Worker's Compensation Shoulder Practices

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Allina Health

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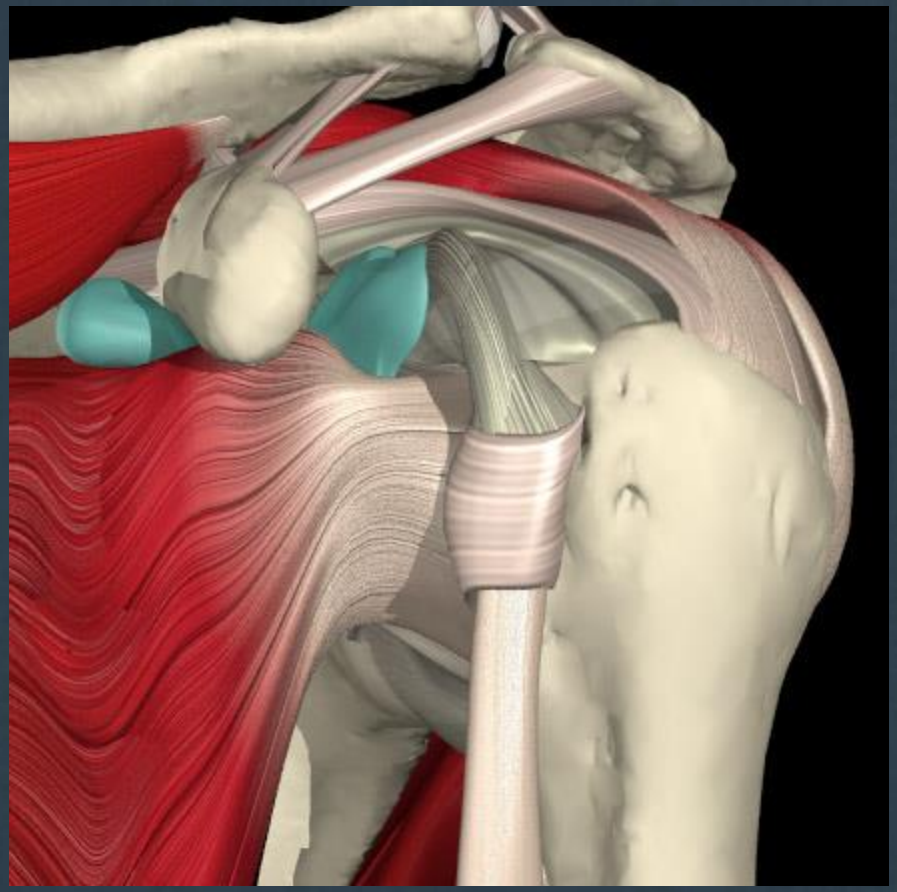
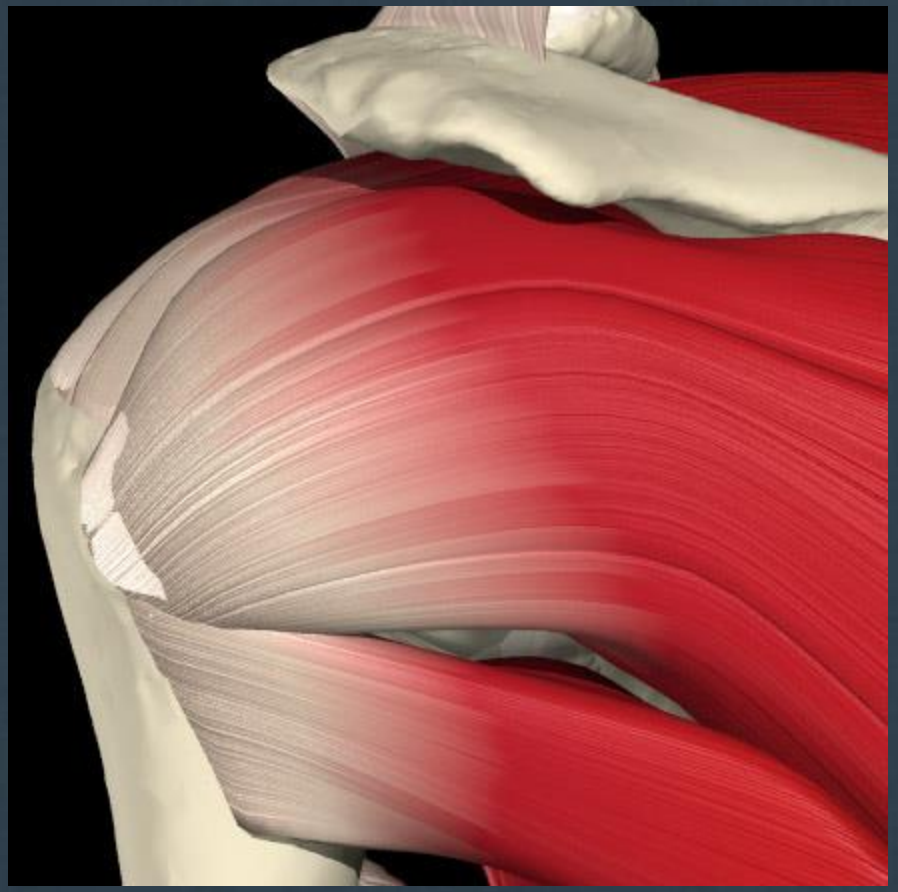
SHOULDER ANATOMY 101

