

Surgical Management of TOF in Adults

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Tetralogy of Fallot (TOF) in Adults

- Most common cyanotic congenital heart disease which survival to adulthood is possible
- TOF in adults –
 - Non-repaired TOF in adults
 - Repaired TOF with residual lesions
- Survival without surgery (non-repaired)
 - 66% survive up to 1 yr, 49% survive up to 3 yrs, 24% survive to 10 years

Betranou EG, Kirklin JW *et al.* Am J Cardiol 1978;42:458-66

Tetralogy of Fallot (TOF) in Adults

- Current trend - total correction as early as possible
- TOF in adults – problems encountered –
 - Unrepaired
 - Effects of prolonged cyanosis
 - Polycythaemia, coagulation defects, development of eg bronchial collaterals => haemoptysis, secondary myocardial dysfunction
 - Aortic root dilatation
 - Biventricular failure

Tetralogy of Fallot (TOF) in Adults

- TOF in adults – problems encountered –
 - Repaired
 - Morphological or physiological consequences of previous palliative shunts
 - Residual lesions eg chronic pulmonary regurgitation (transannular patch) & chronic pulmonary stenosis
 - Aortic root dilatation
 - Biventricular failure

Difficulties encountered during surgery

- Bleeding – collaterals, re-sternotomy
- Reoperation
 - Possibility of extensive adhesions in the pericardial cavity after previous operation
 - Injury to the heart/great vessels upon sternal re-entry
- Need to control previous shunts before bypass
- Presence of collaterals/coronary fistula
 - Shunting away of blood causing low perfusion pressure
 - Difficulty in arresting the heart

Types of operations

- Total correction of TOF
 - Closure of VSD, relief of RVOT obstruction +/- pulmonary valve replacement
 - +/- takedown of previous shunts
- Pulmonary valve replacement (PVR) +/- RVOT reconstruction
- Aortic root replacement
- Heart transplantation

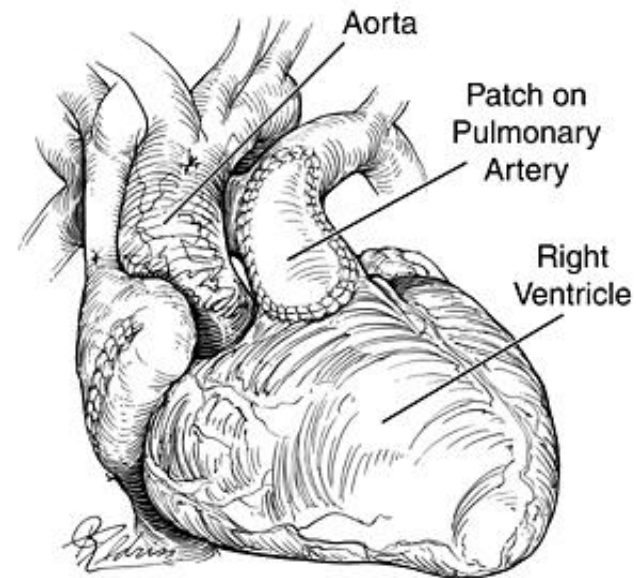
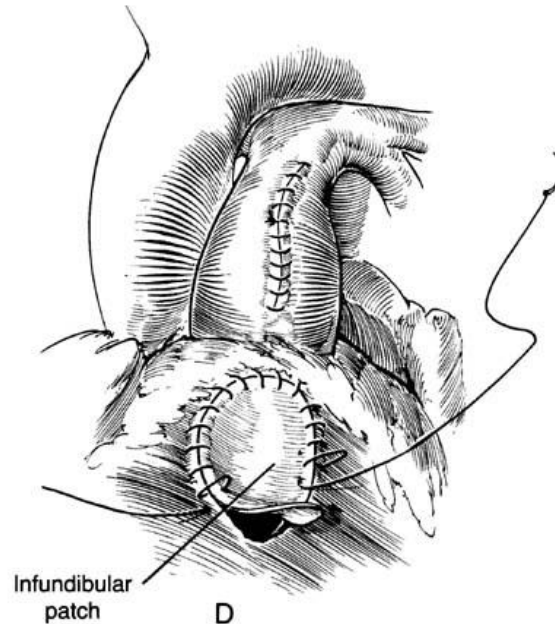
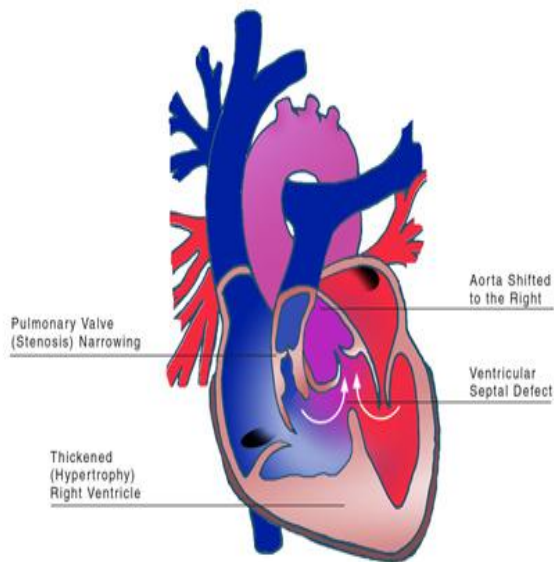
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Pulmonary valve replacement (PVR)

