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Case report

Submitral aneurysm with left atrial communication

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Abstract

Annular sub-mitral aneurysms are rare lesions of varied etiology. A sub-mitral membranous curtain may be a potential area of weakness through which these lesions expand. Initially described in young males of African origin and reported from varying geographical areas, these lesions arise from the atrioventricular groove in close relation to the mural leaflet. They may cause pressure effects, lead to mitral incompetence and left ventricular dysfunction. Key issues during repair are proximity to the circumflex coronary artery, atrioventricular junction and progressive involvement of the mitral valve. This case report of a calcified bi-lobed sub-mitral aneurysm with communication to the left atrium discusses the anatomical basis of the lesion, the role of computed tomogram angiography in pre-operative evaluation and surgical management.

Keywords: Aneurysm other; Mitral valve; Left ventricle

1. Case report

Annular sub-mitral aneurysms occur secondary to varied etiology. We discuss a case of calcified bi-lobed sub-mitral aneurysm with communication to the left atrium. The anatomical basis of the lesion, pre-operative evaluation and pertinent surgical issues are presented.

A 28-year-old female presented with 2-year history of worsening exertional dyspnea. There was no history of chest discomfort, palpitation, congestive heart failure or infection.

Examination of the cardiovascular system revealed normal jugular venous pulse and cardiomegaly. There were no murmurs or added sounds. Other sub-systems and laboratory tests were normal. Chest X-ray revealed cardiomegaly and cine-fluoroscopy confirmed retro-cardiac calcification. An electrocardiogram showed sinus rhythm with left-axis deviation. Transthoracic echocardiography revealed normal valves, trivial mitral regurgitation, dilated left sided chambers and a 6 cm × 4 cm sub-mitral aneurysm expanding into the floor of the left atrium. Transesophageal echocardiogram revealed color Doppler flow into a posteriorly located aneurysm and the left atrium.

Computed tomographic (CT) angiography revealed a calcified bi-lobed aneurysm measuring 4.9 cm × 4.6 cm × 9.7 cm expanding from the atrioventricular groove (Fig. 1a). The distal circumflex coronary artery was coursing between the lobes and the terminal obtuse marginal branches were splayed on the surface of the lower lobe. There was no compression of the coronary arteries (Fig. 1b). A 10 mm × 5 mm fistulous opening in the floor of the left atrium led into the upper lobe of the aneurysm that measured 4 cm × 3 cm × 5.3 cm. A densely calcified partition with an eccentric inter-lobar communication separated the upper from the calcified lower lobe (4.6 cm × 3.5 cm × 4.8 cm). Atrioventricular disjunction was represented by a defect at the junction of the left atrial floor with the mural leaflet (Fig. 1c).

Surgical correction was performed through a median sternotomy under standard cardiopulmonary bypass. The aneurysm extended downwards onto the left ventricular wall, upwards into the base of the left atrium and was adherent to the pericardium. The pulmonary veins and coronary arteries were normal. Manipulation of the aneurysm was avoided in view of the hazard of atrio-ventricular disruption. Left atriotomy was made and the fistulous track in its floor enlarged to access the upper lobe. The calcified partition was divided to expose the defect. The neck of the sub-mitral defect located in close proximity to the left atrial

