ACUTE QUADRICEPS MUSCLE STRAINS. MAGNETIC RESONANCE IMAGING FEATURES AND PROGNOSIS

Background:
The use of magnetic resonance imaging (MRI) findings to predict outcome (return to sport) in acute intrinsic quadriceps muscle strain injuries has not been documented.

Research question/s:
Which factors on MRI best predict the time to return to sport following acute quadriceps muscle strain injuries in athletes?

Methodology:
Subjects: 40 professional Australian Rules football players with 25 clinical quadriceps muscle strain injuries.
Experimental procedure: All the subjects sustained Grade 1 to 2 acute intrinsic quadriceps muscle strain injuries, and MRI examinations were performed within 24–72 hours of injury. All subjects performed a similar rehabilitation programme (4 stages) with a defined end point of return to sport.
Imaging features of muscle strain injury included the anatomical location (rectus femoris or vasti), size (cross-sectional area (%) and length), and site (proximal, middle, or distal) and portion of the muscle (central, peripheral).
Measures of outcome: Time from injury to return to full training (rehabilitation interval – RI) in days.

Main finding/s:
- Other factors significantly increasing the RI were cross sectional area and length of injury
- Three players had normal MRI examinations (mean rehabilitation interval = 5.7 days)

Conclusion/s:
- The prognosis (rehabilitation days) of acute intrinsic quadriceps muscle strain injuries is significantly worse in injuries involving the central region of the rectus femoris muscle, and if the injury size on MRI, is larger.
- MRI is helpful in predicting the prognosis for acute quadriceps strains

<table>
<thead>
<tr>
<th>RI (days)</th>
<th>Rectus femoris – central tendon</th>
<th>Rectus femoris – peripheral</th>
<th>Vasti</th>
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</thead>
<tbody>
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<td>40</td>
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</table>

Keywords: Quadriceps muscle strain, injury, magnetic resonance imaging, prognosis

DETECTION AND QUANTIFICATION OF ROTATOR CUFF TEARS

Background:
The accuracy of ultrasonography and magnetic resonance imaging (MRI) for the detection of full and partial thickness rotator cuff tears has not been well studied.

Research question/s:
What is the accuracy of ultrasonography and MRI for the detection and measurement of the size of rotator cuff tears, with arthroscopic findings used as the gold standard?

Methodology:
Subjects: 71 patients with shoulder pain undergoing ultrasonography, MRI and arthroscopy.
Experimental procedure: Subjects were divided into those with a full-thickness tear (FTT = 46), partial-thickness tear (PTT = 19), and no tear (N = 6) at surgery. The presence or absence of a full or partial thickness tear and the tear size as demonstrated by each imaging test and at the time of arthroscopy were recorded.
Measures of outcome: Sensitivity (Sens), specificity (Spec), positive predictive value (PPV), negative predictive value (NPV) and accuracy (Acc) of US and MRI for FTT and PTT.

Main finding/s:

<table>
<thead>
<tr>
<th></th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>Positive PV</th>
<th>Negative PV</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>US: Complete and partial tears</td>
<td>97%</td>
<td>67%</td>
<td>97%</td>
<td>67%</td>
<td>94%</td>
</tr>
<tr>
<td>US: No tears</td>
<td>98%</td>
<td>80%</td>
<td>90%</td>
<td>95%</td>
<td>94%</td>
</tr>
<tr>
<td>MRI: Complete and partial tears</td>
<td>100%</td>
<td>67%</td>
<td>97%</td>
<td>100%</td>
<td>97%</td>
</tr>
<tr>
<td>MRI: No tears</td>
<td>100%</td>
<td>68%</td>
<td>85%</td>
<td>100%</td>
<td>89%</td>
</tr>
</tbody>
</table>

- The overall accuracy for both imaging tests was 87%
- US correctly predicted the degree of retraction of 73% of the FTT and the length of 85% of the PTT, and MRI correctly predicted the retraction and length of 63% and 75%, respectively
- US correctly predicted the width of 87% of the FTT and 54% of the PTT, and MRI correctly predicted the width of 80% and 75%, respectively
- There were no significant differences between US and MRI (p > 0.05)

Conclusion/s:
Both ultrasonography and MRI have comparable accuracy (overall 87%) for identifying and measuring the size of full thickness and partial thickness rotator cuff tears.

