

Mitral valve gradient after valve repair of degenerative regurgitation with restrictive annuloplasty

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ABSTRACT

Backgrounds: Outcomes of mitral valve repair have been well described for patients with degenerative regurgitation. The hemodynamic effects of repair have not been as well studied, however. We report hemodynamic outcomes in these patients.

Methods: We reviewed 1147 patients who underwent isolated mitral valve repair for degenerative mitral valve regurgitation between January 2004 and December 2013. Baseline characteristics included mean age 58.6 ± 13.4 years, male sex in 792 patients (69.1%), mean ejection fraction of 0.64 ± 0.07 , and New York Heart Association class III/IV dyspnea in 215 patients (18.8%).

Results: Mitral valve repair involved the posterior leaflet in 764 patients (66.6%), anterior leaflet in 57 patients (5.0%), both leaflets in 260 patients (22.7%), and annuloplasty alone in 66 patients (5.8%). Among the patients who underwent posterior leaflet repair, 713 (93.3%) were treated with our standard technique of triangular leaflet resection/plication and repair with partial posterior band annuloplasty using an unmeasured 63-mm flexible band. Follow-up echocardiography data were obtained in 1138 survivors (99.4%) at 600 ± 880 days. Mild or less valve regurgitation was present at last follow-up in 1030 patients (90.5%). The mean mitral valve gradient was 3.1 ± 1.4 mm Hg in the operating room and 3.5 ± 1.6 mm Hg at the last follow-up ($P < .001$). The mean mitral valve gradient decreased from the first to the second median time periods (124.5 days) of follow-up (3.7 ± 1.6 mm Hg to 3.3 ± 1.8 mm Hg; $P < .001$).

Conclusions: Mitral valve repair for degenerative regurgitation results in a small mitral valve gradient that appears to decrease with time after discharge. (J Thorac Cardiovasc Surg 2015; ■:1-4)

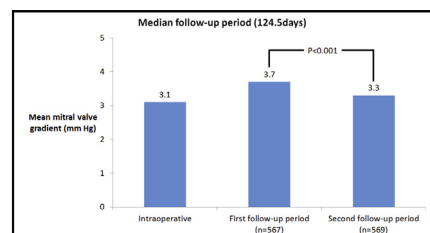
Mitral valve repair is preferred over replacement in the setting of degenerative mitral valve disease.¹ In this condition, most mitral valve repair techniques involve leaflet resection, suture repair, and restrictive band or ring annuloplasty.² It is intuitive that some narrowing of the valve orifice will occur after the use of these techniques, and indeed the literature supports such a concept.³ The effects

of such repair have not been well studied, however, and only a few reports have been published to date.^{4,5} We studied our experience in this setting to better understand the effect of mitral valve repair as it relates to long-term valve gradient.

METHODS

The Mayo Clinic's Institutional Review Board approved the collection and analysis of the data for this study. We reviewed the records of 1255 patients who underwent isolated mitral valve repair for degenerative valve regurgitation between January 2004 and December 2013. We excluded 108 patients (8.6%) who had undergone previous valve surgery or had a history of active endocarditis or mitral valve stenosis. A total of 1147 patients (91.4%) were enrolled in this study.

Baseline patient characteristics, operative data, surgical techniques, and echocardiography data were abstracted from the Division of Cardiovascular Surgery's database and individual patient medical records. Data were collected in keeping with definitions outlined in the Society of Thoracic Surgeons' Adult Cardiac Surgery Database.



The changes of mitral valve gradient after valve repair of degenerative regurgitation.

Central Message

Mitral valve repair for degenerative disease results in a low mitral valve gradient that decreases with time after discharge.

Perspective

The mitral valve gradient after mitral valve repair has not been well studied. We retrospectively reviewed 1147 patients over a 10-year period. Our standard technique includes leaflet resection and annuloplasty with a standardized flexible band. We found that our repair technique results in a good long-term durability, as well as a small mitral valve gradient that decreases with time after discharge.

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Mitral valve repair techniques are defined based on the leaflets involved in the repair as posterior, anterior, bi-leaflet, or ring annuloplasty alone. Commissuroplasty is classified as a bi-leaflet repair. In general, our institutional strategy for posterior leaflet repair includes posterior leaflet triangular resection/plication, cleft closure, and repair with an unmeasured 63-mm flexible band (Medtronic, Minneapolis, Minn) annuloplasty (Figure 1). This is a “one size fits all” strategy that involves no modification of the band. Follow-up echocardiography was done at Mayo Clinic and interpreted by cardiologists.

Descriptive statistics for categorical variables are reported as count (percentage), and those for continuous variables are reported as mean \pm standard deviation or median (interquartile range) as appropriate. Statistical analyses were performed using the χ^2 or Fisher exact test for categorical variables and the nonparametric rank-sum test for continuous variables. Freedom from recurrent mitral valve regurgitation was calculated using Kaplan-Meier estimates.

