

Percutaneous Closure of Paravalvular Leak in a Patient with Mitroflow Bioprosthetic Pulmonary Valve

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Introduction

- Paravalvular leak (PVL) is a complication due to suture dehiscence between the prosthetic sewing ring and native tissue resulting in regurgitation around the replaced valve.
- The standard treatment for pulmonary PVL is surgical repair or valve replacement.
- However, surgery is associated with significant morbidity and mortality.
- Transcatheter intervention for aortic and mitral valve PVL is effective and known to have better long-term outcomes than surgery, which has a 12-year survival of 30-40% and high rate of recurrence.
- In the setting of pulmonary PVL, transcatheter approach may be a useful technique with optimal outcomes.

Patient Description

- A 22-year-old male born with tetralogy of Fallot and bilateral peripheral pulmonary artery (PA) stenosis had transannular patch repair early in life.
- Due to severe pulmonary regurgitation (PR), his pulmonary valve was replaced with a 27 mm Mosaic tissue valve at 8 years of age.
- Subsequently, at 15 years of age, he underwent pulmonary valve replacement with a 25 mm Mitroflow bioprosthetic valve and intraoperative stenting of the branch PAs.
- Postoperative period required extracorporeal membrane oxygenation support and prolonged tracheostomy leading to severe post-traumatic stress syndrome.
- He presented with severe PR, multiple episodes of syncope, dyspnea on exertion (NYHA class III), and worsening lower extremity edema.
- On Holter monitoring, he was noted to have short runs of ventricular tachycardia.

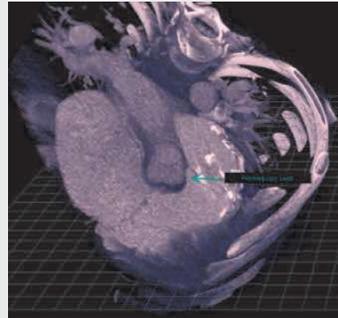


Figure 1. CT on True3D Viewer (EchoPixel, Inc., Mountain View, CA) showing paravalvular tunnel measuring 8x6x9 mm in the posteromedial side of the pulmonary valve

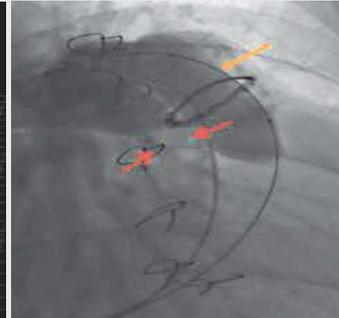


Figure 2. PVL (red arrows) localized by balloon (yellow arrow) occlusion of the valve and simultaneous contrast injection into the PA

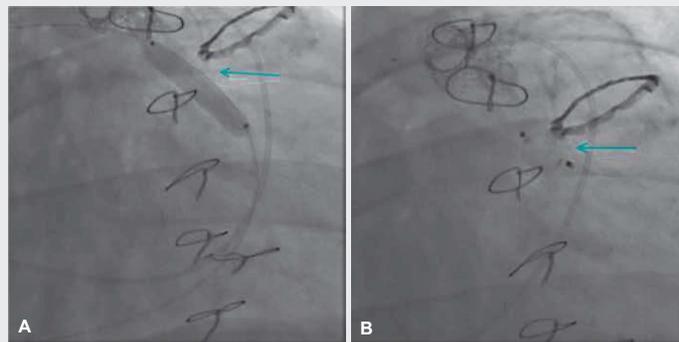


Figure 3: A) PVL size confirmed using Armada balloon; B) AVP II deployed in the PVL.

Indication for Intervention

- In view of worsening dyspnea, syncope, edema, and cardiac computed tomography (CT) showing PVL tunnel measuring 8x6x9 mm in the posteromedial side of the Mitroflow bioprosthetic valve (Figure 1), PVL closure was considered.
- Considering his complex history and associated risks with redo sternotomy, a multi-disciplinary team recommended transcatheter PVL closure.

Intervention

- Moderate stenosis was noted across the Mitroflow valve at the pulmonary position with gradient of 25-30 mmHg, and Qp:Qs of 1:1; PA angiography demonstrated moderate pulmonary insufficiency and severe regurgitation via PVL.
- The PVL was localized by balloon occlusion of the valve and simultaneous contrast injection into the PA (Figure 2).
- The defect was sized using an Armada balloon (8x4 mm; Figure 3A).
- After careful hemodynamic and angiographic evaluation, a 12 mm Amplatzer vascular plug II (AVP II) was deployed in the tunnel-like leak without any complications or residual leak (Figure 3B).
- The diastolic PA pressure improved from 6 to 20 mmHg after PVL closure. The patient recovered well and was discharged without arrhythmias on follow-up.

Learning Points

- Although transcatheter closures of pulmonary PVL are reported using AVP II and ventricular septal defect occluders, successful closure is dependent on appropriate case selection and operator expertise.
- Transcatheter intervention is a feasible treatment option with lower complication rates than surgery and must be considered in the setting of pulmonary PVL.