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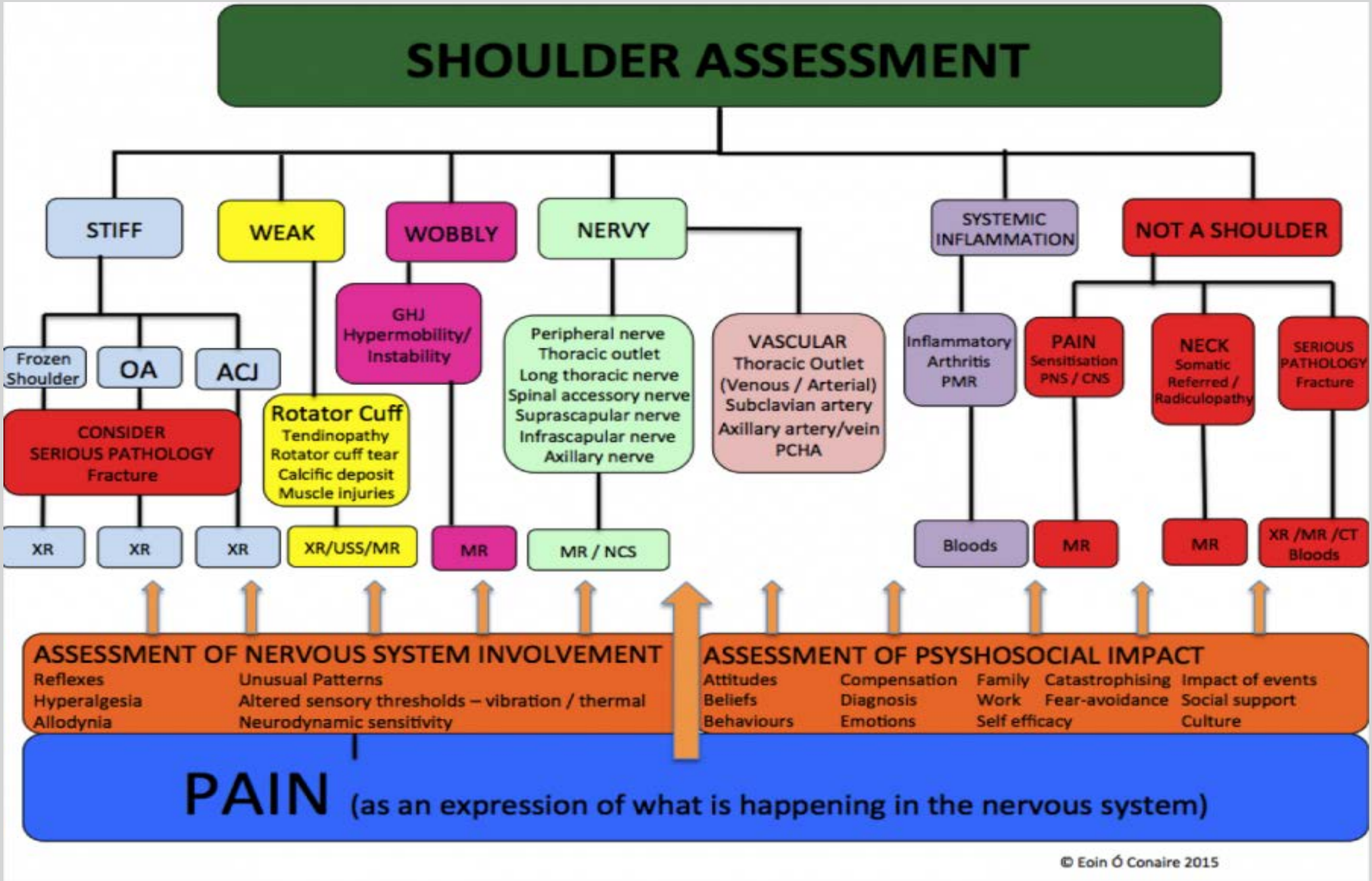
# Managing shoulder injuries and rethinking our approach

Return to Work Matters

October, 2019

# Background

- Shoulder pain is common
- Imaging equates to diagnosis
- Interventional treatment is common
- Outcomes are poor


