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EDITORIAL COMMENTARY

Getting to the heart of the matter

Donald Glower, MD

See related article on pages 877-84.

In a study reported in this issue of the *Journal*, Bhaya and colleagues used speckle tracking echocardiography (Figure 1) to examine the effect of antegrade cardioplegia alone versus integrated cardioplegia on left ventricular function 4 to 5 days after cardiac surgery. Integrated cardioplegia was performed as antegrade and retrograde cardioplegia combined with a terminal hot-shot dose. The study was limited by being relatively small and nonrandomized, with differences in baseline characteristics and the operating surgeons between the groups. Bhaya and colleagues concluded that these

findings indicate that integrated cardioplegia offers superior myocardial protection to that of antegrade cardioplegia alone.

Although the debate about antegrade versus retrograde cardioplegia is not new, these data are among the few that have been able to differentiate between different means of myocardial protection in terms of perioperative left ventricular function. These data suggest that all multidose combined antegrade and retrograde cardioplegia with a terminal hot-shot dose may provide superior myocardial protection relative to antegrade cardioplegia alone in cardiac surgery. The only noted difference in outcome was a small but significant improvement in left ventricular wall motion detected by speckle tracking echocardiography. Potential mechanisms for the differences in ventricular function and myocardial preservation between the 2 groups include more frequent cardioplegia administration with retrograde cardioplegia, less antegrade air embolization with retrograde cardioplegia, and the effect of a terminal hot-shot dose. Unfortunately, this study does not differentiate between the effects of retrograde cardioplegia alone, the effects of combined antegrade and retrograde cardioplegia, and the possible advantages of terminal hot-shot administration.

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FIGURE 1. Example of strain imaging with speckle tracking in a longitudinal axis echocardiographic image.

The article of Bhaya and colleagues does provide some suggestion as to the potential mechanism for the long described and relatively common finding of septal dysfunction after cardiac surgery. Multiple mechanisms have been proposed, including postoperative conduction abnormalities, mediastinal scarring, warming of the septum by right ventricular blood, and air embolism down the right coronary artery. Bhaya and colleagues suggest that septal dysfunction several days after cardiac surgery can be largely eliminated by the use of the integrated cardioplegia and terminal hot-shot delivery. The implication is that postoperative septal dysfunction is due to inadequate intraoperative protection of the septum; however, these data do not clarify the roles of multidosing, avoiding air embolism, and other effects of integrated cardioplegia.

Finally, this study is somewhat unique in being able to detect statistically significant differences in left ventricular performance between 2 fairly standard myocardial protection techniques in a small group of patients undergoing cardiac

surgery. Today most conventional cardioplegia techniques are thought to provide such good myocardial protection that significant differences in either laboratory or clinical outcomes are rarely demonstrated. This work by Bhaya and colleagues shows that speckle tracking echocardiography can be a quite sensitive means to detect subtle changes in regional and global ventricular function across time in human patients undergoing cardiac surgery. If this is true, then speckle tracking echocardiography might be useful to look at such issues as chordal preservation during mitral replacement, flexible versus rigid rings for mitral repair, timing of surgery for mitral or aortic regurgitation, patient-prosthesis mismatch in aortic valve replacement, and completeness of revascularization in patients with coronary artery disease.

Although these data do not definitely settle the issues of optimal myocardial preservation, the cause of septal dysfunction after cardiac surgery, or the best means of clinically assessing left ventricular function after cardiac surgery, the article of Bhaya and colleagues should stimulate further work to address these questions.