

Aortic uncrossing procedure: When the right becomes left



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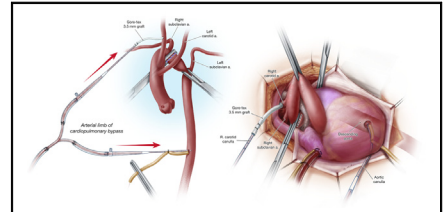
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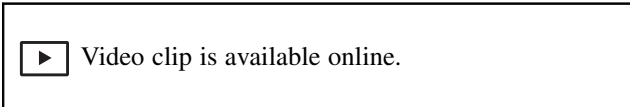


Dual arterial cannulation in infants is a useful technique to avoid circulatory arrest.

CENTRAL MESSAGE

Aortic translocation for circumflex aorta causing tracheobronchial compression can be performed safely on a beating heart using normothermic cardiopulmonary bypass via dual arterial cannulation.

See Commentary on page 243.



The first description of aortic uncrossing was in 1984 by Planché and LaCoeur-Gayet.¹ This procedure allows translocation of the retroesophageal aorta (Figure 1, A and B) anterior to the trachea (Figure 1, C and D), thus alleviating the airway compression. The aortic arch then changes from being right sided to a left sided, relative to the airway. We present the technique in a 7-month-old girl with a vascular ring consisting of a right aortic arch with mirror-image branching and a left-sided descending aorta and left ligamentum, using normothermic cardiopulmonary bypass (CPB) (Figure 2).

SURGICAL TECHNIQUE (VIDEO 1)

Intraoperative bronchoscopy was performed to evaluate the airway (Figure 3, A). After sternotomy and adequate mobilization of ascending aorta, arch and branches, CPB was initiated via dual arterial cannulation (right common carotid and descending aorta) at normothermia. Left ligamentum arteriosum was divided. A side-biting clamp was placed on the proximal descending aorta, and another 1 just after the takeoff of the right subclavian artery. The proximal arch was then transected and

the proximal end was over sewn. The arch was then brought from its retroesophageal position anteriorly where it was anastomosed in an end-to-side fashion to the distal ascending aorta (Figure 4). Clamps were removed and the patient was weaned off CPB. Repeat bronchoscopy showed complete relief of airway compression (Figure 3, B). The patient was extubated in the operating room and the postoperative course was uneventful. Permission from the parents to publish this case was obtained.

DISCUSSION

Circumflex aorta should be addressed when present with other vascular ring variants to avoid recurrence of symptoms and repeat operation.² The procedure can be performed safely on a beating heart without circulatory/cardioplegic arrest³ using the technique of dual arterial cannulation (Figure 5).⁴ We used the same size cannula for both upper and lower body perfusion, leaving it up to each organ’s vascular resistance to regulate its own blood flow. We did not feel the need for concomitant

