



TAILORED PULMONARY VALVE RECONSTRUCTION VS. TRANSANNULAR PATCH IN TETRALOGY OF FALLOT PATIENTS WITH PULMONARY VALVES TOO SMALL TO PRESERVE

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Highlights

- We present the early outcomes of tailored bicuspid pulmonary valve creation in patient with Tetralogy of Fallot where the pulmonary valve is not preservable.
- The material used is equine decellularized pericardium, Autotissue, Germany.
- The procedure is reproducible and adds about 20 minutes to the bypass time.
- The outcomes are comparable to patients who had pulmonary valve preservation in the short term.

Find a full unedited video of this case on the authors YouTube Channel



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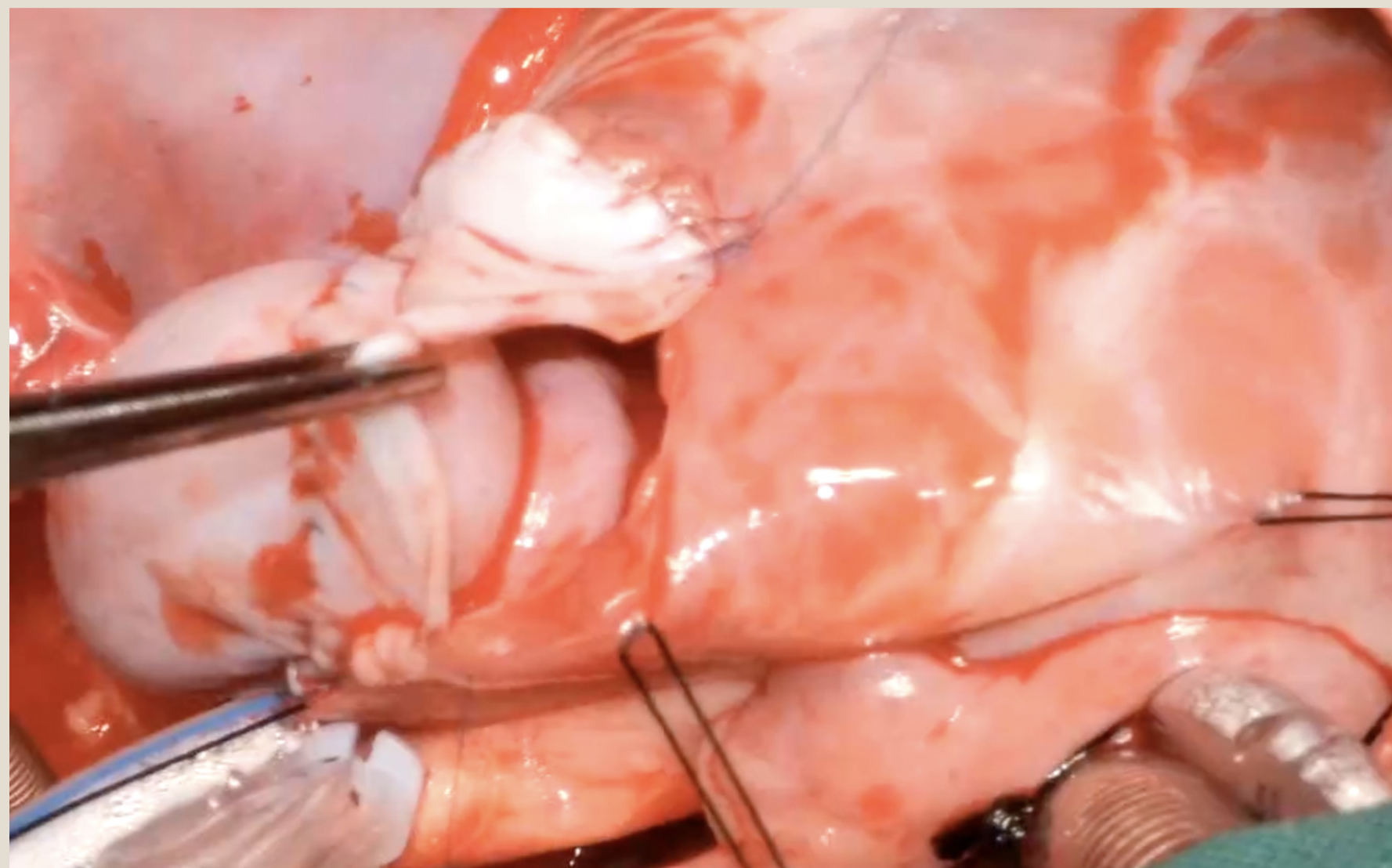
INTRODUCTION

