Does the hypoplastic arch grow after resection of Coarctation and extended end-to-end anastomosis?

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Background

- Arch hypoplasia coexists in about 40% of children presenting with Aortic Coarctation.
- When Coarctation and aortic arch hypoplasia coexist with an intra-cardiac heart defect such as AVSD, one of the strategies involves a single stage correction of both intra and extra-cardiac defects through a sternotomy with the use of CPB. The other strategy being a 2 stage correction: Coarctation repair through a thoracotomy without use of CPB in the neonatal period and an intra-cardiac repair at around 3 months of age.
- The optimum strategy would be the one that leads to a perfect reconstruction of the arch (Roman shaped arch) facilitating an age correlated growth, minimal surgical stress on the brain development and a long lasting intra-cardiac repair.
- With these goals in mind, we studied the growth of the hypoplastic arch after a Coarctation repair through a left thoracotomy.

Clinical methods and surgical technique

- 25 patients with hypoplastic arch and Coarctation undergoing resection and extended end-to-end anastomosis, through a left posterior muscle sparing thoracotomy and without the use of CPB (out of a total of 139 consecutive Coarctation repairs performed between 2002-2010) were reviewed.
- Coarctation repair was performed using a muscle sparing left posterior thoracotomy and an extra-pleural approach.
- 6 patients successfully underwent intra-cardiac repair at the 2nd stage for sub-aortic membrane (2), AVSD (1), VSD(1), ASD(1), VSD and Mitral valve reconstruction (1).
- Median follow-up (Follow-up) was 82.3 (28.1-119.7) months.

Demographic and clinical data

- Retrospective analysis
- N: 25
- Median age: 7 (0-442) days
- Median weight: 3.1 (0.98-10) kg
- There was no early or late death.
- No patient needed surgical re-enlargement of the arch.
- 2/25 patients required balloon dilatation for Recoarctations each at 2 months postoperatively (Fig 1).

Results

- The below table and Fig 2 show the progression of Z value of the aortic arch
- All (barring 1) patients were free of antihypertensive medication.
- 3 patients had signs of LV hypertrophy, often due to association with bicuspid aortic valve, sub-aortic stenosis and AV septal defect.

<table>
<thead>
<tr>
<th>Preoperative Z value (transverse arch)</th>
<th>Postoperative Z value (transverse arch before discharge)</th>
<th>Z value of transverse arch at a median follow-up of 69 (3.4-118) months</th>
<th>Z value of transverse arch at a median follow-up of 97 (47-138) months * (Available in 16 patients)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4.6 (-9.4 to -1.4)</td>
<td>-3.5 (-7.6 to -0.5)</td>
<td>-2.6 (-7.3 to -0.6)</td>
<td>-2.4 (-5 to 1)</td>
</tr>
<tr>
<td>Median Weight 3.1 (0.98-10) kg</td>
<td>Median Weight 3.1 (0.98-10) kg</td>
<td>Median Weight 19.5 (9-44) kg</td>
<td>Median Weight 25 (13-53) kg</td>
</tr>
</tbody>
</table>

Conclusion

- The hypoplastic arch grows with age after resection and extended end-to-end anastomosis, but some arches remain small for age.
- Most of the arches tended to grow to a Z value < -3 at last follow up.
- It was gratifying that most of the patients were free of antihypertensive medications.
- Further studies are underway to identify the morphological subgroup with small proximal arch diameter that may be best corrected through a sternotomy and use of CPB.