Shoulder Examination

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The 3 Big Problems

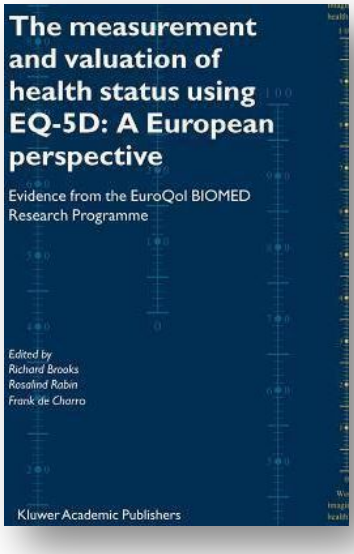
- Rotator cuff tendinopathy (RCT)
- Sub acromial pain syndrome (SPS) – incorporates impingement, bursitis etc
- Frozen shoulder syndrome

Background Facts

- Shoulder pain is the 2nd to 3rd most common musculoskeletal complaint in the general population *(Picavet & Schouten 2003, Parsons et al 2007)*

- 1 in 3 (30-60%) people will experience shoulder pain at some point in their life and the incidence increases with age *(Van der Heijden, Luime et al 2004)*

- Shoulder pathology is associated with a high morbidity rate, 50% resolved within 6 months, 40-54% of people report on going symptoms for 1-3 years *(Van der Windt et al 1996, MacFralane et al 1998, Winters et al 1999)*



- 'Quality of life' scores (EQ5D) for MSK pain comparable to complicated diabetes, heart disease and chronic liver failure *(Taylor 2005 NZ Med Journal 118)*

- Patients often come to us with the wrong diagnosis:
  - Sub acromial impingement
  - Frozen shoulder (takes 18 – 30 months to resolve if untreated, but is a convenient diagnosis)
  - Rotator cuff problems
  - Bursitis

- Overuse of surgery is a huge problem

- 'No evidence to support subacromial decompression' evidence based from studies at 6 months, 1,2,3& 5 years. *(Lewis 2014)*

Why So Many Shoulder Problems?

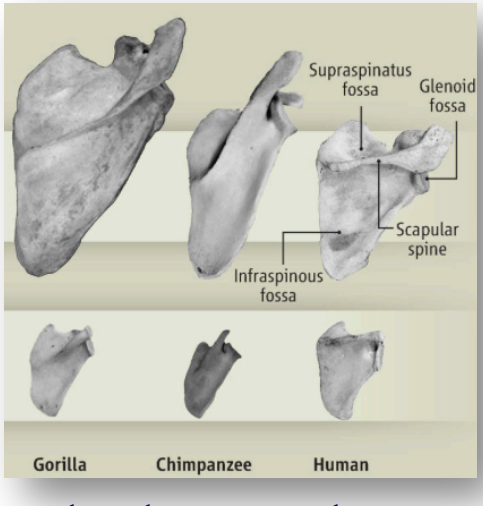
- Live longer - designed for 40 years max
- Sitting – lack of metabolic activity

• 'Under-loading' then overuse

• Occupational – above head activity & hand postures

• Sports

• Lifestyle factors
    • Smoking: tendon repair severely impaired because Type 1 collagen does not heal in the presence of nicoine
    • ST failure



Shoulder Function

- Evolutionary changes
- Changes in visual field to upright
- Compare scapula evolution
    - changes in clavicle shape
    - changes in G/H alignment
- Leads to mechanical compromise of the sub acromial space
- Human shoulder is great up to 90 degrees

• 2004 study: Car mechanics, house painters, machinists – people working in same job, involving overhead activity, for over 10 years
• MRI diagnosed alterations in supraspinatus tendon were associated with working the shoulders in an elevated position *Svensdsen et al 2004: Work above shoulder level and degenerative alterations of the RC tendons: and MRI study. (Arthritis Rheum I50 (10) 3314-3322)*

