Management of Osteochondral Lesions of the Talus Using Autologous Chondrocyte Implantation

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We have no potential conflicts with this presentation.
Introduction

• Osteochondral lesion of the talus (OLT) are frequent occurrences
  – traumatic and atraumatic
  – rate of up to 70% OLT in patients who sustain an ankle sprain or fracture

• OLTs rarely treated non-operatively as results of non-operative treatment have shown a success rate of less than 50%.
Surgical Strategies

• Reparative (<1.5cm²)
  – Marrow stimulation

• Replacement (<2.5cm²)
  – Osteochondral auto/allograft
  – autologous chondrocyte implantation (ACI)
  – matrix induced autologous chondrocyte implantation (MACI)
  – periosteal autologous chondrocyte implantation (PACI)
  – metallic implantation
Purpose

To perform a systematic review of the literature to determine which surgical treatment option for OLT less than 2.5cm² excluding microfracture provided the lowest complication rate, best clinic outcomes, and highest patient satisfaction rate.

Hypothesis

MACI would have the lowest complications rate and the highest patient satisfaction rate of the treatments examined.
Methods

• Two reviewers independently conducted the search on February 1, 2014
  – Medline, Cochrane Central Register of Controlled Trials, SportDiscus, and CINAHL.
  – (talus OR talar) AND (osteochondral OR cartilage OR lesions) AND (chondrocyte OR autologous OR implantation OR chondrogenesis)

• Exclusion
  – Level V evidence, reviews, letters to the editor, basic science, biomechanical studies, imaging, surgical technique, and classification studies
Methods

• 218 studies $\rightarrow$ 19 included in final analysis
  – open MACI, arthroscopic MACI, open PACI
  – Clinical outcome scores, complications, re-operations noted

• Statistics
  – Data was aggregated based on each treatment method and weighted outcomes were calculated
  – Random effect model
  – Continuous data: Inverse Variance
  – Dichotomous data: Mantel-Haenzel
Results

• 343 study subjects
Results

• Regardless of the treatment option all studies demonstrated a statistically significant improvement between pre-operative and post-operative AOFAS scores.

• Evaluation of post-operative AOFAS scores demonstrate no statistical difference between all MACI and PACI, but open MACI has a greater post-operative AOFAS score compared to arthroscopic MACI.
Re-operation and Complications

- Reoperation: no statistical significant was noted between MACI vs. PACI,
  - open MACI had a significantly lower rate of reoperation compared to arthroscopic MACI.
- No difference in complication rates between MACI and PACI
- Open MACI had a statistically significant increase in overall complications for the open technique with a rate 18.18% compared to 0.78% for arthroscopic
- Rate of impingement was noted to be significantly higher for the open technique of MACI (vs. arthroscopic)
### Complications of MACI vs. PACI

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Number of Studies</th>
<th>Number of Subjects</th>
<th>Complications (%)</th>
<th>Impingement (%)</th>
<th>Graft Breakdown (%)</th>
<th>Wound Complications (%)</th>
<th>Painful Hardware (%)</th>
<th>Non-union (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MACI</td>
<td>9</td>
<td>194</td>
<td>6.70</td>
<td>4.12</td>
<td>4.12</td>
<td>4.12</td>
<td>1.03</td>
<td>4.12</td>
</tr>
<tr>
<td>PACI</td>
<td>2</td>
<td>22</td>
<td>4.55</td>
<td>0.0</td>
<td>0.0</td>
<td>4.55</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

**OR** 1.51\(^1\) OR 2.05\(^2\) OR 0.35\(^3\) OR 0.11\(^4\) OR 0.58\(^5\) OR 0.35\(^6\)

\(^{1}\)p = 0.70, \(^{2}\)p = 0.63, \(^{3}\)p = 0.52, \(^{4}\)p = 0.12, \(^{5}\)p = 0.73, \(^{6}\)p = 0.52

### Complications of Open vs. Arthroscopic MACI

<table>
<thead>
<tr>
<th>Technique</th>
<th>Number of Studies</th>
<th>Number of Subjects</th>
<th>Complications (%)</th>
<th>Impingement (%)</th>
<th>Graft Breakdown (%)</th>
<th>Wound Complications (%)</th>
<th>Painful Hardware (%)</th>
<th>Non-union (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open</td>
<td>4</td>
<td>66</td>
<td>18.18</td>
<td>10.61</td>
<td>10.61</td>
<td>10.61</td>
<td>3.03</td>
<td>10.61</td>
</tr>
<tr>
<td>Arthroscopic</td>
<td>5</td>
<td>128</td>
<td>0.78</td>
<td>0.78</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

**OR** 28.22\(^1\) OR 15.07\(^2\) OR 5.89\(^3\) OR 5.89\(^4\) OR 9.96\(^5\) OR 5.89\(^6\)

\(^{1}\)p = 0.002, \(^{2}\)p = 0.01, \(^{3}\)p = 0.28, \(^{4}\)p = 0.28, \(^{5}\)p = 0.14, \(^{6}\)p = 0.28
Conclusion

• No procedure demonstrates superiority or inferiority between the combination of open or arthroscopic MACI and PACI in the management of OLT less than 2.5 cm².
• Although under the comparison of open and arthroscopic MACI, we found both advantages favoring open MACI.
• The measured benefits of open MACI come at the cost of higher complication rates.