Ramazzini Presentation

THE TEMPORAL RELATIONSHIP BETWEEN SUPRASPINATUS TENDON RUPTURE AND FATTY INfiltrATION OF THE SUPRASPINATUS MUSCLE
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Shoulder injuries in QLD 2014-5


To assess the relationship of a traumatic tear to the Supraspinatus tendon and the time required for varying levels of development of fatty degeneration in the Supraspinatus muscle.
Prevalence of Supraspinatus Injuries

<table>
<thead>
<tr>
<th>Age</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All ages¹</td>
<td>5-39%</td>
</tr>
<tr>
<td>&lt;50 yrs²</td>
<td>0%</td>
</tr>
<tr>
<td>51-60 yrs</td>
<td>10.70%</td>
</tr>
<tr>
<td>61-70</td>
<td>15.20%</td>
</tr>
<tr>
<td>71-80</td>
<td>26.50%</td>
</tr>
<tr>
<td>&gt;80</td>
<td>36.60%</td>
</tr>
</tbody>
</table>


Proposed Pathology of Fatty Infiltration of the Supraspinatus Muscle

- Loss of traction on the muscle and resultant loss of permutation angle and;
- Loss neurological input


Melis et al showed that fatty infiltration can be found at an average of 3 years from traumatic injury.

- Melis et al had no description of size of tendon tears
- This research looked at large tendon tears (Patte Classification Stage 3)
- Animal studies suggest that the rate of fatty infiltration can be much faster

This is a correlation study

- Patients under the care of two co-located surgeons
- Imaging completed at Brisbane Private Hospital Imaging
- The retraction of the Supraspinatus tendon was assessed as greater than stage 3 Patte classification.
- The Goutallier grade of fatty infiltration was noted
- The patients file was examined for a date of injury
- The time from the injury to the MRI was calculated
- The time from injury to MRI was compared to the grade of fatty infiltration for correlation
Inclusion criteria were established to assess participant eligibility.

- The patient must be over the age of 18 years;
- Provide consent;
- Had an MRI completed at the Medical Imaging Practice with in the years 2011 and 2016; and,
- Retraction greater Patte Stage 3 as assessed by the medical imaging practice radiologists;
Patients were excluded from the study for the following reasons:

- Retraction less than Stage 3 as measured by the medical imaging practice radiologists on MRI;
- No date of injury recorded in the patient records; and,
- Patient had undergone previous surgery or had a significant previous injury as noted in patient records
Degree of retraction of the Supraspinatus Tendon

Goutallier Stages of Fatty Infiltration

Data Collection

244 Reports identified
102 had less than Stage 3 retraction
33 had no date of injury
30 had previous surgery
79 reports meet criteria
## Results

<table>
<thead>
<tr>
<th>Age Groups</th>
<th>Number of Patients</th>
<th>Male</th>
<th>Female</th>
<th>Average FI</th>
<th>Range of FI</th>
<th>Average Time Elapsed (Days)</th>
<th>Range of Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;55 years</td>
<td>23</td>
<td>19</td>
<td>4</td>
<td>1.3</td>
<td>0-3</td>
<td>104.3</td>
<td>7-459</td>
</tr>
<tr>
<td>55-70 years</td>
<td>40</td>
<td>34</td>
<td>6</td>
<td>1.6</td>
<td>0-3.5</td>
<td>119.5</td>
<td>7-459</td>
</tr>
<tr>
<td>&gt;70 years</td>
<td>16</td>
<td>9</td>
<td>7</td>
<td>2.1</td>
<td>0-4</td>
<td>106.9</td>
<td>7-756</td>
</tr>
<tr>
<td>All ages</td>
<td>79</td>
<td>62</td>
<td>17</td>
<td>1.6</td>
<td>0-4</td>
<td>112.5</td>
<td>6-380</td>
</tr>
</tbody>
</table>

FI = Fatty Infiltration
# Results

<table>
<thead>
<tr>
<th>Ages</th>
<th>Correlation</th>
<th>p value</th>
<th>Number of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>All ages</td>
<td>0.18</td>
<td>0.11</td>
<td>79</td>
</tr>
<tr>
<td>&lt;55 years</td>
<td>0.24</td>
<td>0.26</td>
<td>23</td>
</tr>
<tr>
<td>55-70 years</td>
<td>0.29</td>
<td>0.07</td>
<td>40</td>
</tr>
<tr>
<td>&gt;70 years</td>
<td>-0.31</td>
<td>0.24</td>
<td>16</td>
</tr>
</tbody>
</table>
• The aim of this study was to investigate if there was a correlation between fatty infiltration and time elapsed from the time of injury to time of imaging
  • The correlation was negligible
  • The p value did not reach significance
Discussion

- The rate of pre existing fatty infiltration in the community\(^1\)

- The presence of pre existing asymptomatic supraspinatus tendon tears in the community\(^2\)

- The length of time from when the injury occurred to the time of imaging being too short\(^3\)


This suggests that fatty infiltration would most likely pre-date an acute injury.

This may assist with some insurance claim determinations.
Limitations

- Lack of statistical significance
  - Increased number of participants
    - Increasing the number of surgeons, and
    - Increasing the number of medical imaging practices
Limitations

- Lack of understanding of pre-existing state of the muscle
  - A new tear of the supraspinatus muscle
  - Extension of a pre-existing partial thickness tear
  - Pre-existing non-symptomatic full thickness tears that is now symptomatic
Limitations

- Lack of time for fatty infiltration to develop
  - Melis et al. found a period of 3-6 years was required for fatty infiltration to develop
  - The longest period in this study was 459 days
  - It would be unethical to let such a condition develop as repairable prior to Goutallier grade 2

Future Directions

- Prospective study of at risk working populations
  - Regular MRI’s to identify fatty infiltration and tendon tears in asymptomatic patients
  - Unethical to leave a young symptomatic patient to develop fatty infiltration as tendon are repairable
Summary

- This study failed to demonstrate a correlation between the time elapsed between an acute rupture of the Supraspinatus tendon and MRI was related to the development of fatty infiltration of the supraspinatus muscle.
- Further investigation of the natural history of fatty infiltration of the Supraspinatus muscle following trauma is required.
- Such studies may be unethical to conduct due to good outcomes of repairs of the Supraspinatus tendon.