

Simple versus complex degenerative mitral valve disease

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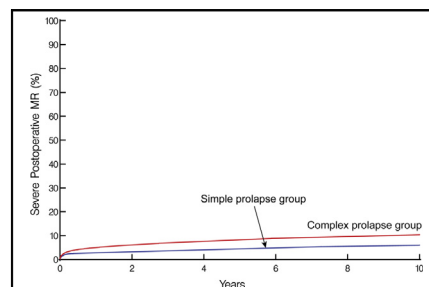
ABSTRACT

Objectives: At a center where surgeons favor mitral valve (MV) repair for all subsets of leaflet prolapse, we compared results of patients undergoing repair for simple versus complex degenerative MV disease.

Methods: From January 1985 to January 2016, 6153 patients underwent primary isolated MV repair for degenerative disease, 3101 patients underwent primary isolated MV repair for simple disease (posterior prolapse), and 3052 patients underwent primary isolated MV repair for complex disease (anterior or bileaflet prolapse), based on preoperative echocardiographic images. Logistic regression analysis was used to generate propensity scores for risk-adjusted comparisons (n = 2065 matched pairs). Durability was assessed by longitudinal recurrence of mitral regurgitation and reoperation.

Results: Compared with patients with simple disease, those undergoing repair of complex pathology were more likely to be younger and female (both *P* values < .0001) but with similar symptoms (*P* = .3). The most common repair technique was ring/band annuloplasty (3055/99% simple vs 3000/98% complex; *P* = .5), followed by leaflet resection (2802/90% simple vs 2249/74% complex; *P* < .0001). Among propensity-matched patients, recurrence of severe mitral regurgitation 10 years after repair was 6.2% for simple pathology versus 11% for complex pathology (*P* = .007), reoperation at 18 years was 6.3% for simple pathology versus 11% for complex pathology, and 20-year survival was 62% for simple pathology versus 61% for complex pathology (*P* = .6).

Conclusions: Early surgical intervention has become more common in patients with degenerative MV disease, regardless of valve prolapse complexity or symptom status. Valve repair was associated with similarly low operative risk and time-related survival but less durability in complex disease. Lifelong annual echocardiographic surveillance after MV repair is recommended, particularly in patients with complex disease. (*J Thorac Cardiovasc Surg* 2018; ■:1-8)



Temporal trend of severe postoperative mitral regurgitation (MR) after mitral valve repair.

Central Message

Degenerative mitral valve repair operations have become increasingly durable. However, lifelong annual echocardiographic surveillance is recommended, particularly for patients with complex disease.

Perspective

Mitral valve repair for degenerative disease is associated with excellent survival and low operative risk, regardless of valve prolapse complexity. However, repair of complex disease is still less durable and requires lifelong postoperative annual echocardiographic surveillance.

See Editorial Commentary page XXX.

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Degenerative mitral valve disease is the most common indication for mitral valve surgery and is recognized as an important preventable cause of chronic heart failure.¹⁻³ The recent American Heart Association/American College of Cardiology guidelines recommend (class IIA) surgical mitral valve repair for asymptomatic patients with chronic severe primary mitral regurgitation (MR) with preserved left ventricular function (ejection fraction > 60% and



Scanning this QR code will take you to a supplemental video, appendix, figures and tables for the article.



Abbreviations and Acronyms

MR = mitral regurgitation

NYHA = New York Heart Association

end-systolic dimension < 40 mm) in whom the likelihood of a successful and durable repair without residual MR is more than 95%, and expected mortality of <1% when performed at an experienced heart valve center.⁴

Although there is consensus that repair of posterior leaflet prolapse by resection and annuloplasty is reproducible and durable, outcomes after repair of anterior leaflet and bileaflet prolapse are less certain.⁵ Thus, many cardiologists have been reluctant to recommend surgical intervention in asymptomatic patients with anterior or bileaflet prolapse because of perceived inferior surgical outcomes (Video 1).^{1,6} At a center where surgeons favor mitral valve repair for all subsets of leaflet prolapse, we sought to identify temporal trends in characteristics of patients with simple (posterior leaflet prolapse) and complex (anterior or bileaflet prolapse) degenerative MR undergoing mitral valve repair, determine whether postoperative complications differed after repair of simple versus complex disease, assess recurrent MR over time and prevalence of reoperation after repair in each group, compare long-term survival, and identify factors associated with mortality and durability after repair.