RESULTS

The 1147 patients included 792 males (69.0%). The mean age at surgery was 58.6 ± 13.4 years, and the mean preoperative left ventricular ejection fraction was 0.64 ± 0.07 . The preoperative New York Heart Association functional class was I in 335 (29.2%), II in 595 (51.9%), III in 180 (15.7%), IV in 35 (3.1%), and missing in 2 patients. Atrial fibrillation was present in 91 patients (7.9%).

The mitral valve surgical technique was median or partial sternotomy in 784 patients (68.3%) and right thoracotomy with or without robot assistance in 363 patients (31.6%). The mean duration of cardiopulmonary bypass was 57.1 ± 27.8 minutes. The aortic cross-clamp time was 41.0 ± 19.7 minutes. Operative mortality occurred in 2 patients (0.2%).

Valve repair included operation on the posterior leaflet in 764 (66.6%), anterior leaflet in 57 (5.0%), both leaflets in 260 (22.7%), and ring annuloplasty alone in 66 patients (5.8%). Among the patients that underwent operation on

the posterior leaflet alone, 713 (93.3%) received our standard repair technique of triangular leaflet resection/plication and partial posterior band annuloplasty with an unmeasured 63 mm flexible band.

Adjunctive mitral valve repair techniques were done in 434 (37.8%) patients. Such techniques included one or more of the following: artificial chordae in 206 (18.0%), commissuroplasty in 182 (15.9%), posterior leaflet quadrangular resection in 41 (3.6%), or an Alfieri (ie, edge-to-edge) repair in 27 patients (2.4%).

Intraoperative transesophageal echocardiography data about valve regurgitation were available in 1146 (99.9%) patients, while follow-up transthoracic echocardiography data were available in 1138 survivors (99.4%) survivors at 600 ± 880 days (median 124.5, interquartile range, 4–884.3). Mild or less grade mitral valve regurgitation was present in the operating room in 1136 patients (99.1%) and at last follow-up in 1031 patients (90.6%). Freedom from moderate or greater mitral valve regurgitation at 5 years was $77.0\% \pm 2.6\%$.

Mitral valve gradient data were reported intraoperatively in 920 patients (80.3%) and at last follow-up in 1136 survivors (99.2%) (Table 1). A mitral valve gradient was present in 917 patients (99.7%) intraoperatively and in 1136 (100%) at last follow-up. The mean gradient was 3.1 ± 1.4 mm Hg in the operating room and 3.5 ± 1.6 mm Hg at last follow-up. Paired data were available in 910 survivors (79.5%), and the difference between the 2 groups was statistically significant ($P < .001$).

Mitral valve gradient data stratified by type of repair are summarized in Table 1. At last follow-up, posterior leaflet repair was associated with a lower mean gradient (3.4 ± 1.5 mm Hg) than anterior leaflet repair (3.7 ± 1.8 mm Hg), bi-leaflet repair (4.0 ± 1.9 mm Hg),

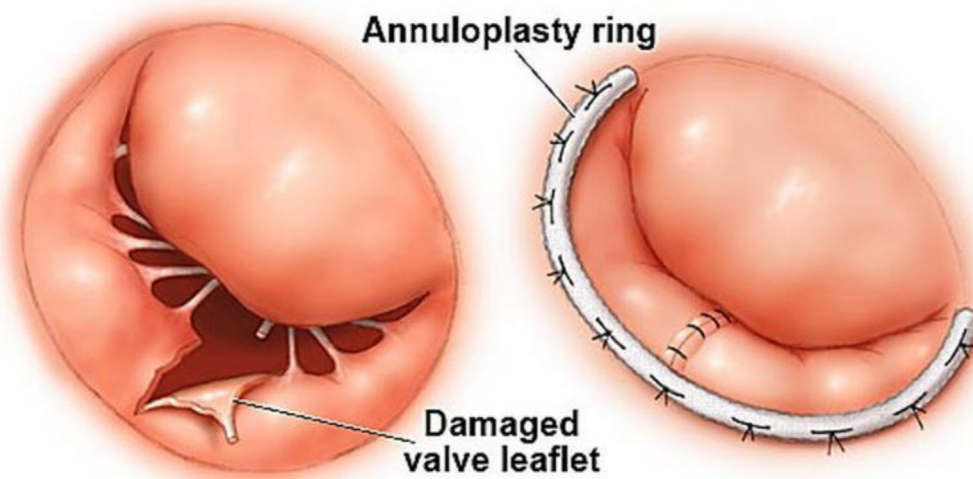


FIGURE 1. Illustration of our standard mitral valve repair technique including triangular leaflet resection/plication and partial posterior band annuloplasty with an unmeasured 63-mm flexible band.

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