Evidence based rating: 6/10 Clinical interest rating: 8/10
Type of study: Case series
Methodological considerations: Case series with no control groups
Keywords: Quadriceps muscle strain, injury, magnetic resonance imaging, prognosis

Evidence based rating: 7.5/10 Clinical interest rating: 8/10
Type of study: Diagnostic study
Methodological considerations: Well conducted study
Keywords: Ultrasound, magnetic resonance imaging, shoulder, rotator cuff tears
AN EVALUATION OF THE APPREHENSION, RELOCATION, AND SURPRISE TESTS FOR ANTERIOR SHOULDER INSTABILITY


Background:
There are very few studies describing the validity of clinical tests for anterior shoulder instability.

Research question/s:
What is the validity of the apprehension, relocation, and surprise tests as predictors of anterior shoulder instability?

Methodology:
Subjects: 46 patients with shoulder pathology.

Experimental procedure: The subjects were divided into five groups using clinical and radiological criteria: traumatic anterior instability (AI = 18), rotator cuff tendinosis (RC = 17), posterior instability (PI = 2), glenohumeral osteoarthritis (OA = 4), or multidirectional instability (MI = 5). Subjects were then evaluated by four independent, blinded examiners using the apprehension (App test), relocation (Rel test), and surprise tests (Surp test).

Measures of outcome: Inter-observer reliability, sensitivity (SENS), specificity (SPEC), positive predictive (PPV), negative predictive value (NPV) for diagnostic tests for instability.

Main finding/s:

<table>
<thead>
<tr>
<th>Test</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>Positive predictive value</th>
<th>Negative predictive value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apprehension test</td>
<td>53</td>
<td>99</td>
<td>98</td>
<td>73</td>
</tr>
<tr>
<td>Relocation test</td>
<td>45</td>
<td>54</td>
<td>44</td>
<td>56</td>
</tr>
<tr>
<td>Surprise test</td>
<td>64</td>
<td>99</td>
<td>98</td>
<td>78</td>
</tr>
</tbody>
</table>

- Inter-observer reliability was determined to be 0.83
- Subjects who had a feeling of apprehension on all three tests: mean positive and negative predictive values were 93.6% and 71.9%, respectively
- The surprise test was the single most accurate test (sensitivity = 63.89%; specificity = 98.91%)

Conclusion/s:
- The ‘surprise test’ for instability is the single most accurate test for shoulder instability (sensitivity = 64%, specificity = 99%), compared with the ‘apprehension test’ and the ‘relocation test’
- A positive instability examination using all three tests is highly specific and predictive of traumatic anterior glenohumeral instability

Evidence based rating: 7/10  Clinical interest rating: 8/10
Type of study: Diagnostic study (retrospective)
Methodological considerations: Well conducted study, clinical criteria used as “gold standard”
Keywords: Shoulder, instability, diagnostic tests, validity, surprise test, apprehension tests, relocation test

DURATION OF COGNITIVE IMPAIRMENT AFTER SPORTS CONCUSSION


Background:
Sports-related concussion results in cognitive impairment, but the duration of the impairment is not well described and has implications for “return to play” guidelines.

Research question/s:
What is the duration of cognitive impairment after sports concussion?

Methodology:
Subjects: 64 male military cadets (who participated in the physical education boxing programme) who sustained a mainly Grade II concussive injury (INJ group) and 18 controls (CON group).

Experimental procedure: All the subjects underwent a preseason computerised neuro-psychological test battery (ANAM battery) (Baseline). In the INJ group, resting testing occurred at regular intervals (0–23 hrs, 1–2 days, 3–7 days, 8–14 days) after they sustained sports-related concussions, while subjects in the CON group underwent testing at parallel intervals.

Measures of outcome: Cognitive impairment (MSP = matching to sample, MTH = mathematical processing, SPD = spatial processing, STN = Sternberg procedure, SRT = simple reaction time, CPT = continuous performance test).

