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Coarctation of the aorta with aortic arch hypoplasia: Tackle from the front or the side?

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Abstract

This is a commentary on a single-institution retrospective review that describes the short-term outcomes of the pediatric patients who underwent re-operative surgery for residual or recurrent coarctation after a previous coarctation repair. There were 51 patients over 12 years.

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Coarctation of the aorta with aortic arch hypoplasia: Tackle from the front or the side?

In their single-institution retrospective review, Egunov and colleagues describe the short-term outcomes of the pediatric patients who underwent re-operative surgery for residual or recurrent coarctation after a previous coarctation repair [1]. There were 51 patients over 12 years. The indication for the operation was the recurrence of coarctation with a significant gradient as measured by the arm to leg blood pressure difference or by echocardiography and presence of an associated transverse arch hypoplasia (Z score [?] -2). Thus, these patients were unsuitable for a percutaneous approach or re-operative surgery via a left thoracotomy [2]. Hence, the approach was via a median sternotomy using moderate hypothermia and antegrade cerebral perfusion. 14% of the patients underwent re-operative median sternotomy, and all these had their first surgery

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as a neonate. Prosthetic patch aortoplasty (45%) was the most common re-repair technique used, followed by a resection with an extended end-to-end anastomosis (29%) and an interposition graft implantation (25%). Their outcomes were excellent, with no operative mortality and no residual coarctation. The only morbidity recorded was the occurrence of chylothorax. At a median follow-up of 2 -years, there were no recurrences or any mortality. Also, there was a resolution of systemic hypertension in most patients.

For the first operation, thoracotomy was the most common approach (73%), whereas sternotomy was used in 14% of the patients, all of whom were neonates. Resection and end-to-end anastomosis was the most common technique used (63%), and for patients below one year of age, it was used in 85% of the cases. Other techniques used were prosthetic patch aortoplasty (16%) and interposition graft insertion (8%). As expected, interposition graft was used in children > five years of age. Interestingly, 14% of the patients had balloon dilation as the first intervention for the coarctation, including a neonate.

The occurrence of re-coarctation was analyzed using time interval clusters of less than one year, 1 to 5 years, 5 to 10 years, and later than ten years. There was a similar incidence of 20 to 30% in the first three clusters each, and there was a drop to 15% when the recurrence occurred beyond ten years. Thus, recurrence of coarctation is a time-dependent variable with similar risk up to 10 years and a drop after that. Patients, who had a rapid recurrence within a year, as expected, were infants at a median age of 5 months of age and were more likely to have an end-to-end repair from the side and could be re-repaired with an end-to-end repair but from the front. Very few needed a prosthetic patch angioplasty.

The independent risk factors for re-intervention after a coarctation repair in this study are in line with previous studies, such as younger age at operation, presence of associated arch hypoplasia, and the type of the initial operation [2, 3, and 4]. More than 50% of the patients were less than one year of age at the initial operation in this series. These patients have the steepest of somatic growths, and thus repaired segments of the aorta may not catch up, leading to a recurrence. Unaddressed transverse aortic arch hypoplasia is another risk factor for reoperation, and all the patients in this series had transverse arch hypoplasia (Z score[?] -2). As previously mentioned, thoracotomy and end-to-end anastomosis was the most common first procedure, and it does not directly address proximal transverse aortic arch hypoplasia. However, information about the severity of the hypoplasia at the initial presentation is unknown in this study as thoracotomy and end to end anastomosis is still an acceptable approach when the proximal transverse arch hypoplasia is less than moderate (Z score> -4 to- 5), in which case the arch hypoplasia can improve with time [3,4]. Besides, patients receiving a reoperation in this series had the first operation at *variousoutside* centers, and thus the *denominator* is unknown, leading to a skewing of the outcomes. The use of cardiopulmonary bypass with selective cerebral perfusion does carry an additional risk beyond an off-pump technique from the side due to stroke risk, end-organ injury, and possible impact on neurodevelopmental outcomes and this should be taken in to consideration when electing a midline approach [3, 5].

Inadequate technical repair at the first operation may be responsible for the need for a reoperation as 14% of the neonates did have a midline approach, and this approach should have adequately addressed the concomitant arch hypoplasia. The risk factor could have been an inadequate resection of ductal tissue, use of patch material that is susceptible to shrinkage, and inability for the repaired segments to catch up with tremendous somatic growth. Arch augmentation from the front is thus not entirely recurrence risk-free [1, 3]. The authors in this series have used a PTFE patch, which has a lesser susceptibility for contraction and reactive residual ductal tissue is not a factor in reoperations. Recurrence of coarctation is a time-dependent outcome as shown in this study and other studies, and hence a follow-up beyond the current median of 2 years is required to evaluate continued success of this series [1, 2].

In conclusion, coarctation resection via a thoracotomy approach should still be considered especially when there is less than moderate transverse arch hypoplasia. In cases where there is a lack of expectant growth, a reoperation from the front can be performed with excellent outcomes, as shown in this study.

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