Clinical Outcomes of Femoral Head Microfracture: A Group-Matched Controlled Study with Minimum Two-Year Follow-Up

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Disclosures

- American Hip Institute\textsuperscript{a}, AANA Learning Center Committee\textsuperscript{a}, Amplitude\textsuperscript{c}, Arthrex\textsuperscript{b,c,d}, ATI\textsuperscript{b}, Breg\textsuperscript{b}, DJO Global\textsuperscript{d}, Orthomerica\textsuperscript{d}, Pacira\textsuperscript{b,c}, Stryker\textsuperscript{b,c}

- \textsuperscript{a} – boardmember; \textsuperscript{b} – research support; \textsuperscript{c} – consulting; \textsuperscript{d} – royalty; \textsuperscript{e} - stockholder
Microfracture

- Noted successes in knee, ankle, and elbow surgery
- Recent success noted in the hip for focal chondral loss
  - Debride cartilage stable rim
  - Remove calcified cartilage
  - Penetrate subchondral plate
Purpose

- To compare the results of patients who underwent femoral head microfracture to a control group who did not require microfracture with greater than two years of follow-up.
Methods

- February 2008 and September 2013 all data was prospectively collected and placed in database
- Retrospectively reviewed for inclusion in this study
- Microfracture group treated with microfracture as described by Steadman et al
- Pair Match
  - 3:1 pair match was conducted based on a priori power analysis
  - Match criteria
    - Age +/- 5 years
    - LCEA +/- 5 years
    - Labral treatment
    - Capsular closure vs release
    - Outerbridge 3 or less
Methods

Inclusion
• > 2 year follow up
• Femoral head microfracture conducted at the time of arthroscopy

Exclusion
• Tönnis grade >1
• Dysplasia (LCEA <20)
• AVN
• Pediatric hip conditions
  o SCFE/Perthes
• Prior hip surgery
• Profunda/Protrusio
• Abductor tendon repair

PROs Collected
• mHHS
• HOS-SSS
• NAHS
• VAS
A priori power analysis

- Estimated clinically significant difference between both groups in regards to mHHS would be 8.0 standard deviation of the pre-operative group being 10
- Performing Cohen’s $d$ calculation to compute the two-tailed effect size for a t-test for independent samples, it was determined that a 1:3 group-matching ratio must be achieved to attain a power of 0.8 or higher

Shapiro Wilk to determine if data normally distributed

- t-test for two independent samples was performed to assess for significant differences between groups for age, mHHS, NAHS, HOS-SSS, and VAS
- To determine if there was a difference in the change in arthritic state of the hip, preoperative and latest follow-up Tönnis grades were compared for each of the two groups using Fisher’s Exact tests
Results

• 2,757 hip arthroscopies performed in this time interval
• 18 patients eligible, 15 had completed follow-up
• 2 patients required THA
  - 1 of which was prior to 3 month PRO collection
    - This patient was not matched secondary to no PROs collected
## Demographics/Procedures

<table>
<thead>
<tr>
<th>Table 1: Demographics</th>
<th>Microfracture</th>
<th>Control</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>8 (53.3%)</td>
<td>24 (57.1%)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>7 (46.7%)</td>
<td>18 (42.9%)</td>
<td></td>
</tr>
<tr>
<td>Mean age (years)</td>
<td>44.9 ± 8.6</td>
<td>44.7 ± 8.4</td>
<td>0.95</td>
</tr>
<tr>
<td>Laterality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right</td>
<td>8 (53.3%)</td>
<td>24 (57.1%)</td>
<td></td>
</tr>
<tr>
<td>Left</td>
<td>7 (46.7%)</td>
<td>18 (42.9%)</td>
<td></td>
</tr>
<tr>
<td>Mean follow-up time (months)</td>
<td>34.5 ± 17.9</td>
<td>38.8 ± 19.7</td>
<td>0.319</td>
</tr>
<tr>
<td>Number of conversions to THR</td>
<td>2 (13.3%)</td>
<td>2 (4.8%)</td>
<td></td>
</tr>
<tr>
<td>Mean time to THA (months)</td>
<td>3</td>
<td>4.38 ± 0.34</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2: Procedures</th>
<th>Microfracture</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labral treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repair</td>
<td>8 (53.3%)</td>
<td>21 (50%)</td>
</tr>
<tr>
<td>Debridement</td>
<td>7 (46.7%)</td>
<td>21 (50%)</td>
</tr>
<tr>
<td>Capsular treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repair</td>
<td>2 (13.3%)</td>
<td>6 (14.3%)</td>
</tr>
<tr>
<td>No repair</td>
<td>13 (86.7%)</td>
<td>36 (85.7%)</td>
</tr>
<tr>
<td>Acetabuloplasty</td>
<td>9 (60%)</td>
<td>28 (66.67%)</td>
</tr>
<tr>
<td>Femoroplasty</td>
<td>8 (53.3%)</td>
<td>34 (80.9%)</td>
</tr>
<tr>
<td>Iliopsoas release</td>
<td>2 (13.3%)</td>
<td>7 (16.67%)</td>
</tr>
<tr>
<td>Ligamentum teres debridement</td>
<td>5 (33.3%)</td>
<td>16 (38.1%)</td>
</tr>
<tr>
<td>Notchplasty</td>
<td>1 (6.67%)</td>
<td>4 (9.5%)</td>
</tr>
</tbody>
</table>
# Change in PROs

## Table 3: Mean PROs Scores and VAS

<table>
<thead>
<tr>
<th></th>
<th>Microfracture (Pre-Op)</th>
<th>Control (Pre-Op)</th>
<th>p-value</th>
<th>Microfracture (Follow-Up)</th>
<th>Control (Follow-Up)</th>
<th>Δ (Microfracture)</th>
<th>Δ (Control)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>mHHS</td>
<td>55.4 ± 16.5</td>
<td>62.7 ± 12.6</td>
<td>0.086</td>
<td>72.4 ± 14.7</td>
<td>75.3 ± 20.0</td>
<td>17.1 ± 15.1</td>
<td>11.8 ± 22.7</td>
<td>0.423</td>
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<tr>
<td>HOS-SSS</td>
<td>26.7 ± 21.6</td>
<td>42.1 ± 26.6</td>
<td>0.056</td>
<td>57.2 ± 25.9</td>
<td>65.6 ± 29.5</td>
<td>30.5 ± 30</td>
<td>21.1 ± 34.9</td>
<td>0.377</td>
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<tr>
<td>NAHS</td>
<td>52.7 ± 21.8</td>
<td>60.3 ± 16.9</td>
<td>0.178</td>
<td>72.1 ± 17.1</td>
<td>78.8 ± 20.1</td>
<td>19.4 ± 17.4</td>
<td>16.7 ± 23.8</td>
<td>0.703</td>
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<tr>
<td>VAS</td>
<td>6.3 ± 1.9</td>
<td>5.8 ± 2.0</td>
<td>0.386</td>
<td>3.5 ± 2.3</td>
<td>2.6 ± 2.6</td>
<td>-2.8 ± 1.9</td>
<td>-3 ± 2.9</td>
<td>0.788</td>
</tr>
</tbody>
</table>
Strengths

• First study to look at femoral head microfracture with control group
• All lesions in weight bearing zone
• Had a control group to compare
• Adequately powered

Limitation

• Small size (uncommon procedure)
• 2 different techniques depending on location
• Impossible to perfectly match groups
Conclusion

• Femoral head microfracture can be technically difficult procedure, but when performed correctly results are similar to patients who did not require microfracture.

• Further study of femoral head microfracture is necessary to continue to support these encouraging outcomes.