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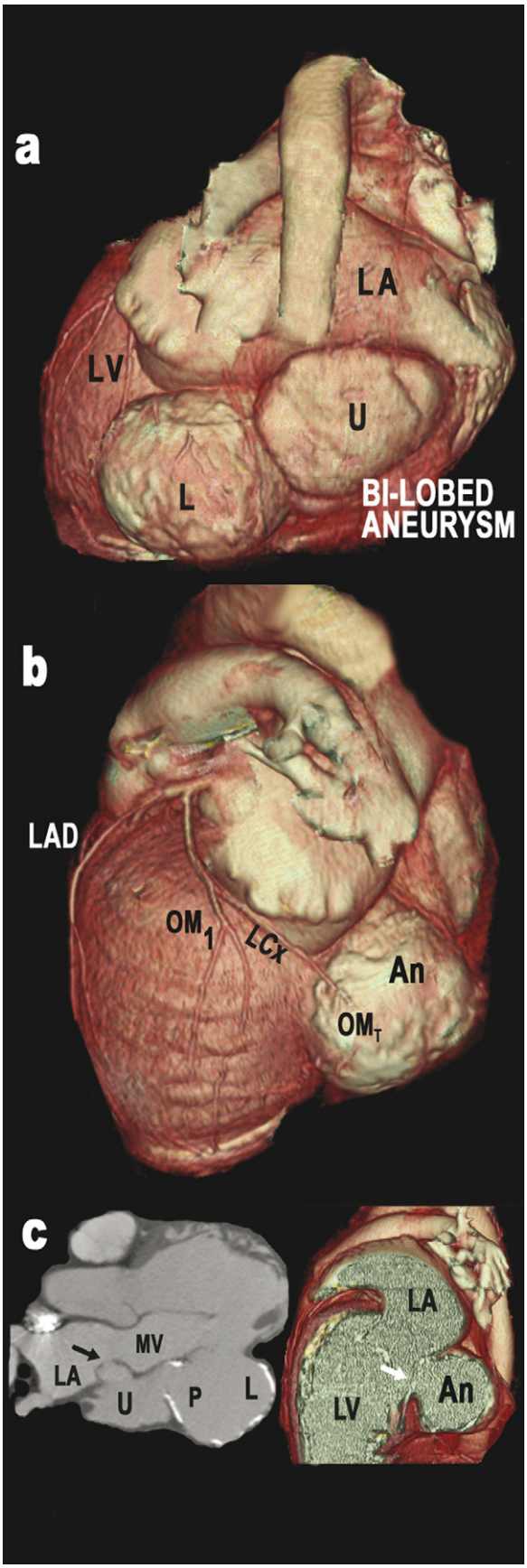

mural leaflet junction measured 8 mm in height and extended along a 30 mm circumference of the mural leaflet from the posteromedial commissure to the junction of P1 and P2 segments (Fig. 2a).

Repair was carried out by working through the floor of the left atrium and from within the aneurysm. As the terminal circumflex artery and its branches were displaced epicardially, interrupted sutures could be passed safely from within the aneurysm through Teflon felts placed between peridefect fibrous tissue and the posterior mitral annulus. All the sutures were passed from outside within to be tied on the left atrial aspect (Fig. 2b). The left atrial opening was closed between strips of pericardium and the aneurysm excluded (Fig. 2c). There was no distortion of the mitral apparatus and valve function was normal except for a trivial leak. Postoperative recovery was uneventful.

Histopathological examination of the wall of the aneurysm revealed fibrous tissue and extended tissue cultures were negative for pathogenic organisms. A check echocardiogram revealed trivial mitral regurgitation. The patient is doing well at 1-year follow-up.

2. Comment

Annular subvalvar left ventricular aneurysm is a relatively rare cardiac condition first described by Abrahams et al. [1]. Commonly prevalent in the African population these lesions have been reported from Asia and the Americas [2]. A genetic basis has been suggested because of racial predilection [3].

The basic pathology in these lesions is a disjunction of the left ventricular musculature with the left atrium-mitral valve region — similar to that associated with floppy mitral valve [2,4—6]. A recent study demonstrated the presence of a membranous sub-mitral curtain between the posterior mitral annulus and the left ventricular musculature. This membrane, which extends along varying lengths of the posterior annulus beyond the posteromedial commissure, forms an area of potential weakness. Infection of this inherently strong area may predispose to aneurysmal dilatation [2].

Additional factors implicated include tuberculosis [6,7], cardiac lymphostasis [8] and thinning of the fibrous tissue in the atrioventricular groove secondary to high left ventricular pressures [3]. An association with Takayasu's arteritis and rheumatic endocarditis that is probably coincidental was also reported [2,7]. Communication to the left atrium and calcification are relatively rare [2,9].

A classification into types I—III, depending on the extent of involvement of the posterior mitral annulus by the neck of the aneurysms has been described [7]. Presence of multiple necks in type II and involvement of the entire length of the annulus in type III lesions may occur secondary to progressive segmental disjunction throughout the annulus [2,5,7].

