CONCLUSIONS

We describe ultrasound visualization of the left circumflex artery by direct endocardial scanning of the mitral annulus during surgery.

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EDITORIAL COMMENTARY

Intraoperative endocardial ultrasonography: Improving safety in mitral valve surgery

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Injury to the circumflex coronary artery during mitral valve surgery is a dangerous but fortunately rare complication of mitral valve surgery.¹ The circumflex coronary artery courses in proximity to the mitral valve annulus and is therefore at risk for injury during mitral valve surgery. Anatomic and computed tomographic studies have demonstrated that the distance between the annulus and the artery ranges from 0.4 ± 3.6 to 4.8 ± 3.6 mm, with the closest point being in the posterior annulus near the anterolateral commissure, which is the most common site of injury (Figure 1).²

Injury to the circumflex artery occurs more commonly in patients with left dominant coronary circulation. The mechanisms of injury include (1) direct injury by either encircling or transfixing the artery, (2) vascular distortion secondary to changes in annular size or shape, and (3) external compression. Such injury may lead to complete or partial arterial occlusion, kinking, or spasm.¹

Prevention of this complication includes the identification of the course of the circumflex artery in the preoperative coronary angiogram and in the intraoperative transesophageal echocardiogram and the correct placement of annular sutures. Multidetector computed tomography, although not routinely done, may be very useful.

Circumflex coronary artery and mitral valve annulus (MVA).

Central Message

Intraoperative localization of the circumflex coronary artery with endocardial ultrasound in patients at increased risk for circumflex injury may further increase the safety of mitral valve surgery.

See Article page 53.

In this issue of the *Journal*, Abe and colleagues³ describe the use of endocardial ultrasonographic scanning of the posterior mitral valve annulus to identify the location of the circumflex artery and its distance from the annulus. This is done with an epicardial ultrasound probe, which is readily available in most operating rooms and with which most surgeons are familiar. Minimal additional training thus would be required to scan the mitral annulus searching for the circumflex coronary artery; however, the identification of the artery in the arrested and empty heart without coronary flow may not be always easy.

FIGURE 1. Coronary angiogram showing the proximity of the circumflex coronary artery to the mitral valve annulus (MVA).

There were more than 24,000 isolated or combined mitral valve surgeries in 2015.⁴ The reported incidence of circumflex artery injury is 0.5% to 1.8%.¹ Scanning the mitral valve annulus in every mitral valve procedure may be unnecessary, adding costs and prolonging the surgery for the potential prevention of only 120 to 500 circumflex injuries per year. Selective scanning of patients at high risk of injury may be more cost-effective. Unfortunately, the evidence that identifies patients at increased risk for this complication

is weak.¹ Patients at high risk may include (1) those with a left dominant circulation in which the circumflex coronary artery runs close to the atrioventricular groove in the coronary angiogram or in the intraoperative transesophageal echocardiogram, (2) those who require an extensive annular débridement for either calcification or infection, (3) those set to undergo suture closure of the left atrial appendage, and (4) those in whom there is a mismatch between the mitral annulus size and the prosthesis size. In addition, ultrasonographic scanning may be useful after the placement of the mitral annulus sutures to assure the surgeon that the artery has not been compromised.

Mitral valve surgery is a very safe procedure, with an operative mortality that ranges from 1.1% for isolated valve repair to 9.8% for combined mitral valve replacement and coronary artery bypass grafting.⁴ Intraoperative localization of the circumflex coronary artery with endocardial ultrasonography in patients at risk may increase the safety of the procedure even further.

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