• Swimmers employing a stroke that does not place the shoulder at end of range are less likely to suffer pathology *(Yanai T, Hay JG, Miller GF – 2000 – Med Sci sports Exerc. 32(1) 30-40*

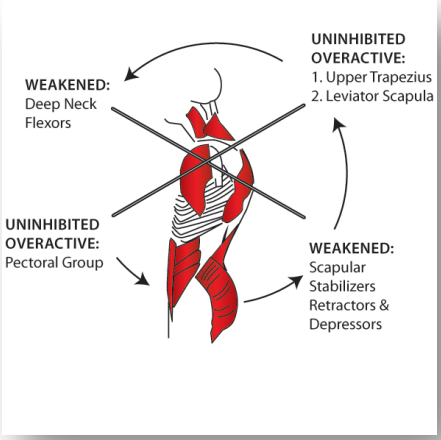
Energy Transfer

- Tennis serve *(Kibler 1995)*
    - Leg/Trunk 54%
    - Shoulder 21%
    - Elbow 15%
    - Wrist 10%

- Pitching *(Kibler and Chandler 1995, Seroyer et al 2010, Sciascia and Cromwell 2012)*
    - 24% energy decrease from hip and trunk requires a 34% increase at shoulder to deliver the same amount of force
    - Hip and trunk extension facilitates scapula retraction. Hip and trunk flexion facilitates scapula protraction

- **Remember LEX, Pelvis & the Thoracic spine!** Thoracic spine treatment often improves shoulder function as much as treating the shoulder

Posture



• Head forward posturing and scapular protraction (upper crossed pattern) have both been associated with subacromial impingement *(Greenfield et al. 1995, Warner et al. 1992)*.

• Altered scapular kinematics has been shown in patients with dysfunctional scapular musculature *(Ludewig and Cook 2000)*, rotator cuff fatigue *(Tsai 1998)* and altered thoracic and cervical curvature *(Wang et al. 1999)*, either structural or functional.

Sub-Acromial Pain Syndrome (SPS) & the Sub-Acromial Space

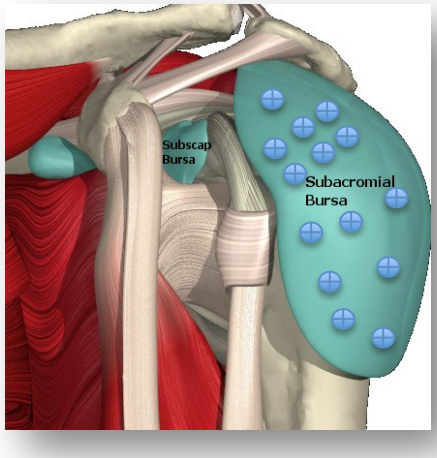
• There are 6-12 sub acromial bursa around the shoulder – help decrease friction (they resemble plastic sleeves – very slippery). An important structure.

• Innervation – superior articular branch of the suprascapula nerve (C5/6) + articular branch of the lateral pectoral nerve

• Long head of biceps (can have up to 5 heads!)

(Aszmann et al (1996) innervation of the human shoulder – Clinical Orthopedics. 330: 202-207)

Bursa Histopathology

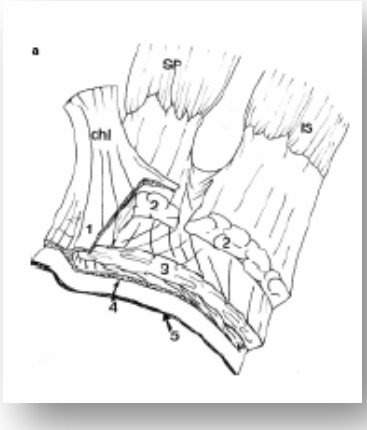


- Easily infiltrated by local chemical milieu:
  - Cytokines - IL 1β, TNF-α, VEGF, IL-6
  - Cyclo-oxygenase enzymes Cox 1, Cox 2
  - Matrix metalloproteinases (MMP's) MMP 1, MMP 9
  - Neuropeptides, substance P
  - All potential mediators of inflammation and may have a catabolic effect on the tendon

