Active infective endocarditis (IE) is a devastating condition with high surgical risk (Figure 1). In addition, surgeons are often reluctant to preserve the native mitral valve (MV) because of the fragile leaflet tissue, risk of recurrence, and uncertain long-term outcomes. Indeed, in “real-world” practice in 1998, MV repair was performed in only 10.7% of active native MV IE cases.1 However, MV repair has been performed more aggressively since Dreyfus et al reported excellent results in 35 patients with active IE.2 MV repair is currently performed in approximately 19% of active IE cases at the general community level worldwide.3 In experienced institutions, MV repair is feasible for between 36% and 100% of active IE cases,4 although the definition of active IE and study design vary widely among the reports.

Similar to a degenerative MV, repair for MV IE is also associated with better early and late outcomes compared with replacement. A previous meta-analysis indicated early and late mortality rates of 2.3% and 7.8% after MV repair and 14.4% and 40.5% after replacement, respectively, although 66% and 78% of these patients, respectively, had acute IE. A contemporary population-based study in New York and California revealed 30-day mortality rates of 3.5% vs. 8.4% and survival at 12 years of 68.8% vs. 53.5% after MV repair vs. replacement for active IE. To eliminate the major drawback associated with the inhomogeneity of the 2 groups in these analyses, a recent nationwide cohort study in Taiwan using propensity score matching also indicated better in-hospital and late mortality rates at 4.8 years after MV repair (6.3% and 19.3%, respectively) than replacement (10.8% and 31%, respectively) for mainly acute IE (71.3% and 73.9%, respectively). Therefore, the current guidelines recommend MV repair over replacement as a surgical intervention for active MV IE.6–8

In an article published in this issue of the Journal, Nakamura and colleagues9 report an analysis of their experience with a total of 35 patients undergoing isolated MV surgery for active IE between January 2004 and August 2015. They aggressively performed valve repair and preserved the valve in 86% of cases. In 30 patients undergoing MV repair, the in-hospital mortality rate was 3.3% and the 5-year survival rate was 89±6%. Postoperative MV replacement was required in only 1 patient 2 months later, and no recurrence of endocarditis occurred in any of the cases. As described before, their results are not surprising in the modern era, but their innovative technique is noteworthy.

They applied 0.625% glutaraldehyde solution to the defective edge for 2 min, and found that this reinforced the residual tissue edges and reduced the resected area. Glutaraldehyde solution has widely been used as a disinfectant and for fixation of specimens. It cannot be applied directly in humans because of its strong toxicity. In the field of cardiovascular surgery, the application of glutaraldehyde has been limited to preservation or stabilization of heart valve tissue and the autologous or xenologous pericardium. These tissues should be rinsed adequately before use in patients to eliminate any residual toxic agent. In 1988, Carpentier’s group confirmed improvement of goat pericardium quality with preservation of the natural structure after 10 min of treatment with glutaraldehyde solution.9 Glutaraldehyde was next applied in the setting of acute aortic dissection to stabilize the fragile dissected aortic wall.10,11,12 These reports led to the widespread use of biological adhesives, including bovine serum albumin and glutaraldehyde, since 1998. Therefore, the clinical concept of stabilizing the fragile infected mitral leaflet proposed by...
Nakamura and colleagues may be justified. Although their study was approved by the local ethics committee, the major drawback is the lack of scientific background for clinical application of glutaraldehyde solution to the MV. This may be the first report describing the application of glutaraldehyde to the MV in consecutive patients with acute IE (although there is a report of a case operated in 2017). Thus, the optimal concentration and duration for application should be determined experimentally before clinical use. Their rationale was a report by Gorman et al indicating inactivation of common microorganisms by 0.2–2% solution within 2 min, which seems both reasonable and safe. The second drawback is that this was not a comparative study but a retrospective study of their technical modifications for consecutive patients without a control group. It is not possible to determine whether their results could be reproduced without the use of glutaraldehyde or with other disinfectants (e.g., povidone iodine) because the other operative techniques used were conventional. Therefore, although the retrospective nature of the study precluded discussion about whether use of glutaraldehyde is superior to other methods, it is reasonable to conclude that its use is safe without adverse events. The third drawback is the lack of long-term follow-up data. The mean follow-up period for their patients was only 4.3±3.7 years. However, deterioration of glutaraldehyde-treated autologous pericardium is known to become evident from 10 years after surgery (Figure 2). The actual role of topical application of glutaraldehyde to the fragile mitral leaflet should be confirmed in further studies in larger cohorts with longer follow-up.

Nonetheless, these authors are to be congratulated on their innovative technique with excellent results in this critical setting. It should be emphasized that they experienced no reoperation beyond 2 months and no recurrence of IE over a mean follow-up period of 4.3±3.7 years. This may have been due to the bactericidal effects of glutaraldehyde in addition to the formation of irreversible cross-linkages between collagen molecules. Interessingly, the beneficial effect of MV repair for IE was not apparent in a low-volume center. This simple but innovative technical modification may result in the more widespread adoption of MV repair for active IE, making the procedure reproducible and more durable at the general community level after careful inspection of its validity.

Disclosures
The author declares no conflicts of interest.

References


