

The Cardiac Surgeon's Easy Way to the Heart: Echocardiography

Ruediger Autschbach, MD, PhD

“The routine use of transthoracic echocardiography (TTE) during cardiac surgery has revealed new cardiac pathology in 1 of every 3 patients, and it has led to altered surgical management in 1 of every 4.”¹⁾

Echocardiography as an anytime-and-everywhere available tool plays a crucial role in the treatment of cardiac surgery patients. This holds true for pre-, intra- and postoperative echocardiography. But the above-mentioned citation, a dilemma known by all of us, should encourage some contemplation:

Preoperative echocardiography is basically performed as a transthoracic procedure and, in certain circumstances, as transesophageal (TEE) within cardiological diagnostics before the patient is presented to the surgeon, but, increasingly, also shortly before the scheduled operative procedure for ambiguous or borderline findings. For example, in a patient with moderate mitral regurgitation undergoing coronary artery bypass grafting (CABG) surgery, the reparability of the valve plays an important role in the consideration of whether to operate on it (not to say that the degree of mitral regurgitation is considered moderate if some sonographers are uncertain about its need for repair), and only the surgeon himself can make this decision. Furthermore, in the so-called “functional” (ischemic) mitral regurgitation, the severity and etiology can be estimated only during a beating heart examination, done best before general anesthesia. And—without blame—cardiological prearrangement lacks to a certain degree specific (cardiologically unimportant, but for surgical decision making it is decisive) measurements of, for example, aortic root dimensions before aortic valve-preserving surgery.

Intraoperative transesophageal echocardiography is already instituted in nearly all cardiac surgery departments

From Department of Thoracic and Cardiovascular Surgery, University Hospital Aachen, Medical Faculty RWTH, Germany

Address reprint requests to Ruediger Autschbach, MD, PhD, Department of Thoracic and Cardiovascular Surgery, University Hospital Aachen, Medical Faculty RWTH, Pauwelsstr. 30, 52074 Aachen, Germany.

during reconstructive valve surgery, or even in all valve interventions. Other indications are a monitoring of the left ventricular function in off-pump surgery. But also for indeterminate intraoperative problems, TEE in the hands of the experienced is a reliable guidance. As stated in the preface of this editorial, however, incidental findings during intraoperative TEE often present the surgeon with a challenge (usually because intraoperative TEE is frequently performed by anesthesiologists who are untrained in the quantification of valvular heart disease).

Postoperative echocardiography, transthoracic or complementary transesophageal, in the intensive care unit, is an essential tool in determining acute or chronic complications after cardiac surgery, such as pericardial effusion or cardiac tamponade, myocardial heart failure, and valvular dysfunction. It is also useful when looking for a potential cardiac source of embolus before cardioversion or after a recent event of stroke. There is general agreement that every patient, following heart surgery, should have a conclusive status concerning myocardial and valvular function, as well as follow-up examinations should be performed in patients with pericardial effusion or to monitor drug therapy.

But who has not read an echocardiography report describing a paravalvular leak after a Bentall procedure, which can't be anything else than the physiologic regurgitation of every mechanical valve? Or about a myocardial rupture after a Dor procedure, which is nothing more than flow into the abolished aneurysm cavity before a complete thrombosis?

Besides the aforementioned, there are also plenty of other indications for specific issues that make a perioperative echocardiographic examination necessary. But who is performing all these examinations?

Obviously not the surgeon. Today nearly all echocardiographic meetings offer sessions called something like, “What the surgeon needs to know.” The often first-presented slides, “What the surgeon **wants** to know?”—“Nothing!” provoke a consent smiling of an audience with—if at all—only a sporadic lost surgeon. Cardiologists (and an increasing number of anesthesiologists

gists) are the ones who tell one another what we as surgeons need to know!

We continue, with arrogance and pretension, to ignore the need to incorporate echocardiography in the training periods of subsequent cardiac surgeons. Most surgeons blame either the referring cardiologist or the enthusiastic anesthesiologic sonographer, tackling him with what he himself has failed to prepare for the patient. We cannot expect the cardiologist to know and to report all things we need to know before surgery, especially because *we* don't tell them in the echocardiographic sessions mentioned above.

Echocardiographic, transthoracic, and transesophageal procedures need to become an integral part in the training of cardiothoracic surgeons. This is also important against the background of the increasing number of patients with percutaneous valve procedures. If we don't want to stand aside and examine how we lose our patients, we need to take part in the diagnostic process. We need to join forces with our neighbor disciplines so that we will not end up as the odd-job man for failed procedures that we would have anticipated to fail because of our specific experience. We have the knowledge and skills to remain as an integral part in the decision making and treatment process of patients with heart disease. We owe this to our patients.

Today echocardiography machines are available in almost every operating room, cardiothoracic intensive care unit, and cardiac surgery department. We are in the unique position to directly compare what we have seen in the echo to the heart's anatomy and vice versa. As surgeons, we have a much more 3-dimensional (3-D) understanding of the heart and its inner structures than most other sonographers do. Live 3-D echocardiography, also called 4-dimensional echo, is already on the market, and we surgeons are already familiar with these views and will be able to apply this tool in our daily work much more than any other user. Probably we will develop a different

approach to perform perioperative echocardiography, especially because the main work-up of the patient is already done, and we will be concentrating on the specific pathology.

We need not be able to juggle with strain, strain rate, 2-dimensional strain, and all the different modes of application of tissue Doppler imaging (TDI), but for those who are interested, this will open up a huge academic fair-ground for studies with a unique patient population. Hemodynamic changes after valve replacement or ventricular restoration can be monitored instantaneously, and maybe in a few years we will have a different understanding of what we are doing. And for the dwindling numbers of surgeons interested in cardiac resynchronization therapy, another fading part of our discipline, TDI will offer unique insights.

It is not necessary for everyone to become an expert in performing echocardiography, but it is much easier to "read an echo" when having learned to read one by performing one.

All that needs to be done is (1) maintain the interest that most starting young trainees have in echocardiography, and (2) offer them the opportunity to learn echocardiography systematically. Maybe it will even improve our interdisciplinary work if this can be done in the cardiological echo laboratory.

We will do much better in preparing patients for surgery, in planning and performing their heart operations, and in treating them postoperatively. And that is what we want most as cardiac surgeons.

References

1. Minhaj M, Patel K, Muzic D, Tung A, Jeevanandam V, et al. The effect of routine intraoperative transesophageal echocardiography on surgical management. *J Cardiothorac Vasc Anesth* 2007; **21**: 800–4.