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Traumatic pulmonary valve hematoma; an unusual complication of pulmonary balloon valvuloplasty

Pulmoner balon valvuloplastinin nadir komplikasyonu; travmatik pulmoner kapak hematomu

Introduction

Pulmonary balloon valvuloplasty (PBV), initiated in 1982 by Kan et al. (1) was one of the first therapeutic procedures used catheters for the treatment of congenital heart disease. PBV is now recognized as the standard therapy for pulmonary valve stenosis (PS). Complications of PBV such as pulmonary regurgitation, annular laceration, pulmonary artery dissection, cardiac perforation have been reported. This is the presentation of the case with pulmonary valve hematoma that resulted as a complication following the treatment of PS after the application of PBV.

Case Report

A 16-year-old female patient was hospitalized with the diagnosis of isolated PS. She defined dyspnea, palpitations and fatigue on exertion that started one year before her admission. The auscultation of the patient unveiled a 4/6 grade pansystolic murmur which was best heard at the right and left second intercostal spaces. The chest roentgenogram showed mild cardiomegaly. Electrocardiogram demonstrated right ventricular hypertrophy. The remainders of the laboratory data were normal. Transthoracic echocardiography revealed PS with an 80 mm Hg gradient at the valvular level.

The pressure gradient between the right ventricle and the pulmonary artery was measured to be 70 mm Hg and pulmonary valve annulus was delineated as 18 mm by catheterization. PBV had been performed using 16 mm balloon valvuloplasty catheters with a length of 3 and 4 cm (PDC520-TH-70282010/04) by the pediatric cardiology. However, pulmonary valve gradient persisted after PBV in the echocardiography but any suspicious mass over the pulmonary valve or subpulmonary muscle hypertrophy was reported.

The patient underwent an operation one month after PBV. The heart was exposed through a midline sternotomy and cardiopulmonary bypass instituted. Pulmonary valve was inspected through the supravalvar vertical pulmonary arteriotomy incision. Unexpected, a red colored, fluctuating mass of 1.5 cm×2 cm in diameter was seen over the anterior semi lunar cusp (Fig. 1a). The thin external capsule of the mass was ruptured with the manipulation of the forceps and dark red colored liquid was discharged. A hard pearl like mass with the dimensions of 0.5×0.5×0.5 cm was occurred (Fig. 1b) with in the pouch. A valvotomy was made by the scalpel just next to the annulus but suitable size Hegar dilatator could not pass through the infundibular area, so the incision over the pulmonary artery was then extended towards the infundibular area of the right ventricular outflow tract (RVOT) until an adequate enlargement was obtained. Resection of the fibromuscular ridge and myectomy was performed from the infundibulum. The RVOT was closed with a diamond shaped (3×2 cm) Dacron patch. The rest of the operation was completed in uneventfully. No complication was encountered during the postoperative follow-up period. A pulmonary infundibular gradient of 10 mm Hg was measured with transthoracic echocardiography at the postoperative 5th day. Postoperative course was uneventful and the patient was discharged after 1 week.

Microscopic examination of the partially excised pulmonary valve showed fresh bleeding and myxoid degeneration areas (Fig. 2a). Histology of the pearl like mass demonstrated dense fibrosis (Fig. 2b).

Discussion

Balloon dilation of the pulmonary valve is currently considered the therapeutic modality of choice for the treatment of PS in any group and any valvular morphology (2). According to the previous studies, the independent predictors of long term result after BPV in pediatric patients are: 1) valve morphology; 2) ratio of balloon to annulus diameter; and 3) immediate post dilation pressure gradient through pulmonary