Bones

Ligaments

Muscles

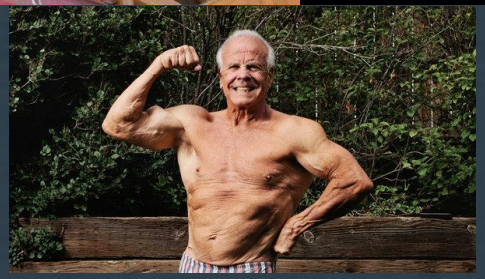




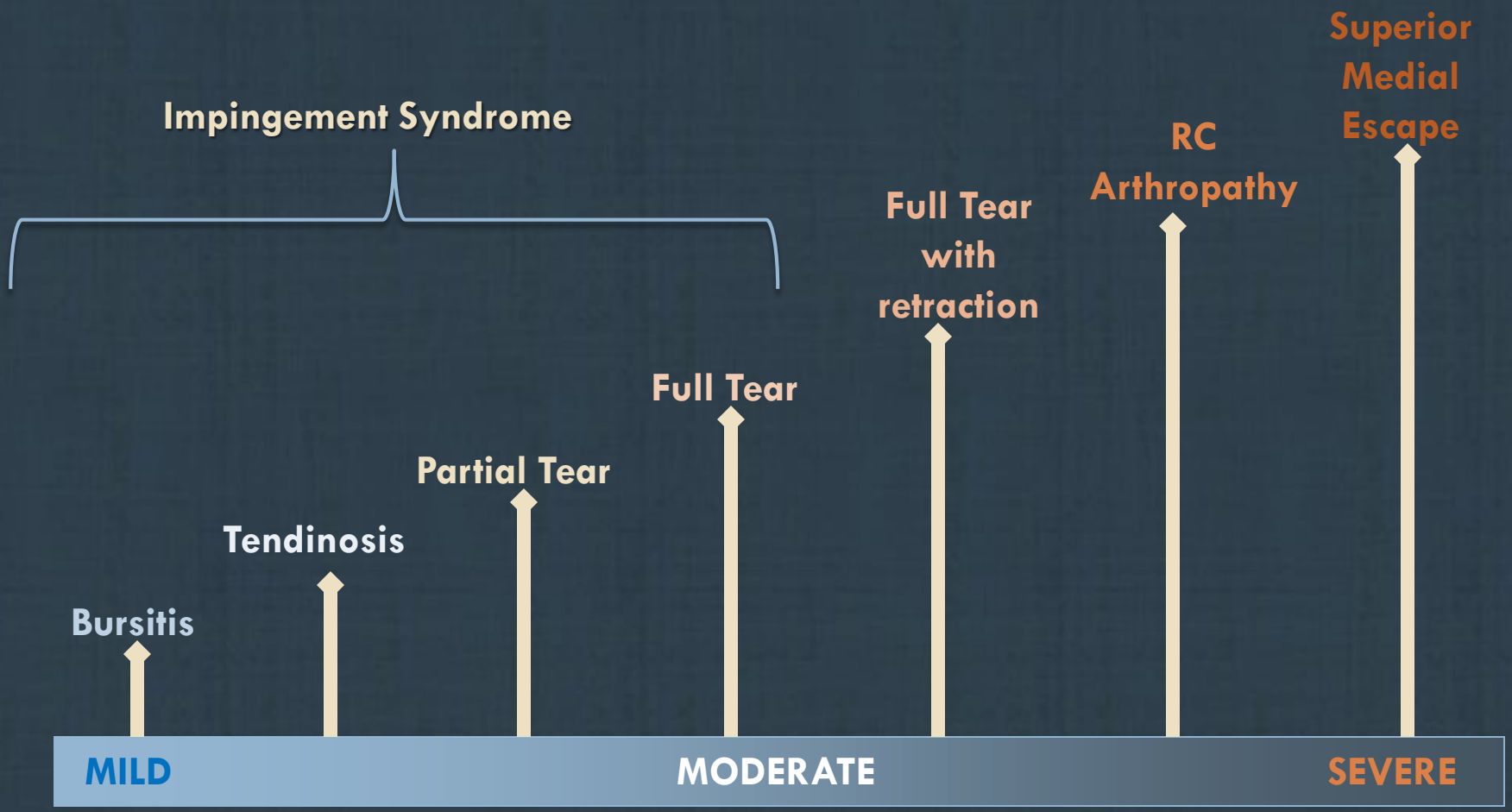
What causes rotator cuff injuries, labral tears, clavicle fractures, AC sprains and osteoarthritis in the shoulder?

