Anterior Leaflet Procedures During Mitral Valve Repair Do Not Adversely Influence Long-Term Outcome

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Objectives. This study was done to assess the impact of anterior mitral leaflet reconstructive procedures on initial and long-term results of mitral valve repair.

Background. It has been suggested that involvement of the anterior leaflet in mitral valve disease adversely affects the long-term outcome of mitral valve repair. Our policy has been to aggressively repair such anterior leaflets with procedures that include triangular resections in some cases.

Methods. From June 1979 through June 1993, 558 consecutive Carpentier-type mitral valve repairs were performed. The anterior mitral leaflet and chordae tendineae were repaired in 156 patients (mean age 58 years). The procedures included anterior chordal shortening in 78 patients (50%), anterior leaflet resections in 44 (28%), resuspension of the anterior leaflet to secondary chordae in 42 (27%) and anterior chordal transposition in 27 (17%). Concomitant cardiac surgical procedures were performed in 75 patients (48%).

Results. The operative mortality rate was 2.5% (2 of 81) for isolated mitral valve anterior leaflet repair and 3.8% (6 of 156) for all mitral valve anterior leaflet repair. Freedom from reoperation at 5 and 10 years was, respectively, 89.7% (n = 160) and 83.4% (n = 24) for the entire series of 558 patients, 91.9% (n = 51) and 81.2% (n = 10) for patients with anterior leaflet procedures, 88.8% (n = 109) and 84.4% (n = 14) for patients without anterior leaflet procedures and 91.7% (n = 118) and 88.9% (n = 18) for patients without rheumatic disease. Logistic regression showed that rheumatic origin of disease (odds ratio 2.99), but not anterior leaflet repair, increased the risk for reoperation.

Conclusions. These results demonstrate that expansion of mitral valve techniques to include anterior leaflet disease yields immediate and long-term results equal to those seen in patients with posterior leaflet disease.

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Mitral regurgitation resulting from degenerative mitral valve disease is associated with anterior leaflet abnormality in approximately one third of cases (1). The standard correction of a prolapsing posterior leaflet consists of quadrangular resection and annular plication. However, many procedures have been advanced for repairing anterior leaflet prolapse (2–4), including triangular leaflet resection, chordal shortening, posterior chordal transfer, suspension from secondary chordae and replacement with synthetic chordae.

Despite the availability of such a variety of techniques, little information has been published regarding the long-term efficacy of anterior leaflet repair in a heterogeneous group of patients. This report evaluates the safety and durability of mitral valve reconstruction in a consecutive series of patients requiring procedures on the anterior mitral leaflet.

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**Table 1. Types of Anterior Mitral Leaflet Repair Procedures Performed**

<table>
<thead>
<tr>
<th>Procedure</th>
<th>No. (~) of Patients</th>
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<tr>
<td>Chordal shortening</td>
<td>78 (50%)</td>
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<tr>
<td>Anterior leaflet resections</td>
<td>44 (28%)</td>
</tr>
<tr>
<td>Resuspension of the anterior mitral leaflet to secondary chordae</td>
<td>42 (27%)</td>
</tr>
<tr>
<td>Transposition of posterior chordal segments to the anterior leaflet</td>
<td>27 (17%)</td>
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<tr>
<td>Two or more of the above procedures</td>
<td>32 (21%)</td>
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**Figure 1. Effect of anterior mitral leaflet procedures on freedom from reoperation.**

**Figure 2. Effect of anterior mitral leaflet procedures on freedom from reoperation and severe mitral regurgitation.**

**Results**

The operative mortality rate was 2.5% (2 of 81) for isolated mitral valve reconstruction with anterior leaflet procedures; it was 3.8% (6 of 156) for all mitral valve reconstruction with anterior leaflet procedures. The patients had a mean age of 57.9 years and a mean preoperative New York Heart Association functional class of 3.0. Concomitant operative procedures were performed in 75 patients (48%), including 32 coronary bypass procedures (20%) and 18 procedures on valves other than the mitral valve (12%). The anterior leaflet procedures performed included chordal shortening in 78 patients (50%), anterior leaflet resections in 44 (28%), resuspension of the anterior mitral leaflet to secondary chordae in 42 (27%) and transposition of posterior chordal segments to the anterior leaflet in 27 (17%) (Table 1). The etiology of the mitral valve disease was degenerative in 70 patients (44.9%), rheumatic in 27 (17.3%), ischemic in 24 (15.4%) and infectious in 24 (15.4%).

