Arterial Vieussens’ ring pseudoaneurysms with fistula to the pulmonary trunk (ECR 2015 Case of the Day)
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Section: Cardiovascular
Area of Interest: Cardiac Cardiovascular system
Procedure: Localisation
Procedure: Imaging sequences
Procedure: Diagnostic procedure
Procedure: CAD
Technique: Conventional radiography
Technique: Ultrasound
Technique: Ultrasound-Colour Doppler
Technique: Catheter arteriography
Technique: CT-Angiography
Technique: MR
Special Focus: Pathology Aneurysms
Case Type: Clinical Cases
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Patient: 65 years, female

Clinical History:

65-year-old woman with incidental finding in chest X-ray after humerus surgery. Asymptomatic, normal physical examination and normal ECG except negative T wave in aVL. History of pericardial cyst diagnosed several years ago.
Imaging Findings:

Chest X-ray showed focal bulge in the left and anterior cardiac border (third mogul sign in PA projection).
Doppler echocardiography demonstrated a large aneurysm above the left ventricle anterior wall with a thick mural thrombus and a communicating vessel from the lumen to the pulmonary trunk.
Cardiac MR showed a large aneurysm (blood signal and contrast filling) between left ventricle anterior wall and pulmonary trunk, with peripheral thrombus. A communication with the anterior descendent coronary artery was suspected.
Coronary angiogram showed evidence of a tortuous enlarged vessel originated from the right coronary sinus (right conal branch). The aneurysm was filled from a branch of the anterior descendent coronary artery (left conal branch). No relation was demonstrated between both findings.
Coronary CT identified enlargement and tortuosity of the connected conal arteries, with a small pseudoaneurysm communicating with the pulmonary trunk, and another giant saccular pseudoaneurysm feeding from the left conal artery. The descendent coronary artery was enlarged.
Discussion:

Background: Vieussens’ ring is a remnant embryologic arterial circle connecting the right conus branch, originating from the right coronary artery or the right sinus of Valsalva, and the proximal right ventricular branch of the descendent coronary artery. There are few reported cases of pseudoaneurysms in the Vieussens’ ring [1-5].

Clinical perspective: Coronary pseudoaneurysms of the Vieussens’ ring can be asymptomatic, oligosymptomatic [1, 2, 5] or complicated by rupture with acute cardiac tamponade [3]. Typical angina has been observed only in a case with concomitant coronary stenosis [4].

Imaging techniques allow diagnosis and give relevant information for the therapeutic management.

Imaging Perspective: Doppler echocardiography and cardiac MR are the first choice imaging when a cardiac or pericardial lesion is suspected. Both of them are able to diagnose a coronary aneurysm as a vascular dilated structure not depending from cardiac chambers neither great vessels. Usually, small vessels feeding the aneurysm can be demonstrated.

Coronary ECG-gated CT allows a more confident diagnosis and detailed anatomy of coronary aneurysms and fistulas. The presence of large tortuous arteries anterior to the pulmonary trunk should suggest that the pseudoaneurysms originate from Vieussens’ ring, and fistulas to the pulmonary artery has to be searched. Imaging must include aortic arch and entire pulmonary artery. Helical acquisition with retrospective reconstructions in different phases of the cycle and multiplanar reconstructions are very useful to identify fistula and avoid misinterpretations. If the fistula is small, enlarged cardiac chambers from left to right shunting are not present. Coronary angiography shows the coronary fistula and aneurysm, but may potentially miss feeders that arise from an unexpected location.

Outcome: Rupture is the main risk associated to pseudoaneurysm of the Vieussens’ ring. Surgical resection has shown excellent results. Endovascular treatment could be useful, but its role in this pathology has not been established yet.

Take Home Message, Teaching Points:

- Differential diagnosis of a left cardiac bulge in chest X-ray has to include coronary artery aneurysm.
- If a coronary aneurysm is suspected or diagnosed with cardiac US or MR, coronary tree study is mandatory.
- Coronary ECG-gated CT is an excellent non-invasive technique for diagnosis of coronary aneurysm and fistula, and the best technique to evaluate their anatomic relations. It is important to include the entire pulmonary artery and aortic arch.
- Pseudoaneurysms of the Vieussens’ ring are poorly reported, and rupture is a potential complication. Nowadays the first line treatment is surgical resection.

Differential Diagnosis List: Arterial Vieussens’ ring pseudoaneurysms with fistula to the pulmonary trunk, Large atherosclerotic coronary aneurysm from the anterior descendent coronary artery and a tortuous right conal artery, Vascular Behçet’s disease with coronary artery aneurysms, Kawasaki disease with giant coronary aneurysm., Takayasu arteritis with giant aneurysm of the left main coronary artery

Final Diagnosis: Arterial Vieussens’ ring pseudoaneurysms with fistula to the pulmonary trunk

References:


Figure 1

Description: Chest X-ray (PA and lateral views) Origin: Calvillo P, Área clínica de imagen médica, HUIP La Fe, València, Spain
Figure 2

Description: Doppler Echocardiography
Origin: Calvillo P, Área clínica de imagen médica, HUIP La Fe, València, Spain
Figure 3

(a) **Description:** Cardiac MRI: Dark blood sequences  
**Origin:** Calvillo P, Área clínica de imagen médica, HUIP La Fe, València, Spain

(b) **Description:** Cardiac MRI: White blood cine sequences  
**Origin:** Calvillo P, Área clínica de imagen médica, HUIP La Fe, València, Spain

(c) **Description:** Cardiac MRI: Perfusion sequence  
**Origin:** Calvillo P, Área clínica de imagen médica, HUIP La Fe, València, Spain
Figure 4

Description: Coronarography Origin: Calvillo P, Área clínica de imagen médica, HUIP La Fe, València, Spain
Figure 5

Description: Coronary CT: Transversal images
Origin: Calvillo P, Área clínica de imagen médica, HUIP La Fe, València, Spain.
**Description:** Coronary CT: Multiplanar thick MIP reconstructions **Origin:** Calvillo P, Área clínica de imagen médica, HUIP La Fe, València, Spain.

**Description:** Coronary CT: Multiplanar MIP reconstructions **Origin:** Calvillo P, Área clínica de imagen médica, HUIP La Fe, València, Spain.

**Description:** Coronary CT: Volume rendering **Origin:** Calvillo P, Área clínica de imagen médica, HUIP La Fe, València, Spain.