The Root Cause & Treatment: *Rotator Cuff Injury*

- Etiology
  - Overuse
  - Age
  - Genetics
- Less frequent
  - Trauma
    - Dislocation
    - MVA
    - Falls



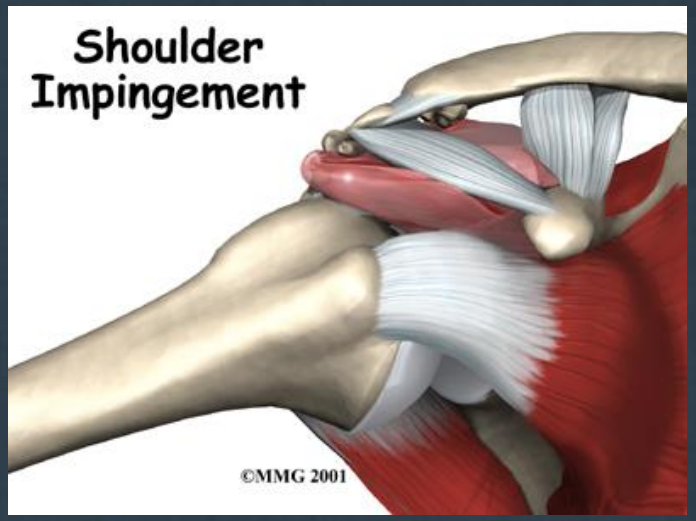
Rotator Cuff Injury Timeline



The Root Cause & Treatment:

What may be involved in a rotator cuff injury?

- Impingement Syndrome
  - Rotator cuff tendons
    - Tendonitis
    - Partial thickness tear
  - Bursa
    - Bursitis
      - Irritation
      - Thickening
  - Acromion
  - Coracoid
    - Coracoacromial ligament
- Rotator cuff tear
  - Rotator cuff tendons
    - Full thickness tear
  - All of impingement structures



Rotator Cuff Tear Symptoms

- Anterior shoulder pain
- Pain with overhead reaching
- Loss of ROM secondary to pain
- Loss of strength secondary to pain

