Dissecting Aneurysm of the Main Pulmonary Artery
A Rare Complication of Pulmonary Balloon Valvuloplasty Diagnosed 1 Month After the Procedure

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Since the first introduction of pulmonary balloon valvuloplasty by Kan in 1982, the procedure has been used for relief of pulmonary valve stenosis. It is normally recommended that the procedure should be performed for peak-to-peak gradients in excess of 50 mm Hg, and the balloon/annulus ratio should be 1.2 to 1.25 for effective and safe results. Complications of the procedure are minimal and rare. We present the case of dissecting aneurysm of the main pulmonary artery, a dangerous complication of pulmonary balloon valvuloplasty performed in a child, which was successfully treated with surgical management.

A 4-year-old boy was admitted to our hospital in December, 2007, whose history included 2 years of 4/6 systolic murmur heard over the pulmonary artery. The transthoracic echocardiogram showed severe pulmonary valve stenosis, and the Doppler-measured peak instantaneous gradient was 121 mm Hg, which was the indication for pulmonary balloon valvuloplasty. A 6F Mansfield balloon catheter was used (18/30 mm, balloon-to-annulus ratio 1.15). The catheterization-measured peak-to-peak gradient was 125 mm Hg. Manual inflation was performed until the balloon indentation disappeared, and 2 additional inflations were performed. After the inflations, the transvalvular pressure gradient was reduced to 28 mm Hg. The patient was observed in an intermediate care setting overnight, with monitoring of heart rate, pulse oximetry, blood pressure, pulses, and puncture site for bleeding. An echocardiogram performed on the morning after the procedure showed the transvalvular pressure gradient was 26 mm Hg, and no complications were revealed. The patient was asymptomatic.

At follow-up 1 month later, the patient was still asymptomatic, but a 3/6 systolic murmur was heard over the pulmonary artery. Transthoracic x-ray examination showed the main pulmonary artery to be more dilated than before the valvuloplasty (Figure 1). A transthoracic echocardiogram showed a peak-to-peak gradient of 37 mm Hg and main pulmonary artery dissection (Figure 2). The obvious dilatation of the main pulmonary artery was noted, and a long, freely moving, intimal flap from the stenotic pulmonary valve to the crotch of the main pulmonary artery was revealed. The intimal flap separated the main pulmonary artery into a small true lumen and a large false lumen (32×58 mm), and it also interfered with the motion of the pulmonary valvar leaflets and the blood flow of the left and right pulmonary arteries. The blood supply of right pulmonary artery was through the true lumen, whereas that of the left pulmonary artery was through a small break on the intimal flap. Computed tomography (CT) examination and a multislice CT scan confirmed the dissection and the presence of the dissecting aneurysm (Figure 3, Figure 4, and Figure 5).

Because the dissecting aneurysm was very big and affected the normal pulmonary blood flow, and even though it was asymptomatic, the patient required surgery. After longitudinal incision of the main pulmonary artery, the situation of the pulmonary valvar leaflets and the intimal flap were seen clearly. The anterointernal and posterointernal fused valve commissures were separated, but a 5-mm rupture was found at the base of the anterointernal commissure. The lateral valve commissure was still fused. The proximal break of the dissecting aneurysm (30×50 mm) was near the root of the main pulmonary artery, whereas the distal break of the aneurysm was near the crotch of the main pulmonary artery. So we incised the lateral valve commissure and attached the ruptured valvar leaflet to the pulmonary valve.
ring. After excising the intimal flap, we sutured the residual edge of the endomembrane to the artery wall to avoid further dissection (Figure 6) and excised 10 mm pulmonary artery wall to form a normal pulmonary artery. Echocardiogram examination after the procedure showed that the pulmonary artery lumens were smooth, and the transvalvular pressure gradient was 30 mm Hg.

Discussion

Pulmonary balloon valvuloplasty has been the first-line therapeutic option for treatment of pulmonary valvar stenosis since its first description in 1982 by Kan. It is generally effective and safe if the balloon/annulus ratio is 1.2 to 1.25, rather than 1.1 to 1.3 as recommended previously. Compared with surgical valvotomy, balloon valvuloplasty provides long-term relief of pulmonary valvar stenosis and less pulmonary insufficiency in the majority of patients. Complications of the procedure are rare and minimal. Pulmonary artery dissections typically occur at the site of a pulmonary artery aneurysm associated with pulmonary hypertension or connective tissue disease. It has been postulated that in patients with pulmonary stenosis, the deficiency of elastic fibers makes the vessel wall relatively vulnerable to intimal tearing during balloon dilation. Dyspnea on exertion, retrosternal chest pain, central cyanosis, and sudden hemodynamic decompensation are the 4 main clinical signs and symptoms associated with a pulmonary artery dissection. Diagnosis of a pulmonary artery dissection is frequently made postmortem, because many of these patients experience sudden death when the main pulmonary artery dissects into the pericardium, causing acute cardiac tamponade. Pulmonary artery dissection has been diagnosed in living patients using transthoracic echocardiogram, CT, magnetic resonance imaging, and angiography, and multislice CT scan reconstructions can vividly show the dissection and dilatation of the pulmonary artery.

For symptomatic and asymptomatic patients whose hemodynamics are affected by a pulmonary artery dissection, surgery is curative, whereas for stable asymptomatic patients, conservative treatment and echocardiographic follow-up are necessary. Further dilatation of the pulmonary artery is an indication for surgery. Despite the presence of some complications, pulmonary balloon valvuloplasty by a skilled opera-

Figure 2. Transthoracic echocardiogram showing the main pulmonary artery with an intimal flap (arrow).

Figure 3. CT showing the main pulmonary artery with an intimal flap (arrow).
tor is still the first line therapeutic option for treatment of pulmonary valvar stenosis.

Disclosures

None.

References


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