Long-term follow-up revealed a mean functional class of 1.4. Reoperation was necessary in 8.3% (13 of 156) of patients with anterior leaflet procedures compared to 7.5% (30 of 402) in patients with mitral valve reconstruction not involving the anterior leaflet (p = NS). Freedom from reoperation at 5 and 10 years was 89.7% (n = 160) and 83.4% (n = 24) for the overall series of 558 patients, 91.9% (n = 51) and 81.2% (n = 10) for patients with anterior leaflet procedures (Fig. 1), 88.8% (n = 109) and 84.4% (n = 14) for patients without anterior leaflet procedures and 91.7% (n = 118) and 88.9% (n = 18) for all mitral repairs in patients with disease of nonrheumatic origin (p = NS). Similarly, freedom from both reoperation and severe mitral regurgitation was unaffected by the performance of anterior leaflet repair (Fig. 2). Cox hazard analysis revealed that only rheumatic origin of disease, but not anterior leaflet repair, increased the risk for reoperation (odds ratio 2.99) (Fig. 3). The various types of repair did not have a statistically significant effect on the incidence of reoperation.

**Discussion**

Mitral valve reconstructive techniques were initially applied primarily to degenerative valves with posterior leaflet prolapse. As experience with mitral valve reconstruction has increased, more aggressive approaches to treatment of anterior leaflet prolapse have been developed. The present lack of data regarding long-term outcome of anterior leaflet mitral repair procedures prompted this review of our experience.

Carpentier (2) has described the primary techniques for correcting anterior leaflet prolapse. These include chordal shortening, chordal reattachment, resuspension to secondary chordae and transposition of posterior chordae. Some investi-
Table 2. Incidence of Failure of Mitral Valve Repair As Influenced by Valvuloplasty Procedures

<table>
<thead>
<tr>
<th>Valvuloplasty Procedures</th>
<th>Incidence of Failure of Mitral Valve Repair</th>
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</thead>
<tbody>
<tr>
<td>Posterior leaflet procedures only</td>
<td>7.5% (30/402)</td>
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<tr>
<td>Anterior chordal shortening</td>
<td>11.5% (9/78)</td>
</tr>
<tr>
<td>Anterior leaflet resection</td>
<td>4.5% (2/44)</td>
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<tr>
<td>Anterior leaflet resuspension</td>
<td>2.4% (1/42)</td>
</tr>
<tr>
<td>Posterior chordal transfer</td>
<td>7.4% (2/27)</td>
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p = NS for all comparisons.

In the repair of flail anterior leaflets with polytetrafluoroethylene sutures deserves special comment. Although good initial results with these sutures have been reported (3,7), long-term results are not yet available. The standard techniques of repair of such leaflets involving chordal plasty or transposition of posterior chordae have proved adequate for all situations we have encountered to date.

The technique of triangular anterior leaflet resection introduced by Carpentier (2) was later abandoned (8,9). As reported earlier (10), we believe that this technique is useful but should be limited to instances in which a redundant anterior leaflet is present with or without chordal disease. This redundancy allows a triangular resection to be performed, and the resulting leaflet anastomosis can be made without tension. No increased risk for failure of reconstruction has been noted with this technique (10).

Conclusions. Our results suggest that with use of the appropriate techniques, mitral valve reconstruction for disease involving the anterior leaflet provides short- and long-term results as satisfactory as those provided by such reconstruction when the anterior leaflet is not involved. Therefore, anterior mitral leaflet abnormalities can be treated with the appropriate techniques of mitral valve reconstruction with the expectation of a good long-term outcome.

References