

Left main coronary artery compression by the right pulmonary artery in a patient with congenital pulmonic stenosis

Compresión del tronco coronario izquierdo por la arteria pulmonar derecha en un paciente con estenosis pulmonar congénita

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Abstract

Congenital pulmonary stenosis (PS) can be associated with pulmonary artery (PA) dilatation. In some cases, this can cause compression of nearby structures including the left main coronary artery (LMCA). This compression causes angina and is considered an indication for surgical treatment. We present the case of a patient with PS and angina secondary to LMCA compression by the right PA and review the main indications and options for surgical treatment.

Key words: Left main coronary artery. Pulmonary stenosis. Pulmonary artery. Angina. Mexico.

Resumen

La estenosis pulmonar congénita se asocia a dilatación de la arteria pulmonar. En algunos casos esto puede causar compresión de las estructuras adyacentes incluyendo el tronco de la coronaria izquierda. Esta compresión causa angina y es considerada una indicación para tratamiento quirúrgico. Presentamos el caso de un paciente con estenosis pulmonar y angina secundaria a compresión del tronco de la coronaria izquierda por la arteria pulmonar derecha y revisamos las indicaciones y opciones de tratamiento quirúrgico.

Palabras clave: Tronco coronaria izquierda. Estenosis pulmonar. Arteria pulmonar. Angina. México.

Introducción

A 52-year-old man presented with a history of ventricular septal defect (VSD) and congenital pulmonary valve stenosis (pulmonary stenosis [PS]) who underwent pulmonary valve replacement with a biologic valve at 15 years old and VSD closure with pericardial

patch at 17 years old in another institution. The indication and specifics of each procedure are unknown.

He had a 2-year history of stable angina (Class II of the Canadian Cardiovascular Society). An echocardiogram was performed which reported reopening of the VSD. He was referred to our institute for workup. During workup a transthoracic echocardiogram was performed,

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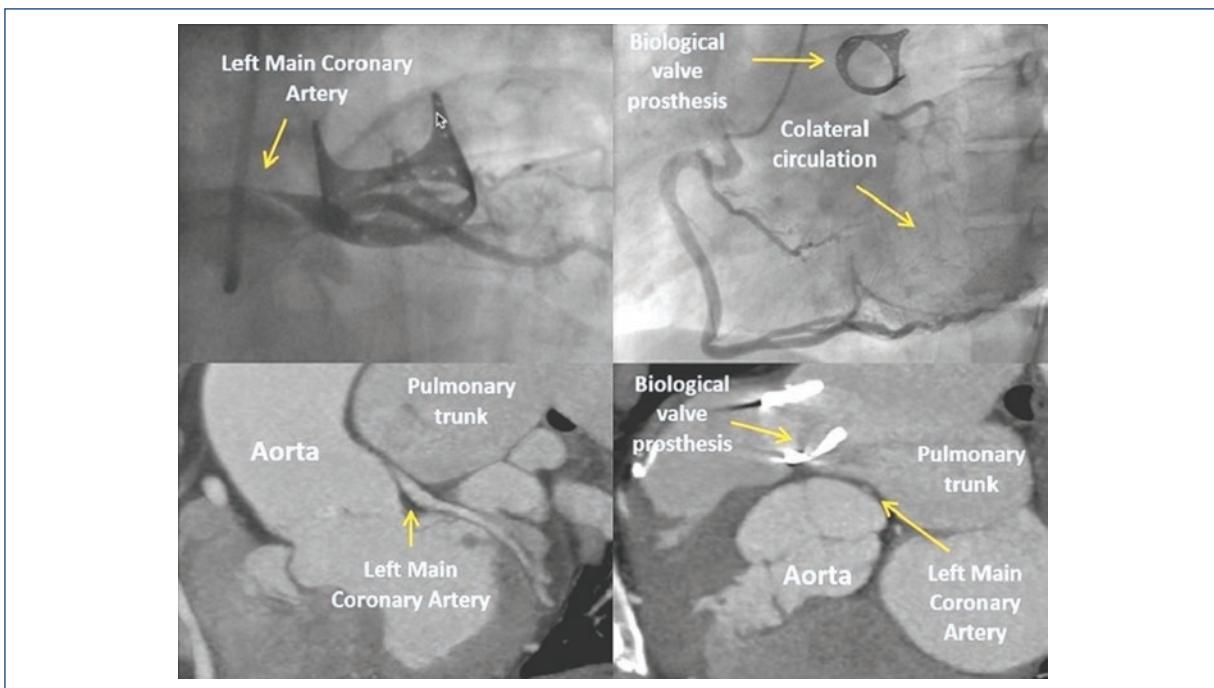