Main finding/s:
- Cognitive impairment was apparent on the day of injury and at 1 to 2 days post-injury, and recovery of cognitive performance occurred after 3 to 7 days
- There were no other significant differences between groups and over time with the exception of a decreased score in the injured group in MTH after 0–23 hrs

Evidence based rating: 6.5/10  Clinical interest rating: 8/10
Type of study: Prospective cohort study
Methodological considerations: Possible practice effects of the tests, reports of tests being “prone to error”, grading of concussion not by clinical criteria
Keywords: Sports, athletic injuries, brain, concussion, neuropsychology, minimal brain injury

EXERCISE AND DIETARY WEIGHT LOSS IN OVERWEIGHT AND OBSESE OLDER ADULTS WITH KNEE OSTEOARTHRITIS


Background:
Both exercise and dietary weight loss have been shown to result in significant, yet modest, improvements in function and pain in older adults with knee osteoarthritis (OA).

Research question/s:
Does exercise and dietary weight loss, either separately or in combination, improve physical function, pain, and mobility more than usual in older overweight and obese adults with knee OA?

Methodology:
Subjects: 316 obese adults (≥60 yrs, BMI ≥28 kg/m2) with knee pain, x ray evidence of knee OA, and self reported physical disability (252 subjects (80%) completed the study).

Experimental procedure: Subjects were randomised into healthy lifestyle (HL) diet (designed to 5% decrease in BW) only (DIET), exercise only (EX) [60 min resistance and endurance training, 3 days/week, for 18 months with 4 months in institution] and diet plus exercise (DIET + EX) groups.

Measures of outcome: Self-reported physical function (WOMAC), pain, weight loss, 6-minute walk distance, stair climb time, WOMAC pain and stiffness scores, and joint space width.

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Main finding/s:

- Weight loss: There was more body weight loss in the DIET (4.9%), DIET + EX (5.7%) than the HS group (1.2%)
- 6 min walk: There were improvements in 6 min walk distance (p<0.05) in the EX and DIET + EX groups
- Pain: The DIET + EX reported greater decreases in pain after 18 months compared with the HS group
- Joint space: There were no differences between groups

Conclusion/s:
A programme combining diet and exercise (resistance and endurance training, 60 min, 3/week) resulted in improvements in function, pain and in performance measures of mobility in older obese adults with knee osteoarthritis.

Evidence based rating: 8/10  Clinical interest rating: 8/10
Type of study: Randomised clinical trial
Methodological considerations: Well conducted study
Keywords: Knee, osteoarthritis, exercise, diet

REFLEXIVE MUSCLE ACTIVATION ALTERATIONS IN SHOULDERS WITH ANTERIOR GLENOHUMERAL INSTABILITY

Background:
Patients with glenohumeral instability have proprioceptive deficits that are suggested to contribute to muscle activation alterations.

Research question/s:
Do patients with anterior glenohumeral instability of the shoulder have altered muscle activation?

Methodology:
Subjects: 11 patients with anterior glenohumeral instability (GHI group), and 11 control (CON) subjects.
Experimental procedure: Indwelling fine wire electromyography (EMG) (supraspinatus = SS, infraspinatus = IS, subscapularis = SSC) and surface EMG (pectoralis major = PM, biceps brachii = BB, anterior deltoid = AD, latissimus dorsi = LD) activity was measured during an external humeral rotation apprehension perturbation test in all subjects.

Measures of outcome: Peak and mean muscle activation (%), reflex latency (ms), co-activation (%).

Main finding/s:

- Muscle activation: There was decreased PM and BB mean activation; increased peak activation of the SSC, SS, and IS in the GHI group compared with the CON group
- Co-activation: SS-SSC co-activation was significantly decreased in the GHI group

Conclusion/s:
There is altered muscle activation (decreased rotator cuff co-activation, slower biceps brachii activation, and decreased pectoralis major and biceps brachii mean activation) in patients with previous glenohumeral instability.
Therapeutic exercises that address the altered muscle function in these patients may be of benefit in the treatment of these patients.

Evidence based rating: 7/10  Clinical interest rating: 7/10
Type of study: Case control study
Methodological considerations: No cause-effect can be demonstrated, limitations of the apprehension model
Keywords: Instability, reflexes, electromyography, shoulder, proprioception