PATIENTS AND METHODS

Patients

From January 1, 1985, to January 1, 2016, 6153 patients underwent primary mitral valve repair for degenerative mitral valve disease with leaflet prolapse (Carpentier type II⁷) at Cleveland Clinic. Patients with concomitant tricuspid valve repair (n = 350 [5.7%]), closure of an atrial septal defect or patent foramen ovale (n = 274 [4.5%]), or surgical ablation for atrial fibrillation (n = 750 [12%]) are included, but those with severe mitral annular calcification or undergoing other concomitant cardiac operations are not. These 6153 patients represent 96% of the 6408 patients undergoing primary mitral valve surgery for degenerative disease. The proportion of patients undergoing mitral valve repair has increased steadily, to nearly 100% in recent years (Figure E1).

Cardiologists usually recommend surgical intervention based on complexity of the valve pathology seen in echocardiographic images. Therefore, simple versus complex degenerative mitral valve disease was classified by review of echocardiographic images. Of 6153 patients, 3101 underwent mitral valve repair for simple disease on preoperative echocardiographic imaging, which represents 97% of 3183 patients undergoing mitral valve surgery for simple disease (Figure E2, A), and 3052 underwent mitral valve repair for complex disease, which represents 95% of 3225 patients undergoing mitral valve surgery for complex disease (Figure E2, B).

Surgical Details

Full sternotomy was performed in 2351 patients (39%), partial sternotomy in 1958 (32%), and right minithoracotomy in 693 (11%), and a



VIDEO 1. Simple versus complex degenerative mitral valve disease. Video available at: <http://www.jtcvsonline.org>.

robotic approach was used in 1045 (17%). Details of surgical approaches for patients undergoing less invasive and robotic mitral valve repair have been described previously.⁸⁻¹⁰

The most common repair techniques included band/ring annuloplasty in 6055 (98%), leaflet resection in 5052 (82%), sliding repair in 2576 (42%), insertion of polytetrafluoroethylene chords in 579 (9.4%), chordal transfer in 529 (8.6%), and commissuroplasty in 254 (4.1%). The most common reasons for not using annuloplasty repair were high probability of postrepair systolic anterior motion and valve stenosis due to small size of the annulus. Further details are provided in Appendix E1.

End points

End points included in-hospital mortality and morbidity, longitudinal persistence or recurrence of MR, reoperation after mitral valve repair, and time-related mortality. In-hospital mortality and complications were defined according to the Society of Thoracic Surgeons National Cardiac Database (see http://www.sts.org/sites/default/files/documents/STSAAdultCVDataSpecificationsV2_81.pdf).

A total of 7719 postoperative echocardiograms were available for 3767 patients (91%) in the matched repair group (see Data Analysis and Presentation for matching strategy). However, only a subset of 1085 matched patients have been routinely followed at Cleveland Clinic, with a total of 3370 echocardiograms available. Compared with patients not having follow-up echocardiography, these patients were more likely to be younger and less symptomatic, with a higher prevalence of chordal elongation and use artificial chordae, annuloplasty, and sliding repair techniques (Tables E1 and E2). Details of echocardiographic follow-up are shown in Figures E3 and E4.

For time-related events, patients were followed systematically at 2, 5, 10, 15, and 20 years after surgery by mailed institutional review board-approved questionnaires, telephone interviews, or examination at Cleveland Clinic. Median time for this active follow-up was 6 years, with 25% of survivors followed for more than 10 years and nearly 5% for 20 years (Figure E5).

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