Valve Sparing Repair (VSR) is the preferred strategy in patients with Tetralogy of Fallot (TOF). However, the pulmonary valve annulus may be too small or the Pulmonary Valve (PV) too dysplastic to result in an unobstructed and competent right ventricular outflow tract (RVOT). In such patients a Transannular Patch (TAP) is the default. An alternative strategy of a Tailored Pulmonary Valve (TPV) is presented, using two semilunar patches of equine pericardium (Autotissue, GE) oriented antero-posteriorly to create a bicuspid pulmonary valve after incising the annulus is presented and the short-term outcomes compared to TAP and VSR patients.

METHODS AND MATERIALS

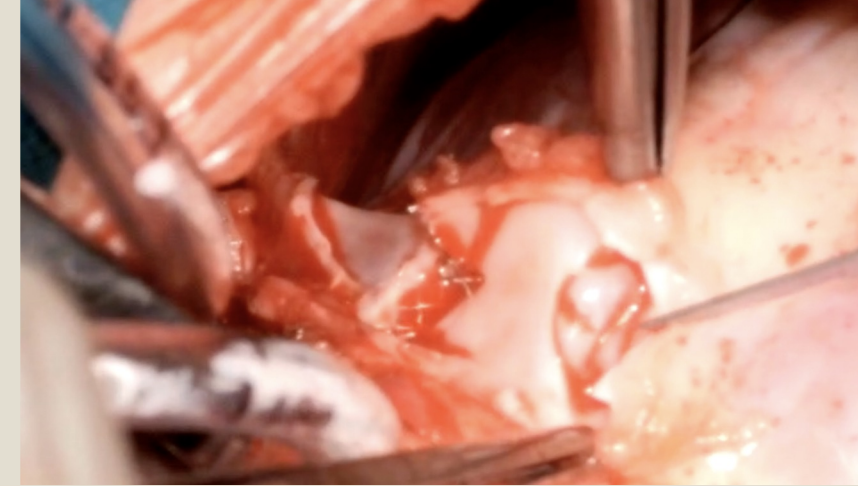
All patients who underwent TOF repair from 5/2012 to 10/2024 were included (N=174). The demographic, anatomical and clinical predictors were compared between the three study groups. Binary, continuous, and ordinal variables were tested univariately with the Kruskal-Wallis, Pearson, and Proportional odds likelihood ratio tests. The operative and short-term echocardiographic follow-up of RVOT stenosis and Pulmonary Insufficiency (PI) was compared between the groups using mixed effects models for longitudinal data.