- Tetralogy of Fallot (TOF) corrective surgery
 - Relief of right ventricular outflow tract (RVOT) obstruction
 - Transannular incision

Heart Cross Section with Tetralogy of Fallot



PVR

- Chronic PR is a common problem after congenital heart surgery esp after TOF repair
- Chronic PR is strongly associated with late adverse events
 - RV dilatation, arrhythmia eg VT, sudden death
- Indications for PVR is really a balance between the risks of PVR surgery vs the benefits

PVR

- PVR does not improve survival & does not decrease the incidence of VT

Gengsakul A *et al.* Eur J Cardiothoracic Surg 2007;32:462-468

Harrild DM *et al.* Circulation 2009;119:445-451

- PVR improves symptoms, subjective exercise tolerance & functional class

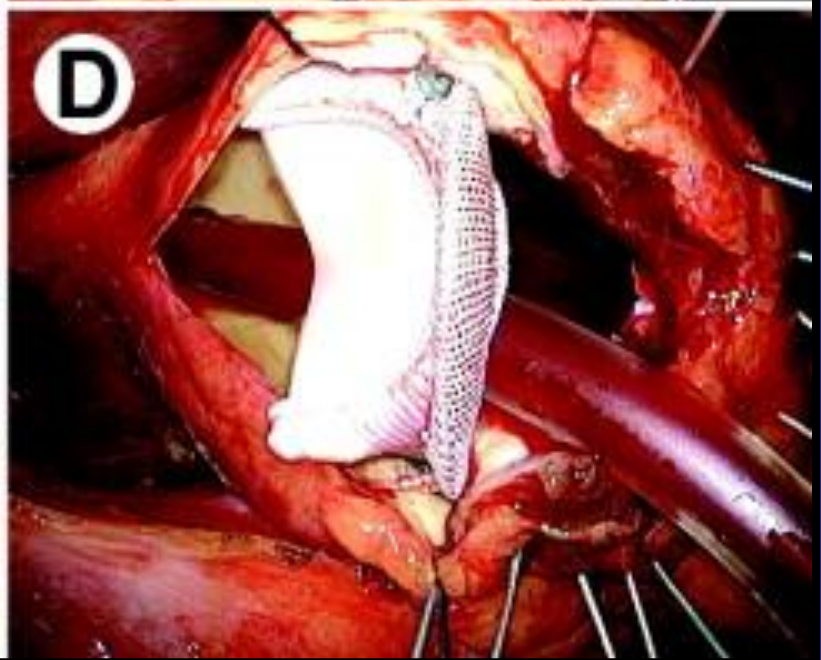
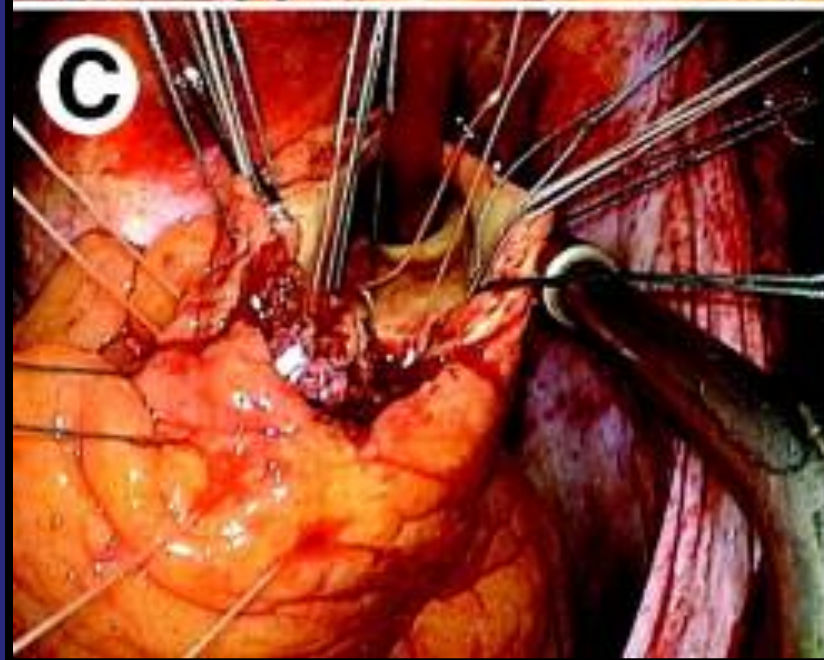
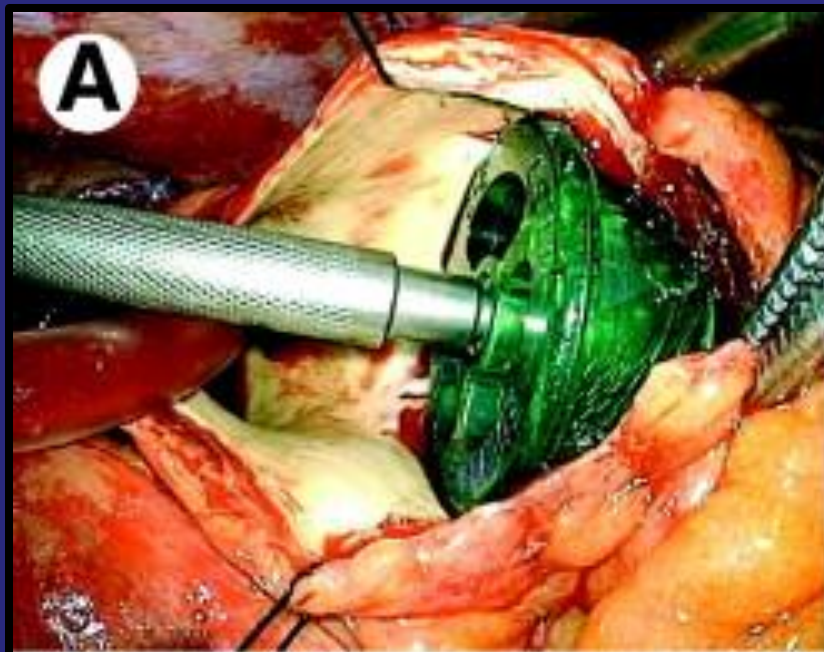
Discigil B *et al.* J Thorac Cardiovasc Surg 2001;121:344-351