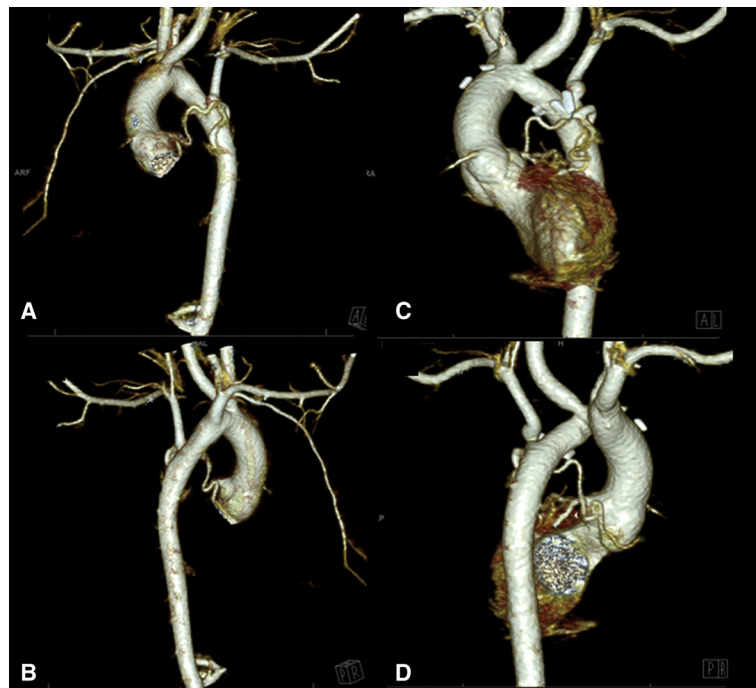


FIGURE 1. A through D, Computed tomography scan with 3-dimensional reconstruction, front and back views, comparing the circumflex aorta before (A and B) and after (C and D) the uncrossing.

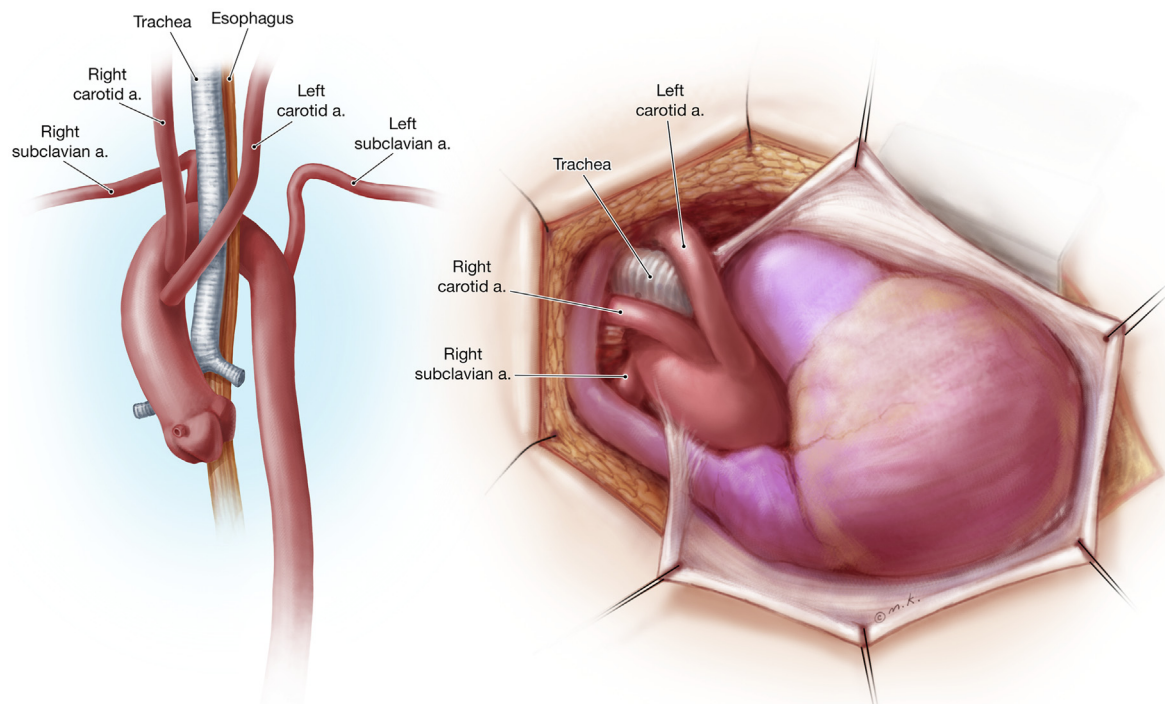


FIGURE 2. Illustration showing the anatomy of the aortic arch in the current case. Right aortic arch with retroesophageal circumflex aorta. The order of branching are left common carotid, followed by right common carotid, right subclavian, and left subclavian arteries. Trachea and esophagus are encircled between the left ligamentum, right arch, and retroesophageal circumflex aorta.

