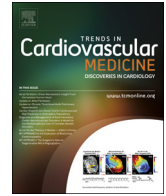


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MY APPROACH

MY APPROACH to the surgeon's view on degenerative mitral regurgitation*



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Part I: What the surgeon needs from the echocardiogram

When I am asked to evaluate a patient with severe mitral regurgitation for surgical intervention, the first thing that I think about is whether we have enough information to decide if the regurgitation is primary (degenerative), secondary (functional), or a combination of both. These entities represent different disease processes, have different treatment approaches, and markedly different prognoses; so, it is very important to distinguish them at the outset. As a surgeon, I often have two advantages: the diagnosis has been made and the echocardiographic images have been obtained. Therefore, contrary to our teaching to see the patient first, I will often review the transthoracic echocardiogram first, as well as the transesophageal echocardiogram if one has been obtained. This can be very helpful because when I evaluate the patient and recommend surgery, I can have a discussion at that time with the patient about the type of operation (repair vs replacement). There are many pieces of information that I look for while reviewing the echo that help me decide on valve reparability, ability of the ventricle to handle the operation, and the need for adjunctive procedures. Therefore, it is important that the reading cardiologist provides this information in the echo report. Here is a quick itemized list.

Accurate assessment of ventricular function

- Assessment of the ejection fraction (EF), including quantitation; making sure that the left ventricle is not foreshortened is very important. It is important to emphasize, however, that abnormal EF in the setting of severe mitral regurgitation is defined as $<60\%$; so, a patient with an EF of 55%, for example, does not have a normal EF. In addition, we must remember that EF is often overestimated with severe mitral regurgitation by about 10 points. So, really, by the time the EF is 55%, that ventricle has already taken a hit! Considering this intrinsic limitation of EF measurement in mitral regurgitation, measurement of left ventricular end-systolic dimension has become paramount for both prognostication and in guideline-based recommendations for surgery in degenerative mitral regurgitation.

Size of the left atrium

- Larger left atrium often reflects long-standing mitral regurgitation. A small left atrium may make the mitral valve more difficult to visualize, depending on the approach. In atrial fibrillation, very large left atrium size correlates with lower effectiveness of the Maze procedure, if performed.

Presence and severity of pulmonary hypertension

- Severe pulmonary hypertension in a patient with significant lung disease may benefit from further investigation to establish reversibility and may prohibit the operation if not reversible.

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Presence of and degree of tricuspid regurgitation

- Higher degree of hypertension, again, often is reflective of long-standing duration of mitral regurgitation, and may require concomitant repair at the time of the mitral operation.

Finally, the inspection of the mitral valve, including all the components of the mitral valve apparatus:

- *Degree of mitral regurgitation:* surgeons recognize that this can be difficult. Views that show eccentric jet wrapping around the left atrium can be very helpful. There should be an attempt to interrogate each pulmonary vein for systolic flow reversal. Similarly, there should be an attempt at quantitation of mitral regurgitation by an experienced cardiologist because inaccurate quantitation can potentially impact treatment decisions, and surgeons often do not have the intricate knowledge to determine whether the quantitative assessment can be trusted.
- *Direction of the jet:* in isolated leaflet prolapse, the jet should be anteriorly directed in posterior leaflet prolapse, posteriorly directed in anterior leaflet prolapse, and variable in bi-leaflet prolapse. In addition, if there is a component of secondary mitral regurgitation, the jet can also be seen centrally or even along the entire coaptation area.
- *Leaflets:* are they thin and normal appearing, or are they thickened; are there any leaflet segments that are prolapsing, and, if so, is the prolapse limited to the posterior leaflet, the anterior leaflet, or does it affect both; is there tethering of the leaflets; and what is the size of the coaptation depth? These factors bear directly on the ability to repair the valve and whether mitral replacement should be considered.
- *Annulus:* is it dilated or not? Measurements are rarely reported but could be helpful.
- *Chords:* are they normal; are they thickened; are they thin and elongated; and are there any ruptured chords?

Note: Assessment for the presence of patent foramen ovale (PFO) is very helpful. It can be added to the consent form, and the patient can be counseled accordingly, rather than having to tell him/her after the operation if a PFO is found intraoperatively.

In summary, the importance of the cardiologist in providing this information cannot be overemphasized. These factors all impact surgical decision-making, assessment of the perceived ease or difficulty of the operation, assessment of intraoperative risk, as well as the need for adjunctive procedures.

Part 2. Patient evaluation

A thorough review of the patient's past and present history is paramount. I usually have the advantage of reviewing the

information obtained by other providers, including the primary care physician and the cardiologist. There are some focused pieces of information I ask patients. Their age is important as it can impact risk; a frailty assessment is paramount; and valve choice needs to be discussed. An important gender-related issue pertains to women of child-bearing age in whom a discussion on pregnancy management is mandatory. Cardiac risk factors should routinely be obtained, including hypertension, hypercholesterolemia, diabetes mellitus, smoking, and obesity. These are important in order to optimize the patient prior to surgery. For example, obtaining hemoglobin A1c is helpful and, if very elevated, surgery can be postponed until better glucose control is achieved in the elective setting. This is also true for hypertension and hypercholesterolemia control. Similarly, if surgery is scheduled in a few weeks, stopping smoking can improve secretion clearance postoperatively and potentially decrease the incidence of pneumonia. Remember, the risk of the operation relates to the preoperative state of the patient, and patients who go in well-optimized are at much lower risk for mortality and postoperative morbidity. The role of the primary medical doctor and the cardiologist in this issue, again, cannot be overemphasized. Unfortunately, all too often we are referred patients who need an urgent operation. Preoperative heart failure and urgent operation are two of the most important factors that drive increased mortality and postoperative morbidity in these patients. Every effort should be made to refer patients with degenerative mitral regurgitation earlier in the disease process and certainly before heart failure develops—better refer too early and have the surgeon weigh in on the timing of the operation than refer late at the expense of increased morbidity and mortality.

Atrial fibrillation is common in patients with mitral regurgitation. If the patient gives a history of atrial fibrillation or a-flutter, or if he/she gives a history of some abnormal rhythm, I obtain the records from the treating physician in order to evaluate the patient's candidacy for concomitant atrial fibrillation surgery. The addition of atrial fibrillation surgery must be considered in all surgical candidates, as it does not result in an increase in mortality in appropriately selected patients. In addition, the ability to get the patient out of atrial fibrillation postoperatively has been much improved now compared with the past with the development of systematic approaches and performing all the appropriate lesions.

Renal insufficiency is an important risk factor in mitral valve surgery, especially in the elderly. In patients with renal insufficiency, it is particularly important to optimize volume and electrolyte status preoperatively, otherwise they struggle immediately in the postoperative setting. History of stroke or transient ischemic attack places patients at higher risk for stroke, and they should be counseled accordingly. In addition, history of gastrointestinal (GI) bleed is important, with the need for heparinization with cardiopulmonary bypass. I routinely pursue a GI evaluation in anyone with a prior history of GI bleed in elective and some urgent cases. History of bleeding or thrombotic disorders might also affect valve choice recommendations. In patients with a history of prior myocardial infarction, I look to see what information I have to try to figure out if the muscle is dead or alive. This is particularly important in patients with degenerative mitral regurgitation

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