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

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
Types of operations

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

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

- PVR improves symptoms, subjective exercise tolerance & functional class
  
  Eyskens B et al. Am J Cardiol 2000;85:221-225

- 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

<table>
<thead>
<tr>
<th>Male: Female</th>
<th>43 : 21</th>
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<tbody>
<tr>
<td>Age (years)</td>
<td>23.94 +/- 10.49</td>
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<tr>
<td>Weight(kg)</td>
<td>50.28 +/- 13.77</td>
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| Indications for operation | Symptomatic patients (12.5%)
  - RV outflow tract obstruction (3.1%)
  - Severe PR (84.4%)
## Results

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

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<th>Pre-PVR</th>
<th>Post-PVR</th>
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<tr>
<td>QRS interval (ms)</td>
<td>162.38 +/- 35.88</td>
<td>152.40 +/- 27.35</td>
<td>0.002</td>
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<tr>
<td>Cardiothoracic ratio</td>
<td>0.60 +/- 0.06</td>
<td>0.56 +/- 0.05</td>
<td>&lt;0.001</td>
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<td>RV end-diastolic volume index (ml/m²)</td>
<td>194.51 +/- 46.57</td>
<td>106.36 +/- 32.47</td>
<td>&lt;0.001</td>
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<td>RV end-systolic volume index (ml/m²)</td>
<td>109.85 +/- 31.12</td>
<td>58.87 +/- 22.01</td>
<td>&lt;0.001</td>
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<td>RV ejection fraction (%)</td>
<td>44.24 +/- 8.93</td>
<td>48.06 +/- 15.77</td>
<td>0.156</td>
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<tr>
<td>VO₂ max (ml)</td>
<td>28.51 +/- 4.27</td>
<td>29.73 +/- 3.89</td>
<td>0.185</td>
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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