the diagnosis of large-vessel vasculitis and the assessment of activity and extent of disease.	Three scans were categorized as grade I, 12 as grade II and 3 as grade III arteritis. Visual grade was significantly correlated with both CRP and ESR levels (P=0.002 and 0.007 respectively; grade I: CRP 4.0 mg/l, ESR 6 mm/h; grade II: CRP 37 mg/l, ESR 46 mm/h; grade III: CRP 172 mg/l, ESR 90 mm/h). Overall sensitivity was 60% (95% CI, 40.6%-77.3%), specificity 99.8% (95% CI, 89.1%-100%), PPV 99.7% (95% CI, 77%-100%), NPV 67.9% (95% CI, 49.8%-80.9%) and accuracy 78.6% (95% CI, 65.6%-88.4%). In patients presenting with a CRP <12 mg/l or an ESR <12 mm/h, logistic regression revealed a sensitivity of <50%. In patients with high CRP/ESR levels, sensitivity was 95.5%/80.7%.	3
64. Shahidi S, Eskil A, Lundof E, Klaerke A, Jensen BS. Detection of abdominal aortic graft infection: comparison of magnetic resonance imaging and indium-labeled white blood cell scanning. *Ann Vasc Surg* 2007; 21(5):586-592.	Observational-Dx	58 In-111-labeled WBC scans 59 MRIs were performed in 40 suspected patients	To evaluate the predictive value of indium-111-labeled WBC scans and MRI in patients who were suspected of having intracavitary vascular graft infection.	The diagnosis of intracavitary vascular graft infection was based on clinical signs, microbiological and histological examination, MRI and leukocyte imaging, and lack of graft incorporation with surrounding fluid observed intraoperatively. The PPV of MRI was 95% (95% CI, 84%-105%) compared to In-111-labeled WBC scans, which was 80% (95% CI, 62%-96%). The NPV of MRI was 80% (95% CI, 68%-92%) compared to 82% (95% CI, 69%-94%) for In-111-labeled WBC scans. MRI showed a nonsignificant but better PPV for detecting intracavitary vascular graft infection compared to In-111 leukocyte imaging. The NPVs for MRI and In-111-labeled WBC scans were very near each other, with a very small advantage for In-111- WBC scans. This comparison study suggested MRI as a primary diagnostic modality to investigate patients suspected of having aortic graft infections before In-111-labeled WBC scans.	3

Evidence Table Key

Study Quality Category Definitions

- *Category 1* The study is well-designed and accounts for common biases.
- *Category 2* The study is moderately well-designed and accounts for most common biases.
- *Category 3* There are important study design limitations.
- *Category 4* The study is not useful as primary evidence. The article may not be a clinical study or the study design is invalid, or conclusions are based on expert consensus. For example:
  a) the study does not meet the criteria for or is not a hypothesis-based clinical study (e.g., a book chapter or case report or case series description);
  b) the study may synthesize and draw conclusions about several studies such as a literature review article or book chapter but is not primary evidence;
  c) the study is an expert opinion or consensus document.

Dx = Diagnostic

Tx = Treatment

Abbreviations Key

CI = Confidence interval

CRP = C-reactive protein

CT = Computed tomography

CTA = Computed tomography angiography

ECG = Electrocardiographically

ESR = Erythrocyte sedimentation rate

FDG-PET = Fluorine-18-2-fluoro-2-deoxy-D-glucose-positron emission tomography

FISP = Fast imaging with steady-state precession

IMH = Intramural hematoma

IVUS = Intravascular ultrasound

MRA = Magnetic resonance angiography

MRI = Magnetic resonance imaging

NPV = Negative predictive value

PAU = Penetrating atherosclerotic ulcer

PPV = Positive predictive value

SD = Standard deviation

SSFP = Steady-state free-precession

TEE = Transesophageal echocardiography

TEVAR = Thoracic endovascular aneurysm repair

TTE = Transthoracic echocardiography

US = Ultrasound

WBC = White blood cell