Cardiovascular disease is the major cause of death in subjects >75 years of age, a healthcare problem that will increase as the population continues to age. In the United States, the predicted population >75 years of age will exceed 50 million by the year 2038. Epidemiological studies have shown that the prevalence of mitral regurgitation (MR) also increases progressively with age; thus, MR is a common and growing problem in the elderly. The most frequently encountered types of MR in the elderly are degenerative mitral valve disease, which results from primary floppy, myxomatous valves with prolapsing or flail leaflets and calcified mitral annulus, and ischemic MR (IMR), now that rheumatic mitral valve disease has declined and endocarditis remains comparatively rare.

Although there are American College of Cardiology/American Heart Association (ACC/AHA) guidelines for the optimal management of a broad spectrum of patients with severe MR, attention has not focused specifically on the elderly, in whom the condition predominates. In addition, operative mortality is increased in the elderly by major comorbidities that include coronary artery disease, cerebrovascular disease, heart failure, atrial fibrillation, and renal insufficiency. Furthermore, little is known regarding the difference in life expectancy and risk of adverse events in elderly patients with severe MR undergoing successful mitral valve surgery versus those who decline or are denied surgical intervention. A delicate balance must be struck in optimally managing elderly patients with severe MR that not only favors symptomatic benefit over perioperative risk of an adverse clinical outcome, but also improves long-term outcome with regard to morbidity and mortality.

Over the past 2 decades, surgical strategies in the treatment of MR have changed from routine mitral valve replacement to mitral valve repair. Because the surgeons’ understanding of normal mitral valve functional anatomy has improved, largely because of the use of intraoperative transesophageal echocardiographic imaging, repair techniques have become more sophisticated and more successful, at least at short- and mid-term follow-up. Currently, annuloplasty placement and complex repair techniques, including leaflet resection, leaflet augmentation, chordal transposition, and chordal replacement, have become standardized and are available at most high-volume surgical programs. Mitral valve repair may be more challenging and more complicated in the elderly because of extensive mitral annular calcification, friable leaflet tissue, and the need for concomitant procedures such as coronary bypass grafts. The rationale for performing mitral valve repair rather than replacement is that mitral repair preserves all major chordal-ventricular attachments, which acts to maintain left ventricular (LV) cavity geometry, preserve LV function, and avoid problems associated with prosthetic valves and the need for anticoagulation.

Although the indications for surgical intervention for MR in the elderly may need further clarification, one lesson learned from the management of younger patients with degenerative MR is not to await progressive LV dilatation and evidence of declining ejection function. LV dilatation in chronic severe MR is associated with a disproportionately greater increase in LV volume than LV mass. This may be tolerated initially, but when wall stress rises, it drives down systolic function, which, if unchecked, culminates in heart failure. Thus, serial measurements of LV size and ejection fraction by quantitative echocardiography in patients with severe MR play a pivotally important role in the management and timing of surgical intervention. LV cavity diameter at end systole of >4.5 cm and ejection fraction <55% to 60% are independent class I indications for mitral valve surgery. LV size and LV ejection fraction exceeding these cut points predict poor clinical outcome, irreversible LV dysfunction, and development of congestive heart failure. Recent improvements in surgical techniques currently achieve a >80% likelihood of successful mitral valve repair in degenerative MR and decreased surgical mortality compared with the reported figures of 10% to 20%. This is the rationale for exploring a more aggressive surgical strategy in the elderly.

In this issue of Circulation, Detaint and coinvestigators report their experience with a large cohort of 1344 consecutive asymptomatic patients with severe MR and preserved LV function who underwent either mitral valve repair or prosthetic mitral valve replacement at a single institution (Mayo Clinic) between 1980 and 1995. Clinical follow-up was almost complete (98.4%) over a mean of 6.8 years. Two thirds of the patients had MR caused by degenerative disease of the mitral valve leaflets, whereas one third had functional,
ischemic, rheumatic, endocarditic, or unknown origin. Patients with rheumatic mitral stenosis, aortic or tricuspid valve replacement, prior mitral valve repair or replacement, congenital heart disease, or pericardial disease were excluded. Patients were stratified by age into 3 groups—those ≥75 years of age (n=284, 21%), those between 65 and 74 years of age (n=504, 38%), and those <65 years of age (n=556, 41%)—to achieve 3 aims. The first goal was to compare the clinical characteristics of elderly and younger patients undergoing mitral valve surgery. The second aim was to assess the long-term survival relative to expected survival. The final goal was to examine the time trends in operative mortality and morbidity in each age strata and to ascertain whether these data justify a more aggressive surgical approach for severe MR in the elderly.

Preoperatively, the cohort of elderly patients (≥75 years of age) had significantly more advanced heart failure, greater prevalence of atrial fibrillation, more coronary artery disease and IMR, and the need for combined coronary bypass grafts than either of the 2 younger age groups. Surprisingly, despite the increased comorbidities in this elderly group of patients, there were no differences in LV end-diastolic size, LV end-systolic size, left atrial size, or LV ejection fraction among the 3 age groups. Additionally, these echocardiographic parameters in all age groups were indicative of only mild LV remodeling and preserved LV function (mean LV ejection fraction >57%).