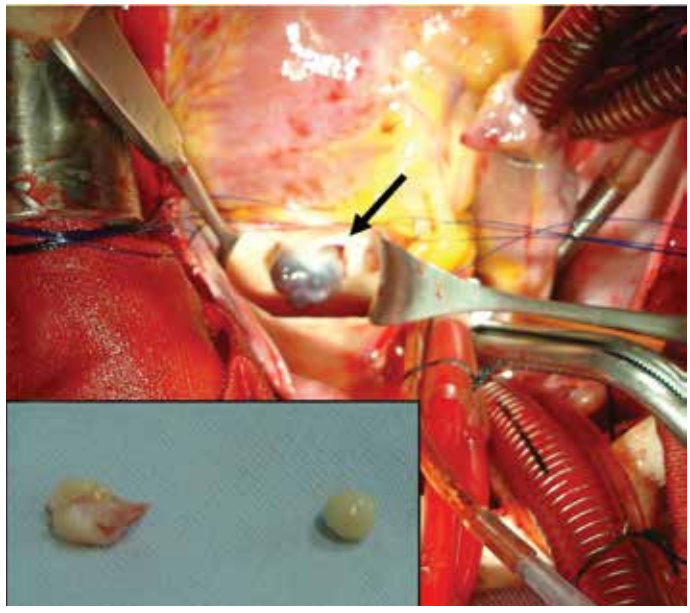

Figure 1. Intraoperative views: a) Arrow indicates red colored, 1.5 cmx2 cm in diameter, fluctuating mass over the anterior semilunar cusp through the supravalvar pulmonary vertical incision; b) Excised anterior semilunar pulmonary valve and hard fibrotic pearl like mass with the diameters of 0.5x0.5x0.5 cm

valve. Poor long term results are observed if the valve is dysplastic or ratio of balloon to annulus diameter is <1.2 or there is a residual transvalvular pressure gradient >36 mm Hg (3, 4). However, some authors have claimed that it is not necessary to use a larger balloon (ratio of balloon-to-annulus diameter >1.2) in adults as in children because adults have much lower restenosis rates than children (4.8% vs 19%) and there is no clear relationship between the balloon size and hemodynamic results (4, 5).

Possible mechanism of this pulmonary valve hematoma is sub endothelial bleeding following pulmonary commissural laceration induced by balloon dilation and development of localized fibrosis.

Major complications of PBV have been reported in pediatric patients (6), that include death (0.2%) and cardiac perforation (0.1%).

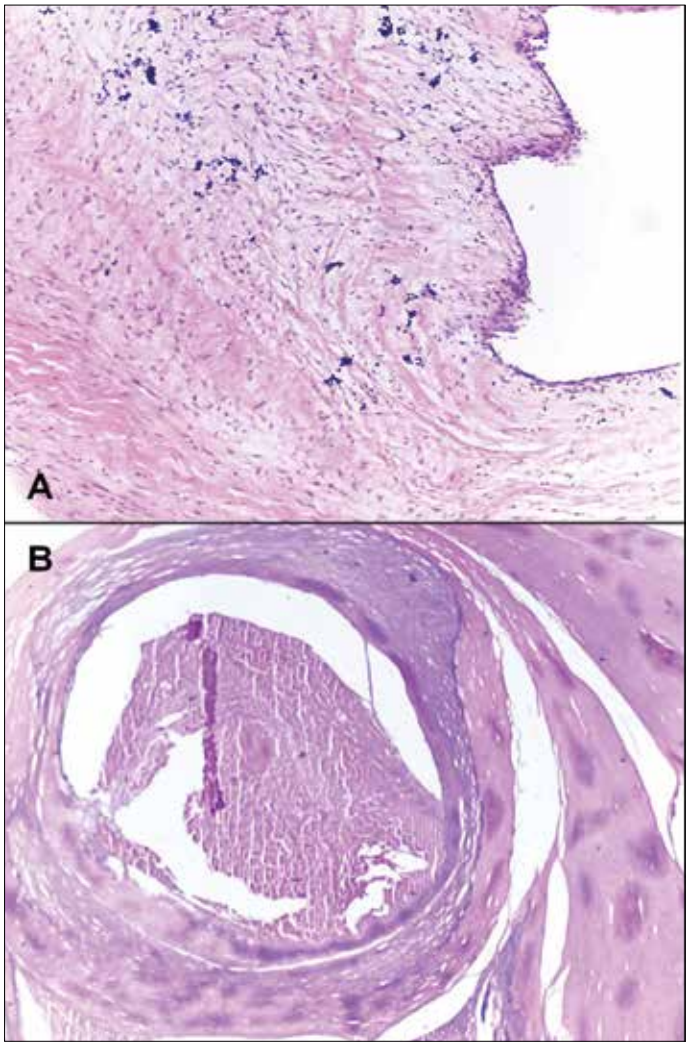

Figure 2. a) Histopathologic examination showing endothelialized pulmonary valve with fresh bleeding and myxoid degeneration areas; b) Microscopic examination of the pearl like mass demonstrating dense fibrosis

Among adult patients, 1 death was reported by Hermann et al. (7), and 1 case of cardiac tamponade by Kaul et al. (8).

Conclusion

PBV is a safe, effective and reliable treatment for pediatric patients with congenital valvular PS. Valve morphology and ratio of balloon to annulus diameter is important factors and cardiologist should not be one-track minded for the repetitive balloon dilations if the pulmonary valve gradient is not dropping as required. Complications as described in this presentation and in the literature should also be kept in mind and surgery should still be regarded as a valid and reliable method of treatment in failed PBV cases.

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