Occupational Shoulder Injuries: A Physical Therapist’s Perspective

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Disclosures/Conflicts of Interests-

- Mr. Hoyle and Ms. McBee indicate they are both employed by Select Medical which is the largest provider of outpatient physical therapy services in the United States. Neither has a financial interest in Select Medical outside of their employment with the company. Neither has any other financial or conflicts of interest as defined by ACOEM to disclose related to this presentation.

Shoulder Injuries

- 13.6% of all workplace injuries are shoulder injuries.
- Median days away from work are the greatest for shoulders than any other body part at 24 days.
- NCCI study looking at 4.2 million claims from 1996-2000 demonstrated shoulder injuries are the most costly in W/C.
Prevalence

- In working population prevalence of UE symptoms is 20-30%³.
- Prevalence in general population of 15.4% in Men and 24.9% in women. ¹³
- Prevalence of chronic pain is 41%. Most common in the 45 to 64 year old age group.¹⁴
- 50% of new episodes of shoulder pain show a complete recovery in 6 months, 60% at a year.⁹,¹²

Shoulder Injury causes

- External Physical Risk factors
- Personal Risk Factors
- Psychosocial Risk Factors

External Physical Risk Factors

- Repetitive Mechanisms⁸,⁹
- High Force Demands- Specifically with the hands⁸,¹⁰
- Work Related Posture-Duration, Awkward or Extreme ⁸,¹⁰
- Vibration⁹
- Computer Work⁴
Personal Risk Factors

- Female gender\(^5,6,7\)
- Obese \(^21\)
- Age \(^9\)
- No physical activity \(^15\)
- Sleep disturbances \(^16,17\)
- Smoking \(^16,17\)
- Psychosocial risk factors

Psychosocial Risk Factors

- Work related Stress or just Stress \(^6,8\)
- High Productivity Demands \(^6\)
- Low job control \(^11\)
- Low influence \(^11\)
- High quantitative demands \(^11\)
- Depressive Symptoms \(^18\)
- Poor Job Satisfaction \(^19\)
- Low social support or dislike of supervisor

What is the easiest shoulder injury to manage?

- The one you prevent.
Preventative Interventions

- Ergonomic preventative strategies
- Change employee behavior
- Interchange the computer input device for VDT users
- For sedentary workers promote physical activity during off time
- Light resistance work outs may benefit office workers

Case Study

- MD’s with new EMR System
- 6 MD’s reporting varying M/S pain, UE dominant for most

Risk Factors

- Awkward postures
- Repetitive postures
- Sustained postures
- High work demands
- Low control
- Dissatisfaction with Supervisor

Interventions used

- Headaches- new glasses
- R arm pain N/T- keyboard tray
- B shoulder pain- new chair, keyboard tray and foot rest
- R shoulder impingement- new desk area so no cross body reaching
- Move mouse to existing tray
**Poor Prognosis** $^{20, 9, 23}$

- Heavy material handling, Vibrating tools, Hands above shoulder level
- Psychosocial risk factors
- Duration of symptoms
- Severe pain
- High pain catastrophizing scores predict poor prognosis
- Previous history
- High disability scores at baseline
- Job Dissatisfaction

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**Centralized Pain**

- Consider date of onset
- Pain distribution does not match structure related patterns
- Pain patterns are unpredictable and tied with emotions, illness, stress, etc.

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**Etiology of Shoulder Pain**

- The painful tissues resulting in the report of shoulder pain (lateral arm pain) are primarily thought to be part of the Gleno-humeral joint.
  - Rotator Cuff Tendons
  - Long Head of the Biceps
  - Glenoid Labrum
  - Sub-Acromial Bursae
  - Joint Capsule
  - Joint surface
Factors Leading to Nociception from Glenohumeral Tissues

- **Intrinsic**
  - Rotator Cuff Tendonopathy
    - Tendinitis
    - Tendinosis
    - Tears
  - Biceps Tendonopathy
    - Tendinitis
    - Tendinosis
    - Tears
    - SLAP Lesions

- **Extrinsic**
  - Scapular Dyskinesis

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Tendinopathy

- **Tendinitis**
  - Thought to be symptomatic
  - Inflammatory markers present
    - Postaglandin E2
    - Leucotiene B4
  - Normal collagen matrix
    - Organized fiber matrix
    - Firm red tissue
    - Tight collagen bundle formation.
  - Lack of neovascularity.

- **Tendinosis**
  - May or may not be symptomatic
  - Absence of inflammatory markers
  - Degenerative collagen matrix
    - Disorganized fibers
    - Soft, yellow or brown tissue.
    - Loss of tight collagen bundle formation.
  - Neovascularity present.

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Fig. 1: Microphotographs of sections showing histology of non-inflamed tendon, (A) Normal tendons with normal histology showing normal collagen matrix and normal architecture. (B) Inflammation of the rotator cuff tendons showing inflammation of a portion of the tendon with surrounding oedema and an inflammatory cell infiltrate. (C) Inflammation (hypertrophy of cells) of the repaired rotator cuff tendons. Neovascularisation can be seen in the surrounding tissue. All sections are stained with Masson’s Trichrome (left) and H&E (right). Image credit: Macmillan Publishers Limited.
### Physical Therapist Perspective

**Working with other Medical Providers**

- Is it a problem amenable to physical therapy?
  - Is it neuromusculoskeletal and movement related?
  - Is it coming from within the shoulder joint.
    - Screen above and below.
- Is there pain with passive motion?
  - Joint or noncontractile element of contractile structures (tendon, bursae, cartilage, labrum).
  - Is there pain with resistance?
    - Tendon, possible muscle (less common).