Frigiola A *et al.* Circulation 2008;118(suppl 14):S182-S190

Eyskens B *et al.* Am J Cardiol 2000;85:221-225

Tsang FH *et al.* Hong Kong Med J 2010;16:26-30

- PVR reduces RV size in some patients





Our experience

- Jan 2002 to Dec 2012
- 64 patients
 - 1 patient has dysplastic pulmonary valve with severe PR
 - All other patients have previous TOF repair

| | |
|---------------------------|--|
| Male: Female | 43 : 21 |
| Age (years) | 23.94 +/- 10.49 |
| Weight(kg) | 50.28 +/- 13.77 |
| Indications for operation | Symptomatic patients (12.5%) Asymptomatic (87.5%) <ul style="list-style-type: none">- RV outflow tract obstruction (3.1%)- Severe PR (84.4%) |

Results

| | |
|---|-----------------|
| Time interval between TOF and PVR (years) | 18.13 +/- 8.15 |
| Pre-operative cardiothoracic ratio | 0.60 +/- 0.06 |
| Pre-operative QRS duration (ms) | 162.2 +/- 33.31 |
| Patients with pre-operative QRS > 180ms | 15 (23.44%) |
| Cardiopulmonary bypass time (mins) | 90.35 +/- 40.44 |
| Aortic cross-clamp time (mins) | 40.46 +/- 34.92 |
| Beating heart surgery | 18 (28.1%) |
| Hospital stay (days) | 10.56 +/- 4.88 |

Post-PVR improvement

| | Pre-PVR | Post-PVR | <i>P</i> |
|--|------------------|------------------|----------|
| QRS interval (ms) | 162.38 +/- 35.88 | 152.40 +/- 27.35 | 0.002 |
| Cardiothoracic ratio | 0.60 +/- 0.06 | 0.56 +/- 0.05 | < 0.001 |
| RV end-diastolic volume index (ml/m ²) | 194.51 +/- 46.57 | 106.36 +/- 32.47 | <0.001 |
| RV end-systolic volume index (ml/m ²) | 109.85 +/- 31.12 | 58.87 +/- 22.01 | <0.001 |
| RV ejection fraction (%) | 44.24 +/- 8.93 | 48.06 +/- 15.77 | 0.156 |
| VO ₂ max (ml) | 28.51 +/- 4.27 | 29.73 +/- 3.89 | 0.185 |

Our experience

- 1 mortality (1.5%)
- 1 patient with bleeding requiring exploration (1.5%)
- No other complications requiring surgical intervention
- Surgical PVR is a safe and effective way to correct chronic PR as a result of previous TOF repair

Summary

- TOF is the most common cyanotic congenital heart disease which survival to adulthood is possible
- Repaired vs unrepaired
- PVR – common surgical intervention required in adulthood after previous TOF repair
- Surgical PVR is a safe and effective procedure to correct chronic PR as a result of previous TOF repair