Figure 1. Extrinsic left main coronary artery (LMCA) compression of 90% and reduced blood flow to the left anterior descending with collateral circulation from the RCA in coronary angiography. LMCA compression by the pulmonary artery in computed tomography.

showing reduced right ventricular systolic function, left ventricle with anterior wall and septal hypokinesia and an ejection fraction of 45%, reopened VSD with left-right shunt and a dysfunctional prosthetic pulmonary valve (PPV) due to severe stenosis and severe regurgitation. A computed tomography showed obstruction of the left main coronary artery (LMCA) due to extrinsic compression by the right PA (RPA), left anterior descending (LAD), and left circumflex arteries where filled by collateral circulation, dilation of MPA, and its branches (MPA 52 mm, RPA 53 mm, and left PA 44 mm); VSD with a 17 x 14 mm diameter (Fig. 1). A right and left cardiac catheterization was performed which showed extrinsic LMCA compression with 90% stenosis and reduced blood flow to the LAD, PPV with a 60 mmHg gradient, and VSD with left-right shunt, mean pulmonary pressure of 20 mmHg and a Qp: Qs ratio of 1.2.

The patient was admitted for surgical treatment. He underwent pulmonary valve replacement with a prosthetic biological valve and RPA plasty. Coronary artery bypass of the LAD was attempted, but the artery could not be visualized during the procedure, so revascularization to the obtuse marginal artery with a radial artery graft was performed. The total surgical time was 11 h, with 361 min of extracorporeal circulation and aortic

cross-clamping of 219 min. The patient was admitted to the post-operative intensive therapy with cardiogenic shock. He had a torpid evolution persisting in cardiogenic shock despite the use of vasopressin, norepinephrine, and dobutamine, eventually presenting multiple organ failure and 4 days after surgical procedure presented asystole and was declared dead after failure of advanced cardiopulmonary resuscitation.

Discussion

More than half the cases of PA dilatation are associated with congenital heart diseases mainly in cases with the left-right shunt, due to volume and pressure overload in the right cardiac system which causes hemodynamic stress on the vessel wall¹. Congenital PS has also been associated with PA dilation. The mechanism of dilatation in PS is believed to be due to the jet of blood generated by the stenotic valve against the PA wall, without necessary relationship between the degree of stenosis and the degree of enlargement². This condition can cause compression of nearby structures including the LMCA. We present the case of a patient with PS angina secondary to LMCA by the RPA. A relationship between PA diameter and

LMCA compression was determined in a study with 36 patients with pulmonary dilation and pulmonary hypertension (PH) of which 26 had angina. Compression was not seen in patients with pulmonary diameters < 40 mm and in patients with PA diameter ≥ 40 mm, 37% had compression of the LMCA³.

The best treatment option for patients with PA dilatation is uncertain. There are no clear guideline indications for surgical intervention but some authors recommend surgical intervention when the PA diameter is ≥ 5.5 cm, if the diameter increases ≥ 0.5 cm in 6 months, compression of nearby structures occurs, thrombus formation in the aneurysm, presence of clinical symptoms, evidence of valvular pathologies or shunt, and if it presents signs of rupture or dissection¹. In this case, the patient already had surgical indication for pulmonary valve replacement and due to the compression of the LMCA and presence of symptoms; he was also considered a candidate for RPA plasty, which was compressing the LMCA.

Surgical repair options for patients with PA dilatation include interposition of Dacron prosthesis or a homograft, reconstruction with pericardial patch or arterioplasty⁴. Our patient underwent pulmonary valve replacement, coronary bypass, PA and RPA plasty which was considered a high-risk surgery due to the procedure itself, the presence of biventricular dysfunction and the fact that it was his third cardiac surgery. All this combined eventually led to a bad outcome.

Conclusions

PA dilatation can cause compression of nearby structures, causing angina when it compresses the LMCA. There is an association between PS and PA dilatation

being the jet of blood generated by the stenotic valve the presumed cause. There is no clear consensus on the indications for surgical repair of PA dilatation although the presence of symptoms due to compression of other structures, like in the case presented, is generally considered an indication for intervention.

Conflicts of interest

None.

Funding

None.

Ethical disclosures

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this study.

Confidentiality of data. The authors declare that no patient data appear in this article.

Right to privacy and informed consent. The authors have obtained the written informed consent of the patients or subjects mentioned in the article. The corresponding author is in possession of this document.

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