MRI evaluation of soft tissue regeneration after arthroscopic partial repair with bone marrow vents

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Disclosure Information

Grant/Research Support
- none

Speaker’s Bureau
- none

Consultant
- ConMed, Exactech

Major Shareholder
- none

Other
- none

I will be discussing “off-label” uses of the following medications:
- none
Retrospective study between April 2013 and May 2018

Partial repair cases for irreparable cuff tears 98 cases

Follow-up MRI (at 1y) available 58 cases

<table>
<thead>
<tr>
<th>Age (yr)</th>
<th>70.0 ± 5.5 (range, 54 to 80)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (M/F)</td>
<td>25/33</td>
</tr>
<tr>
<td>Side (R/L)</td>
<td>42/16</td>
</tr>
<tr>
<td>Tear pattern</td>
<td>Collin Classification</td>
</tr>
<tr>
<td>A</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>11</td>
</tr>
<tr>
<td>C</td>
<td>21</td>
</tr>
<tr>
<td>D</td>
<td>18</td>
</tr>
<tr>
<td>E</td>
<td>8</td>
</tr>
</tbody>
</table>

![Diagram showing tear patterns](image)
Surgical technique

- LHB tenotomy/tenodesis
- Microfracture on GT
- ISP (SSP) Repair to the middle facet
Evaluation items

• **UCLA score**

• **ROM** (active)
  • Elevation
  • External rotation at side

• **Muscle strength**
  • MMT (at side)

• **VAS** scale measuring **pain** (0 – 100 mm)

• **MRI** (at 1y or +)

Statistics: $\alpha$-error = 0.05
- Paired t-test: UCLA, ROM (flexion, external rotation)
- Mann–Whitney U test: VAS, internal rotation
- Chi-square: sex
- t-test: age
- Kruskal-Wallis Test: tear pattern
### Overall outcome

<table>
<thead>
<tr>
<th></th>
<th>Pre</th>
<th>1yr+ f-up</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCLA</td>
<td>17.1 ± 4.8</td>
<td>28.7 ± 5.7</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Active ROM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elevation</td>
<td>119 ± 40</td>
<td>144 ± 23</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>External rotation at side</td>
<td>36 ± 19</td>
<td>44 ± 16</td>
<td>0.000808</td>
</tr>
<tr>
<td>Pain-VAS (mm)</td>
<td>60 ± 21</td>
<td>17 ± 19</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Strength (ER MMT)</td>
<td>3.5 ± 1.3</td>
<td>4.2 ± 0.8</td>
<td>0.000508</td>
</tr>
</tbody>
</table>

All clinical items significantly improved postoperatively.
MRI

Soft tissue full coverage over Greater tuberosity in...

41% (24/58 cases)
Comparison in terms of “regeneration”

<table>
<thead>
<tr>
<th></th>
<th>Regeneartion +</th>
<th>No regeneartion</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCLA</td>
<td>28.8±4.8</td>
<td>28.5 ± 6.2</td>
<td>0.91</td>
</tr>
<tr>
<td>Active ROM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elevation</td>
<td>147 ±22</td>
<td>143 ±24</td>
<td>0.65</td>
</tr>
<tr>
<td>External rotation at side</td>
<td>43±15</td>
<td>45±18</td>
<td>0.69</td>
</tr>
<tr>
<td>Pain-VAS (mm)</td>
<td>15 ±18</td>
<td>20 ±20</td>
<td>0.39</td>
</tr>
<tr>
<td>Strength (ER MMT)</td>
<td>4.4±0.5</td>
<td>4.1±0.9</td>
<td>0.30</td>
</tr>
<tr>
<td>Tear pattern</td>
<td></td>
<td></td>
<td>0.31</td>
</tr>
</tbody>
</table>

There was no significant differences between the cases with regenerated tissue and those without regeneration.
CASE: 72 yo, female

- Collin type C: SSP, gone; ISP, delaminated; SSc Lafosse type 2
  - Active flexion 115°, external rotation 25°
  - VAS-pain, 69 mm
  - UCLA 16
Partial repair

- ISP repair to middle facet
- SSc repair to LT (suture-bridge)
- LHB tenotomy
- Microfracture on GT

1-yr post op

- Active ROM
  - flexion 150°
  - External rotation 35°
- VAS-pain, 0 mm
- UCLA 35

GT, covered with T2 low tissue

Sugaya type 2
Neo-tendon regeneration or just a scar?

However, there was no significant differences between the cases with regenerated tissue and those without regeneration.
Limitation

• Retrospective study

• No histological examination

• Selection bias
  • Patient with relatively better ROM
  • Main complaint was pain

• Short follow-up
This study showed...

- **Possibility of regeneration** of the cuff or “cuff-like” soft tissue
- On the microfractured tuberosity
- After the arthroscopic partial cuff repair