

Role of Balloon Pulmonary Valvuloplasty, following a surgical shunt, in Tetralogy of Fallot with Diminutive Pulmonary Annulus in Preventing Transannular Patch at Repair: Mid Term Follow-Up

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Background: Transannular patch repair (TAP) in Tetralogy of Fallot (TOF) is practiced (in 30-70%) when the pulmonary annulus (PA) is small (Z-score < -2). TAP carries disadvantages including chronic pulmonary insufficiency, right or biventricular dysfunction and the need for multiple valve replacements. In 2008 we initiated balloon pulmonary valvuloplasty (BPV) after a surgical shunt in such patients, to enhance PA growth by improving forward flow and thus avoid the need for TAP at repair.

Objectives: To demonstrate effectiveness of BPV in patients with TOF and diminutive PA in avoiding TAP at repair and provide follow up results.

Methods: We reviewed the catheterization, echocardiographic and medical records of all patients with TOF who underwent BPV.

Results: Between October 2008 and January 2014, 20 patients with TOF and diminutive PA were studied. Eighteen had surgical shunts and 2 ductus like flow. They underwent BPV at age 2-5 months (median=5), weight 2.8 – 7 kg (median=6), using balloon to valve ratio closest to 140%. The PA measured 2.5 to 7 mm (median=5.5), Z-score -8.2 to -3.5 (median= -4.2) at BPV. Based on these measurements, all the patients would have required TAP if they underwent repair at this age. Improvement in pulmonary and systemic saturations ranged from 10 to 24%, $P < 0.01$, reflecting modest increase in pulmonary forward flow. Significant growth of the PA was demonstrated by serial echocardiography and at surgical repair, 3-5 months after BPV in all (Δ Z-score +2 to +4.8, median +4, paired T test $p < 0.001$). Fourteen of 15 patients (1 is awaiting surgery, with PA Z-score -1.5) whose PA Z-score was larger than -5.2 at BPV did not require TAP, and had PA Z-score -1.5 to +1, at repair (75% reduction in predicted TAP). Only one patient required repeat BPV, 3 months after repair. The 5 patients, who had PA Z-score at BPV smaller than -5.5, required TAP. Doppler postoperative follow up (4-60 months), in the 14 patients without TAP, was consistent with mean velocities predicting <20 mm Hg pulmonary valve gradients and +1 to +2 pulmonary regurgitation.

Conclusions: Our results in this cohort of TOF with diminutive PA suggest: 1. BPV may have an important role in improving forward flow and growth of PA to avoid TAP at repair. 2. Sufficient time lapse (3 months) should be permitted between BPV and surgical repair to allow for growth of PA to avoid TAP. 3. Freedom from reintervention at mid-term follow up is acceptable.