Choosing the "Golden Moment" for Mitral Valve Repair*

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Patients with asymptomatic or minimally symptomatic mitral regurgitation present a dilemma for the clinician. Because the valve lesion itself causes increased preload and decreased afterload, the normal response of the left ventricle to mitral regurgitation should be a normal or low end-systolic volume. Afterload, the normal response of the left ventricle to mitral valve lesion itself causes increased preload and decreased regurgitation.

The report by Enríquez-Sarano et al. (2) in this issue of the Journal agrees with previous studies suggesting that prooperative depression of left ventricular ejection fraction (1,3) or elevation of end-systolic ventricular size (4–6) is predictive of reduced ejection fraction after surgical correction of mitral regurgitation.

Interplay between ventricular size and function. Enríquez-Sarano et al. further suggest that prooperative ejection fraction and end-systolic diameter by echocardiography together have more predictive power than either one alone. For example, a patient with ejection fraction <50% and end-systolic diameter >45 mm has a >70% likelihood of postoperative ventricular dysfunction (Table 3, Fig. 4 [2]). No previous study has demonstrated the interaction of these two easily obtainable, noninvasive variables in as usable a way.

The potential for occult left ventricular dysfunction in mitral regurgitation has been recognized in the past. Many previous studies have attempted to determine a simple guide to the optimal time for operative intervention in asymptomatic patients. Other echocardiographic variables studied include the end-systolic wall stress/end-systolic volume index ratio (6–8) and the systolic diameter/wall thickness ratio (9). Both showed significant, although not independent, effects on postoperative ejection fraction in the present study. One group found a correlation between left atrial size and outcome (9), unlike the current study. Not included in the current study were Doppler-derived estimates of pulmonary pressure (1) and the rate of change in left ventricular pressure over time (10), end-systolic stress-strain (11) and myocardial elastance (12), all of which have also been considered important factors in this decision. Unfortunately, a practical load-independent measurement of left ventricular function that would cleanly avoid the problems with ejection fraction has not yet been found. In the present study, end-systolic diameter and ejection fraction accounted for 52% of the variability in postoperative ejection fraction (2).

Integration of clinical and echocardiographic data. Assessments of left ventricular size and function are only one component of this complex clinical decision (13,14). In evaluating patients with pure isolated mitral regurgitation who are being considered for mitral surgery, I consider five elements: 1) symptoms, 2) left ventricular size, 3) left ventricular function, 4) significant pulmonary hypertension and 5) chronic or recurrent atrial fibrillation (14–18). If two or more of these factors are abnormal as a result of the valve lesion, elective operation should be considered. If one or more are partially abnormal, the patient should be followed with clinical and echocardiographic study every 6 to 12 months. Trends toward functional deterioration outside the interobserver error, ~5 mm for left ventricular diameter (19,20), are also an important consideration.

Surgical repair may be indicated earlier or later depending on concomitant mitral stenosis, abnormalities of other valves, coronary artery disease, endocarditis, right ventricular dysfunction, pericardial disease or noncardiac factors influencing symptoms or operative risk. In patients with significant coronary disease or ischemic mitral regurgitation, one should be more aggressive with surgical recommendations or close follow-up, or both (18,21). Even a single bypassable coronary artery lesion in addition to severe mitral regurgitation may be a valid indication for earlier surgical intervention. In the study by Enríquez-Sarano et al (2), the group with ischemic mitral regurgitation had an 80% incidence of postoperative left ventricular dysfunction compared with 32% in the nonischemic group (2).

Mitral repair versus replacement. The choice of mitral repair versus replacement should also affect the decision on timing of mitral operation. I disagree with the current study, which states that this cannot be incorporated into current preoperative decisions. Further evaluation of their results to determine the effect on ejection fraction of repair or replacement might be interesting.

In the 1970s, the indications for correction of mitral regurgitation were New York Heart Association functional class III symptoms that could not be controlled with medical management (22–24). At that time, the only surgical option was valve replacement. The risks were death or development of progressive heart failure from myocardial dysfunction. Clinicians made decisions on the basis of echocardiographic predictors of myocardial dysfunction. The clinical solution was to delay operation as long as possible. As a result, surgical therapy for mitral regurgitation was associated with lower long-term...
survival rates than any other common isolated valve lesion, including mitral stenosis, aortic regurgitation and aortic stenosis (25).

Today, the indications for operation for mitral regurgitation are different because valve repair is a feasible surgical option performed by experienced surgeons in 70% of cases (26). The risks of timely repair are low, with only a 2% perioperative mortality rate (26,27), whereas the risks of delay are higher, and valve replacement may be required, which has a 5% to 8% perioperative mortality risk rate and a much higher chance of "prosthetic valve diseases," including prosthetic endocarditis, ventricular dysfunction, inherent stenosis of the prostheses and complications from thromboemboli or hemorrhage (28). The way in which clinicians make decisions should reflect a learned appraisal of likely surgical outcome, including that of valve repair versus replacement (29), which is still as important in preoperative decisions as is the presence of occult myocardial dysfunction.

Echocardiography can accurately determine the mechanism of mitral regurgitation (30). The likelihood of repair versus replacement depends on the mechanism of dysfunction and varies from 20% to 90% (26). The feasibility of repair versus replacement also varies with the skills and experience of the individual surgeon (31). Whether repair or replacement is performed substantially affects perioperative risk (28) and postoperative myocardial function (32).

Choosing the "golden moment" for operation. Both surgical and medical options have inherent risks and benefits that should be considered carefully. Despite severe mitral regurgitation, it is difficult to expose an asymptomatic patient to minor or major perioperative complications, which occurred in 8% in the current study (2). By contrast, the patient managed medically should be informed of the potential for interval complications, endocarditis or progression of disease, which could result in an irreparable valve and death. Recognizing the risks of waiting, some patients, including some with symptoms, may choose the "stitch in time" philosophy before two of the five categories previously listed are fully abnormal.

The optimal time for mitral surgery should be chosen on the basis of a comprehensive evaluation of the individual patient and the risks and benefits of either the medical or surgical approach. Our understanding of this field has been enhanced by the Enriquez-Sarano et al. study, the largest of its kind published to date. In patients with mitral regurgitation, the echocardiogram should be used for objective assessment of left ventricular size and function and for determining the mechanism of the valvular dysfunction, both of which impact the optimal timing, the "golden moment" for operative intervention.

References