SHOULDER ASSESSMENT
STIFF
WEAK
WOBBLY
NERVY
SYSTEMIC INFLAMMATION
NOT A SHOULDER
Frozen Shoulder
OA
ACJ
CONSIDER SERIOUS PATHOLOGY Fracture
Rotator Cuff
Tendinopathy
Rotator cuff tear
Calcific deposit
Muscle injuries
GHJ Hypermobility/ Instability
Peripheral nerve
Thoracic outlet
Long thoracic nerve
Spinal accessory nerve
Suprascapular nerve
Infrascapular nerve
Axillary nerve
VASCULAR
Thoracic Outlet
(Venous / Arterial)
Subclavian artery
Axillary artery/vein
PCHA
Inflammatory Arthritis PMR
PAIN Sensitisation PNS / CNS
NECK Somatic Referred / Radiculopathy
SERIOUS PATHOLOGY Fracture
XR
XR
XR
XR/USS/MR
MR
MR / NCS
Bloods
MR
MR
XR /MR /CT Bloods
ASSESSMENT OF NERVOUS SYSTEM INVOLVEMENT
Reflexes
Hyperalgesia
Allodynia
Unusual Patterns
Altered sensory thresholds – vibration / thermal
Neurodynamic sensitivity
ASSESSMENT OF PSYSHOSOCIAL IMPACT
Attitudes
Beliefs
Behaviours
Compensation
Diagnosis
Emotions
Family
Work
Self efficacy
Catastrophising
Fear-avoidance
Impact of events
Social support
Culture
PAIN (as an expression of what is happening in the nervous system)
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# Jeff

- 65M presents with R shoulder pain
- Job: Communications technician
- MOI: Lifting manhole cover at work 35kg with key
- Initial management – BIBA to ED, x-ray NAD, opioids

# Jeff

- 2/7 Post injury
  - Med Hx - HTN, pAF, L shoulder rotator cuff repair
  - Hx – weakness, night pain, overhead pain
  - Examination; DROM, / +ve empty can, Hawkins, lift off
  - Rx – analgesia + physiotherapy
- Review at 48 hours;
  - Continues to experience pain ++ no improvement ROM
  - Referred for MRA – partial supraspinatus tear
- Referred to Orthopaedic surgeon for an RCT repair

# Impact of shoulder pain

Common problem

- 3rd most common reason for seeking health care treatment for MSK pain in the US
- Top 5 of MSK disorders in workers compensation claims in US
- 40-50% chronic

# Australian Workcover Claims

**Table 27: Number of serious claims by bodily location of injury or disease, 2000–01 and 2011-12 to 2016-17p**

| Bodily location of injury or disease | 2000-01 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | % chg | 2016-17p |
|---|---|---|---|---|---|---|---|---|
| **Upper limbs** | **43,045** | **42,950** | **40,520** | **38,695** | **38,440** | **37,610** | **-13%** | **37,535** |
| Hand, fingers and | 17,625 | 15,335 | 14,565 | 13,940 | 14,290 | 14,230 | -19% | 14,585 |
| Shoulder | 10,650 | 13,680 | 12,925 | 12,445 | 11,960 | 11,430 | 7% | 11,155 |
| Wrist | 6,115 | 6,005 | 5,625 | 5,310 | 5,160 | 4,980 | -19% | 4,955 |
| Elbow | 3,110 | 3,135 | 2,970 | 2,790 | 2,780 | 2,575 | -17% | 2,660 |
| Forearm | 2,165 | 2,005 | 1,835 | 1,580 | 1,625 | 1,635 | -24% | 1,545 |
| Upper arm | 1,145 | 1,145 | 1,060 | 1,065 | 1,040 | 1,075 | -6% | 1,040 |
| **Trunk** | **42,590** | **34,665** | **31,670** | **29,485** | **27,770** | **26,315** | **-38%** | **25,215** |
| Back - upper or lower | 35,260 | 28,290 | 25,860 | 24,115 | 22,655 | 21,320 | -40% | 20,215 |
| Abdomen and pelvic region | 4,745 | 4,105 | 3,645 | 3,360 | 3,195 | 3,070 | -35% | 2,980 |
| Chest (thorax) | 2,350 | 2,035 | 1,950 | 1,775 | 1,705 | 1,680 | -29% | 1,850 |
| **Lower limbs** | **26,345** | **28,050** | **26,565** | **25,810** | **25,285** | **24,685** | **-6%** | **25,020** |
| Knee | 10,460 | 12,005 | 11,390 | 11,090 | 10,980 | 10,380 | -1% | 10,210 |
| Ankle | 5,915 | 6,210 | 5,855 | 5,635 | 5,560 | 5,455 | -8% | 5,785 |
| Foot and toes | 4,545 | 4,280 | 4,020 | 3,950 | 3,840 | 3,810 | -16% | 3,860 |
| Lower leg | 2,245 | 2,710 | 2,490 | 2,430 | 2,275 | 2,260 | 1% | 2,350 |
| Upper leg | 1,015 | 1,020 | 950 | 920 | 840 | 940 | -7% | 930 |
| Hip | 780 | 915 | 940 | 880 | 855 | 855 | 10% | 860 |

