Mitral Valve Repair in Ischemic (Carpentier Type I and IIIb) Functional Disease

Risk of ischemic MR

Patients with ischemic MR are a group at higher risk than degenerative disease. The morbidity and mortality of patients with mitral regurgitation (MR) and coronary artery disease (CAD) is greater than those with CAD alone. Even mild MR after acute MI showed increased mortality at 3.5 years (29%) compared to no MR (12%).

Cosgrove et al (Cleveland) reported on their experience with patients with moderate ischemic MR presenting for CABG. Five year survival of patient undergoing isolated CABG without moderate MR was 85% compared to 73% for patients with moderate ischemic MR.

Ruvolo (Italy) reported on the impact of moderate ischemic MR after isolated CABG. Ischemic MR affected late survival only in patients with LVEF 40% or less.

Risk of repair vs replace for ischemic MR

Historically it has been reported that there is greater morbidity and mortality for replacement vs repair in these patients. Recent meta-analysis of short-term vs long-term survival following repair vs replacement for ischemic MR showed that early mortality was 2.5 times greater in the replacement vs repair group. The long term survival reflected a 35% increased risk of death in the replacement vs repair group.

Enriquez-Sarano et al at the Mayo Clinic recently published (Nov 2011) their summary work on mitral regurgitation in patients with ischemic cardiomyopathy. They suggested that, when adjusted for physical factors, there was no difference between mitral repair and replacement. Additionally they defined two different mortality risk phases: (1) early phase up to 1 year and (2) the late phase beyond the first year. Once patients survived their first year, their subsequent mortality was mostly based on their non-cardiac comorbidity of diabetes, renal insufficiency, and age. Factors influencing mortality in the early phase were history of CABG, emergency/urgent status, age, and low EF.

Mitral repair techniques for ischemic MR

The mechanism of ischemic MR is related to leaflet tethering in systole, preventing the anterior and posterior leaflets from moving normally to the annulus and closing. This tethering is thought related to ventricular geometric changes, papillary muscle separation, altered annular dynamics and inflow resulting in abnormal chordal tethering.

Mitral valve repair for ischemic MR has generally involved undersizing of mitral annular ring 1-3 sizes (most typically 2). The mitral valve annulus is sized as for degenerative repair, that size determined is then downsized appropriately.

Tahta, Duran et al (2002) reported on 100 consecutive patients undergoing CABG and MV repair for moderate or worse MR. Early mortality was 12% and late 14%. Three year survival was 77%. Despite immediate postoperative mitral regurgitation grades of 0-1+ in 98% of patients, 29% of late survivors returned in follow up with greater/or equal to 2+ MR.
Cosgrove et al (2004) reported their results for MV repair for ischemic MR, generally also with CABG. During the first 6 months after repair, the proportion of patients with 0 or 1+ MR decreased from 71% to 41%. The proportion with +3 or +4 MR increased from 13% to 28%. They reported 6.3% incidence of hospital deaths, 82% survival at 1 year and 60% survival at 5 years.  

Cohn et al reported their results of patients with ischemic MR undergoing repair. They had mean LVEF 43%. All had moderate to severe MR, with severe MR in 62%. Eighteen percent were having MV repair after previous cardiac procedure. The 30-day mortality was 4.7%. Ten-, 20-, and 30 year survival was 44%, 4% and 0%.  

Undersizing of the annular ring in ischemic mitral valve repair can lead to functional mitral stenosis post repair. This “stenosis” is often sub-annular and reflects persistent sub-annular tethering of the anterior leaflet.  

Realization of these complex mechanisms has led some to add sub-valvular papillary procedures to ischemic repair techniques.  

These complex mechanisms and increased morbidity/mortality with ischemic repair compared to CABG alone has generally encouraged surgeons to address only severe ischemic MR (valve or repair). The question of what to do with moderate MR in patients undergoing CABG is more difficult. Work trying to relate the role of myocardial viability in patients undergoing CABG has importance in deciding what to do with the mitral valve (repair, replace, leave alone or percutaneous MV clip).  

**Spectrum of Repair Difficulty**  
**Functional Disease** (Carpentier Type I, Type IIIb)  

<table>
<thead>
<tr>
<th>Complexity of Repair</th>
<th>Repair Type</th>
<th>Mitral Valve Pathology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple</td>
<td>MV Replacement</td>
<td></td>
</tr>
<tr>
<td>More Complex</td>
<td>Reduction Anuloplasty with Ring – less than “normal annulus”</td>
<td>Dilated Annulus Systolic Leaflet Restriction</td>
</tr>
<tr>
<td>More Complex</td>
<td>Rings &amp; Strings</td>
<td>Dilated Annulus Systolic Leaflet Restriction</td>
</tr>
<tr>
<td>More Complex</td>
<td>Annuloplasty Ring plus Papillary Muscle Re-orientation</td>
<td>Abnormal Posterior to Anterior papillary distance</td>
</tr>
<tr>
<td>Other</td>
<td>Percutaneous Clip</td>
<td>A2/P2 Functional pathology</td>
</tr>
</tbody>
</table>
References:


