Chronic severe aortic regurgitation (AR) imposes a combined pressure and volume overload on the left ventricle (LV). Fortunately, preload reserve and compensatory hypertrophy allow most patients with chronic severe AR to maintain normal LV systolic function for many years. Most such patients are asymptomatic and have an excellent prognosis (1–3). Over the course of time, adverse loading conditions may cause LV systolic dysfunction, which often precedes the onset of symptoms. The standard of care is to monitor patients with chronic severe AR carefully and operate at the first sign of symptoms or LV dysfunction (4–6). However, some patients do not come to medical attention until they already have severely depressed LV systolic function. The question then arises as to whether such patients will benefit from surgery because of relief of afterload mismatch or whether it is too late to operate because irreversible LV dysfunction has already occurred.

In this issue of the Journal, Bhudia et al. (7) report the results of surgery for pure, chronic severe AR in 724 patients who underwent surgery at the Cleveland Clinic from 1972 to 1999. Of these, 88 (12%) had severe LV dysfunction defined as left ventricular ejection fraction (LVEF) ≤30%. Patients with severe LV dysfunction tended to be older (56 vs. 50 years) and male (91% vs. 67%). Propensity-matching was used to select 77 well-matched pairs of subjects with and without severe LV dysfunction. In this group, hospital mortality before 1985 was 17% in those with severe LV dysfunction compared with 3% without it (p = 0.03). In patients who underwent surgery after 1985, there were no hospital deaths in either group. Long-term survival was worse with severe LV dysfunction (81% vs. 92% at 1 year, 68% vs. 81% at 5 years, 46% vs. 62% at 10 years), but this was mostly the result of hospital mortality in the patients undergoing surgery before 1985. In those patients who underwent surgery after 1985, there was no significant difference in long-term survival. Importantly, the mean LV end-diastolic and –systolic diameters were 7.5 ± 0.7 cm and 5.9 ± 0.8 cm, respectively. Thus, the patients in this study had not only depressed LVEF but also increased LV dimensions, which would indicate a poor surgical outcome based on older studies.

What is the take-home message for clinicians? First, this study suggests that, in the current era, operative mortality for chronic severe AR is low, even for patients with a dilated, severely dysfunctional LV. This result confirms a prior study from the Mayo Clinic, in which operative mortality was 3.7% for patients with severe AR and LVEF <35% (8). That the operative mortality for such patients has declined over the course of time is probably multifactorial, reflecting improvements in surgical and anesthetic techniques, cardioprotection, prosthetic valve design, postoperative care, and concomitant medical therapy. Second, this study indicates that long-term survival in the current era is not significantly different between patients with and without severely depressed LV systolic function. The reason for this somewhat surprising finding is not clear from the data presented. It has been previously shown that surgery for symptomatic patients with severe AR reduces LV volumes, LV mass, and wall stress, and increases LVEF (9–12). Accordingly, it is tempting to speculate that surgical relief of the afterload mismatch, perhaps accompanied by appropriate medical therapy, resulted in favorable LV remodeling and improvement in LV systolic function. However, the study does not report temporal changes in LV dimensions or LVEF after surgery, nor does it report what medicines were prescribed.

A few caveats should be mentioned to keep the data in proper perspective. First, because this was a retrospective, observational study, there was likely a selection bias that favored patients thought to be good candidates for aortic valve surgery. Second, these results come from a high-volume center with skilled surgical, medical, and ancillary personnel. Third, most of these patients were men. Small, elderly women are more likely to have worse outcomes with cardiovascular surgery and are predisposed to patient-prosthesis mismatch (13). In individual patients, age, gender, and aortic annulus size should be considered, along with other comorbidities that could limit the effectiveness of aortic valve surgery. Finally, Carabello (14) has suggested that patients with chronic severe AR, poor LV function with marked dilation, and low systolic blood pressure may...
be a particularly high-risk group, presumably because they do not have sufficient afterload mismatch to expect LV functional recovery after surgery.

The American College of Cardiology/American Heart Association 2006 Guidelines for the Management of Patients with Valvular Heart Disease state that “AVR is indicated for asymptomatic patients with severe AR irrespective of LV systolic function” and that “AVR is indicated for asymptomatic patients with chronic severe AR and LV systolic dysfunction (EF 0.50 or less) at rest” (4). A lower limit on LVEF is not mentioned in the guidelines. The study by Bhudia et al. (7) supports this position by showing no difference in hospital mortality or long-term survival in patients with chronic severe AR and severely depressed LV systolic function. Although such patients should not be denied surgery, they should be referred to high-volume centers experienced in the management of high-risk, complex valvular heart disease.

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