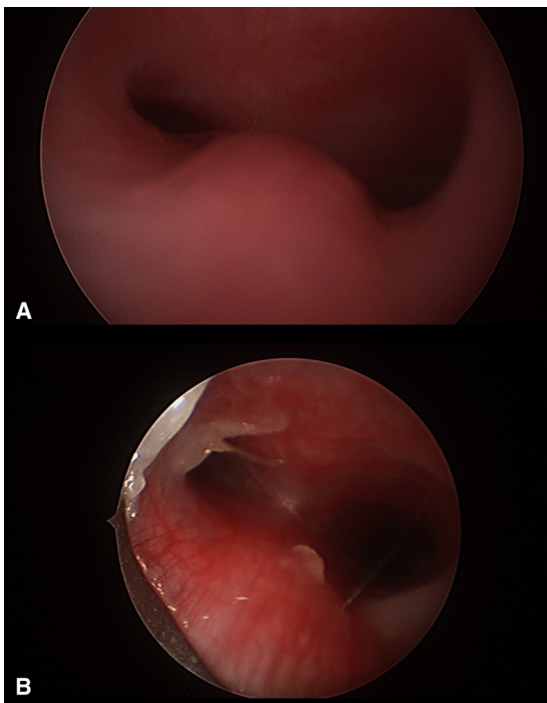
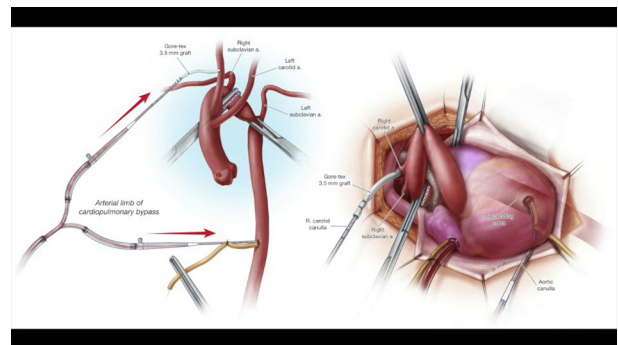


FIGURE 3. A and B, Intraoperative bronchoscopy before (A) and after (B) the uncrossing procedure showing complete relief of the tracheobronchial compression.



VIDEO 1. This video demonstrates the surgical technique of aortic uncrossing in a 7-month-old infant who had severe tracheobronchial compression due to circumflex aorta. The procedure was performed on beating heart at normothermia with complete relief of airway compression. Video available at: [https://www.jtcvs.org/article/S2666-2507\(20\)30525-3/fulltext](https://www.jtcvs.org/article/S2666-2507(20)30525-3/fulltext).

