

## Correction of anterior mitral prolapse: The parachute technique

Konstantinos Zannis, MD,<sup>a</sup> Laurens Mitchell-Heggs, MD,<sup>a</sup> Valentina Di Nitto, MD,<sup>a</sup> Matthias E. W. Kirsch, MD, PhD,<sup>b</sup> Milena Noghin, MD,<sup>a</sup> Gabriel Ghorayeb, MD,<sup>a</sup> and Arrigo Lessana, MD<sup>a</sup>

**Objectives:** To evaluate a new surgical technique for the correction of anterior mitral leaflet prolapse.

**Methods:** From October 2006 to November 2011, 44 consecutive patients (28 males, mean age  $55 \pm 13$  years) underwent mitral valve repair because of anterior mitral leaflet prolapse. Echocardiography was performed to evaluate the distance from the tip of each papillary muscle to the annular plane. A specially designed caliper was used to manufacture a parachute-like device, by looping a 4-0 polytetrafluoroethylene suture between a Dacron strip and Teflon felt pledget, according to the preoperative echocardiographic measurements. This parachute was then used to resuspend the anterior mitral leaflet to the corresponding papillary muscle. Of the 44 patients, 35 (80%) required concomitant posterior leaflet repair. Additional procedures were required in 16 patients (36%). The preoperative logistic European System for Cardiac Operative Risk Evaluation was  $4.3 \pm 6.9$ .

**Results:** The clinical and echocardiographic follow-up were complete. The total follow-up was 1031 patient-months and averaged  $23.4 \pm 17.2$  months per patient. The overall mortality rate was 4.5% ( $n = 2$ ). Also, 2 patients (4.5%) with recurrent mitral regurgitation required mitral valve replacement, 1 on the first postoperative day and 1 after 13 months. In the latter patient, histologic analysis showed complete endothelialization of the Dacron strip. At follow-up, all non-reoperated survivors ( $n = 40$ ) were in New York Heart Association class I, with no regurgitation in 40 patients (93%) and grade 2+ mitral regurgitation in 3 (7%).

**Conclusions:** This technique offers a simple and reproducible solution for correction of anterior leaflet prolapse. Echocardiography can reliably evaluate the length of the chordae. However, the long-term results must be evaluated and compared with other surgical strategies. (*J Thorac Cardiovasc Surg* 2012;143:S24-8)

The benefits of mitral valve repair over valve replacement have made mitral valve repair the treatment of choice for patients with mitral regurgitation (MR). Although posterior leaflet repair is well codified, anterior leaflet repair can be challenging. The introduction of polytetrafluoroethylene (PTFE) sutures for chordal replacement have simplified this procedure.<sup>1</sup> However, the length of the artificial chordae remains an issue. In the present report, we present an alternative method for anterior mitral leaflet (AML) valve repair and our short-term results.

### PATIENTS AND METHODS

#### Patients

The local ethics committee approved the present study, and the need for patient consent was waived because of the retrospective nature of the study.

From the Department of Cardiac Pathology,<sup>a</sup> Institut Mutualiste Montsouris, Paris, France; and Department of Cardiac Surgery,<sup>b</sup> Institut de Cardiologie, Hôpital Pitié-Salpêtrière, Groupe Hospitalier Pitié-Salpêtrière, Paris, France.

Disclosures: Konstantinos Zannis, Laurens Mitchell-Heggs, Valentina Di Nitto, Matthias E. W. Kirsch, Milena Noghin, Gabriel Ghorayeb, and Arrigo Lessana have nothing to disclose with regard to commercial support.

Presented at The American Association for Thoracic Surgery Mitral Conclave, New York, New York, May 5-6, 2011.

Received for publication May 15, 2011; revisions received Sept 22, 2011; accepted for publication Oct 20, 2011; available ahead of print Dec 6, 2011.

Address for reprints: Konstantinos Zannis, MD, L'Institut Mutualiste Montsouris, 42, Boulevard Jourdan, Paris 75674 Cedex 14, France (E-mail: konstantinos.zannis@imm.fr).

0022-5223/\$36.00

Copyright © 2012 by The American Association for Thoracic Surgery

doi:10.1016/j.jtcvs.2011.10.034

From October 2006 to November 2011, 340 patients with MR underwent mitral valve repair at our institution. Of these, 44 consecutive patients (13%; 28 males, mean age,  $55 \pm 13$  years) presented with AML prolapse and underwent mitral valve repair using the parachute technique. These 44 patients formed the study cohort.

#### Echocardiography

Transthoracic preoperative echocardiography was performed in all patients and allowed measurement of the distance from the tip of each papillary muscle to the annular plane at end-systole in an apical view (Figure 1, A). The length of the free edge of the entire anterior mitral leaflet was also measured in the short-axis parasternal view at end-diastole. Perioperative transesophageal echocardiography was mandatory. When poor echogenicity impeded a correct evaluation of the preoperative measurements, perioperative transesophageal off-pump measurements were used as the proxy.

Postoperative transesophageal echocardiography was used to evaluate valve competence according to the presence of color Doppler residual regurgitation, the presence of a satisfactory coaptation height, and the absence of systolic anterior motion.

#### Surgical Technique

A parachute-like device<sup>2</sup> was constructed by looping a 4-0 polytetrafluoroethylene (Gore-Tex, WL Gore & Associates, Flagstaff, Arizona) suture between a 2.5-mm-wide Dacron strip (Bard Sauvage, Tempe, Arizona) and a Teflon felt pledget. A dedicated caliper (Delacroix-Chevalier, Paris, France) was used to ensure adequate length of the PTFE loops and of the Dacron strip according to the preoperative echocardiographic measurements. When necessary, a separate device was manufactured for each papillary muscle.

