

Acute aortic syndrome: Stanford A aortic dissection

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Section: Cardiovascular

Area of Interest: Arteries / Aorta

Procedure: Education

Imaging Technique: CT-Angiography

Special Focus: Dissection Diverticula Case Type:

Clinical Cases

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Patient: 51 years, male

Clinical History:

Patient with past history of meningitis, non-cooperative, was admitted to emergency department for syncope. Presence of previous chest or abdominal pain are unknown. Physical examination showed no abnormalities. Blood analysis showed severe metabolic acidosis and hyperlactacidemia. An aortic angiography computed tomography (CT) scan was performed.

Imaging Findings:

On the aortic angiography CT it's possible to identify an intimal flap originating from the ascending aorta and extending through the aortic arch, brachiocephalic artery, descending aorta and abdominal aorta just to the bifurcation level and including the left renal artery. It is possible to distinguish the true lumen from the false lumen which is larger than the first one. Left renal artery blood flow originates from the false lumen and there is a slightly asymmetry on the renal parenchyma enhancement, which is reduced on the left kidney.

Discussion:

Aortic dissection refers to a spontaneous separation of the aortic intimal and adventitial layers caused by the entrance of blood in the intima-media space originating two lumina: one false and one true lumen.

It is responsible for 70% of the acute aortic syndromes, affects 2.6-3.5/100,000 persons/year [1] and is more frequent in males. The most predisposing factor is hypertension, but other conditions such as Marfan's and Turner's syndromes, aortic aneurysm, valvular aortic anomalies, infection and pregnancy also increase the risk.

The Stanford Classification for aortic dissection is the most commonly used and it is based on the location, extension and the need for surgical treatment of the dissection. Stanford A dissections account for 60-70% of the cases [2] and the process involves the ascending aorta, aortic arch and can extend to the descending aorta, while in Stanford B dissections the affected segment is the descending aorta distal to the left subclavian artery and it accounts for 30%–40% of cases [2].

Typically, the patients present with chest pain that can change location as the process extends along the aorta or involves other arteries. 20% of the patients can present with syncope [1]. Other symptoms include abdominal pain, oligoanuria and symptoms due to compression of adjacent structures.

Aortic angiography CT plays an essential role in diagnosis confirmation and is fundamental to determine the origin, extension and associated complications. The main imaging features are the identification of an intimal flap (70% of the cases) [2] and establish the distinction between the true and false lumen. The false lumen is larger, can be

occluded by thrombus and if its not, some wedges around the true lumen can be seen (beak-sign) as well as collagenous media-remnants (cobweb sign). It presents a delayed enhancement. The true lumen is smaller and may have calcifications. If the dissection extends to the abdominal aorta, the celiac trunk, superior mesenteric artery and right renal artery flow originates from the true lumen while the left renal artery flow mostly originates from the false lumen.

The outcome is determined by the type, extent of dissection and the presence of associated complications. Complications of Stanford A type include coronary artery dissection or occlusion, other organs hypoperfusion, pericardial tamponade and death. It requires urgent surgical treatment and if untreated are associated with a high mortality rate (50% in the first 48 hours). Stanford B type can be treated medically.

Written informed patient consent for publication has been obtained.

Differential Diagnosis List: Stanford A aortic dissection, Intramural hematoma, Penetrating atherosclerotic ulcer, Pulmonary thromboembolism, Acute coronary syndrome

Final Diagnosis: Stanford A aortic dissection

References:

Kiran K. Maddu et al (2014) Nontraumatic Acute Aortic Emergencies: Part 1, Acute Aortic Syndrome. AJR 202:656–665 (PMID: [24555605](#))

Michelle A. McMahon; Christopher A. Squirrell (2010) Multidetector CT of Aortic Dissection: A Pictorial Review. RadioGraphics 30:445–460