Competent tailored bicuspid pulmonary valve

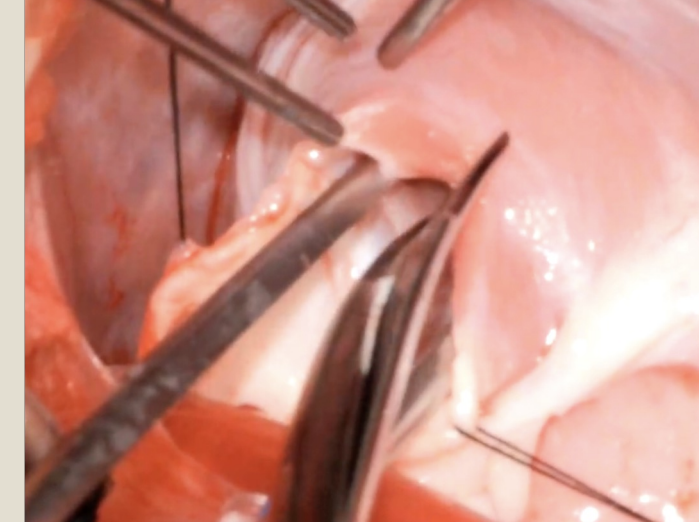


SURGICAL TECHNIQUE

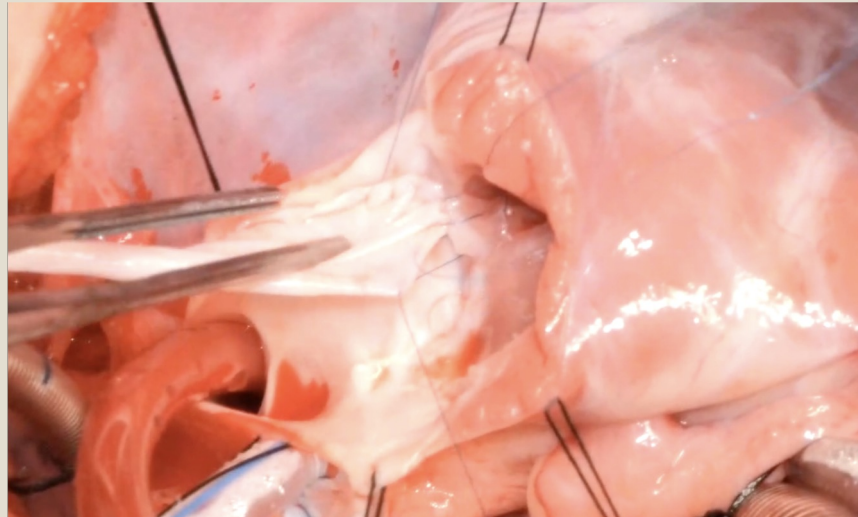
Dysplastic pulmonary valve



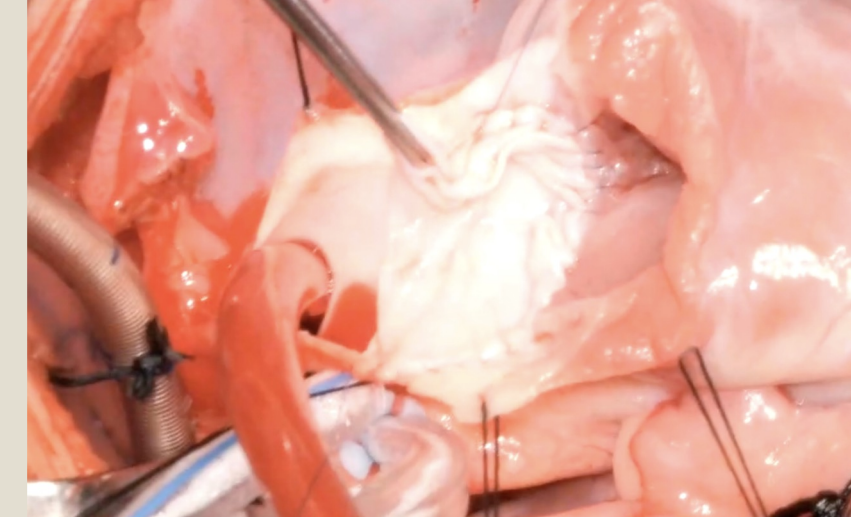
Limited tranannular incision



Posterior cusp implantation



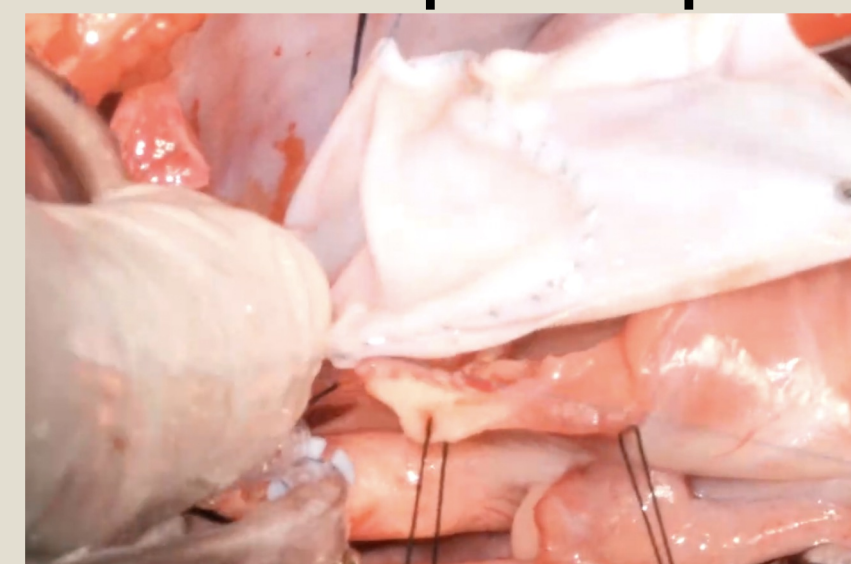
Completed posterior cusp



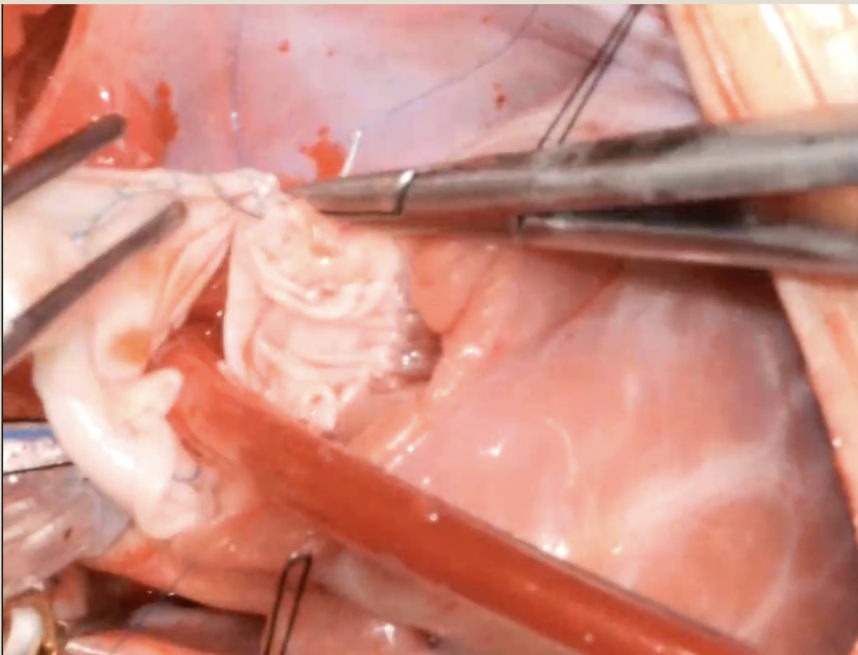
Anterior cusp and patch



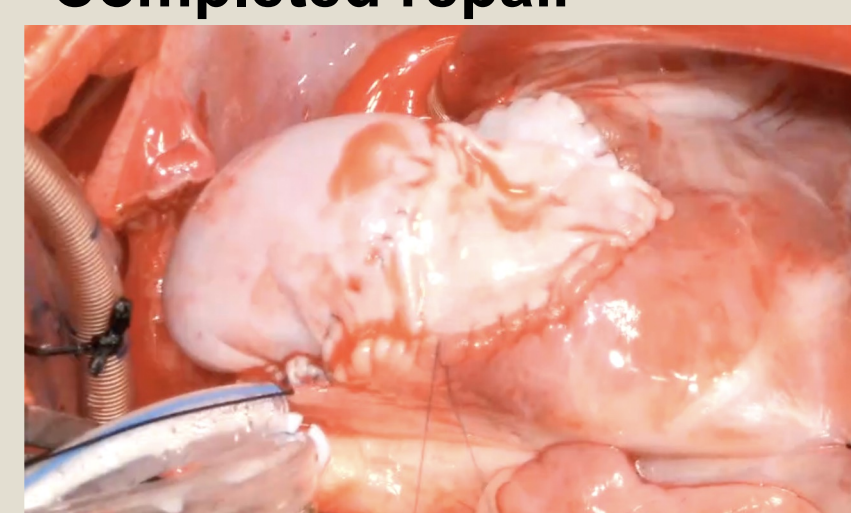
Anterior cusp within patch



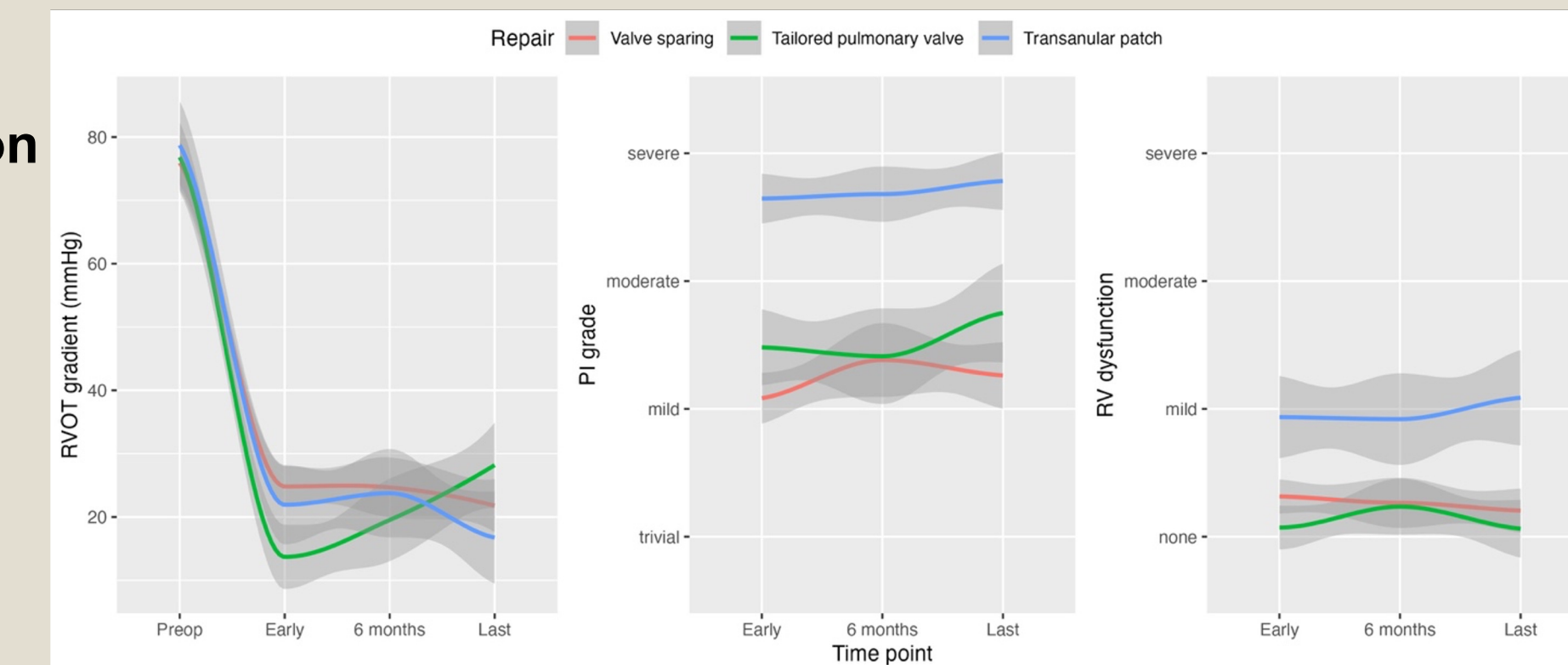
Commissure creation



Completed repair



ECHO OUTCOME ANALYSIS



RESULTS