Median sternotomy or right thoracotomy was then performed and cardiopulmonary bypass was used in normothermia. Myocardial protection was obtained by intermittent antegrade and retrograde normothermic blood

### Abbreviations and Acronyms

AML = anterior mitral leaflet  
 MR = mitral regurgitation  
 PTFE = polytetrafluoroethylene

cardioplegia. The mitral valve was approached either by the left atrium through Sondergard's groove or using a biatrial approach, depending on the concomitant procedures and surgeon preference.

### Valve Inspection

A systematic inspection of the valve leaflets, mitral annulus, native chordae, and papillary muscle position was performed. The prolapsing segment with elongated or ruptured chordae of the AML was identified and stay sutures were placed on either side. The segment between these stay sutures was considered the region requiring chordal support. In all cases, the match between the preoperative echocardiographic findings and perioperative evaluation was good. No additional intraoperative measures were performed by the operating surgeon. Particular attention was paid to the papillary head to identify the future suture site of the neosubvalvular apparatus.

### Parachute Landing

The parachute-like device was brought into the operating field, and the PTFE suture was inserted adjacent to the papillary muscle head, affixed to a pledget on each side. Next, the upper part of the "parachute" was sutured on the rough zone of the prolapsing anterior leaflet using a running 5-0 polypropylene suture (Figure 1, B).

### Postoperative Antithrombotic Treatment

All patients received intravenous heparin until epicardial lead ablation, followed by oral anticoagulation using fluindione for the first 3 postoperative months. The international normalized ratio was targeted at 2.5 to 3.5. Thereafter, anticoagulation was suspended in the absence of other indications.

### Data Collection

The preoperative and operative data were recorded in a computerized data registry. A preoperative risk assessment was performed according to the definitions of the European System for Cardiac Operative Risk Evaluation (EuroSCORE).<sup>3</sup>

### Follow-up

The patients were systematically followed up at 1 and 3 months and every 6 months thereafter. The clinical status and echocardiographic data were recorded and entered into our database. Postoperative events were compiled and analyzed according to the guidelines for reporting morbidity and mortality after cardiac valvular operations.<sup>4</sup> Only the latest echocardiographic data were considered for the present study.

### Statistical Analysis

Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS, Chicago, Illinois). Continuous variables are expressed as the mean  $\pm$  standard deviation and were compared using paired 2-tailed Student's *t* tests. Categorical variables are expressed as percentages and compared using the chi-square test. A 2-tailed probability value of less than .05 was taken to indicate statistical significance. The survival data were analyzed using standard Kaplan-Meier actuarial techniques for estimation of survival probabilities.

## RESULTS

### Patients

All 44 patients had moderate to severe MR due to AML prolapse. The preoperative risk factors, MI etiology, and New York Heart Association preoperative class are listed on Table 1. The preoperative logistic EuroSCORE was  $4.3 \pm 6.9$ .

Of the 44 patients, 35 (80%) presented with bileaflet prolapse requiring concomitant posterior leaflet repair (Table 2).

### Procedure

Mitral valve repair was feasible in all patients. Additional AML repair procedures were performed in 7 patients (16%) and included Alfieri stitch in 1 patient (2.3%) and anterior leaflet triangular resection in 6 (13.6%). Mitral annuloplasty was performed in all patients using a complete ring as follows: a Carpentier Edwards Physio ring (Edwards Lifescience, Irvine, California) in 19 patients (43%), a Medtronic Duran annuloplasty ring (Medtronic, Minneapolis, Minnesota) in 16 patients (36%), and Sorin Memo 3-dimensional annuloplasty ring (Sorin Biomedica Cardio S.r.L., Saluggia, Italy) in 9 patients (20%). The mean annular size was  $35.3 \pm 2.9$ . Other procedures were required in 16 patients (36%), including tricuspid valve repair in 9 (20%), atrial septal defect repair in 4 (9%), atrial fibrillation ablation in 2 (4.5%), and coronary artery bypass grafting in 1 (2.3%). The mean cardiopulmonary bypass and aortic crossclamp time was  $118 \pm 29$  and  $94 \pm 25$  minutes, respectively. Intraoperative echocardiography detected residual grade 2+ MR in 1 patient (2.3%) that was corrected by an Alfieri stitch. Systolic anterior motion was noted in 1 patient (2.3%) and was managed successfully with short-acting  $\beta$ -blockers and volume expansion. Postoperative complications included re-exploration for bleeding in 2 patients (4.5%) and transient motor deficit in 2 patients (4.5%).

### Mortality

The overall mortality rate was 4.5% ( $n = 2$ ). One of the redo patients with previous Bentall surgery never emerged from the anesthesia, and postoperative cerebral imaging revealed diffuse cerebral injury. Another patient died late after surgery (160 days postoperatively) of progressive heart failure with recurrent valve insufficiency; the patient was also affected by uncontrolled leukemia.

### Reoperation

Two patients (4.5%) required mitral valve reoperations, both for recurrent MR. One patient required early reoperation on postoperative day 1 for parachute disinsertion resulting from loosening of the running 5-0 polypropylene suture. In this context, the operating surgeon opted for a straight replacement using a bioprosthesis. A second patient

Download English Version:

<https://daneshyari.com/en/article/2981409>

Download Persian Version:

<https://daneshyari.com/article/2981409>

[Daneshyari.com](https://daneshyari.com)