Fig. 1. Computed tomogram angiography images showing (a) bi-lobed aneurysm (b) distal left circumflex coronary artery (LCx) and the terminal obtuse marginal branches (OM_T) splayed on the surface of the aneurysm (An) (c) communication to the left atrium (black arrow) and the left ventricle (white arrow). Key: Upper (U) and lower lobes (L) of the aneurysm; P—calcified partition; LA—left atrium; MV—mitral valve; LV—left ventricle; LCx—distal circumflex coronary artery.

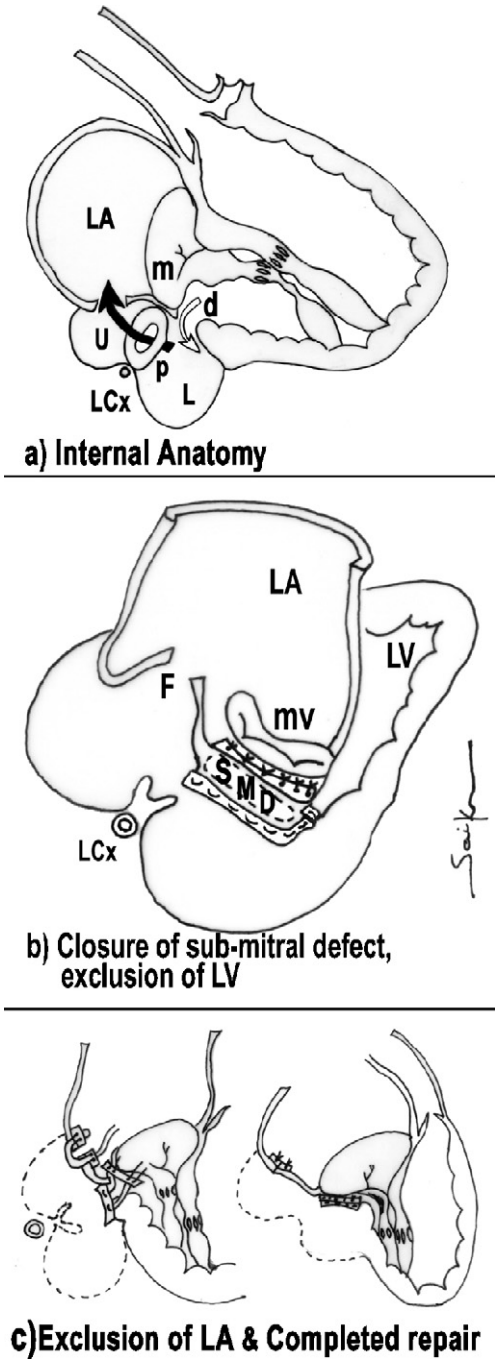

Fig. 2. Schematic depiction of (a) internal anatomy: Upper (U) and lower lobes (L) of the aneurysm with an intervening partition (p) and distal circumflex artery (LCx). The sub-mitral defect (d) below the mural leaflet (m) and the communications to the left atrium (solid black arrow) and the left ventricle (white arrow) are also shown. (b) Repair of the sub-mitral defect (SMD) through floor of the left atrium (F). (c) Repair of the floor of the left atrium (left panel) and completed repair (right panel). Key: LA—left atrium; mv—mitral valve; LV—left ventricle; LCx—distal circumflex coronary artery.

Clinical features include mitral insufficiency, thromboembolic cardiomyopathy, arrhythmias and rarely coronary artery compression [2]. Growth of the aneurysm causes distortion of the mitral apparatus and the direction in which the aneurysm expands influences surgical approach [1,10].

Absence of antecedent ischemia, infection or trauma and presence of dystrophic calcification implicate congenital atrioventricular disjunction as the etiology in our patient. CT angiography, a less invasive investigation, was of great assistance in delineation of pathology and pre-operative planning. The pertinent surgical issues were heavy calcification of the wall of the aneurysm, septated anatomy and a normal mitral valve. Communication to the left atrium and displacement of the coronaries facilitated trans-left atrium, intra aneurysm access during the repair. Interrupted sutures were preferred to avoid undue tension on the suture line.

In conclusion, successful surgical outcome in these rare lesions depends on careful handling of the heart, accurate identification and closure of the defect, preservation of the mitral valve and prevention of injury to the coronary arteries.

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