Healing Rates of Arthroscopic Repair of Massive Rotator Cuff Tears by Human Dermal Allograft Reconstruction Versus Maximal Repair: A Prospective Randomized Controlled Trial

A P Tejaswi Ravipati MBBS, MS(Ortho), DNB(Ortho)
Ivan Wong MD FRCSC, MAcM, Dip Sport Medicine
Disclosures

A P Tejawsi Ravipati

• No financial disclosures

Ivan Wong

• Speakers Bureau – Smith & Nephew
• Research – Smith & Nephew, Linvatec, Arthrex
• Fellowship – Smith & Nephew, Depuy Synthes, Arthrex
Background

• Massive rotator cuff tears continue to present a challenging problem with re-tear rate following repair ranging from 5 to 90% 1-3

• Reconstruction with acellular human dermal allografts (HDA) 4,5 has been reported with good outcomes but to our knowledge, there are no randomized controlled trials comparing this with the conventional maximal repair.
Purpose

To determine healing rate of rotator cuff reconstruction with an acellular human dermal allograft (HDA) compared with the gold standard arthroscopic maximal rotator cuff repair of massive tears of the rotator cuff.
Methods

• 30 patients with MRI diagnosis of massive cuff tear were randomized to either the reconstruction or repair group.
• All patients were evaluated with 1.5T MRI
  • 15.6 months ± 10.2 post-surgery
• Rotator cuff arthropyathy (RCA) and acromiohumeral distance (AHD) were graded using X-ray
• Western Ontario Rotator Cuff (WORC) scores, range of motion (ROM) of shoulder were analyzed.
## Demographics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Reconstruction (n = 15)</th>
<th>Repair (n = 15)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at Surgery (years)</td>
<td>59.4 ± 8.2</td>
<td>60.9 ± 6.5</td>
<td>0.583</td>
</tr>
<tr>
<td>BMI</td>
<td>30.15 ± 5.07</td>
<td>30.7 ± 3.83</td>
<td>0.752</td>
</tr>
<tr>
<td>Male (n)</td>
<td>7</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Right (n)</td>
<td>11</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>
# Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Reconstruction (n = 15)</th>
<th>Repair (n = 15)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incidence of re-tear (N)</td>
<td>13% (2)</td>
<td>73% (11)</td>
<td>0.008</td>
</tr>
<tr>
<td>Progression to RCA</td>
<td>7.10%</td>
<td>35.70%</td>
<td>0.006</td>
</tr>
<tr>
<td>Pre AHD (mm)</td>
<td>6.7 ± 1.77</td>
<td>7.8 ± 1.70</td>
<td>0.139</td>
</tr>
<tr>
<td>Post AHD (mm)</td>
<td>6.8 ± 2.38</td>
<td>5.5 ± 2.31</td>
<td>0.156</td>
</tr>
<tr>
<td>Δ AHD (mm)</td>
<td>0.1 ± 1.86</td>
<td>-2.3 ± 2.22</td>
<td>0.006</td>
</tr>
</tbody>
</table>

RCA= Rotator Cuff Arthropathy, AHD= Acromiohumeral distance
## Results

<table>
<thead>
<tr>
<th>Group</th>
<th>Pre-op WORC</th>
<th>Post-op WORC (12 months)</th>
<th>Δ WORC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reconstruction</td>
<td>50.5 ± 27.4</td>
<td>31.8 ± 26.7</td>
<td>-18.7 ± 45.7</td>
</tr>
<tr>
<td>Repair</td>
<td>63.2 ± 22.48</td>
<td>64.1 ± 33.5</td>
<td>0.9 ± 38.9</td>
</tr>
<tr>
<td>p-value</td>
<td>0.190</td>
<td><strong>0.009</strong></td>
<td>0.223</td>
</tr>
</tbody>
</table>

The reconstruction group had significantly better forward flexion (p = 0.01) and scapular plane abduction (p = 0.03) compared to the repair group.
Discussion

• HDA acts as a biological scaffold spanning the residual cuff deficiency and allowing tissue on-growth to produce a complete repair of rotator cuff tears\(^6\)

• To our knowledge, this is the first prospective RCT reporting better healing rates and functional outcomes in the reconstruction versus the repair technique although prior studies reported better functional outcomes following reconstruction with HDA\(^7\)

• The repair group had a significantly higher progression to RCA than did the reconstruction group

• The re-tear rates for the repair group (73%) are similar to the previously reported studies on similar sized tears\(^3,8\) even after attempting a maximal repair, while in the reconstruction group the re-tear rate (13%) was among the least reported for massive cuff tears
Discussion

• Our study shows that improving the healing rates by using a HDA in fact delays the progression of cuff arthropathy in contrast to the maximal repair group which showed greater progression of arthropathy, which is similar to findings by Matsuda et al\textsuperscript{10}.

• This study shows that this procedure is associated with high patient satisfaction, without the morbidity of tendon transfer or arthroplasty.

• For those few cases where further surgery is required, no bridges are burned.
Conclusions

Rotator cuff reconstruction with a dermal allograft demonstrated:

- Better healing rates than rotator cuff repair
- Preservation of AHD and lower progression rate to RCA as compared to the repair group
- Higher $\Delta$ WORC scores than the rotator cuff repair patients
References