Thoracic aortic disease by CTA
Normal aortic anatomy

Ref (2)
A large aneurysm of the right coronary sinus of Valsalva is observed in an asymptomatic patient with an abnormal cardiac silhouette observed in a chest radiograph.

- Sinus of Valsalva aneurysms (SVA; arrows) are anomalies of congenital origin that manifest in adulthood.
- The cause appears to be a disruption between the media of the aorta and the annulus fibrosus of the aortic valve.
- In most cases, these aneurysms arise from the right coronary cusp and are asymptomatic unless they rupture into the right ventricle or right atrium.
- Acute rupture results in a continuous heart murmur and may cause chest pain or heart failure symptoms.

Ref (1)
Sinus of Valsalva aneurysm. (A) Axial and (B) oblique multiplanar reformatting views of a gated CTA show dilatation, wall calcification, and mural thrombus (arrows) within the aneurysmal noncoronary sinus of Valsalva.
Great Arteries: PDA
Arch Anomalies (1)
Right Aortic Arch
Double aortic arch. Axial source image from thoracic CTA shows right and left aortic arches. Note the innominate vein and superior vena cava (arrowheads).
Four-vessel arch. Axial source image from gated thoracic CTA at the level of the arch vessel origins (A) shows four vessels arising from arch (arrows) representing, from the patient’s right to left: the brachiocephalic trunk, the left common carotid artery, the left vertebral artery, and the left subclavian artery. (B) Volume rendered reconstruction shows the left vertebral artery arising directly from the aortic arch.
Four-vessel arch. Axial source image from gated thoracic CTA at the level of the arch vessel origins (A) shows four vessels arising from arch (arrows) representing, from the patient’s right to left: the brachiocephalic trunk, the left common carotid artery, the left vertebral artery, and the left subclavian artery. (B) Volume rendered reconstruction shows the left vertebral artery arising directly from the aortic arch.
Bovine arch. Axial source images from nongated thoracic CTA at the level of the aortic arch and arch vessel origin (A) show only two vessels arising from the arch (arrows) (a common trunk for the brachiocephalic and left common carotid arteries and a left subclavian artery). (B) Coronal reconstruction shows the left common carotid artery (arrow) arising from the common trunk.
Ductus diverticulum and bovine arch. Oblique volume rendered image of nongated thoracic CTA shows prominent ductus diverticulum (arrow) in patient without history of trauma. Note the common ostium of the brachiocephalic trunk and left common carotid artery (arrowhead).
Diverticulum of Kommerell. Axial (A, B) and volume rendered (C) images of nongated thoracoabdominal CTA show posterior origin of the left subclavian artery which courses posterior to the esophagus and trachea upward and toward the right. Note the ostial widening of this aberrant right subclavian artery (diverticulum of Kommerell).

Ref (1)
Arch Anomalies (2)
Coarctation of the Aorta

Ref (3)
Pseudocoarctation (A) vs true coarctation (B). (A) Sagittal oblique thick maximum intensity projection image of nongated CT shows an elongated proximal descending thoracic aorta with a pseudokink, lending an appearance suggestive of coarctation. However, note the absence of a significant reduction in luminal diameter, which makes this a case of pseudocoarctation. (B) Oblique volume rendered reconstruction of gated CTA in a different patient shows high-grade luminal narrowing distal to the left subclavian artery origin and enlarged intercostal collateral arteries, indicative of true coarctation of the aorta.

Ref (1)
Aortic coarctation repair and its late complications. (A) Multiplanar reformations in the aortic arch plane show effacement of the sinotubular junction and a coarctation that was repaired with a left subclavian artery patch. There was subsequent re-stenosis that was treated with an aortic stent. Note the stent deformity, causing re-stenosis, and the aneurismal deformation of the subclavian artery patch. (B) Volume rendered reconstruction shows the aortic stent with an aneurysm beginning at its distal end.

