Chitin-Based Scaffolding With Microfracture Versus Microfracture Alone For The Treatment Of Acetabular Defects: Two Year Outcomes

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Disclosures

Rakesh John
• No financial disclosures

Ivan Wong
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Cartilage Delamination and FAI

• Risk factors include male gender and presence of cam morphology\(^1\)

• Cell viability is 39% in cartilage flaps and few patients have >50% viability showing that cartilage in the flaps is not normal\(^2\)

• Microfracture has been shown to have positive outcomes at a 2.5 year follow-up with a 78% return to sport\(^3\)
Treatments

Microfracture
- PROBLEM: MFX was found to have decreased improvement after two years post-operatively and at the five- and eight-year mark\textsuperscript{4,5}
- Microfracture leads to:
  - Formation of unstable clots
  - Creation of fibrotic tissue

Chitosan-based Scaffold: CarGel
- Designed to stabilize blood clots
- Delivered to the lesion after microfracture and forms a 3D scaffold
- Studies in the knee found:
  - Greater lesion filling compared to microfracture alone and;
  - Superior repair tissue quality when compared to microfracture\textsuperscript{5}
Purpose

To evaluate short-term clinical outcomes of patients treated arthroscopically with a chitosan-based bioscaffold (BST-CarGel) for acetabular chondral defects in conjunction with microfracture compared to lesions treated with microfracture alone.
Methods

• Retrospective review of prospectively collected data from 2014-2016
• Inclusion – Focal cartilage delamination defect > 2cm² treated with microfracture ± BST-CarGel
• Primary Objective: Patient-reported outcomes (iHOT33 and HOS)
  • Collected preoperatively and post-operatively at 6 weeks, 3 months, 6 months, 1 years, 2 years, 3 years
  • All patients had a minimum two year follow-up
• Secondary Objective: Radiographic outcome and Safety
  • Imaging – X-rays, MRI-A
    • Taken pre-operatively and at one year
  • Complications such as nerve injury, admission to hospital, infection
  • Progression to THA
• Measured intraoperative details such as lesion size, cartilage grade, associated pathologies and took note of incidence of labral repair/reconstruction
## Demographics

<table>
<thead>
<tr>
<th></th>
<th>Microfracture</th>
<th>CarGel</th>
<th>p-value</th>
<th>Total (N = 86)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>33</td>
<td>53</td>
<td>-</td>
<td>86</td>
</tr>
<tr>
<td>% Male (N)</td>
<td>58 (19)</td>
<td>75 (40)</td>
<td>0.10</td>
<td>69 (59)</td>
</tr>
<tr>
<td>Age at surgery (years)</td>
<td>41.6</td>
<td>36.2</td>
<td>0.03</td>
<td>38.3</td>
</tr>
<tr>
<td>Defect Size (cm²)</td>
<td>3.04</td>
<td>4.88</td>
<td>0.0002</td>
<td>4.1</td>
</tr>
<tr>
<td>% Right (N)</td>
<td>61 (20)</td>
<td>55 (29)</td>
<td>0.59</td>
<td>57 (49)</td>
</tr>
<tr>
<td>Pre-operative joint space (mm)</td>
<td>4.17</td>
<td>4.47</td>
<td>0.17</td>
<td>4.40</td>
</tr>
<tr>
<td>Follow-up (years)</td>
<td>3</td>
<td>3</td>
<td>-</td>
<td>3</td>
</tr>
</tbody>
</table>
### Outcome

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Microfracture</th>
<th>CarGel</th>
<th>Adjusted p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint Space (mm)</td>
<td>-1.41</td>
<td>-0.21</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>iHOT33 score</td>
<td>19.81</td>
<td>18.39</td>
<td>0.854</td>
</tr>
</tbody>
</table>

*Adjusted for age at surgery and defect size (different between the two groups)

### Joint Space Pre (mm)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Microfracture</th>
<th>CarGel</th>
<th>Survival</th>
<th>Failure (THA)</th>
<th>Survival</th>
<th>Failure (THA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>% (N)</td>
<td>70 (23)</td>
<td>30 (10)</td>
<td>94 (50)</td>
<td>6 (3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joint Space Pre (mm)</td>
<td>4.4</td>
<td>3.6</td>
<td>4.4</td>
<td>3.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joint Space Post (mm)</td>
<td>3.6</td>
<td>0.9</td>
<td>4.3</td>
<td>2.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Defect Size (cm²)</td>
<td>2.8</td>
<td>3.5</td>
<td>4.6</td>
<td>8.8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Significant difference in defect size (p = 0.001)
PROMs are similar between both groups but joint space is better preserved in CarGel

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Microfracture (33)</th>
<th>CarGel (55)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-op</td>
<td>Post-op</td>
</tr>
<tr>
<td>iHOT33 (N)</td>
<td>40.15</td>
<td>59.96* (21)</td>
</tr>
<tr>
<td>HOS - ADL</td>
<td>59.16</td>
<td>75.99*</td>
</tr>
<tr>
<td>HOS - SSP</td>
<td>36.43</td>
<td>46.59*</td>
</tr>
<tr>
<td>Post-operative Joint Space (mm)</td>
<td>4.17</td>
<td>2.76</td>
</tr>
</tbody>
</table>

*statistically significant (p < 0.05)

- There were no major adverse events in either group
- Both groups showed improved iHOT33 scores post-operatively (Microfracture p = 0.002; CG p = 0.003) but ΔiHOT33 was the same in both groups (p = 0.85)
Discussion

• 30% of microfracture patients showed OA progression
  • Higher than previously reported, however our delamination size is larger

• Results are comparable to previous studies showing 22% progression to THA with a smaller defect size\(^4,5\)

• Significant decrease in number of failures when CarGel was used

• The lack of difference between the two groups with respect to ΔiHOT33 is likely because of short term follow-up

• CarGel shows similar safety profile to microfracture
Summary

• Treatment with CarGel in addition to microfracture decreases the rate of hip OA progression and THA as compared to microfracture alone
• Short-term clinical results are promising in this difficult population of patients
• Advantage: safe, single-step procedure
References