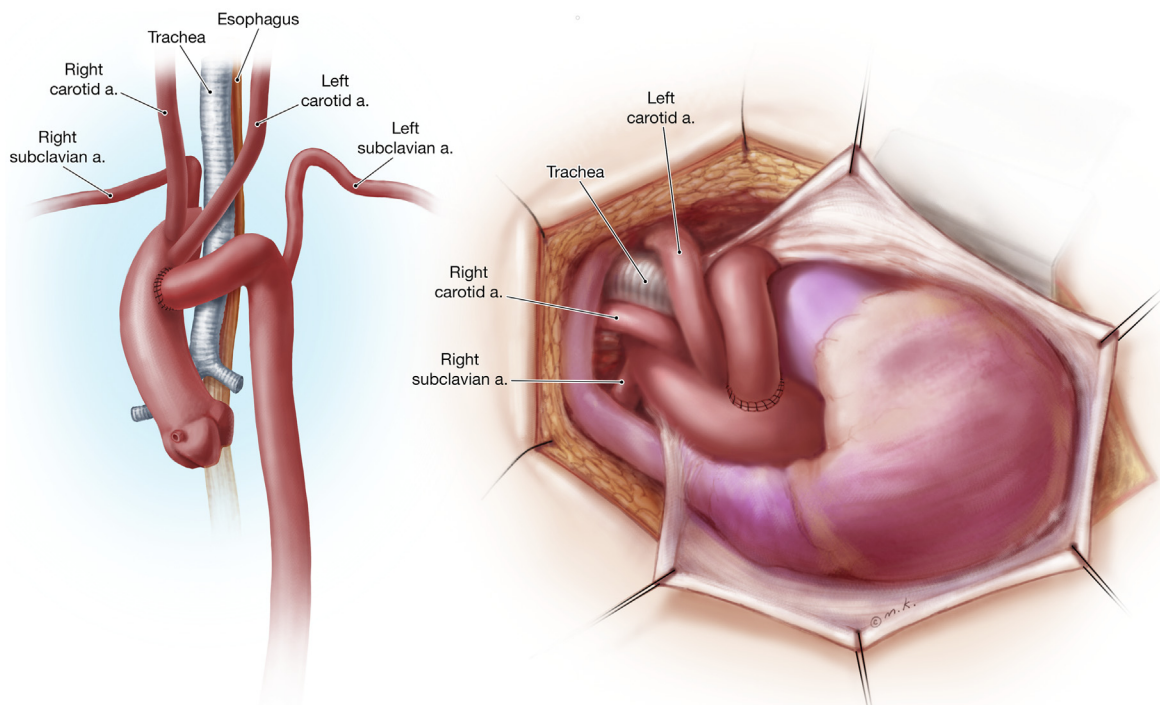


FIGURE 4. Illustration showing the postoperative result after the uncrossing procedure where the right arch simply becomes a left arch.

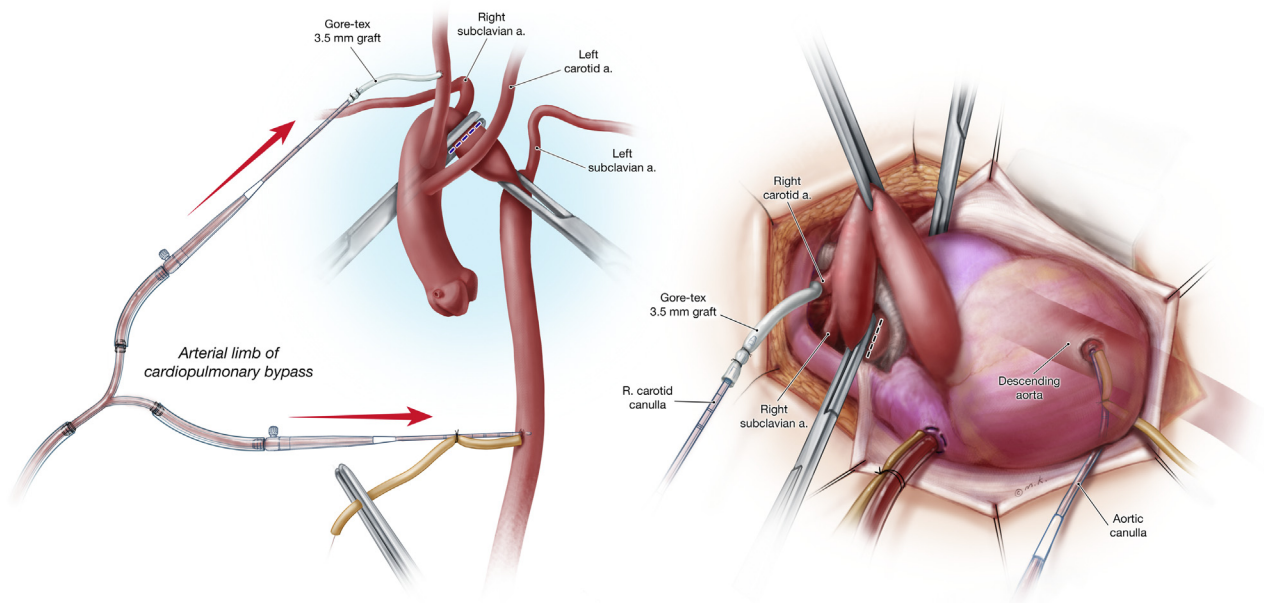


FIGURE 5. Dual arterial cannulation in infants is a useful technique to avoid circulatory arrest.

tracheobronchopexy due to the complete resolution of airway compression.⁵

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