# # and % serious claims by mechanism and body part

| Mechanism of injury or disease<br>Bodily location of injury or disease | Number | Percentage |
|---|---|---|
| **Body stressing** | **40,330** | **38.0%** |
| Back - upper or lower | 15,275 | 37.9% |
| Shoulder | 7,325 | 18.2% |
| Knee | 3,570 | 8.9% |
| Abdomen and pelvic region | 2,400 | 5.9% |
| Wrist | 2,060 | 5.1% |
| Hand, fingers and thumb | 1,485 | 3.7% |
| Elbow | 1,315 | 3.3% |
| Neck | 1,055 | 2.6% |
| **Vehicle incidents and other** | **6,850** | **6.4%** |
| Back - upper or lower | 1,060 | 15.5% |
| Shoulder | 710 | 10.4% |
| Hand, fingers and thumb | 680 | 9.9% |

# What happens currently?

- Rapid ultrasound
- Anatomical diagnosis
- Steroid
- Allied health
- Specialist review
- Surgery

# History

- Demographics
- Medical history
- Presenting event

# Mechanism of Injury

- Direct blow – AC
- Injury when in abduction and external rotation – instability
- Pain at night and overhead – rotator cuff
- Neck involvement, and other upper extremity disorders, including elbow;
- Acute shoulder pain may be the first warning sign of serious disease.

# AC Joint

- History
  - Pain radiates from superior shoulder to lateral neck and upper trapezius
  - Pain with reaching, especially across body
  - Pain with pushups, bench press and overhead lifting
  - Aching resting pain
  - Insidious onset
  - No change in shoulder pain with neck ROM

