Left Ventricular Remodeling After Valve Replacement in Patients With Isolated Aortic Regurgitation

To the Editor:

We read with great interest a paper by Chaliki and associates in the November 19, 2002, issue of Circulation.1 In their study, patients with markedly impaired left ventricular (LV) function were compared with those with moderately impaired or normal LV function. Operative mortality was higher among the markedly impaired LV patients, their 10-year survival rate being lower than that of the other patients. Median time from surgery to postoperative echocardiography was 11.3 months, and ejection fraction of the left ventricle improved significantly in patients with preoperatively impaired LV function. However, improvement was limited to below normal levels, whereas the other patients regained or maintained almost normal levels. Although we agree with the results of Chaliki et al with regard to long-term survival, we have some comments about their evaluation of LV function after operation.

We previously reported a follow-up study involving 25 consecutive patients with isolated aortic valve regurgitation, in which we compared patients with markedly impaired LV function with others according to preoperative echocardiographic findings.2 Considering LV end-systolic dimension (LVDs) and fractional shortening (FS), 13 patients with both LVDs >50 mm and FS <25% were classified as Group I, and the others were classified as Group II. Echocardiography was serially performed at 1, 3, and 5 years after the operation. Group I had regained normal LV function by 3 years after the operation and maintained it thereafter, whereas Group 2 had regained normal function by 1 year and maintained it through 5 years after operation. In the study of Chaliki and associates, echocardiography was performed just 11.3 months after operation.

Henry et al3 showed that the decrease in LV size among patients with LVDs >50 mm and FS <25% had occurred by the time of the early period of the study (8 to 22 days postoperatively), with little additional change thereafter for up to 6 months in patients undergoing aortic valve replacement for isolated aortic regurgitation. However, Fioretti et al4 showed that echocardiograms at least 1 year after aortic valve replacement among patients with impaired LV function revealed LVDs decreased to levels similar to those found among the other patients.

Japanese people have smaller body dimensions than people of Anglo-Saxon or Germanic descent and other similar groups; these physical differences led us to choose LV systolic dimension (LVDs)/BSA as a factor for impaired LV function. Different follow-up periods may lead to different clinical results. Therefore, conclusive evaluations of follow-up studies such as LV function need to be based on serial assessments.

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Response

We thank Drs Misawa and Fuse for their interest in our publication.1 This publication underscores the need for early intervention in patients with severe aortic regurgitation (AR) before development of marked left ventricular (LV) dysfunction. As shown in our study with more than 15 years of long-term follow-up, marked preoperative LV dysfunction due to severe AR leads to high postoperative morbidity and mortality despite successful aortic valve replacement (AVR).

Misawa and Fuse share previous data suggesting a progressive improvement in LV function after AVR in patients with reduced preoperative ejection fraction (EF). It would be ideal to obtain measurements of LV size and EF repeatedly through 5 years in all patients after AVR. However, this is not feasible, as the postoperative mortality hopelessly biases these measurements (only survivors can be assessed) in an increasing manner with increasing postoperative time. Hence, the requirement of measurements at 5 years will lead to the assessment of LV function in patients with mostly normal or improved LV function. This is particularly important in patients with EF <35% who incur a particularly high mortality because of LV dysfunction. This major potential for bias when progressive improvement is examined explains why we focused our efforts on obtaining 1-year EF after surgery to judge effectiveness of AVR on EF improvement.

Both our study and the study described by Misawa and Fuse show a trend for improvement in EF after AVR for AR with marked preoperative LV dysfunction. However, as shown in our study, not all patients with preoperative LV dysfunction normalize or improve their EF despite correction of the volume overload, suggesting that LV dysfunction may be irreversible. This incomplete and inconstant improvement leads to decreased long-term survival (11–9% at 15 years compared with 56±4% in patients with normal preoperative EF) and higher heart failure rate (50% at 15 years in patients with marked preoperative LV dysfunction compared with 10% at 15 years in patients with normal preoperative EF). Hence, incomplete improvement in LV function translates into dire clinical consequences.

The clinical implications are that early surgery before development of LV dysfunction in patients with severe AR is warranted. The concept that EF completely normalizes after AVR despite marked preoperative reduction in LV function2 could therefore lead to false reassurance and unnecessary delay in AVR, resulting in excess morbidity and mortality.

The second issue raised by Misawa and Fuse is the need to adapt thresholds of LV size to body size. We completely agree that LV dimension should be adjusted for body size in case of AR. Indeed, in previous studies performed in our institution, we observed that the natural history of isolated severe AR3 is most strongly affected by LV dimension adjusted to body surface area. We also observed that the use of unadjusted LV dimensions probably contributes to excess mortality in women after AVR.4 Therefore, adjusted LV dimension for body size is an indicator of adverse prognosis in patients with severe AR. In fact, LV end-systolic dimension normalized to body surface area (LVS/BSA >25 mm/m²) has now been adopted as one of the important criteria in the recommendations of the
European Society of Cardiology for selecting patients with severe AR for consideration of AVR. We believe that the American and Asian cardiology societies should follow suit and recommend that patients who meet this criterion should be promptly considered for AVR.

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