Preoperative dilatation of the right pulmonary artery is a risk factor for refractory respiratory complications late after the definitive repair of Tetralogy of Fallot with absent pulmonary valve

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Background
Refractory respiratory complication is not a rare condition late after definitive surgery of Tetralogy of Fallot with absent pulmonary valve (TOF/PVA).

Here we evaluated perioperative risk factors for the post-operative respiratory complications in TOF/PVA patients.

Enrolled patients
Twenty-one TOF/PVA cases who had undergone the definitive repair at our institute from 1/1/1987 to 31/12/2012.

Method
- Retrospectively perioperative clinical indices were analyzed from the medical record.
- Included indices: sex, age, body weight, body surface area (BSA), cardiac-thoracic ratio (CTR), days at definitive operation, type of operation (with/without plication of pulmonary arteries, type of RVOTR), hemodynamic values from cardiac echocardiography and catheter examination at preoperative and postoperative periods.
- Each pulmonary arterial index (PAI) is also calculated as below: RPAI (right PAI) was measured by angiogram or echocardiography LPAI (left PAI) was calculated same as RPAI.

Results

Patient profiles

<table>
<thead>
<tr>
<th>Sex (male: female)</th>
<th>8:13</th>
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<tbody>
<tr>
<td>Age at definitive repair</td>
<td>26.4 ± 10.4 (median 10.45 months)</td>
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<tr>
<td>- neonate (~30 days)</td>
<td>4 (54%)</td>
</tr>
<tr>
<td>- infants (~12 months)</td>
<td>1.1 (13%)</td>
</tr>
<tr>
<td>- child (1 year ~)</td>
<td>7 (33%)</td>
</tr>
<tr>
<td>Pre-operative catheter exam.</td>
<td>18 (86%)</td>
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</table>

Operative details

- Number of patients with PAI: 15 (92%)
- Type of RVOTR: valved conduit (VPR) 5 (24%), monopacaged patch (TPR) 16 (78%)
- Pre-operative respiratory failure: 13 (72%)
- Need for mechanical ventilation: 9 (43%)
- Post-operative catheter exam: 8 (67%)

Definition of clinically significant respiratory complication in this study
1. repeated admission from respiratory infection
2. mechanical ventilation over one month

Survival curve

- Overall Persistent respiratory complication: 8/21 (38%)
- Postoperative respiratory complication in the cases of preoperative respiratory failure: 8/15 (53%)

Summary of Results

From Fig. 1: Postoperative respiratory complication correlated with
1. Pre-operative respirator failure
2. Small body weight
3. Pre-operative RPAI from cardiac catheterization
4. Thoracic ratio

From Fig. 2: Postoperative respiratory complication had no significant correlation with
- Pre-operative catheter examination data
- Type of operation was not correlated with postoperative respiratory complications.

Discussion

- The postoperative respiratory complications were correlated to body weight, the preoperative respiratory failure, the dilatation of the right pulmonary artery from angiogram and decreased pulmonary vascular resistance.
- The post-operative outcomes could be improved by earlier surgical interventions before pulmonary vascular resistance decrease and marked dilatation of the right pulmonary artery develops.

Conclusion

- The postoperative respiratory complications were correlated to body weight, the preoperative respiratory failure, the dilatation of the right pulmonary artery from angiogram and decreased pulmonary vascular resistance.
- The post-operative outcomes could be improved by earlier surgical interventions before pulmonary vascular resistance decrease and marked dilatation of the right pulmonary artery develops.

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