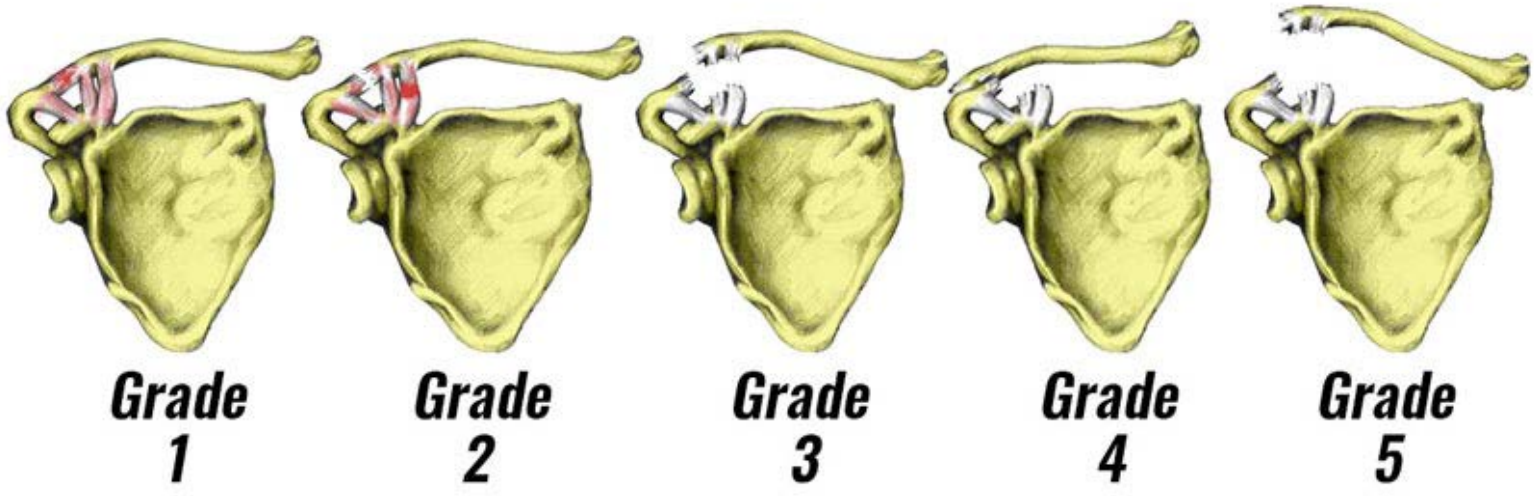
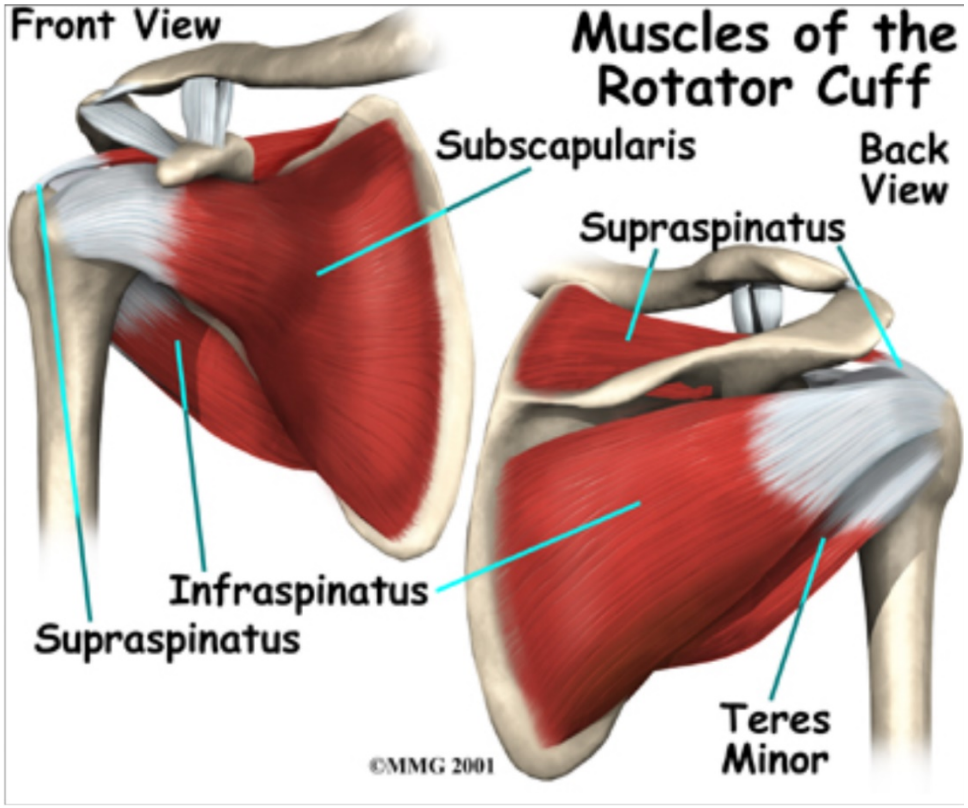



Image- Virtual Sports Injury clinic

# Rotator Cuff Syndrome

- History
  - Trauma
  - Fall on outstretched arm
  - Abduction in scapular plane = Supraspinatus +/- Infraspinatus
  - External rotation = subscapularis
  - Weakness > pain
  - Night pain
  - Overhead pain
- Litaker Study (2000)
  - Prognostic study 450 medical charts
  - Three factors best predicted rotator cuff syndrome
    1) weakness with external rotation
    2) Old age
    3) Night pain



# Subacromial Impingement

- History
  - Pain that radiates from superolateral shoulder to lateral arm
  - Pain with reaching
  - No rest pain
  - Usually insidious onset
  - May be capped by an event or start some time after an event
  - No change with neck ROM

