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Commentary: Surgical management of persistent respiratory symptoms after vascular ring division

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CENTRAL MESSAGE

The aortic uncrossing procedure is an effective adjunctive surgical technique to address residual respiratory symptoms in patients who have undergone repair of a circumflex aorta or double aortic arch.

The persistence of presenting symptoms after vascular ring repair is increasingly recognized as an important outcome measure for what many referring physicians consider a relatively straightforward surgical procedure. More than 2 decades ago, Backer and colleagues¹ reported 8 patients with persistent respiratory or feeding difficulties after repair of right aortic arch variants of true vascular ring anomalies. This landmark publication recognized the impact of not addressing the diverticulum of Kommerell during the initial surgical repair, focusing only on division of the ligamentum arteriosum. The authors described a novel surgical approach to the treatment of right aortic arch variants, namely diverticulum resection and left subclavian artery transfer in addition to division of the ligamentum arteriosum. All of the patients in this series had resolution of their symptoms. Contemporary single-center experience describes 45% to 65% of patients with persistent respiratory or feeding difficulties after repair of complete vascular rings.² This lack of symptom relief is startling, considering the

historical reports regarding this issue. As this phenomenon becomes more recognized by tertiary referral centers, other centers are critically evaluating their results. Binsalamah and colleagues³ reported a single-institution experience of 148 true vascular ring repairs more than 25 years. The operative survival was exceptional, but the freedom from reoperation at 10 years was only 86%. In 5.5% of patients, the need for reoperation was attributed to failure to resect the diverticulum of Kommerell during the initial surgical procedure.

In this issue of the *Journal*, Kamran and colleagues,⁴ like Backer and colleagues in the late 1990s, continue to raise awareness about the etiology of persistent symptoms after repair of certain types of complete vascular rings. In their report, the authors address approaches to complete symptom relief in patients presenting with a circumflex aorta or double aortic arch variant of a

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complete vascular ring. The patients can have tracheal or bronchial malacia or deformed cartilage rings with tracheal stenosis leading to incomplete resolution of presenting symptoms with standard surgical techniques. From a diagnostic standpoint, rigid intraoperative bronchoscopy was critical to identify these residual lesions and allowed patient-specific surgical management. The stated goal was to produce an airway where more than 50% of the luminal diameter is free of extrinsic compression. In their report, the techniques used to accomplish this included the aortic uncrossing procedure, anterior or posterior tracheobronchopexy, or slide tracheoplasty. It is important to emphasize that these additional procedures are adjuncts to the standard surgical approach for each type of vascular anomaly. For example, in patients with a double aortic arch variant of a circumflex aorta, the aortic uncrossing procedure was undertaken after division of the nondominant arch and ligamentum arteriosum. Patients who continued to demonstrate

significant airway compromise had additional surgical procedures based on the anatomy of the patient's airway. The 3-phase bronchoscopy advocated by the authors should be a central component of how congenital heart surgeons manage patients with a circumflex aorta or double aortic arch who may not be as straightforward as once thought.

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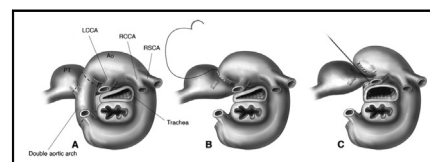
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Commentary: A long haul and a short slide?

Michael E. Mitchell, MD

In "Aortic Uncrossing and Tracheobronchopexy Corrects Tracheal Compression and Tracheobronchomalacia Associated with Circumflex Aortic Arch," Kamran and colleagues¹ make a strong case for a significant upgrade in the intensity of surgery versus a traditional approach for a subgroup of patients requiring surgical relief of severe airway compression due to a circumflex aortic arch. Their argument is carefully constructed, and the



Anterior tracheal suspension for severe tracheomalacia from circumflex aortic arch.

CENTRAL MESSAGE

Aortic uncrossing, combined with advanced tracheal procedures, might play an important role when performed correctly and applied selectively.

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anatomic drawings and honesty of their presentation are excellent.

The authors identify that patients with severe respiratory symptoms and circumflex aortic arch are the patients in whom traditional repair of the vascular ring will tend