Cardiology in the Young

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Surgical management of a giant pulmonary artery aneurysm in a patient with ischaemic heart disease – a case report

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Brief Report

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Abstract

Association of Pulmonary Artery Aneurysm with Ischemic Heart Disease is uncommon, and its surgical management has been rarely described in the literature. Surgical intervention should be individualised according to the coexisting diseases and comorbidities to achieve optimal outcome. We report a case of a 76-year-old man with background history of coronary artery stenting due to ischaemic heart disease. The patient presented with features of coronary compression due to giant pulmonary artery aneurysm. He was operated with replacement of aneurysmal pulmonary trunk with 25 mm Hancock conduit.

Giant aneurysm of pulmonary arterial trunk is uncommon, and its association with ischaemic heart disease has been rarely discussed in the literature. The clinical manifestations of pulmonary artery aneurysm depend upon its size and mostly attributed to its compression on surrounding structures.[1–3] In many patients, pulmonary aneurysms remain asymptomatic in initial stage and are detected incidentally while investigating for other reasons.[1–5] Although it can be managed by conservative treatment with watchful monitoring in early stage, surgical management should be considered whenever necessary to avoid fatal complications from coronary compression, dissection, rupture, or massive hemoptysis.[1,2]

Case report

A 76-year-old man, with known history of chronic obstructive pulmonary disease, hypertension, and ischaemic heart disease, was on routine follow-up for dilatation of main pulmonary artery. He underwent percutaneous coronary intervention with two stents inserted into proximal left anterior descending artery and Ramus intermedius vessel ten years ago. Since last few months, he had progressively increasing shortness of breath and intermittent anginal chest pain on mild exertion or even at rest. On follow-up echocardiography, he had significant dilatation of main pulmonary artery over a brief period of time with moderate pulmonary regurgitation. The pulmonary artery pressure was normal. The recent MRI was suggestive of giant pulmonary aneurysm (83 mm × 71 mm, length 95 mm) immediately juxtaposed to left main coronary artery and proximal left aterior Descending artery with substrate for compression particularly in systole or at higher heart rates. The CT angiography was done to assess the coronary circulation and the anatomy of aneurysm. The left main coronary artery origin was immediately posterior to the inner aspect of the pulmonary artery aneurysm and was indented by the wall of the aneurysm. The stent in the Ramus was patent. The aneurysm was compressing the proximal left anterior descending artery and the stent inside between the aneurysm and the left ventricular myocardium (Fig. 1).

In view of progressively worsening symptoms with huge aneurysmal dilation of pulmonary arterial trunk, surgical intervention was decided. Trans oesophageal echocardiography in theatre confirmed the diagnosis and showed a small patent foramen ovale (PFO). Surgery was carried out through median sternotomy. On opening the pericardium, a huge pulmonary artery aneurysm compressing the adjacent structures was noticed. The cardiac mass was displaced inferiorly and to the right. There was external compression of the ventricular cavities, left atrium, superior caval vein, and coronary arteries of left system. Diffuse calcification noticed over the aortic and pulmonary artery wall. The aorta was displaced towards right side by the aneurysm. The surgical strategy was planned to address the giant aneurysm under cardiopulmonary bypass without cross-clamping the aorta and cardioplegic arrest of the heart due to diffuse coronary artery disease and calcification of aorta. Aortic cannulation was done in a non-calcified area of ascending aorta, and cardiopulmonary bypass was commenced on aorto-bicaval cannulation. The aneurysm of the pulmonary trunk was