Overall, operative mortality for MR declined progressively over time from 16% in 1980 to 1983 to 3% in 1992 to 1995 and was consistently greater in patients with nondegenerative MR than in those with degenerative MR. Operative mortality in the elderly patients (≥75 years of age) was significantly greater in degenerative MR and in nondegenerative MR than in the 2 younger patient groups, despite the overall decline in operative risk. Age ≥75 years predicted low cardiac output defined as a systolic blood pressure <90 mm Hg and cardiac index <1.4 L·min⁻¹·m⁻² after surgery. Similarly, age ≥75 years was associated with a longer hospital stay in both degenerative and nondegenerative MR patients, although the duration of hospital stay declined over time.

During the most recent time period (1992–1995), the greatest operative mortality, regardless of age, was 7% in the nondegenerative subgroup, which included IMR patients. This is a very impressive achievement. Although not stated explicitly because of the small number of patients involved, these data would suggest that the mortality rate for elderly patients with IMR is nearer 10% even in the modern era at the authors’ institution. A further testament to the surgical expertise at Mayo was the surgeons’ ability to repair rather than replace the mitral valve in >80% of patients overall and in 93% of patients with degenerative MR between 1992 and 1995. In addition, mitral valve repair was as feasible in patients ≥75 years of age as in younger patients. The association of valve repair with improved survival compared with valve replacement was similar in patients ≥75 years of age and in younger patients.

Overall 5-year survival decreased with increasing age, and in patients ≥75 years of age, it was 57%. Thus, age ≥75 years was an independent predictor of lower survival at 5 years. However, after adjustment for life expectancy, 5-year survival stratified by age in elderly patients ≥75 years of age was 83%, similar to that occurring in patients <65 years (88%), indicating that age ≥75 years per se was not associated with excess long-term mortality. In comparison, 5-year survival for nondegenerative MR in patients ≥75 years of age was lower at 46% but when adjusted for life expectancy was 66%. This was not different from patients in the 2 younger age groups (65% and 74%).

The safest interpretation of data presented by Detaint and colleagues is that mitral valve surgery is reasonably safe in elderly patients with degenerative MR associated with only mild LV remodeling and dysfunction. It would be warranted and potentially dangerous to extrapolate the authors’ conclusions to an elderly population with IMR on the basis of the data presented in their article. This caveat is important because as the population ages it is likely that IMR will become an increasingly common type of MR. Despite the growing enthusiasm for the surgical treatment of IMR among surgeons and some cardiologists, no randomized prospective data exist to substantiate the efficacy of mitral valve repair or replacement in such patients. In fact, the best available clinical data⁶–⁸ and recent laboratory experiments⁹,¹⁰ strongly suggest that surgery for IMR affords limited, if any, survival benefit. Data on the effects of mitral valve surgery on remodeling and symptoms in IMR patients are limited and routinely confounded by concomitant revascularization procedures.

However, aggressive surgical intervention even with a high likelihood of successful mitral valve repair in patients with degenerative MR as reported by Detaint et al is difficult to reconcile with the recently reported clinical outcome experience of a watchful waiting strategy for a similar cohort of patients with asymptomatic severe degenerative MR.¹¹ This latter study demonstrated that asymptomatic patients with severe degenerative MR, albeit of a younger age (mean, 55 years), can be followed up safely until either symptoms develop or recommended cut points for LV size and LV ejection fraction or pulmonary hypertension are reached, after which they still have good postoperative outcomes.¹¹

Even in the 21st century, cardiac surgery is always a “big event” for the individual patient, especially when the patient is in the eighth decade of life or beyond. Reprieve from surgical intervention may be just around the corner for a portion of these technically challenging elderly patients with degenerative MR in terms of percutaneous catheter-based techniques for mitral repair. These techniques are catheter delivery systems that use the edge-to-edge clip technique to increase leaflet coaptation,¹² mitral annuloplasty with a device in the coronary sinus that cinches down the mitral annular area,¹³ or possibly a combination of these 2 techniques as they become available to stabilize the mitral valve apparatus. Percutaneous mitral repair may not be achievable in all cases but is attractive in the elderly patient with MR because it avoids the trauma of chest incision and cognitive dysfunction associated with prolonged cardiopulmonary bypass. These 2 different types of devices are currently under investigation and have already been deployed in humans with a reduction in severity of MR. These technologies are
particularly applicable to IMR patients because both of these percutaneous procedures are designed to address annular dilatation and poor leaflet coaptation, which are the 2 primary causative mechanisms of IMR.

In the meantime, Detaint and colleagues\(^5\) have demonstrated convincingly that elderly patients with severe MR and relatively preserved LV function and geometry should not be denied surgical treatment, nor should mitral surgery be postponed because of age alone. However, great care and consideration must still be exercised before elderly patients with IMR are referred for operative intervention, especially when MR is the sole indication for surgery. One potential bone of contention is the need for early surgical intervention in elderly patients rather than using the wait and watch strategy recently advocated. Using the cut points for LV size and function and onset of symptoms recommended by the ACC/AHA practice guidelines, the timing and necessity of surgical intervention in asymptomatic elderly patients with severe MR can be determined. A further potential confounder of the study by Detaint and colleagues is that the bar in terms of surgical results has been set high and will need to be emulated nationwide if their recommendations for aggressive early surgery in asymptomatic patients are to be taken seriously.

**Disclosures**

None.

**References:**


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Surgery for Asymptomatic Severe Mitral Regurgitation in the Elderly: Early Surgery or Wait and Watch?

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