

Left main coronary artery compression by pulmonary artery aneurysm in a patient with atrial septal defect

Compresión del tronco coronario izquierdo por aneurisma de la arteria pulmonar en un paciente con comunicación interauricular

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A 67-year-old male with an untreated atrial septal defect (ASD) was admitted due to recurrent chest pain. Blood tests and electrocardiograms were unremarkable. Right heart catheterization detected pulmonary hypertension (PH) of 40 mmHg, pulmonary vascular resistance of 2.4 WU, and Qp/Qs of 2.6.

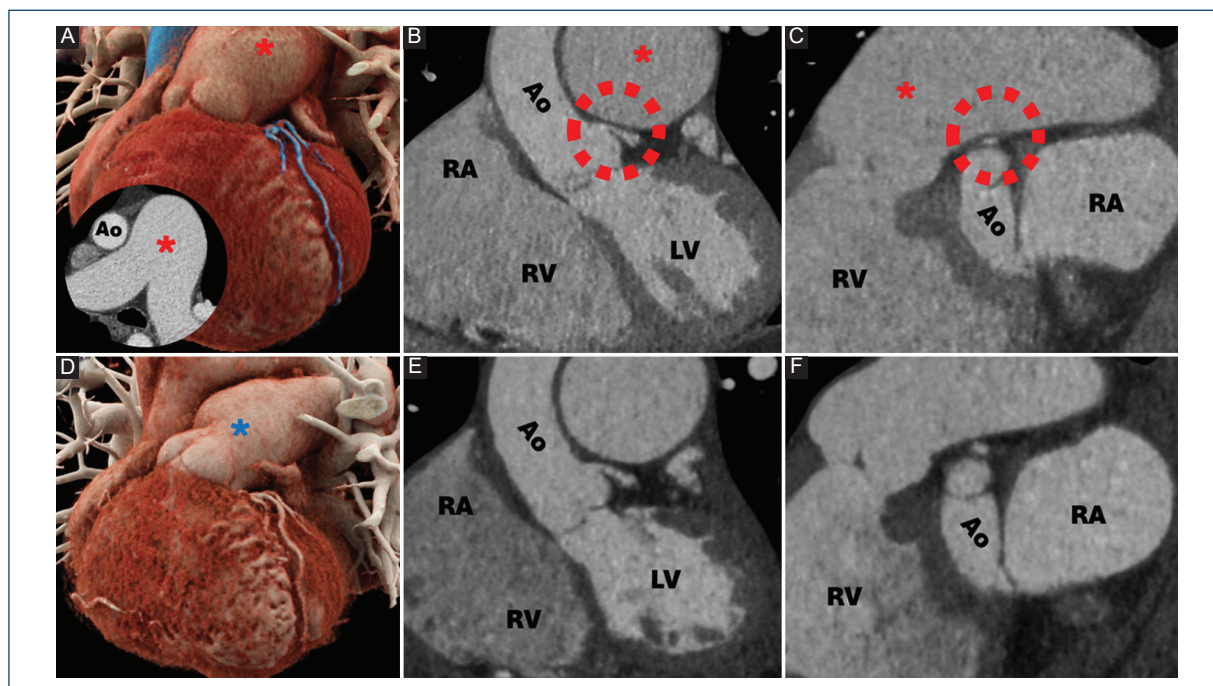


Figure 1. Cardiac CT demonstrating PAA (red asterisk) compressing the left main coronary artery (red dotted line): **A:** axial view of pulmonary trunk bifurcation, and 3D volume-rendered imaging showing PAA and coronary arteries' normal course (blue). **B:** coronal MPR imaging. **C:** oblique MPR imaging. Cardiac CT after pulmonary artery plication (blue asterisk). **D:** 3D volume-rendered imaging. **E:** coronal MPR imaging. **F:** oblique MPR imaging. Ao: aorta; CT: computed tomography; LV: left ventricle; MPR: multiplanar reconstruction; PAA: pulmonary artery aneurysm; RA: right atrium; RV: right ventricle.