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### Level 1 Screening

#### Level 2 Pathoanatomic Dx (Specific Phys Exam)

- History, Basic Physical Exam
- Red, Yellow, Blue and Black Flags

#### Level 3 Rehabilitation Classification

- Movements Impairment Scapula
- Movements Impairment Gleno-Humeral Joint
- Consider Severity of Irritability Impairment

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**Cervical Radiculopathy - Wainner**

- ULTTA
- Involved Rot < 60 degrees
- Distraction
- Spurling’s A
  - 3/4 LR = +6.1; 4/4 LR = +30.9
  - NCVT/EMG

Reliability and Diagnostic Accuracy of the Clinical Examination and Patient Self-Report Measures for Cervical Radiculopathy.

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**Note:** The text continues with more details and diagrams, which cannot be fully transcribed due to the nature of the document.
Shoulder Range of Motion- GH joint

- Flexion
- Abduction
- External Rotation
- Internal Rotation
- Extension

- What Are We Looking For:
  - Full and painless
    - Normal
  - Painful Arc
    - Supra glenohumeral dysfunction.
  - Limited and painful
    - Joint dysfunction
    - Supra glenohumeral dysfunction.
  - Limited and painless
    - "Normal Stiffness"

Glenohumeral Instability

- Age: <40 y/o
- History of trauma (dislocation, subluxation)
- Participation in collision or overhead sports
- Apprehension (Sn: 72%, Sp: 96%)
- Relocation (Sn: 81%, Sp: 92%)
- Sulcus (multidirectional) (Sn: %, Sp: %)
- Load and Shift (Sn: %, Sp: %)

Adhesive Capsulitis

- History of diabetes or thyroid disorders
- Severe loss of range of motion
- Night pain
- Pain felt in lateral deltoid
- ROM loss in capsular pattern (ER, Abd, Flex)

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Shoulder Range of Motion - Scapula Thoracic

- **Scaption/Elevation**
  - **What Are We Looking For:**
    - Starting position
    - Winging
    - Scapular abduction
    - Movement patterns
      - Decreased upward scapular rotation
      - Anterior tipping of scapula (during shoulder elevation)
      - Decreased serratus anterior activity
      - Delays in lower and middle trapezius activation
      - Enhanced upper extremity activity
      - Decreases the subacromial space

https://www.youtube.com/watch?v=ROolIDsjm2o

Shoulder Strength Testing

- **External Rotation**
  - Infraspinatus
- **Internal Rotation**
  - Subscapularis
- **Abduction**
  - Deltoid and Supraspinatus
- **Flexion**
  - Deltoid and Biceps long head.
- **Empty Can**
  - Supraspinatus

- **What are we looking for?**
  - Strong and Painless
    - Normal
  - Strong and Painful
    - Contractile element dysfunction.
  - Weak and Painful
    - More severe contractile element problem.
  - Weak and Painless
    - Neurological deficit
    - Complete Rupture

Rotator Cuff Impingement/Tendonopathy

- **Age:** <40 y/o
- Participation in overhead sports
- Pain felt in lateral deltoid
- Painful arc
- Pain with overhead activities
  - Painful arc (Sn: 33%, Sp: 81%)
  - Loss of AROM (Sn: 30%, Sp: 78%)
  - Hawkins-Kennedy (Sn: 72%, Sp: 66%)
  - Neer (Sn: 75%, Sp: 48%)
- Pain to palpation of tendon insertion
Chronic Rotator Cuff Pathology/Tear

- Age: >40 y/o
- Night pain
- Pain felt in lateral deltoid
- Pain with overhead activities
  - ER MMT (infraspinatus) (Sn: 42%, Sp: 90%)
  - Drop Arm Test (Sn: 27%, Sp: 73%)
  - Empty Can (supraspinatus) (Sn: 44%, Sp: 90%)
  - Lift Off (subscapularis) (Sn: 62%, Sp: 100%)
  - Loss of AROM (Sn: 30%, Sp: 78%)
  - ER Lag Sign (Sn: 70%, Sp: 100%)

Clinical Decision Rule

- Rotator Cuff Tear
  1. Empty Can
  2. External Rotation Strength Testing
  3. Impingement Signs

>98% tear with all 3 positive signs

Slides for Break-outs
Hawkins’ test for subacromial impingement or rotator cuff tendonitis. The arm is forward elevated to 90 degrees, then forcibly internally rotated.

Neer’s test for impingement of the rotator cuff tendons under the coracoacromial arch. The arm is fully pronated and placed in forced flexion.

Supraspinatus examination ("empty can" test). The patient attempts to elevate the arms against resistance while the elbows are extended, the arms are abducted and the thumbs are pointing downward.

Apprehension test for anterior instability. The patient’s arm is abducted to 90 degrees while the examiner externally rotates the arm and applies anterior pressure to the humerus.
Sulcus test for glenohumeral instability. Downward traction is applied to the humerus, and the examiner watches for a depression lateral or inferior to the acromion.

References Part 1


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References Part 2