The median age was 17, 12, and 13 months in the VSR (n=85), TPV (n=44) and TAP (n=45) groups, $p=0.06$. The proportion of males, weight, height, occurrence of hyper-cyanotic spells, and use of beta blockers were not significantly different among the groups. The median preoperative PV annulus (mm) was larger in the VSR (8) versus the TPV (5) and TAP (5) groups, $p<0.001$. Similarly, the main and branch pulmonary arteries were larger in the VSR group, $p<0.001$. More patients in the TPV (14%) group had preoperative RVOT stenosis compared to the VSR (0%) and TAP (2%) groups, $p=0.03$. The median cardiopulmonary pump time was 71, 93, and 84 minutes in the VSR, TPV, and TAP groups, respectively, $p<0.001$. There was one early death in the TAP group and none in the other two groups, $p=0.28$. Overall operative mortality was 1/174 (0.6%). The mean (range) follow-up was 16 (6-80) months. There were four late deaths, two in the VSR, one in each of TPV and TAP groups, $p=0.9$. On serial echocardiography patients in the VSR or TPV groups had stable trivial or mild pulmonary insufficiency (PI) and preserved RV function compared to the TAP group (figure).

CONCLUSIONS

The beneficial effects of VSR can be extended to patients with hypoplastic PV or stented RVOT patients using a TPV repair with comparable mid-term outcomes that are superior to the TAP repair. Longer term follow-up would reveal if the benefits persist over time.