The management of valvular heart disease has markedly changed during the past decades. The timing of intervention—surgically and more recently also by catheter intervention—is no longer primarily driven by the goal of symptom relief for the patient. Treatment strategies aim now for an optimal long-term outcome with regard to both morbidity and mortality.\(^1,2\) The observation that patients may have already developed irreversible damage of their cardiovascular system—in particular of the ventricular myocardium—when they present with symptoms and that this damage has negative impact on their postoperative long-term outcome has moved the recommendations toward earlier intervention.\(^1,2\) Because any intervention is also associated with a certain risk and negative long-term consequences by itself, these risks need to be carefully weighed against the potential risk of delaying intervention in an asymptomatic or mildly symptomatic patient.\(^1,2\)

Because both risks are determined by many individual factors, the timing of intervention has become a real challenge, and potential predictors of outcome that may help to guide decision making have gained high interest in the management of valvular heart disease.

**See Article by Naji et al**

Left ventricular ejection fraction (LVEF) is a generally accepted predictor of outcome in valvular heart disease.\(^1,2\) However, it has also been recognized that LVEF has a poor sensitivity to detect early myocardial damage, which may already have negative impact on the patient’s outcome. In this regard, left ventricular global longitudinal strain (LVGLS) has gained particular interest and is increasingly used with prognostic and clinical decision-making implications.\(^3\) LVGLS has been demonstrated to be a more sensitive marker of LV dysfunction than LVEF and may already be abnormal when LVEF is still preserved.\(^4,6\) In aortic stenosis, LVGLS has been reported to be an independent predictor of long-term outcome and may provide added prognostic value on top of other standard risk factors.\(^5,8\) LVGLS seems to correlate closely and better than LVEF with the extent of myocardial fibrosis,\(^9\) which predicts worse postoperative symptoms and all-cause mortality.\(^9,10\)

In this issue of *Circulation: Cardiovascular Imaging*, Naji et al\(^1\) add important new information on the potential role of LVGLS as a predictor of outcome in the challenging group of patients with severe bioprosthetic aortic valve stenosis with regard to the timing redo valve replacement.

These patients are in general considered to be at increased risk for surgery not only because it is redo surgery but also because they are frequently at advanced age and have relevant comorbidities that may increase the operative risk. Therefore, not only the patient but also the caring physicians may be reluctant to opt for reoperation until symptoms become severe. Nevertheless, increasing life expectancy and improved results of redo surgery support therapeutic strategies that are more based on prognostic considerations. The current study demonstrates that LVGLS is independently associated with the composite outcome of long-term death or admission for congestive heart failure in asymptomatic and mildly symptomatic patients with severe bioprosthetic aortic valve stenosis and preserved LVEF who undergo redo surgical valve replacement. The presented data suggest that LVGLS may provide incremental prognostic value when added to other established risk factors and reclassify the risk of long-term adverse events. LVGLS above or below median was particularly discriminative with regard to the outcome of patients with increased surgical risk (Society of Thoracic Surgeons score ≥24). The authors conclude that the evaluation of LVGLS may, therefore, help to improve timing of redo surgery with the consequence of better long-term outcome.

The strengths of this study need to be acknowledged: it is certainly one of the largest studies evaluating the prognostic value of LVGLS in predicting the outcome of this challenging and continuously increasing group of patients with bioprosthetic aortic valve failure in whom redo surgery is being considered. The study included only patients with preserved LVEF who did not yet have severe symptoms. The selected end point—death or congestive heart failure requiring admission—is adequately strong.

However, the study also has limitations and raises some questions. The vast majority of patients were symptomatic presenting with shortness of breath (77% in New York Heart Association class II). These patients have an indication for reintervention based on current guidelines anyway. It is definitely misleading that the authors talk throughout the article about asymptomatic and minimally symptomatic patients. New York Heart Association class II does not characterize minimally symptomatic patients. The few patients classified as New York Heart Association class I had endocarditis or...
severe aortic regurgitation with a dilated left ventricle indicating surgery. Thus, the really challenging population of patients with severe bioprosthetic valve failure who are truly asymptomatic with, in addition, normal left ventricular function and the value of LVGLS for decision making regarding surgery in this setting is not directly addressed.

Furthermore, this is a retrospective analysis with all its limitations, and the subgroups in the analyses are small precluding statistical analysis.

In addition, the technical limitations of LVGLS assessment need to be addressed. There are different techniques available for the evaluation of this parameter. The authors chose to use velocity vector imaging—less well established than other techniques. In any case, there remain vendor-dependent differences. This is one reason why LVGLS has not reached general acceptance in practice guidelines, yet.

The symptomatic status is frequently difficult to assess in elderly patients. Neurohormones have been shown to be helpful in this situation and to provide prognostic information that may help to guide decision making with regard to intervention in valvular heart disease. Such information and the potential added value of LVGLS could unfortunately not be provided in this retrospective analysis.

The authors report excellent results for redo aortic valve replacement with low operative mortality. This may, however, not be achievable in all centers and patient populations. It is also surprising that there were no documented noncardiac deaths following up in this study. The results may, therefore, not be generalizable. This is particularly true for the subgroup with increased surgical risk defined by an Society of Thoracic Surgeons score ≥4% in whom the authors report that LVGLS may be of the greatest help by identifying asymptomatic or minimally symptomatic patients who may benefit from early surgery. In patients with increased surgical risk, the decision to operate, despite the absence of symptoms, is particularly difficult and requires solid data on the potential benefit of the intervention. A retrospective analysis cannot provide such evidence. The fact that patients with a LVGLS worse than median had a worse long-term outcome does not prove that surgery in a truly asymptomatic patient with such a LVGLS will improve the outcome particularly when associated with a significant operative risk. Thus, the results need to be viewed with caution. Prospective studies will be required to evaluate the role of LVGLS for decision making in asymptomatic patients with bioprosthetic valve failure.

As the authors point out correctly, the development of alternative interventions with potentially lower risk, such as transcatheter valve-in-valve implantation, may have impact on the timing of intervention in the future. However, more data on the long-term outcome after such interventions are required before their use in asymptomatic patients can be justified.

In conclusion, more research is definitely required to define the role of LVGLS for timing of redo aortic valve replacement in patients with significant bioprosthetic valve dysfunction who present with normal ventricular function and without any symptoms. However, in patients with ambiguous findings or borderline indications for reintervention, the results of the present study support that LVGLS adds one additional important piece of information that may help in the decision.

Disclosures
None.

References


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Challenge of Timing Redo Aortic Valve Replacement: Is There a Potential Role for Left Ventricular Global Longitudinal Strain?
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