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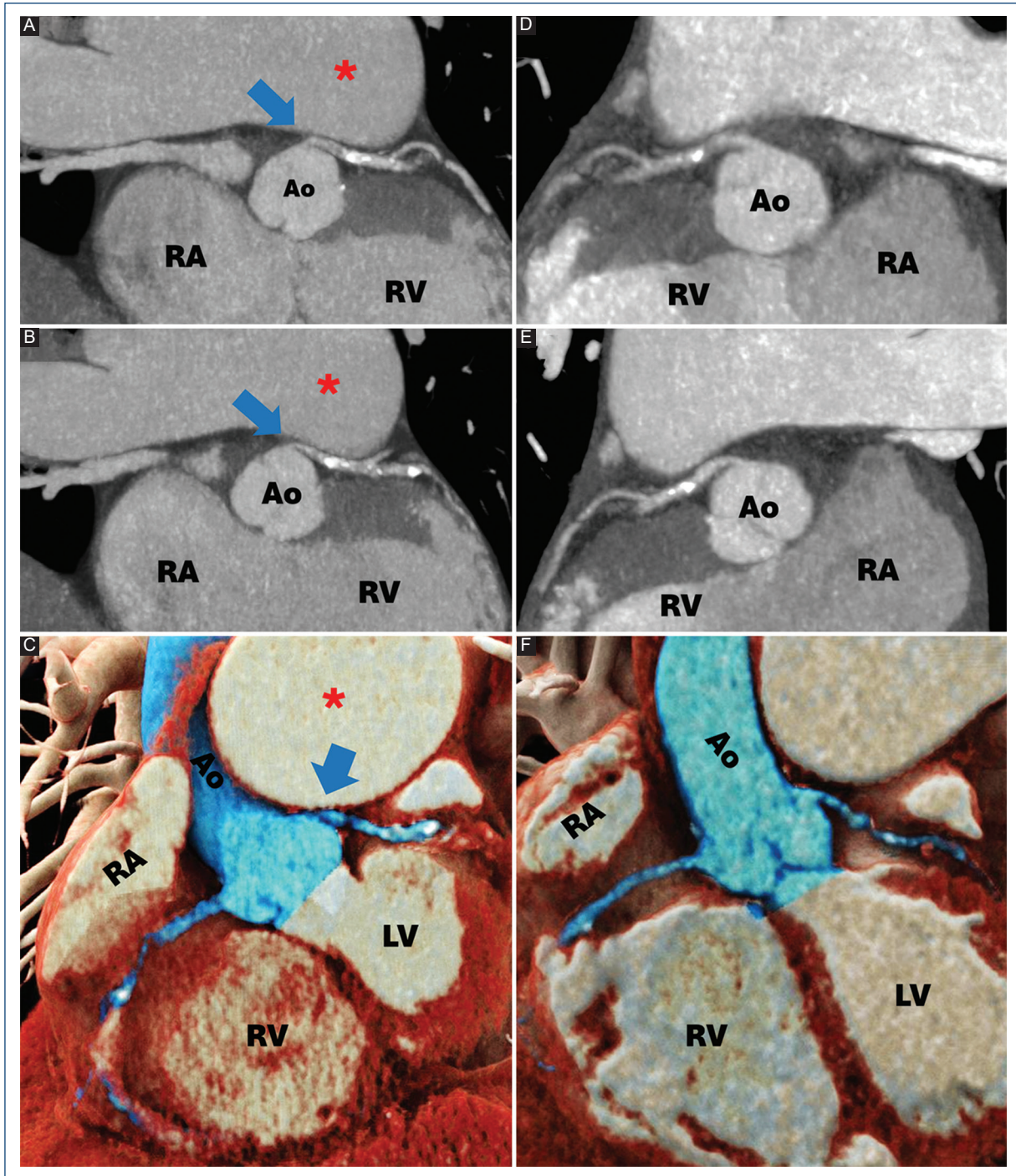


Figure 2. Cardiac CT demonstrating PAA (red asterisk) compressing the left main coronary artery (blue arrow). **A:** MIP imaging in systole. **B:** MIP imaging in diastole. **C:** 3D volume-rendered imaging. Cardiac CT after pulmonary artery plication: **D:** MIP imaging in systole. **E:** MIP imaging in diastole. **F:** 3D volume-rendered imaging. Ao: aorta; CT: computed tomography; LV: left ventricle; MIP: maximum intensity projection; PAA: pulmonary artery aneurysm; RA: right atrium; RV: right ventricle.

Coronary angiography (CA) revealed 80% non-calcified aorto-ostial stenosis. Cardiac computed tomography (CT) revealed moderate coronary plaque and non-obstructive coronary artery disease, along with the

presence of a pulmonary artery aneurysm (PAA) causing extrinsic compression (ECo) of the left main coronary artery (LMCA) (Figs. 1 A-C), resulting in a 50-60% decrease in caliber, particularly during

diastole (Figs. 2 A-C). The patient was referred to the cardiac surgery department in response to persistent symptoms. Pulmonary artery plication with fenestrated ASD closure was performed, thus alleviating the ECo of LMCA (Figs. 1 D-F and Figs. 2 D-F).

As PAA is rare, its natural history is poorly known. It usually follows an indolent course and may cause complications such as compression and rupture of adjacent structures¹. PAA patients may experience ischemia, malignant arrhythmias, or sudden death from ECo of the LMCA². A younger age, a D-shaped septum, a higher pulmonary artery (PA) systolic, mean, and diastolic pressures and PVR, a larger PA diameter with a smaller aortic diameter, as well as accompanying congenital defects such as ASD are significantly associated with ECo of LMCA³. ECo of $\geq 50\%$ of the LMCA has been documented in 8.2% of PAA patients with PH who underwent CA, with stenosis of 70-90% diameter in 64% of these patients. In contrast, it is only detected in 3% of patients who undergo cardiac CT³. Despite the challenge of diagnosing ECo of the LMCA due to its dynamic characteristics, cardiac CT provides a comprehensive method for assessing the severity of ECo^{1,3}.

Currently, there are no guidelines on the management of PAAs². Neither the optimal treatment of PAA nor the management of ECo of LMCA have been standardized³. Surgery remains the cornerstone of therapy for PAA². Because of the risk of dissection and rupture of PAA, aggressive surgery has been advocated for patients with PH³. Surgical treatment should be determined based on a complete anatomical and prognostic assessment¹. Revascularization of the coronary artery may not be necessary if the ECo of the LMCA is relieved following PAA surgery². LMCA stenting is a proven revascularization strategy with excellent clinical and angiographic outcomes requiring only a single stent placement, making it a suitable option for patients with high surgical risks¹⁻³. This case highlights an imaging-based diagnostic approach for ECo of the

LMCA related to PAA in a patient who successfully underwent surgery.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

Ethical considerations

Protection of humans and animals. The authors declare that no experiments involving humans or animals were conducted for this research.

Confidentiality, informed consent, and ethical approval. The authors have followed their institution's confidentiality protocols, obtained informed consent from all patients, and secured approval from the Ethics Committee. SAGER guidelines have been followed as applicable to the nature of the study.

Declaration on the use of artificial intelligence. The authors declare that no generative artificial intelligence was used in the writing or creation of the content of this manuscript.

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