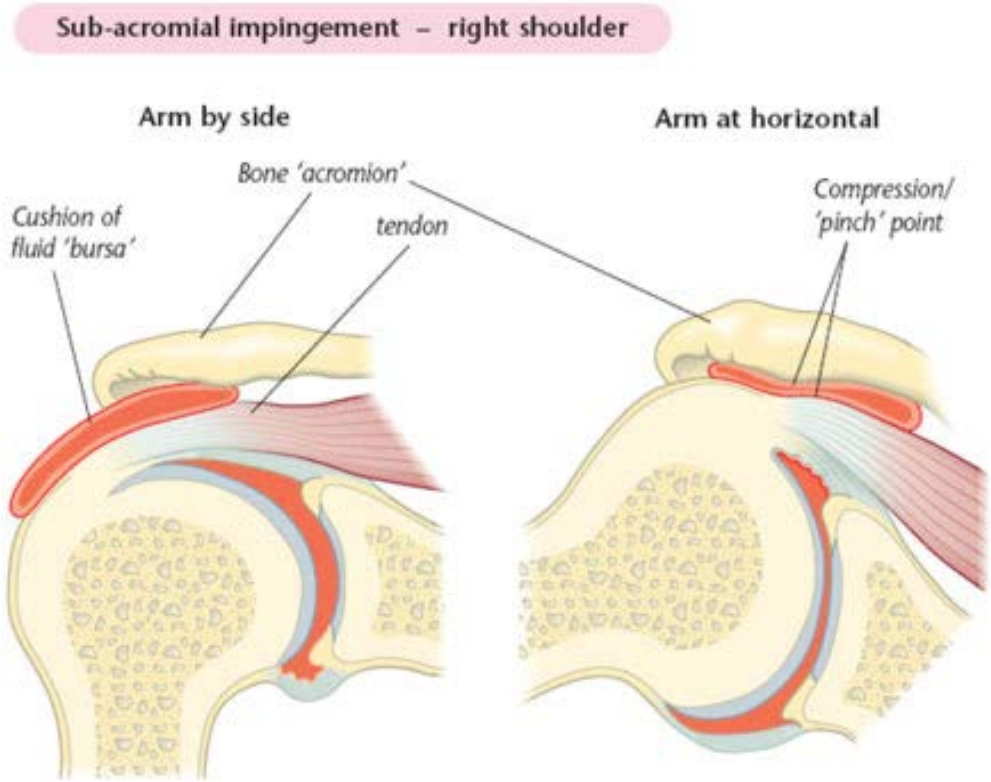



Image- southhampton shoulder clinic

# Glenohumeral Instability

- History
  - Subluxation – popped back in w/o Tx
  - Dislocation
  - Direct of instability follows humeral head
  - Anterior 90% (Abduction / External rotation)
  - Abduction (inferior)
  - Forward elevation (posterior)

# Why Rethink?

Evidence on:

- Causation / natural history
- Examination findings
- Radiological findings
- Treatment outcomes

# Causation

# Causation – AMA Evidence

| Occupational | | Non Occupational | |
|---|---|---|---|
| **RF** | **Evidence** | **RF** | **Evidence** |
| Force and repetition | Some | Age | Very strong |
| Vibration | Insufficient | BMI | Strong |
| Highly repetitive work | Some | Gender | Insufficient |
| Foreceful work | Insufficient | Biopsychosocial | Strong |
| Awkward posture (sustained shoulder posture >60˚ Flx, Abd) | Strong | Diabetes | Some |
| Cold Environment | Insufficient | Dominant hand | Insufficient |
| Length of employment | Insufficient | Anatomy | Low risk |
| Keyboard activities | Insufficient | Comorbidities | Insufficient |
| Smoking | Low risk | Genetic | Insufficient |

Post mortem studies suggest it is common by the fifth decade of life to find degenerative changes in the rotator cuff tendons, particularly thinning and fibrillation at the critical zone (hypovascular zone) of the cuff thought to be of physiological ageing

<35 years – instability or rotator cuff tendinopathy.

>35 years – rotator cuff tears, adhesive capsulitis, osteoarthritis.

# Do you lift weights more than 10kg above shoulder level (compared with no) P value for overall affect <0.01

| Variable | OR | Lower 95%CI | Upper 95% CI |
|---|---|---|---|
| <15 minutes | 1.44 | 0.99 | 2.09 |
| 15min – 2 hours | 2.30 | 1.34 | 3.97 |
| >2hrs | 2.62 | 1.54 | 4.55 |

Beach et al. Factors affecting work related shoulder pain

# Adjusted associations between baseline work-related physical exposures and a subsequent chronic shoulder disorder

| Variable | OR (95% CI) | Men OR (95%CI) | Women (95%CI) |
|---|---|---|---|
| Lifting heavy loads | 2.0 (1.2-3.4) | 1.3 (0.6-2.9) | 2.3 (1.1 – 5.1) |
| Working in awkward postures | 1.8 (1.1-3.1) | 1.1 (0.5-2.5) | 2.0 (0.9 – 4.3) |
| Work involving vibration | 2.5 (1.2-5.2) | 2.3 (1.0-5.3) | 3.0 (0.6 – 16.6) |
| Work involving repetitive movements | 2.3 (1.3-4.1) | 4.0 (1.8-8.6) | 1.2 (0.5 – 2.8) |
| Work paced by machine | 1.1 (0.4-2.8) | 0.7 (0.2-3.4) | 1.7 (0.5 – 6) |
| 1-2 exposures | 3.6 (1.9-6.8) | 2.1 (0.8 – 5) | 5.5 (2-15) |
| 3-5 exposures | 3.9 (1.8-8.5) | 2.9 (1.1 – 7.9) | 5.3 (1.4 – 19.8) |