• Correlation between pain chemicals and cytokines

• Packed with sensory fibers, mechano-receptors and nociceptors:
  - Ruffini endings
  - free nerve endings
  - Pacinian corpuscles

The Rotator Cuff Tendon



• Majority of anatomical texts describe tendons as distinct structures. *(Besmajian 1975, Williams et al 1995)*

• RC tendons fuse to form a 5 layered aponeurosis (continuous common tendon) over the humeral tuberosities - Interwoven with bursae, the joint capsule and coraccohumeral ligament

• Postural tendon – purpose is to position big ball on small socket

• Short, wide, layers intertwined with synovium & interweaved with ligaments

MRI and RC Pathology *(Sher et al 2005 JBJS 77A)*

- N=96 asymptomatic subjects Dominant shoulder
- Shoulder history excluded in questionnaire

- **40-60 yrs. 1 in 4 (28% structural pathology)**
  - 4% FTT
  - 24% PTT
- **>60 (n=46) 1 in 2 (54% structural pathology)**
  - 28% FTT
  - 26% PTT

"The presence of RC tears does NOT correlate with shoulder dysfunction"

MRI Diagnosis of RC disease (*Frost et al 1999 J Sho El Surg 8 (6) 565-568)*

- 42 subjects with SIS
- 31 age matched asymptomatic controls
- Shoulders evaluated with MRI
- Findings:
  - SIS group - 55% had RC pathology on MRI
  - Control group - 52% had RC pathology on MRI

31-39 years = 32%
40-49 years = 48%
50-59 years = 72%

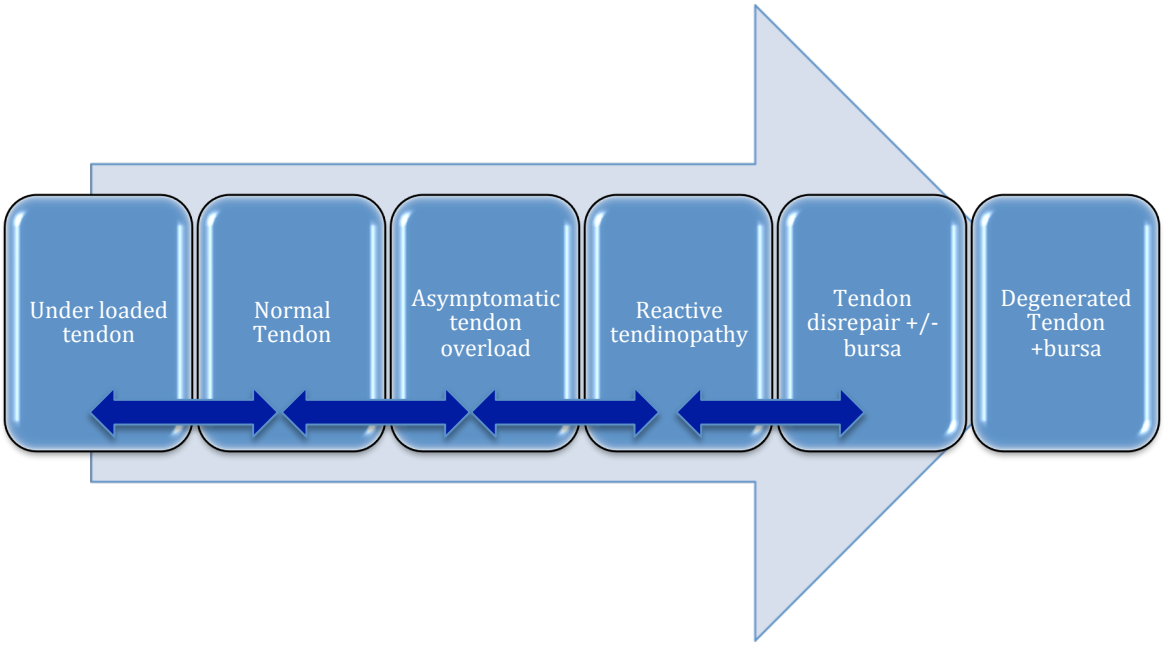
- Conclusions:
  - "RC pathology related to age"
  - "RC pathology on MRI does NOT correlate with symptoms"

