Ensuring proper leaflet apposition during mitral valve repair

To the Editor:

The recent contribution of Anyanwu and Adams¹ correctly emphasizes the importance of adequate mitral leaflet apposition in ensuring a low-stress, durable repair of mitral insufficiency. This is the central concept of a technique known as the “American Correction.”^{2,3} In this approach, the desired amount of leaflet apposition is marked by placing dots on each leaflet along the proposed line of apposition during the repair. Areas of prolapsed leaflet edge are corrected with polytetrafluoroethylene chordae. The length of these chordae is adjusted to produce symmetry of the leaflet edges, but the chordae are not yet tied down. The second stage of the procedure involves the adjustment of the depth of leaflet apposition. This is accomplished by displacing the posterior mitral annulus forward with stay stitches in the posterior mitral annulus (Figure 1). Simultaneously, the left ventricle is inflated with saline to simulate end-diastolic conditions. This has been facilitated by the use of a laparoscopic motorized suction irrigator device. Any fine tuning of leaflet alignment can now also be accomplished. With the final leaflet adjustment made and the chordae tied down, with the ventricle

still inflated, a flexible ring is chosen that matches the circumference of the mitral annulus. A 5- to 10-mm line of apposition is routinely achieved by this technique.

The “American Correction” has been used in more than 900 patients with up to 20 years of follow-up. A detailed description of the technique and surgical videos are available at www.geraldawriemd.com. In view of the inconvenience of having to revise a completed repair if the result is unsatisfactory, this technique provides an alternative approach that ensures that predictable leaflet apposition can be achieved during the course of the procedure.

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Figure 1. Left, Leaflet edges are aligned but apposition is not yet adjusted. Right, The posterior annulus is displaced forward by the posterior annular stay stitches, producing the desired degree of apposition as shown by the position of the dots.

Reply to the Editor:

We are aware of Dr Lawrie’s approach to degenerative mitral valve repair and note that it adopts the key foundation of Carpentier’s French correction, which is the restoration of a symmetric and long line (depth) of leaflet coaptation. We have found Carpentier’s valve reconstructive techniques to be applicable in 100% of complex degenerative cases¹ and note that they are associated with excellent 25-year durability.² We await Dr Lawrie’s report on his more than 900 cases with up to 20 years’ follow-up.

We³ have previously recommended adjusting the length of polytetrafluoroethylene neochordae under saline testing and also agree that marking leaflets with ink before adjustment is useful, particularly in localized prolapse, to provide an additional visual aid to closure line symmetry. We would emphasize that we are not using the ink test to guide “revision” of a completed repair but rather as a final control of the quality of our repair before the postbypass assessment by intraoperative transesophageal echocardiography. Not only is the ink test relevant in degenerative disease (type I or type II dysfunction), but it is also helpful in the case of restricted leaflet motion (type IIIa or IIIb dysfunction).

Mitral valve repair shares some similarities to a golf swing. At the professional level of golf, how one takes the club back or starts the downswing is not what is most critical: it is the optimal relationship of club and ball at the moment of impact. Likewise, we believe it is becoming clear that the most important aspect of mitral valve repair is depth and location of the closure line between the anterior and posterior leaflets during systole and that this position be stabilized by an annuloplasty that respects the amount of leaflet tissue. How one arrives there, like the backswing in golf, is probably less important so long as an optimal coaptation line is achieved in an easily reproducible and durable fashion.

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Ascending aortic cannulation in acute type A aortic dissection: Is intraoperative brachiocephalic malperfusion a possibility?

To the Editor:

I read with great interest the recent article by Dr Jakob and colleagues¹ detailing their pilot experience with direct cannulation of the ascending aorta in acute type A dissection (n = 8: 5 with preoperative cerebral malperfusion). Their method entailed primary venous exsanguination, cannulation of ascending aortic true lumen under direct vision, controlled deairing, followed by standard cardiopulmonary bypass after proximal aortic clamping.

The clinical consideration here is whether this cannulation technique protects against brachiocephalic malperfusion, given that 5 of 8 patients presented with brachiocephalic dissection and cerebral malperfusion in the setting of true lumen pulsatile perfusion.

The following questions relate to this consideration:

1. What intraoperative monitoring was used to detect brachiocephalic malperfusion?
2. Were any episodes of brachiocephalic malperfusion detected intraoperatively? If so, how were they managed?
3. Was surgical intimal fenestration above the ascending aortic clamp ever required to restore adequate brachiocephalic perfusion? In our practice, this management technique has been used successfully to correct innominate malperfusion detected intraoperatively by transcutaneous scanning of the right carotid artery.²
4. Was epiaortic ultrasound guidance for cannulation of the dissected

ascending aorta ever considered? This imaging technique has been used successfully in this scenario.³ It can also confirm correct placement of the arterial cannula.

I congratulate the authors again on a fine study. I look forward to their feedback about these intraoperative considerations.

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Reply to the Editor:

We appreciate Dr Augoustides' important and meaningful questions regarding brachiocephalic dissection and cerebral malperfusion in the surgical treatment of patients with acute type A aortic dissection.

To provide specific answers, we follow his questions as raised after specifying the baseline situation in our 8 patients: All patients came in with a computed tomographic scan diagnosis obtained elsewhere. Six patients demonstrated dissection of the brachiocephalic trunk, 2 of them hemodynamically in highly unstable condition with tamponade. In 2 patients, no dissection of the truncus was seen, but severe instability and cardiac tamponade was observed in 1 patient. Five patients had clinical signs of cerebral malperfusion, and 1 patient was found unconscious and was intubated before arrival. Thus, brachiocephalic malperfusion was present before surgery in at least 5 pa-

tients, confirmed in all by computed tomographic scan.

1. Intraoperative monitoring to detect brachiocephalic malperfusion consisted of bilateral monitoring of radial artery pressure in all but 1 of the highly unstable patients, forcing immediate surgery. To date, no transcranial Doppler or transcutaneous scanning of the carotid arteries has been used.
2. No intraoperative episodes of new brachiocephalic malperfusion were detected. Validation of this simplistic statement can be given in part by the open approach we used: After exsanguination and opening of the ascending aorta, including the retracted intimal sac, the aortic arch could be inspected directly with both head vessels exposed for some seconds. By placement of the aortic cannula in the mid arch position within the true lumen under direct vision and controlled deairing followed by clamping of the ascending aorta adjacent to the cannula, we were able to immediately exclude the primary tear in the ascending aorta, including the blown up false lumen, which primarily caused the obstruction of the brachiocephalic trunk. Distal repair was performed after the target temperature had been reached and after a short period of circulatory arrest and selected cannulation of the brachiocephalic trunk. Backflow via the left carotid artery gave additional information of patency of the right carotid artery. The left carotid artery was cannulated immediately thereafter.
3. The aforementioned surgical strategy of immediate exclusion of the primary aortic tear, including the blown up false lumen, obviated any intimal fenestration above the aortic clamp, even in the presence of a re-entry site in the aortic arch. In the 7 patients with bilateral radial artery pressure monitoring, identical pressures were seen throughout cooling.
4. Occasional dismal experience has been incurred with "blind" direct ascending aortic cannulation in emergency situations, with thrombotic material from the false lumen being