# Examination

| Pathology | Rotator Cuff/Impingement | AC joint | Instability | Bicep Tendon |
|---|---|---|---|---|
| Tests | 1. Neer<br>2. Hawkins / Kennedy<br>3. Empty Can<br>4. Drop arm<br>5. Lift Off<br>6. Hornblower's | 1. Painful arc<br>2. Forced adduction | 1. Anterior apprehension<br>2. Posterior apprehension<br>3. Anterior/posterior draw<br>4. Inferior instability | 1. Speed<br>2. Yergason's |

# Rotator Cuff Pathology

| Test | Sensitivity | Specificity |
|---|---|---|
| **Subscapularis** | | |
| Lift off Test | 12-33 | 90-99 |
| Passive lift off Test | 9-29 | 91-99 |
| Belly Off Sign | 8-27 | 93-100 |
| **Infraspinatus** | | |
| External rotation lag sign 0 degrees | 3-18 | 96-100 |
| External rotation lag sign 90 degrees | 1-15 | 100 |
| Hornblower’s sign | 8-26 | 93-100 |
| **Supraspinatus** | | |
| Empty can test | 80-96 | 53-71 |
| Full Can test | 59-82 | 74-88 |
| Drop Arm test | 14-34 | 93-100 |
| Neer Test | 48-71 | 49-67 |
| Hawkin’s sign | 53-76 | 38-57 |

# Diagnostic Accuracy of Clinical Examination Findings for Identifying Subacromial Pain (+ve response LA injection standard)

| Test | Sensitivity | Specificity |
|---|---|---|
| Lateral Shoulder pain | 12-31 | 72-86 |
| Anterior Shoulder pain | 31-54 | 65-80 |
| Night pain | 46-69 | 42-59 |
| Painful arc in abduction | 43-67 | 30-48 |
| Resisted Abd/ER pain | 64-85 | 12-25 |
| Resisted IR pain | 38-62 | 44-61 |
| No end range pain passive ER | 29-52 | 77-90 |
| Full passive ER | 84-97 | 13-26 |
| Hawkin's Kennedy | 46-70 | 22-38 |
| Drop Arm | 6-22 | 84-94 |
| Empty Can | 76-93 | 9-21 |
| External rotation lag sign | 76-93 | 9-21 |
| Neer Test | 48-71 | 49-67 |

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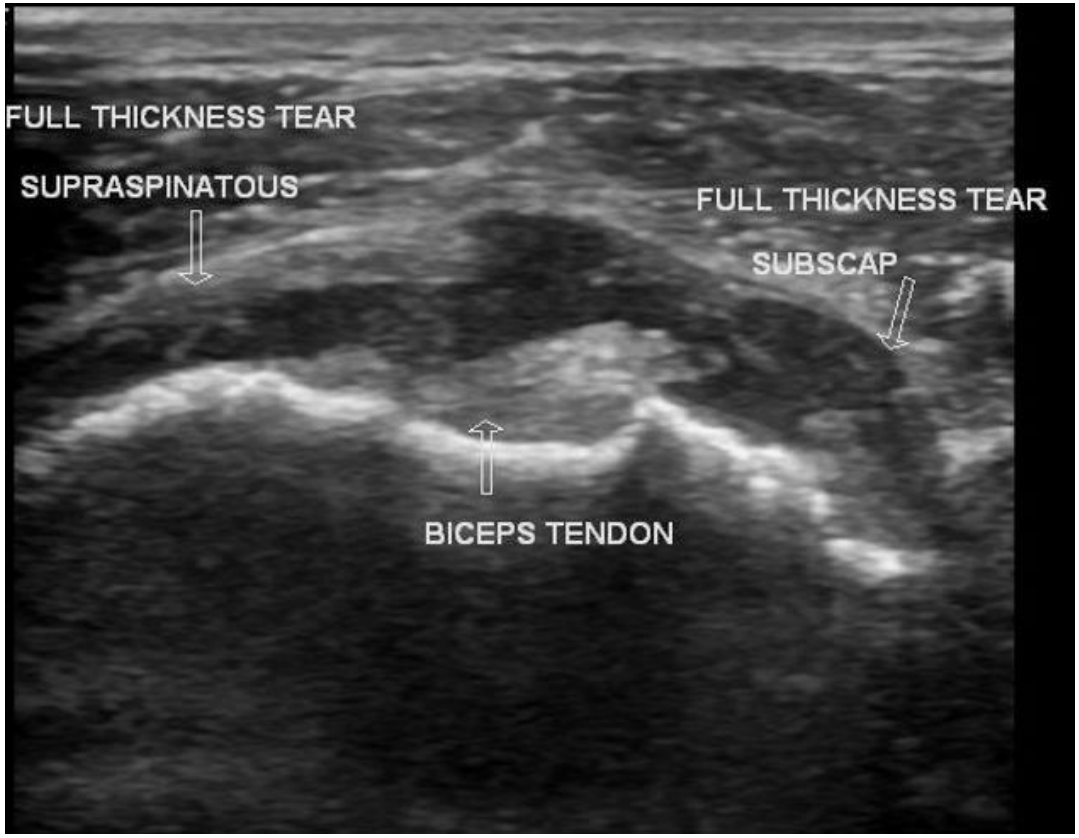
”There is insufficient evidence upon which to base selection of physical tests for shoulder impingements, and local lesions of bursa, tendon or labrum that may accompany impingement, in primary care. The large body of literature revealed extreme diversity in the performance and interpretation of tests, which hinders synthesis of the evidence and/or clinical applicability.”