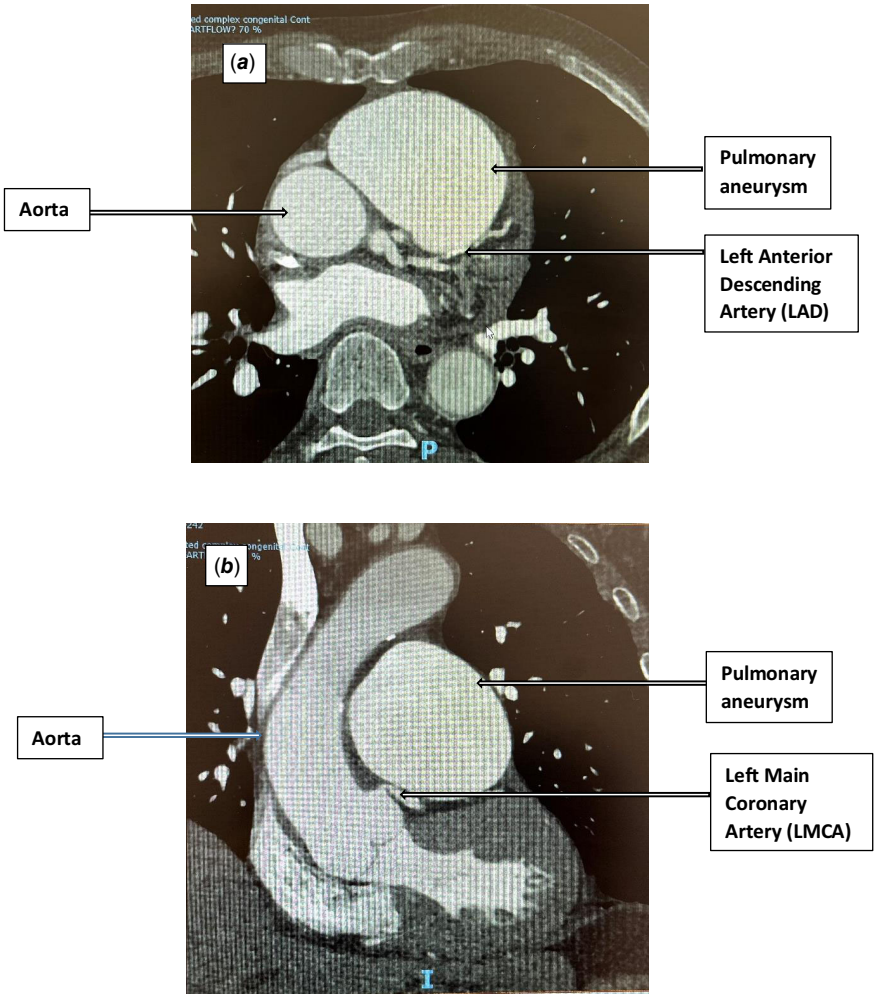

Figure 1. CT scan a) axial reconstruction showing compression of proximal LAD by pulmonary artery aneurysm, b) sagittal reconstruction showing compression over LMCA by pulmonary artery aneurysm.

dissected and mobilised distally up to its bifurcation and proximally to the annulus level. A clamp was applied at the level of the pulmonary valve annulus. Main pulmonary artery was transected, and the aneurysmal trunk was excised up to the bifurcation. A 25 mm Hancock conduit was trimmed to the right shape and size and was anastomosed end to end to the main pulmonary artery bifurcation. Following this, the clamp was repositioned to the level of the pulmonary valve annulus. The pulmonary valve leaflets were removed, and end-to end anastomosis was done between the conduit and the pulmonary valve annulus (Fig. 2). ECG was monitored throughout the procedure to exclude any ischaemic changes due to coronary compression by the clamp or by manipulation of the aneurysm. Cardiopulmonary bypass was discontinued after fully rewarming and de-airing with good haemodynamics. The histopathological examination of the resected pulmonary trunk was suggestive of full-thickness non-specific inflammation of pulmonary artery wall with infiltration by lymphocytes and multinucleated giant cells.

Discussion

A true pulmonary artery aneurysm is defined as dilatation of all the three layers of pulmonary arterial wall. It can be central involving main pulmonary artery or the intra-pericardial branch pulmonary arteries, or peripheral involving distal pulmonary vasculature.[1] Normal main pulmonary artery diameter in adult is 22 mm–28 mm and any diameter above is considered as dilatation or ectasia.[1] Three criteria have been mentioned in literature to describe pulmonary aneurysm: (a) main pulmonary artery diameter>40 mm or branch pulmonary artery diameter > 30 mm, (b) main pulmonary artery diameter > twice the aortic diameter,[2] and (c) main pulmonary artery diameter > 1.5 times the upper limit of normal.[1] Aetiologically, pulmonary aneurysms may be associated with congenital cardiac conditions with abnormal pulmonary blood flow pattern secondary to pulmonary valvar or subvalvar disease or any intra-cardiac or extra-cardiac left to right shunts.[4,5] It may develop after certain congenital cardiac surgeries due to alteration of pulmonary blood flow causing focal strain on pulmonary artery wall.[1] Pulmonary hypertension is a common occurrence with pulmonary aneurysm, and rarely, it can be associated with some autoimmune diseases and vasculitis. Idiopathic pulmonary artery aneurysm is rare and occurs due to congenital weakness or cystic medial degeneration of vessel wall.[1]

Patients with pulmonary aneurysms may remain asymptomatic for a long period. Non-specific symptoms like chest-pain, exertional dyspnoea, and palpitation are common. However, it is very important to rule out any compressive features. Compression of coronary arteries of left system may produce anginal chest pain[6,7] requiring stenting of the coronary arteries to restore coronary circulation.[8,9] Compression of the left bronchus may contribute for dyspnoea or pulmonary complications. Compression over left anterior descending

