Successful Surgical Repair of Pulmonary Artery Aneurysm and Regurgitation

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Pulmonary artery aneurysm (PAA) is generally a rare lesion, and there is no definitive approach for it. We report the case of a 45-year-old man who was admitted for the evaluation of dyspnea. In childhood, he had been diagnosed with PAA with congenital pulmonary valve stenosis and regurgitation, and he had a percutaneous transvenous pulmonary valve commissurotomy. Transthoracic echocardiogram showed dilatation of the right atrium and right ventricle, with right ventricular hypertrophy. There was severe pulmonary valve regurgitation, and the main pulmonary artery was dilated to 68 mm in diameter. From the surgical findings, the left leaflet of pulmonary valve was torn from commissure with failure to coapt with the other leaflet. After direct sutures of edges of the left leaflet, a nearly normal valvular competence was restored. The PAA was repaired with a Y-shaped 24 × 12 mm Dacron graft replacement. The postoperative course was uneventful, and the patient was discharged.

Keywords: pulmonary artery aneurysm, pulmonary valve regurgitation, prosthetic graft replacement, pulmonary valve plasty

Introduction

Pulmonary artery aneurysm (PAA) is generally a rare lesion. Previous reports have demonstrated several associated diseases, such as intracardiac defects and patent ductus arteriosus, which have increased pulmonary blood flow leading to pulmonary artery hypertension (PAH) and severe pulmonary valve stenosis (PS) leading to post-stenotic dilatation, and infection. Diagnosis and treatment of PAA require a multidisciplinary approach, but currently, there is no definitive approach for PAA because of the paucity of information about the long-term outcome following medical or surgical intervention. We report a case of PAA with pulmonary valve regurgitation in which the native pulmonary valve was successfully preserved after pulmonary artery reconstruction, and we prevented the fatal complication of rupture.

Case Report

A 45-year-old man was evaluated for dyspnea on exertion. At the age of 15, he had been diagnosed with PAA with congenital pulmonary valve stenosis and regurgitation, and he had a percutaneous transvenous pulmonary valve commissurotomy. He had an episode of congestive heart failure. On admission, he was in good clinical condition, with New York Heart Association (NYHA) functional class II. On examination, he was in good general condition with sinus rhythm. A grade III/IV systolic murmur and a grade III/IV diastolic murmur were noted at the third costal interspaces. There were no other positive findings on clinical examination. Chest X-ray film (Fig. 1) showed moderate heart enlargement and an aneurysmal dilatation of the main pulmonary artery. An
electrocardiogram showed a grade I atrioventricular block. Transthoracic echocardiogram showed dilatation of the right atrium and the right ventricle, and right ventricular hypertrophy. There was severe pulmonary valve regurgitation, and the main pulmonary artery was dilated to 68 mm in diameter. There was also paradoxical motion at the interventricular septum. A computed tomographic (CT) scan of the thorax (Fig. 2) showed PAA in the main pulmonary artery and dilatation of the proximal side of the left pulmonary artery, but the right pulmonary artery was normal in size. Cardiac catheterization showed normal pulmonary arterial pressure (24/8 mmHg), right atrial pressure (10/8 mmHg), right ventricular pressure (33/5 mmHg), and no detectable shunts. There was a mild systolic gradient across the right ventricular outflow tract. On an angiogram, there was marked aneurysmal dilatation of the main pulmonary artery and severe pulmonary valve regurgitation.

The operation was performed through a median sternotomy with the use of cardiopulmonary bypass with moderate systemic hypothermia (28°C–30°C). The main pulmonary artery was found to be dilated, extending up to the origin of the left pulmonary artery. The main pulmonary artery was opened, and the pulmonary valve was inspected. The valve was a trileaflet, but the left leaflet was torn from commissure of the anterior leaflet with failure to coapt with the other leaflet. The pulmonary valvular insufficiency appeared to be the result of separation of the left leaflet. The annulus was not dilated, and there was no subvalvular stenosis and no ventricular septal defect. After direct sutures of the edges of the left leaflet, nearly normal valvular competence was restored. The PAA was repaired with a Y-shaped 24 × 12 mm Dacron graft replacement. An intraoperative transesophageal echocardiogram showed trivial pulmonary regurgitation and mild stenosis with good blood flow in both branches of pulmonary arteries. We sent the excised PAA wall to microscopic examination to investigate the cause of the PAA. The result was histologically pulmonary arterial tissue without remarkable change. The postoperative course was uneventful, and the patient was discharged.

**Discussion**

PAA is a very rare lesion. An autopsy study reported that the incidence of PAA was approximately 0.007%.

PAA is most often located in the main pulmonary artery (89%) and sometimes also in the main branches (11%).

Previous reports have demonstrated several underlying diseases that were considered as possible risk factors for the development of PAA: valvular pulmonary stenosis, congenital heart disease with intracardiac shunting, PAH, vasculitis, and connective tissue disorder. The most commonly reported etiology of PAA is its association with congenital heart disease with a large left-to-right shunt and PAH. In our patient, PS was treated with percutaneous transvenous pulmonary valve commissurotomy, and a transthoracic echocardiogram also showed no finding of valvular pulmonary stenosis. The PAA demonstrated a remarkable dilatation from 62 mm to
68 mm in just 10 years. Therefore, this suggests that treatment for PS did not stop dilatation of the PAA. Structural, vascular abnormalities due to vasculitis or connective tissue disorder may be a possible mechanism of PAA.4,6

Since PAA is a rare lesion, there are no clear guidelines for the assessment of PAA and surgical indication for its treatment. Previous authors have documented the prognosis of PAA. If there is no left-to-right intracardiac shunt or PAH, although there are exceptions, such patients have a relatively benign prognosis with an uncomplicated course for 1 to 7 years, even if surgical treatment is not performed.5) Although the PAA itself is always asymptomatic, as soon as pain appears, which is a sign of impending rupture, surgical repair is recommended because some patients with PAA may suffer sudden death due to aneurysm rupture and right heart failure.4,5) There are some surgical intervention techniques to repair PAA such as aneurysmorrhaphy and replacement by using a Dacron prosthetic graft or pulmonary allograft.3,4) Aneurysmorrhaphy is a relatively simple procedure, but there is the possibility of recurrent dilatation, especially in cases of associated PAH or structural cardiac lesions.5) If there is pulmonary valvular insufficiency with PAA, simultaneous treatment is recommended since it may cause further aneurysmal dilatation.5)

**Conclusion**

We experienced a case with PAA with pulmonary valve regurgitation, which was successfully treated by Dacron graft replacement and pulmonary valve plasty.

**Disclosure Statement**

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**References**