Figure 1

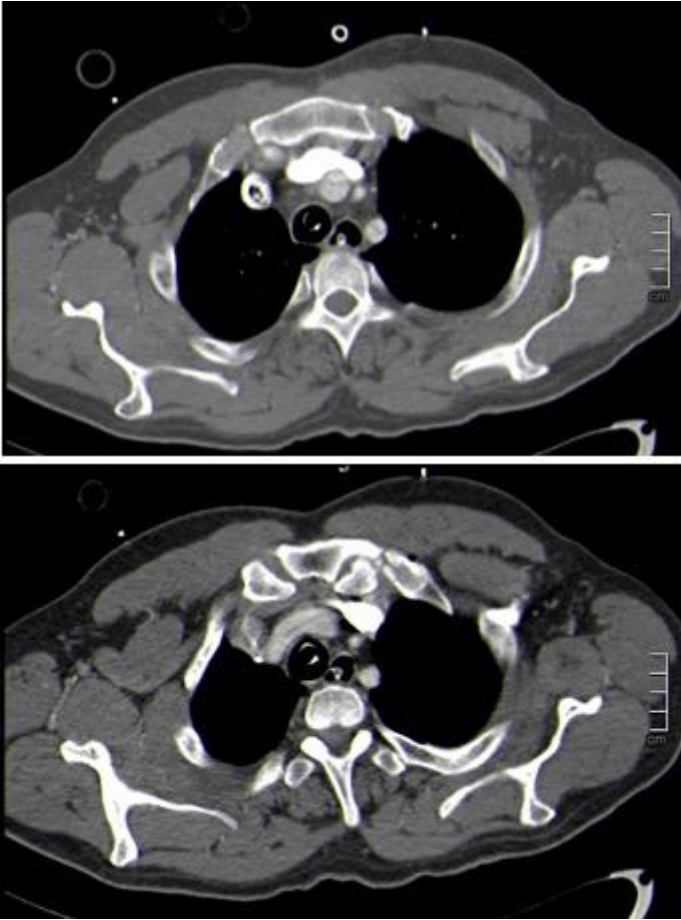
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Description: Aortic angiography CT (axial reconstruction) showing an intimal flap on the ascending and descending aorta. It is possible to distinguish the false and the true lumen. **Origin:** Department of Radiology, Hospital do Divino Espirito Santo de Ponta Delgada, Portugal

Figure 2

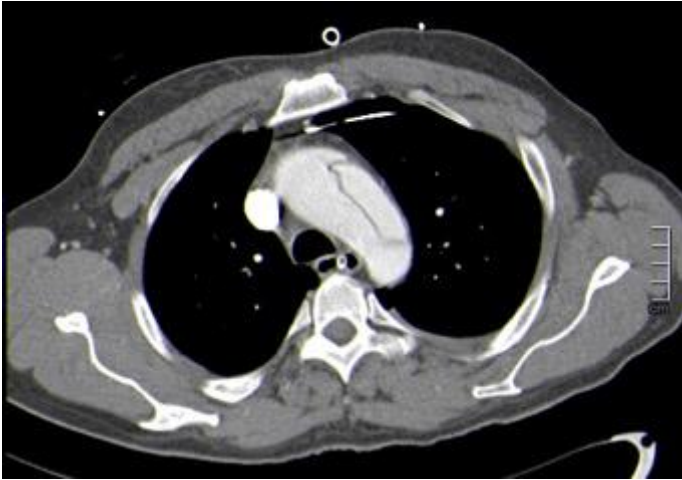
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Description: Aortic angiography CT (axial reconstructions) revealing an intimal flap on the brachiocephalic artery. **Origin:** Department of Radiology, Hospital do Divino Espírito Santo de Ponta Delgada, Portugal

Figure 3

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Description: Aortic angiography CT (axial reconstruction) showing an initial flap on the aortic arch.

Origin: Department of Radiology, Hospital do Divino Espirito Santo de Ponta Delgada, Portugal

Figure 4

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Description: Aortic angiography CT (sagittal reconstruction) revealing an intimal flap extending through the aortic arch, brachiocephalic artery and descending aorta. **Origin:** Department of Radiology, Hospital do Divino Espirito Santo de Ponta Delgada, Portugal

Figure 5

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Description: Aortic angiography CT (axial reconstruction) showing an intimal flap on the abdominal aorta. There are some asymmetry in the renal parenchyma enhancement, which is reduced on the left kidney. **Origin:** Department of Radiology, Hospital do Divino Espirito Santo de Ponta Delgada, Portugal

Figure 6

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Description: Aortic angiography CT (axial reconstructions) showing an intimal flap that extends to the left renal artery. Left renal parenchyma shows a slightly decrease in their enhancement because their blood flow originates from the false lumen. **Origin:** Department of Radiology, Hospital do Divino Espirito Santo de Ponta Delgada, Portugal

Figure 7

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Description: Aortic angiography CT (coronal reconstructions) showing an intimal flap on the left renal artery. **Origin:** Department of Radiology, Hospital do Divino Espirito Santo de Ponta Delgada, Portugal

Figure 8

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Description: Aortic angiography CT (coronal reconstruction) showing an intimal flap on the abdominal aorta extending to the bifurcation level. **Origin:** Department of Radiology, Hospital do Divino Espírito Santo de Ponta Delgada, Portugal