Commentary: Moving the goalposts in arch replacement

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Central Message

Since it was first described by Hans Borst in 1983, the elephant trunk procedure has undergone a number of modifications that have extended its applicability and ease of performance.

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The traditional surgical approaches to the distal aortic arch and proximal descending thoracic aorta were the choice between the single-stage arch-first approach¹ and a 2-stage procedure. With the latter, the second-stage procedure was fraught with difficulty and complications, and it often required a period of circulatory arrest. Improvements came with the introduction of the elephant trunk procedure, which created a free extension of prosthetic graft into the distal aorta, thereby eliminating the proximal suture line in the second stage and making the subsequent procedure easier.² Thirty-years after describing this procedure, Hans Borst³ reflected on the number of modifications and simplifications of his original technique and remarked, “There probably is no method that cannot be improved.”

Improved it was. Svensson⁴ invaginated the graft to make the distal anastomosis easier to perform. A modification by Suto and colleagues⁵ described the use of a distal stent in conjunction with an elephant trunk, paving the way to the current frozen elephant trunk approach.⁶ Taniguchi and associates⁷ described a modified conventional elephant trunk technique for both aneurysmal disease and dissections, with the proximal extent being at the take-off of the innominate artery. Their approach involved a long trunk and was associated with 4% incidence of paraplegia or paraparesis.

In this issue of the *Journal*, Yamamoto and colleagues⁸ present a variation on the theme, combining the proximal extent described by Taniguchi and associates⁷ with the frozen elephant trunk technique in their approach to type A dissections. As with the traditional frozen elephant trunk for dissections, obliteration of the proximal false lumen ideally will lead to favorable aortic remodeling downstream. Circulatory arrest with selective cerebral perfusion is still required, as are exposure, dissection, and mobilization of the arch vessels. The technical benefits of this approach are the elimination for extensive arch resection and the avoidance of performing the distal

anastomosis in what can sometimes be a deep hole. Although an experienced aortic surgeon can usually secure the distal suture confidently, bleeding from this suture line can be problematic and difficult to address. This concern is lessened by moving the suture line farther proximally. In addition, mobilization of the neurovascular structures traversing the arch near the distal suture line, that is, the phrenic and vagus nerves, is no longer necessary. Interestingly and promisingly, the incidence of spinal cord injury was 0% in these patients. Whether this is a reflection of the modified technique remains to be determined.

Evolution of techniques should be the rule and not the exception in our profession. Borst’s observation³ remains as cogent today as it was when he wrote it in 2013.

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