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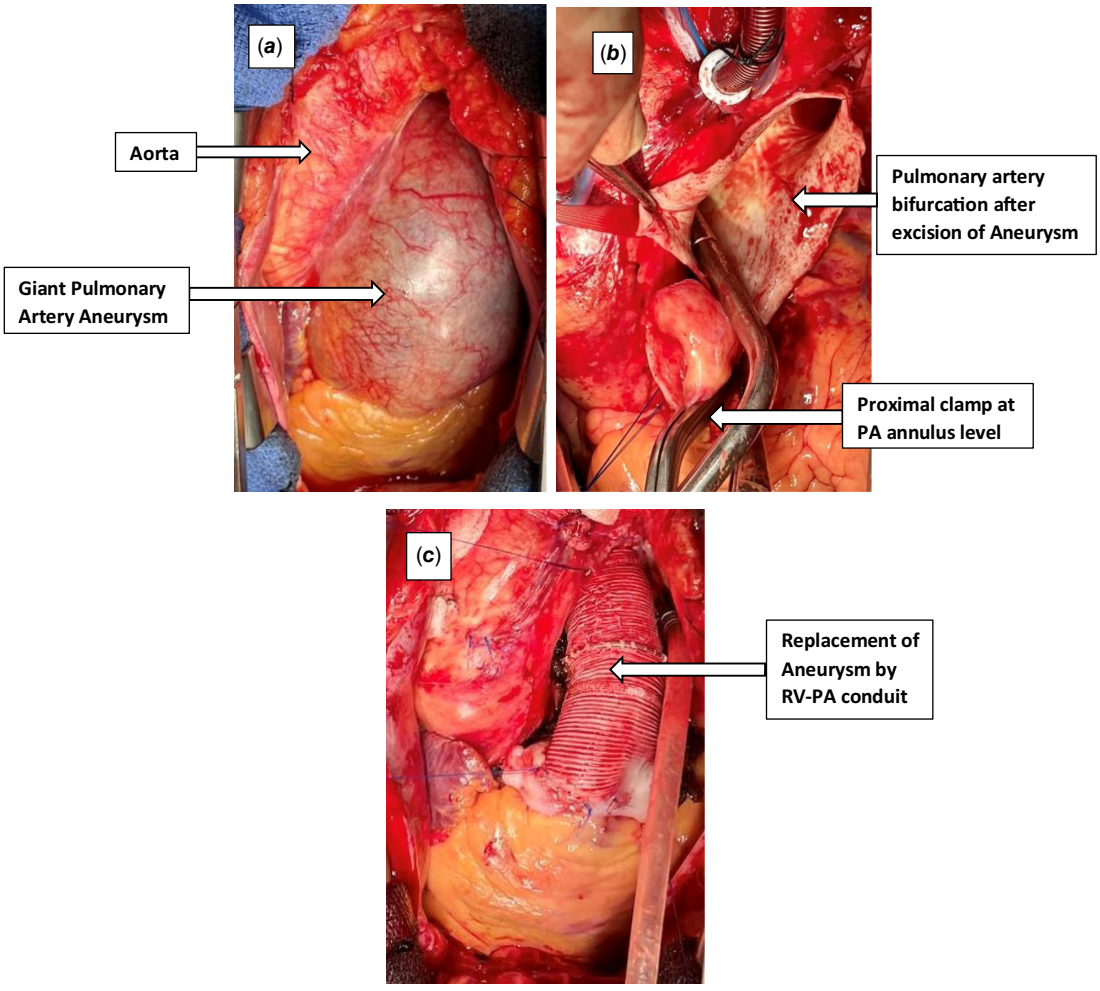

Figure 2. Intra-operative images (***a***, ***b*** and ***c***) showing replacement of giant pulmonary artery aneurysm with right ventricle to pulmonary artery (RV-PA) Hancock conduit.

artery may cause left ventricular dysfunction as mentioned by R. Hou et al in their case reports.[2] A giant pulmonary aneurysm may be fatal and cause massive hemoptysis, dissection, or rupture producing hemothorax requiring emergency surgical intervention.[5]

Echocardiography and MRI are used for routine follow-up to detect any increase in size and associated cardiac anomalies.[5] The regular imaging is essential while managing conservatively.[2,10] Spiral CT angiography with multiplanar reconstruction of image is very useful to delineate the anatomy of the aneurysm and for surgical planning.[5] Medical management should be considered for asymptomatic patients.[5] Pulmonary hypertension needs strict control with medication. Surgical intervention should be considered whenever patient develops compressive symptoms[2,3] or in asymptomatic aneurysms with more than 60 cm of diameter.[5]

Various surgical techniques have been described in the literature. For central pulmonary aneurysms, the options include aneurysmorrhaphy or arterioplasty, pericardial patch reconstruction, and replacement of dilated pulmonary trunk with interpositioning allografts or synthetic textile grafts.[2,5] Focal dilatation is suitable for repair by aneurysmorraphy after excising the redundant vessel wall in the dilated segment. Diffuse disease involving pulmonary arterial trunk requires replacement with suitable conduit. When both the branches are also involved, a long curved graft or a Y-shaped graft may also be used.[2] The outcome of surgery is satisfactory with good long-term results.[10] However, surgical options should be highly individualised depending upon the anatomy, coexisting heart disease, and other associated systemic comorbidities.

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Competing interests. None.

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