Ultrasound & RC Pathology *(Girish et al 2011 Ultrasound of the shoulder. Asymptomatic findings in men. American journal or Roentgenology)*

- 51 asymptomatic men aged 40-70
- US scans 25 right shoulder, 26 left shoulder
- Findings:

① Sub acromial bursal thickenings =	78%
② Acromioclavicular joint degen =	65%
③ Supraspinatus tendinosis =	39%
④ Subscapularis tendinosis =	25%
⑤ Partial thickness tear SS =	22%
⑥ Posterior glenoid labral anomaly =	14%

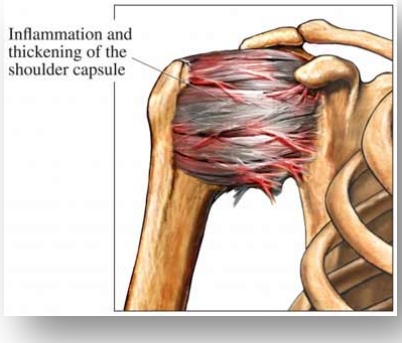
Model for continuum of rotator cuff tendinopathy – 6 stages *(Lewis JS (2010) BJSM Rotator cuff tendinopathy)*



Frozen shoulder – Overview

'a soft tissue capsular lesion accompanied by painful and restricted active and passive motion (of more than 50% in any direction) at the glenohumeral joint' (Grubbs 1993)

- An enigma wrapped in a mystery
- 2-5% of the general population (Grubbs 1993)
- 10-20% in diabetics (Pal et al. 1986, Roy et al 2007)
- Females > Males (60:40) (Baslund 1990)

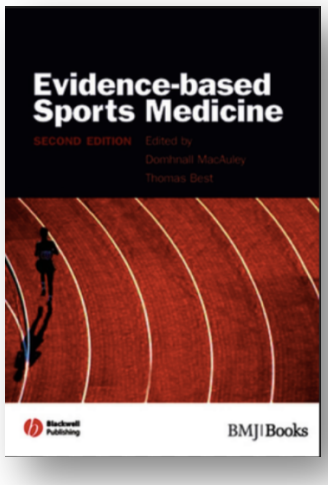


- Age 40 and 60 years of age (Grubbs 1993)
- The non-dominant arm is more likely to be involved (Fareed & Gallivan 1989)
- 12-16% of people are affected bilaterally (Wadsworth 1986)

- Progressive loss of ROM, in descending order of severity *(Roy et al 2007)*

  - External rotation
  - Abduction
  - Flexion
  - Adduction
  - Extension

Clinical testing



1. Systematic review: Lewis J and Tennant D (2007)

"How effective are our diagnostic tests for rotator cuff pathology?" (Evidence Based Sports Medicine (2nd Ed) MacAuley D and best T (Eds). Blackwell publishing. Chapter 18

"It is NOT possible to make a definitive diagnosis with the clinical tests currently in use"

2. "Which clinical examination tests provide clinicians with the most valuable information when examining the shoulder?"
(Hegedus 2012 British Journal of Sports Medicine 46: 964-978)

"the use of any single test to make a pathognomonic diagnosis can not be unequivocally recommended … combinations of tests only marginally better"

3. The "empty and full can" tests do NOT selectively activate supraspinatus.
(EMG study: Boettcher CE, Ginn KA, Kathers I. J Sci Med Sport. 2009 12(4):435-439}

"These tests do not fulfill the basic criteria to be valid diagnostic tools for supraspinatus pathology"