Left main coronary artery compression by a left sinus of Valsalva aneurysm

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Abstract

Myocardial ischaemia due to extrinsic left main coronary artery compression is unusual. Most cases are related to pulmonary hypertension with severe main pulmonary artery dilatation. An extremely rare cause is a left sinus of Valsalva aneurysm (SVA). We describe the case of a patient diagnosed of left SVA after a coronary angiography and aortography, whose initial clinical manifestation was an acute coronary syndrome complicated with an out-hospital resuscitated sudden cardiac death.

Keywords: Aneurysm (aortic root) • Aortic operation • Coronary artery bypass grafts surgery

CASE REPORT

On November 2011, a previously asymptomatic hypercholesterolemic 55-year old man was referred to our hospital for surgical repair after an out-of-hospital resuscitated sudden cardiac death after finishing a marathon caused by left main coronary artery (LMCA) compression by a sinus of Valsalva aneurysm (SVA). No neurological sequelae remained. He had no additional cardiovascular risk factors. On admission, physical examination and laboratory data, including cardiac enzyme levels, revealed no abnormalities. On chest X-ray, no increased cardiothoracic ratio or focal lung lesions were demonstrated and no ischaemic changes were suggested on EKG.

Transthoracic and transoesophageal echocardiography demonstrated a 50-mm aortic root aneurysm with an asymmetrically enlarged left coronary sinus of Valsalva with normal heart valve function, confirmed during aortography (Fig. 1A and B). On coronary angiography (Fig. 1C), an associated severe (70%) concentric ostial and proximal LMCA stenosis was observed, with no other significant coronary stenosis, and urgent surgical correction was indicated. Intraoperative findings included a global dilated aortic root and an asymmetric left SVA with diffuse calcified plaques and intimal ulcers extended through aortic annulus, making very difficult valve-preserving aortic root reconstruction, so we decided to perform an aortic root and valve replacement with a mechanical composite valve conduit (St Jude Medical, St Paul, MN, USA). The LMCA was compressed and enlarged by the aneurysm with a long proximal portion inlaid in its wall. The left anterior descending artery and first obtuse marginal branch with both internal thoracic arteries. On weaning of cardiopulmonary bypass ischaemic ST-segment changes were observed on precordial leads with associated echocardiographic basal anterior acinesia, and a supplemental vein graft to the first diagonal branch was performed. Afterwards, the postoperative course was uneventful.

At 3-month follow-up, the patient remained asymptomatic on New York Heart Association functional Class I.

DISCUSSION

Extrinsic LMCA compression is very unusual, and it is almost always associated with pulmonary hypertension with severe dilated main pulmonary artery (MPA) (MPA > 40 mm; normal: 25–30 mm) and increased MPA/aorta ratio of >1.21 (normal: 1.0) [1]. Recent studies have shown an incidence ranging from 4.5 to 20%, usually in the setting of congenital defects such as atrial septal defect, ventricular septal defect and, more rarely, isolated persistent ductus arteriosus [1].

SVA is also a rare cardiac anomaly [2] that usually locates at the right coronary or non-coronary sinus. Involvement of the left coronary sinus is extremely rare, accounting for ~1% of all SVA, and is most commonly congenital in nature, resulting from the absence of muscular and elastic layers. Acquired, non-congenital SVAs are caused by conditions affecting the aortic wall [2], such as infections (bacterial endocarditis, syphilis or tuberculosis), trauma or degenerative disease (atherosclerosis, connective tissue disorders or cystic medial necrosis).

Unruptured SVAs are typically symptom free and, in fact, clinical presentation is usually due to rupture or fistulization.
However, compression of the left coronary arteries by SV As and by enlarged pulmonary artery has been identified as a potentially life-threatening condition that may lead to refractory angina, persistent myocardial dysfunction and sudden cardiac death [3]. Currently, the ‘gold standard’ for diagnosis of LMCA compression is coronary angiography, with additional intravascular ultrasound (IVUS) if necessary [1]. IVUS can currently be used for procedure guidance and optimal stent deployment and apposition. Also, other non-invasive techniques, such as electrocardiogram-gated magnetic resonance. Imaging Cardiac 64-slice, multidetector computed tomography scanning and transoesophageal echocardiography [4], have been used for LMCA compression and angulation quantification and left and right ventricular function and pulmonary artery disease assessment.

In our case, a combination of echocardiography and coronary angiography and aortography was considered enough for accurate diagnosis of the LMCA stenosis aetiology, and no other image testing was considered necessary and safe in the setting of an acute coronary syndrome with increased risk of sudden death.

Management of LMCA stenosis by MPA compression is challenging. The optimal management of symptomatic patients remains unknown [2, 4]. In patients with a congenital defect and potentially reversible pulmonary hypertension, the correction of the congenital defect, occasionally associated with CABG [5], have been shown to decrease the degree of LMCA compression. For patients with irreversible pulmonary hypertension and significantly increased predicted surgical mortality, LMCA stenting has been favoured as the revascularization strategy of choice, at least for the short-term follow-up. When surgically treated, unruptured SVA repair technique selection has been chosen on the basis of anecdotal experience and has included aneurysm exclusion and, in some cases, replacement of the aortic valve, saphenous vein bypass grafting or a combination of them.

To our knowledge, this is the first report in which a left SVA with associated LMCA compression has been surgically treated with aortic root and valve replacement with a composite mechanical valve conduit, reimplantation of the right coronary artery, ligation of the LMCA and CABG using both internal thoracic arteries.

Conflict of interest: none declared.

REFERENCES


Figure 1: (A and B) Aortic root aneurysm with an asymmetrically enlarged left coronary sinus of Valsalva. (C) Severe concentric ostial and proximal LMCA stenosis was observed, with no other significant coronary stenosis.