

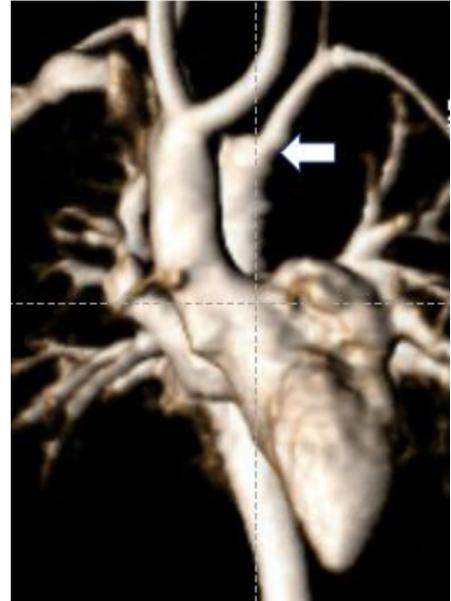
A Few Things About Rings



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The authors describe a surgical technique for resection of the diverticulum of Kommerell and reimplantation of the left subclavian artery in a 4-year-old patient with a right aortic arch and aberrant left subclavian artery. A summary of their technique is as follows: placement of bilateral radial arterial lines, use of transcranial Doppler, approach via left posterolateral thoracotomy (third interspace), division of the ligamentum arteriosum; next, identification and temporary clamping of the left carotid artery with evaluation of transcranial Doppler for decreased flow; then, a similar exercise is done to the left subclavian artery, followed by clamping of both the left carotid artery and the left subclavian artery; once a stable cerebral circulation is assured as evaluated by transcranial Doppler, the diverticulum of Kommerell is resected using a side-biting clamp on the aorta; aneurysmal tissue is resected, the left carotid artery is clamped, and the left subclavian artery is implanted into the left carotid artery in an end-to-side fashion.

This manuscript, and the topic in general, generates debate about what is the appropriate therapy in a child for right aortic arch, aberrant left subclavian artery with diverticulum of Kommerell, and left ligamentum arteriosum. First, is division of the left ligamentum enough; or, does the diverticulum of Kommerell need to be resected and the left subclavian artery anastomosed to the left carotid artery? Backer et al recommend the latter in patients with a diverticulum of Kommerell 1.5 times the size of the left subclavian artery and posterior pulsation of the trachea on *preoperative* bronchoscopy—that is, with the vascular ring still completely intact.¹ It is not explained how or why 1.5 times the size of the left subclavian was chosen. And, one has to wonder what the bronchoscopy would reveal after the left ligamentum was divided. The same group mentions excellent separation of the stumps of the ligamentum as >1.5–2.0 cm.¹ It is unclear how these limits on successful separation were chosen. Luciano et al also advocate primary resection of the diverticulum of Kommerell and reimplantation of the left subclavian artery into the left carotid artery for *all* patients, regardless of the size of the diverticulum of Kommerell.² They did not report the size of the diverticulum in any of the patients. One surgical technique that none of the manuscripts mention, including the one in this issue by Bidar et al, is pexy of the aorta



Three-dimensional reconstruction of magnetic resonance imaging of right aortic arch, aberrant left subclavian artery, and diverticulum of Kommerell. Arrow identifies diverticulum of Kommerell and origin of left subclavian artery.

Central Message

Treatment of aberrant left subclavian artery and diverticulum of Kommerell is controversial. Approaches include ligamentum division or the more aggressive diverticulum resection and subclavian reimplantation.

or base of the left subclavian artery (usually safely done at the stump of the ligamentum) to the prevertebral fascia. This will increase the separation of the divided ends of the ligamentum and the separation of the aorta and left subclavian artery from the trachea and esophagus.

Another important question when dealing with this lesion is the following: does resection of the diverticulum and reimplantation “cure” the patient and lower the risk of aortic aneurysm/rupture and/or dissection? Studies in adult patients undergoing operation of diverticulum of Kommerell suggest the answer to this question is likely no. Medial degeneration or necrosis is commonly found not only in the resected diverticulum of Kommerell specimens, but also in the *aortic specimens* of adults undergoing

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resection of diverticulum of Kommerell along with aortic reconstruction of that area with an interposition graft.³ This suggests the approach championed in the paper by Bidar et al, and others mentioned above (Backer and Luciano), results in an incomplete resection of pathologic aortic tissue. Lifelong aortic surveillance of these patients is warranted. Also, advancements in surgical technique have allowed for endovascular treatment of some adult patients with diverticulum of Kommerell and aberrant left subclavian arteries.⁴ An endovascular approach to the diverticulum along with carotid artery to subclavian artery bypass is an acceptable alternative to open repair with cardiopulmonary bypass and possible use of circulatory arrest.

Also, the surgical technique described by Bidar et al is not completely benign. Structures including the vagus nerve, phrenic nerve, thoracic duct, and sympathetic chain are at risk. And, morbidity including diaphragm paralysis, chylothorax, and ptosis has been reported.

It might be that the best initial operation is ligamentum division and aortopexy. If the diverticulum is large (as large as the descending aorta or larger—based on no data because it doesn't exist—but based on the unparalleled experience of an experienced senior surgeon that is now retired) resection of the

diverticulum and reimplantation into the left carotid artery might be indicated. Regardless of which of these is done, all patients should have aortic surveillance to monitor for increased size of the diverticulum and/or aorta. Because it has been shown that the entire segment of aorta near the diverticulum can demonstrate medial degeneration/necrosis, neither of these 2 initial operations completely treats the aortopathy and completely eliminates the possibility of aneurysm and/or dissection. Once adult size, some patients are candidates for less invasive repairs.

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