Cochrane review 2013

# Radiology

# What investigations to order?




Radiopedia – rotator cuff tear

# What investigations to order?

- X-ray is under utilised
- Chronic pain
  - Diagnosis of degenerative changes
  - Upward shift of the head of the humerus
  - Sclerosis of the acromion
  - Calcifications of the tendons
- Acute trauma
  - Dislocation of the shoulder
  - Fracture of proximal humerus
  - Acute rupture of a RC tendon beyond the high position of the head of the humerus

Botser, Itamar & Hershkovich, Oded & Shapira, Shachar & Sela, Yaron. (2014). Role of radiographs in shoulder pathology: A clinical review. Reports in Medical Imaging. 7. 75. 10.2147/RMI.S35587.

# Prevalence

1995 – Milgrom

- Prevalence of tears increased markedly after 50 years of age
- Over 50%  in aged 60-70yrs
- A natural correlate of ageing….often present with no symptoms

More recently –  tears in 50% of 50yrs

Bursal thickening in 80 – 90% of population

Radiolgicial “abnormality” in ~95 % of the population.

# Does rotator cuff tear severity correlate with pain?

Anatomic features defining the severity of atraumatic rotator cuff tears are not associated with the pain level. Factors associated with pain are comorbidities and lower education level.

Dunn, W. et al. Symptoms of Pain do not correlate with rotator cuff severity. The journal of bone and joint surgery. 2014;96:793-800

# Impingement

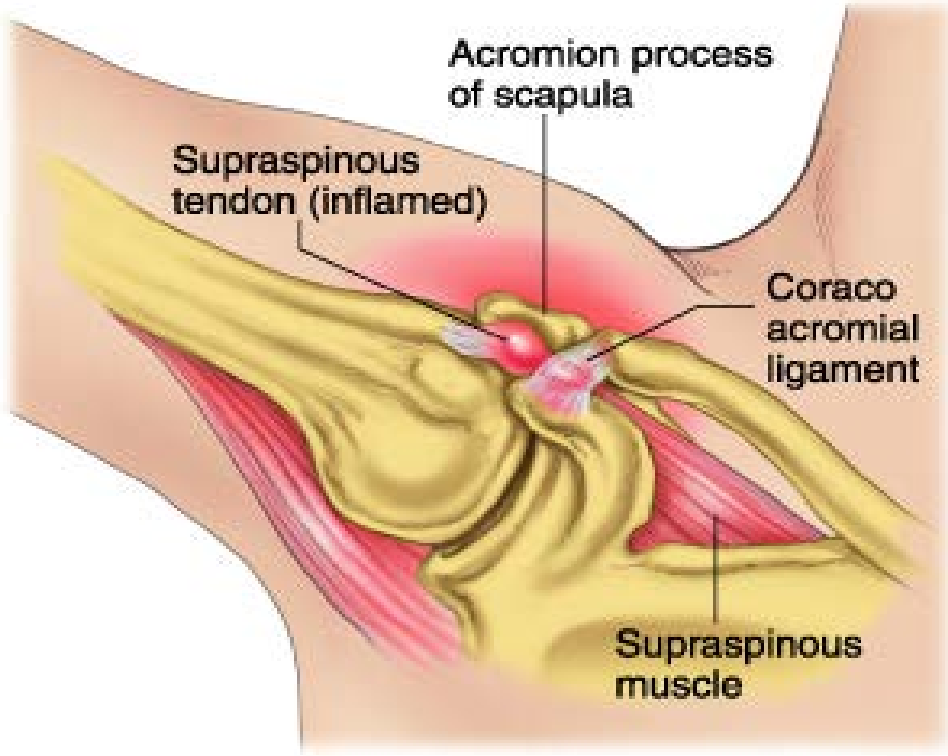
Neer believed that impingement caused tears. It is more likely that rotator cuff dysfunction results in upward displacement of the humeral head and causes impingement….

