Case 15888

Coronary-to-pulmonary artery fistula
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Section: Cardiovascular
Area of Interest: Cardiac
Procedure: Computer Applications-3D
Procedure: Catheters
Procedure: Contrast agent-intravenous
Technique: Image manipulation / Reconstruction
Technique: Catheter arteriography
Technique: CT-Angiography
Special Focus: Fistula Case Type: Clinical Cases
Authors: Nersesyan N, Parrilla-Muñoz C, Bosca-Ramon A, Delgado-Moraleda JJ, Mogort-Martinez J, Aparisi-Pons M.
Patient: 65 years, female

Clinical History:
A 60-year-old patient with thoracic pain was evaluated with a coronary angiogram. As an incidental finding, a left coronary artery fistula was discovered, requiring a further follow-up with additional imaging techniques. The patient was diagnosed with myocardial infarction 5 years before. No imaging techniques were performed at the time.

Imaging Findings:
Figure 1 illustrates an invasive coronary angiogram where the presence of a coronary-to-pulmonary artery fistula with a single prominent tract, originating from the proximal left anterior descending artery (LAD) can be identified (Figure 1 a, b and c). Figure 1d shows the precise location of the fistula marked in red areas.

CT angiogram with axial (Figure 2a, b) and coronal (Figure 2c) images show a dilated fistulous tortuous connection arising from the LAD and entering into the pulmonary trunk (contrast shunt sign).

Volume-rendered (Figure 3a, b and c) and MIP (Figure 3d, e and f) images better delineate the location and trajectory of the coronary artery fistula. The contrast shunt sign is illustrated in the yellow areas of the Figure 3 b and c. Furthermore, the MIP reconstruction of the Figure 3f centres on the drainage site of the coronary artery fistula.

Discussion:
A coronary artery fistula (CAF) is a congenital or acquired abnormal vascular communication of coronary arteries with cardiac chambers or any segment of the systemic or pulmonary circulation, without an intervening capillary network. [1]
The prevalence of CAFs has been increasing in recent studies, mainly due to the extensive use of CT angiography (CTA). [2]

CAFs are mostly asymptomatic, although complications, such as myocardial ischaemia, heart failure, arrhythmia and infective endocarditis may arise in elderly patients. The clinical manifestations are based on the size, the origin and the drainage site of the fistula. [3]

CAFs are most frequently congenital, nonetheless, acquired CAFs can result from iatrogenic procedures such as coronary stent placement, bypass surgery, chest trauma or irradiation. [4]

Compared with other imaging modalities, CTA is useful for the evaluation of CAFs because it involves an noninvasive approach with shorter acquisition time and yields higher temporal and spatial resolution. The 3D reconstructions furthermore increase the precision of the evaluation. When unavailable or contraindicated, MR angiography should be considered. [1]

The drainage site is variable and is used for the classification, and can be used to distinguish between CAF types. [1]

In the case of a left-to-right shunt, the blood volume is increased in the pulmonary vessels and both-sided heart structures, causing pulmonary hypertension and volume overload in both ventricles. With a left-to-left shunt, left heart volume overload increases. [5]

Anomalous LCA arising from the pulmonary artery (ALCAPA), vasculitis and coronary artery ectasia are the primary differential diagnosis of CAFs. [1]

In our case, a coronary artery–to–pulmonary artery fistula (CAPAF) was identified. These CAFs account for up to 30% of all fistulas and are considered to be the result of persistent branches of the pulmonary sinus. [6]

At cardiac CTA CAPAF manifests with the contrast shunt sign, which is a fistulous tract between the coronary artery and pulmonary trunk. [6]

Recent studies distinguish two types of CAPAF. A single prominent fistulous connection between the LAD or RCA and the main pulmonary trunk (or type-C CAF) or multiple small-calibre fistulous connections (or type-D CAF). Type-C CAFs have a higher incidence of haemodynamic symptoms than type-D CAFs. [7]

Several factors should be considered in the management of the CAFs. Surgical ligation is preferred in large fistulas with multiple communications and drainage sites, while the percutaneous transcatheter closure is indicated in older patients with proximal fistula origin and single drainage site. [8]

Our case featured a type-C CAF and was treated conservatively and monitored for complications, without intervention.

Written informed patient consent for publication has been obtained.

**Differential Diagnosis List:**  Coronary artery–to–pulmonary artery fistula involving a single sizeable fistulous tract, ALCAPA, Takayasu arteritis, Kawasaki arteritis, Coronary artery ectasia

**Final Diagnosis:**  Coronary artery–to–pulmonary artery fistula involving a single sizeable fistulous tract
References:


Description: Invasive coronary angiogram where the presence of a coronary-to-pulmonary artery fistula with a single prominent tract, originating from the proximal LAD can be identified. Origin: Francisco Jesus Lopez Fornas. Department of Cardiology, Hospital Clínic Universitari de Valencia, Valencia, Spain.
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Description: Coronal CT image shows dilated fistulous tortuous connection arising from the LAD and entering into the pulmonary trunk (contrast shunt sign). Origin: Nerses Nersesyan. Department of Radiology, Hospital Clínico Universitario de Valencia, Valencia, Spain.
Description: Volume-rendered CT image shows the dilated fistulous tortuous fistula arising from the LAD and entering into the pulmonary trunk. Origin: Nerses Nersesyan. Department of Radiology, Hospital Clínico Universitario de Valencia, Valencia, Spain
b

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c

**Description:** Volume-rendered CT images show the dilated fistulous tortuous fistula arising from the LAD and entering into the pulmonary trunk (contrast shunt sign highlighted in yellow areas). **Origin:** Nerses Nersesyan. Department of Radiology, Hospital Clínico Universitario de Valencia, Valencia, Spain
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