Pseudoaneurysms in the Chest: You See Only What You Look For; You Recognize Only What You Know.
No disclosures
Purpose:

Present various appearances of pseudoaneurysms in the chest, their CT characteristic imaging findings, and the information the surgeon will expect.
Pseudoaneurysms in the chest are rarely seen in chest CT, mostly related to high-energy trauma, associated to unstable hemodynamic status, which precludes performance of non-invasive imaging.

In addition, we may see them after the event of a myocardial infarct or as an iatrogenic result.

When detected, the radiologist must be proactive in providing accurate and precise information to the cardiothoracic surgeon.
Male patient
53 years-old
Off-road racing motorcycle crash
Contrast enhanced chest CT: saccular formation with a wide neck, arising from the lower right pulmonary vein, adjacent its ostium. At the LA-LRPV junction there is a flap that prolapses into the LA. Bilateral hemothorax.
Venous lesions on blunt thoracic trauma are uncommon.

Symptoms are non specific (hypotension, hypovolemia), and CT is required for diagnosis.
Trauma mechanism in closed thoracic trauma

- Desaceleration
- Compresion
- Indirect blow

Vascular rupture may be intrapericardic or extrapericardic.
Findings on CT

Will vary according to relation with pericardium

• Hemothorax
• Hemopericardium
• Contrast media extravasation
• Pseudoaneurysm
• Surgery (median sternotomy with circulatory by-pass)

• Interventional radiology with Brockenbrough technique, which uses interatrial transseptal puncture from the right atrium.
Case 2

Clinical history

Female patient. 83 years-old. Syncope while dancing on New Year’s Eve party. Complains of abdominal pain.
Chest radiograph shows an enlarged cardiac contour, clinically with muffled cardiac sounds.
Coronary CTA was performed: Saccular formation on the mid inferolateral LV segment, with thinned myocardium, hemopericardium.
Cardiac MRI shows a large perfusion defect involving the mid inferior segments with thinned myocardium and a transmural delayed enhancement on the mid inferior and inferolateral segment (image). Hemopericardium.

SSFP short axis view (CINE) showed a saccular formation on the same segment, with a neck/cavity ratio of 0.3, with no significant change during systole/diastole.
Post infarction pseudoaneurysm

- Represent a free wall rupture of the LV, contained by thrombus or pericardium
- Severe complication of myocardial infarct (days 1 through 7): 0.7-8%
- Mostly seen in women, older than 60 years
Imaging findings

Posterior or inferiorly located.

Segmental akinesia (represents ischemia/MI)

Globular cavity with narrow neck (ratio orifice/cavity ranging from 0.25 to 0.5)

Abrupt transition from normal looking myocardium to cavity

Hemopericardium

Delayed pericardial enhancement in MRI (chemical irritation by blood in pericardium)
Aneurysm

- Apical or anteriorly located
- Wide opening (ratio 0.9-1.0)
- Smooth transition from normal to thinned myocardium
- Low incidence of rupture

Pseudoaneurysm

- Posterior or inferiorly located
- Narrow neck with a cavity (ratio 0.25-0.5)
- Does not contract (shape unaltered in cycle)
- Pericardial delayed enhancement by chemical irritation (blood)
- High tendency to rupture: surgical emergency

Diverticulum

- Any location (tends to be perivalvular)
- Finger-like outpouching involving at least 50% myocardial thickness
- Narrow neck (ratio 0.9-1.0)
- Composed of all three layers
- Systolic contraction synchronous LV
Intraoperative findings: extensive myocardial infarct of anterior and anterolateral segments. Contained rupture of 2 cms.

Primary suture on rupture, followed by a bovine pericardial patch.
Case 3

Clinical history

Male patient.
34 years-old.
Motorcycle crash.
CECT of the chest, abdomen and pelvis was requested. Findings: outpouching of the aortic wall at the inferior aspect of the aortic isthmus, with acute angles to the wall. Mediastinal hematoma was also present.
Aortic Pseudoaneurysm

Contained aortic trauma, mostly associated to blunt trauma (MVAs).

Rapid deceleration is the accepted mechanism, where the distal arch displaces while the descending aorta is held in place by the ligamentum arteriosum.

Therefore, 90% of those appear in the aortic isthmus.
Endovascular repair is the standard of care, if the length of the lesion to the origin of the left subclavian arterial allow a safe deployment of the stent (1.5 - 2 cm).

The stent diameter should match the aortic diameter in order to achieve an adequate seal, excluding the injury.
Ductus diverticulum

- Smooth margins
- Obtuse angles with the aortic wall
- Sloped symmetric shoulders
Case 3
(an unusual variant)
28 year-old male patient. MVA.

In this case, the outpouching appears in the ascending aorta, superior to the sinotubular junction.
Intraoperative findings:
3 cm contained aortic rupture, 1 cm over left main coronary ostia

Treatment

Reconstruction was performed with a supracoronary ascending aortic Dacron graft.
Case 4

Clinical history

Female patient
90 years-old
CHF, atrial fibrillation.

Hemoptisis post Swan-Ganz catheter placement.

Chest CT was requested.
Contrast enhanced Chest CT shows a middle lobe pseudoaneurysm dependent of the segmental artery.
Findings confirmed on selective pulmonary angiography, and treated with a covered stent.
Pulmonary Artery Pseudoaneurysm (iatrogenic)

Malpositioned Swan-Ganz catheter are an increasingly common cause for iatrogenic PAP.

Estimated incidence of rupture after Swan-Ganz insertion is 0.2%.

This happens when the tip has been inserted too far in a pulmonary arterial branch. This erodes the vessel wall and forms a PAP.
Suggested reading:


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