Are we Providing Enough Information to Shoulder Surgeons: Comparative Study of Shoulder Arthroscopic Findings and MRI (Magnetic Resonance Imaging) Shoulders

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Purpose

The aim of this study was to assess the accuracy of MRI findings in patients undergoing shoulder arthroscopic surgery. The purpose was to assess whether MRI findings and reports are providing enough information to shoulder surgeons.

MRI (Magnetic resonance imaging) has been gold standard for diagnosing shoulder pathology. It still imposes challenges for correct diagnosis and providing enough information to shoulder surgeons. The two main groups of patients having shoulder MRI are rotator cuff tears in elderly patients and labral pathology in younger cohort.

High sensitivity and specificity for detection of rotator cuff and labral abnormalities has been shown in the literature for MRI, including MRI arthrography. Magee and William showed 98% sensitivity and 96% specificity for detection of full-thickness supra-spinatus tendon tears on conventional 3-T MRI compared with arthroscopy [1]. Sensitivity of MRI shoulder is picking labral tear has been reported as 88% [2].

Since MRI shoulder are performed to diagnose shoulder pathology and help shoulder surgeon, its important to recognize surgically relevant pathology. To look into that, we did a retrospective study and compared the surgical findings with MRI findings.

Methods and materials

This was a retrospective study done at Toowoomba Base Hospital, a regional hospital in South East Queensland. All adult patients, who underwent elective shoulder arthroscopic surgery over a period of 4 years and had MRIs available for review by independent radiologists, were included in this study. Patients with infections, fractures and arthroplasty procedures were excluded.

Patient surgical reports were reviewed. Depending on surgical findings, our patient cohort was divided in following groups:

1. **Group A:**

   Patients with procedures to achieve shoulder stability including labral repair.

2. **Group B:**

   Patients had rotator cuff pathology/ subacromial impingement. This was further classified into two subgroups:
a. Patients who underwent rotator cuff repair.

b. Patients with Intact rotator cuff (Mainly had procedure for subacromial decompression).

Patients' preoperative MRI reports were obtained. An Independent Radiologist, who was blinded to original MRI reports and surgical findings, reviewed these MRIs. These patients’ surgical reports were compared with MRI findings reported by independent radiologist and initial MRI reports.

**Results**

Total 72 patients were included in this study. Majority of patients were male (n=58) and 14 were female. 36.66% (n=26) had labral pathology (Including shoulder instability) and 63.88% (n=46) had rotator cuff pathology.

**GROUP A: Patients with shoulder instability/Labral tear:**

In Group A, average age of the patients was 24.73 years. Out of total 26 patients, 92.3% (n=24) had labral tear and repair was done arthroscopically. In other 2 patients, one underwent capsular reinforcement procedure to achieve stability. Labrum in that patient was found to be intact both on arthroscopy and MRI. Other patient had fraying of labrum, which was not repaired.

Radiologist reviewing MRIs matched operative findings in all patient results (100% result). In 2 cases, initial MRI reports failed to recognize labral tear. One was reported as old bony bankart and other was reported normal.

**Group B: Patients with rotator cuff pathology/Impingement:**

In Group B, patients with rotator cuff pathology/impingement were divided in 2 sub-groups as per arthroscopic findings. Average age of the patients was 52.9 and 51.53 years in 1st and 2nd sub-group.

In 1<sup>st</sup> sub-group, patients had full thickness tear of rotator cuff arthroscopically. These were all repaired. MRI reports and Independent Radiologist, both picked full thickness tear in all patients (100% result).
2\textsuperscript{nd} sub-group was reported surgically to have intact rotator cuff tear. Main procedure done in this sub-group was subacromial decompression with or without lateral clavicle excision depending on degree of arthritis in it. MRI in this group (including MRI reports and MRI review by Independent Radiologist) picked 10 patients with rotator cuff tear (including partial thickness and full thickness tear of partial tendon and interstitial tendon tears). On MRI report and Radiologist review, neither of these patients had full thickness tear of full tendon or tendon retraction. Four patients had full thickness, partial tendon tear of rotator cuff. These all were detected as intact rotator cuff on arthroscopy and had subacromial decompression procedures. Five patients had lateral clavicle excision.

In 2\textsuperscript{nd} subgroup, MRI detected rotator cuff pathology like partial thickness rotator cuff tear, full thickness tear of partial tendon and interstitial tears. Surgeons could only look at the gross integrity of rotator cuff and did not detect these tears. Only 3 surgical reports commented that rotator cuff had tendinopathy. MRI reports were better in detail examination of rotator cuff.

Images for this section:
<table>
<thead>
<tr>
<th>Shoulder Arthroscopic Findings</th>
<th>Rotator Cuff Pathology</th>
<th>Labral Tears</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Full Thickness Tear ( Needed Repair )</td>
<td>Intact Rotator Cuff</td>
</tr>
<tr>
<td>Patient Number</td>
<td>33</td>
<td>13</td>
</tr>
<tr>
<td>Males</td>
<td>26</td>
<td>10</td>
</tr>
<tr>
<td>Females</td>
<td>07</td>
<td>03</td>
</tr>
<tr>
<td>Avg. Age (Years)</td>
<td>51.53</td>
<td>52.96</td>
</tr>
</tbody>
</table>
Fig. 1: Table showing patient demographics
Fig. 2: Shoulder arthroscopic findings (patient percentage in each group)

**Gender Distribution**

![Bar chart showing gender distribution across different conditions: Impingement, Rotator Cuff, Labral tear.]

- Impingement: 3 males, 10 females
- Rotator Cuff: 7 males, 26 females
- Labral tear: 4 males, 22 females

Fig. 3: Gender distribution

<table>
<thead>
<tr>
<th>Findings in Patients with Subacromial Impingement (Intact Rotator Cuff)</th>
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<tbody>
<tr>
<td>Arthroscopic (number of patients)</td>
</tr>
<tr>
<td>----------------------------------</td>
</tr>
<tr>
<td>Intact Rotator Cuff 11</td>
</tr>
<tr>
<td>Rotator Cuff tendinopathy 03</td>
</tr>
<tr>
<td>Calcium Deposition 01</td>
</tr>
<tr>
<td>ACJ Osteoarthritis 05</td>
</tr>
<tr>
<td>Lateral Clavicle excision 05</td>
</tr>
</tbody>
</table>

Fig. 4: Findings in patients with sub acromial impingement (intact rotator cuff)
Fig. 5: Anterior labral tear
Fig. 6: Anterior labral tear - Sagittal view
Fig. 7: Acromio-clavicular joint osteoarthritis
Conclusion

The results of this study showed that the MRI was 100% accurate in detecting full thickness rotator cuff and labral pathology. There was some inter-observer difference in MRI findings of initial report and Independent Radiologist review. Reviewing the results of the group with arthroscopic findings of intact rotator cuff/impingement, 90.9% patients had some degree of rotator cuff tear and 4 had full thickness tear of partial tendon. These tears were not appreciated on shoulder arthroscopy and no rotator cuff repair was done.

This means that MRI is more sensitive in picking rotator cuff pathology. Shoulder arthroscope has limitations and cannot detect all small tears like partial thickness or interstitial tears. Surgeons tend to detect general integrity of rotator cuff while MRI is more detailed and picks up tears, which may not be of significance to shoulder surgeons.

Images for this section:
Fig. 8: Full thickness rotator cuff tear
Fig. 9: Rotator cuff tear
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References