Ref (1)
Penetrating atherosclerotic ulcer. Axial source image from nongated CTA at the aortic arch level shows atherosclerotic wall thickening with excavation and contrast filling of plaque (arrow). Note that the brachiocephalic trunk, left common carotid artery, and left subclavian artery (not shown) arise proximal to the penetrating ulcer, indicating that this is a lesion of the very proximal descending thoracic aorta, despite the relatively anterior location within the chest.
Intramural hematoma. Axial noncontrast nongated MDCT source images in two different patients. (A) Crescent-shaped mural hyperattenuation and intimal calcified plaque, indicating intramural hematoma. (B) Eccentric wall thickening with crescent-shaped mural hyperattenuation (arrow) and displaced intimal calcified plaque (arrowhead). No intimal rupture was present in this case to suggest dissection with a thrombosed false lumen, so it is therefore considered an intramural hematoma.

Ref (1)
Type A aortic dissection after aortic valve replacement. Coronal oblique (A) and axial (B) images from gated thoracic CTA show tilting disc aortic valve prosthesis and an ascending aortic aneurysm with a dissection flap. True and false lumens are nearly equally opacified. Note the large defect within the intimal flap. (B) Aneurysm and dissection flap in ascending aorta. Note that the dissection flap extends into the ostium of the left main coronary artery, although the artery remains patent. Also note the normal descending aortic size with no evidence of a dissection flap.

Ref (1)
Type B aortic dissection. Axial (A) and sagittal oblique (B) images from gated thoracic CTA show normal ascending aorta (A) and dissection flap and aneurysmal dilatation of the descending aorta with a proximally thrombosed and distally perfused false lumen (B), suggesting distal intimal tear with retrograde progression of dissection. (C) Volume rendered reconstructions show the origin of the dissection flap distal to left subclavian artery.
Type B aortic dissection. Axial (A), coronal (B), and sagittal (C) oblique images from gated thoracic CTA show a normal ascending aorta (A and B) and a dissection of the descending aorta with a well-perfused false lumen (C), as indicated by the near identical opacification of false and true lumen in this early arterial-phase CT. Note that the left renal artery arises entirely from a false lumen, but the kidney shows normal corticomedullary opacification, similar to that of the contralateral kidney (not shown).
Aortic traumatic transection (A and B) vs ductus diverticulum (C). (A) Axial source image of nongated thoracic CTA shows an aortic transection with pseudoaneurysm in the vicinity of ligamentum arteriosum (arrow). Note the associated periaortic mediastinal hematoma. (B) Volume rendered reconstruction shows that the pseudoaneurysm (arrow) forms acute margins with the aorta which helps differentiate this entity from ductus diverticulum. (C) Oblique volume rendering of a nongated thoracic CT in a different patient without a history of trauma shows a smooth-bordered, broad-based bump (black arrow) that protrudes from the aortic wall, representing a benign ductus diverticulum.

Ref (1)
Aortic pseudoaneurysm in a patient who is status post an ascending aortic interposition tube graft for repair of an aneurysm. Axial (A) and sagittal oblique (candy cane view) (B) images of gated thoracic CTA show a thrombosed hematoma, two areas of delayed luminal filling of a pseudoaneurysm cavity [one below the left main coronary artery (arrowhead), the other between the ascending aorta and pulmonary artery (arrow)], and compression and displacement of both the ascending aorta and main pulmonary artery. Note that there are stents in the left main and left circumflex coronary arteries, which were placed to treat stenosis resulting from extrinsic compression by the pseudoaneurysm.

Ref (1)
Unicuspid aortic valve with an ascending aortic aneurysm. Aortic root long (A) and short axis (B) of gated CTA show an ascending aortic aneurysm with sparing of sinotubular junction. 

(B) The aortic valve in mid systole has a decreased orifice area and a unicuspid appearance. Presence of a unicuspid valve was confirmed by transesophageal echocardiography and at surgery. 

(C) Volume rendered image shows a large ascending aortic aneurysm with relative sparing of aortic root and sinotubular junction.

Ref (1)
Thoracoabdominal aortic aneurysm. Volume rendered reconstruction of nongated thorax-abdomen-pelvis CTA shows a thoracoabdominal aneurysm extending from the arch to beyond the renal arteries. A small brachiocephalic trunk aneurysm is also evident, as is a prior infrarenal aorto-bifemoral surgical graft.

Ref (1)
Takayasu arteritis. Axial source image of nongated thoracic CTA shows (A) concentric thickening and stenosis of the ostia of left common carotid and left subclavian arteries (arrow).

(B) The mid-descending thoracic aorta exhibits marked wall thickening (arrow).