# Diagnostic Accuracy of Imaging Findings for Identifying Subacromial Pain (Cadogen, 2016)

| Test | Positive Anesthetic response (n=66) % | Negative anesthetic response (n = 130) % |
|---|---|---|
| Ultrasound | | |
| SAB pathology | 70 | 69 |
| Bursal bunching (acromion) | 46 | 42 |
| Supraspinatus tear (any) | 27 | 21 |
| Intrasubstance tear | 14 | 11 |
| PTT bursal surface | 0 | 3 |
| PTT articular surface | 3 | 5 |
| FTT | 11 | 2 |
| Supraspinatus tendinosis | 14 | 14 |
| Xray | | |
| Any ACJ pathology | 12 | 19 |

# Treatment Subacromial Impingement

- Rx
  - Rehabilitation
    - Strengthen scapular stabilisers
    - Stretching pectoralis minor
  - Subacromial HCLA to improve tolerance for rehabilitation



# Subacromial decompression / acromioplasty

Cochrane 2019 (and 2013)

# Methods

Eight trials (1062 participants), Mean age 42-65

Majority compared arthoscopic subacromial decompression with arthroscopy only (placebo surgery)

Comparators could include the following

- Placebo surgery
- Non-operative treatments, including physical therapy, exercises, pharmacologic interventions such as NSAIDs and/or glucocorticoid or other injections
- Wait and see/no or delayed treatment

# Cochrane Outcomes

| Outcome | Risk with exercise | Risk with subacromial decompression | Findings |
|---|---|---|---|
| Pain (scale 0-10) 0 is no pain. Follow up 1 year post | The mean pain was 3.7 points | MD 1.01 better (1.6 better to 0.42 better) | Absolute difference 10% better (4%better to 16%better) |
| Functional outcome (scale 0-100 Follow-up: 1 year | The mean functional outcome was 58 | MD 3.24 better (8.08 worse to 14.55 better) | Absolute difference 3% better (8%worse to 15% Better) |
| Global assessment of treatment success | 598 per 1000 | 723 per 1000 (574 to 902) | Absolute difference 13% more reported success (2% fewer to 30%more) |
| Health-related quality of life (scale from: 0-1, 1 is perfect health) Follow-up: 1 year | The mean health-related quality of life was 0.91 | MD 0.01 better (0.01 worse to 0.03 better) | Absolute difference 1% better (1% worse to 3% better) |

# Findings

”Compared with placebo, high certainty evidence indicates Sub-acromial decompression provides no improvement in pain, shoulder function, or health-related quality of life up to one year, and probably no improvement in global success.”

# Guidelines

2013 UNSW: Clinical Practice Guidelines for the Management of Rotator Cuff Syndrome in the Workplace

# Jeff

- 65M presents with R shoulder pain
- Job: Communications technician
- MOI: Lifting manhole cover at work 35kg with key
- Initial management – BIBA to ED, x-ray NAD, opioids

# Conclusion

- The shoulder is an inherently unstable joint that degenerates over time
- Clinical Examination – Doesn’t assure Dx
- Investigation – Doesn’t assure Dx
- Limited evidence and minimal science
- The presumed mechanism of impingement is not evidence based
- Propensity to use treatment to assure diagnosis leads to overtreatment and inappropriate treatment at times

# Thoughts

# Permanent Impairment

- Usually ROM
- Should be compared contralaterally
- Goniometer
- Consistent

# References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