The Root Cause & Treatment: *Rotator Cuff Injury*

Initial treatment

- Physical therapy
- +/- Injection (can be contraindicated)
- Possible MRI
- Follow-up 6 weeks

Follow-up visit

- Possible MRI
- Possible surgery if indicated and recalcitrant to conservative care
- Conservative treatment minimum 3 months

****70% rate of symptom reduction if treated early and appropriately**

The Root Cause & Treatment: *Rotator Cuff Injury Operative Interventions*

- Arthroscopic Subacromial Decompression
- Arthroscopic AC Resection
- Arthroscopic Coracoid Decompression
- Arthroscopic vs Open Rotator Cuff Repair
  - $\geq$ 50% tendon damage
  - $\leq$ 45 years of age
  - Acute RCT

The Root Cause: Labral/Biceps Injuries

SLAP tear: Superior Labral Anterior Posterior

- Static restraint of glenoid
- Biceps tendon attachment on glenoid
- Mechanism: Repetitive activity, FOOSH
- Symptoms:
  - Vague, deep shoulder pain
  - Mechanical symptoms
  - Weakness

- 45-60 yr old: common age related finding on MRI - often asymptomatic
  - Schwartzberg et al, 2016 Orthop J Sports Med
- Treat symptoms, not imaging

Labral/Biceps Injury Treatment

- Non-operative
  - Physical therapy: Address GIRD, scapular mechanics, RC strength
- Operative Treatment
  - Biceps tenodesis or tenotomy
  - SLAP repair
    - Higher failure rates than biceps tenodesis
    - >45 yrs. old may lead to increased stiffness

The Root Cause & Treatment: Clavicle Fracture

- Epidemiology
  - 75-80% of all clavicle fractures involve the mid -1/3
  - Most often seen in young, active patients
- Mechanism:
  - Fall on outstretched arm
  - Direct trauma to lateral shoulder
- Symptoms:
  - Pain over clavicle
  - Deformity/tenting of skin

The Root Cause & Treatment: Clavicle Fracture

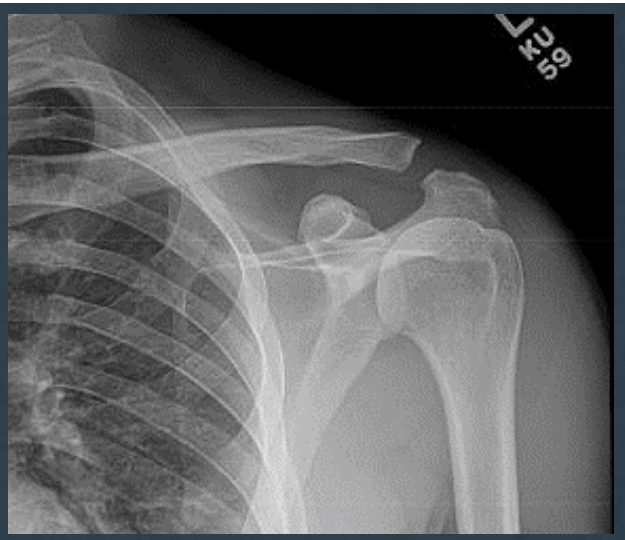
- Diagnostics:
  - XR →possible CT based on complexity
- Non-operative treatment: <2cm shortening
  - Sling immobilization ~4 weeks
  - Physical therapy
- Operative treatment
  - ORIF
    - >2cm shortening and 100% displacement
  - Return to full activity 3-4 months post operatively

The Root Cause & Treatment: Acromioclavicular Joint Sprain

- Disruption of AC ligaments, may include coracoclavicular (CC) ligament
- Caused by:
  - Fall onto shoulder
  - Direct blow to shoulder
- Symptoms:
  - Pain with cross body reaching/overhead reaching
  - Tender over AC joint
  - Instability with potential deformity

The Root Cause & Treatment: Acromioclavicular Joint Sprain

- Non Surgical Care: Grade I-III
  - Grade III controversial – dependent on CC distance
  - Sling, rest, ice and physical therapy
- Surgical Care: Grade III-VI
  - Coracoclavicular interval restoration
  - Ligament Reconstruction vs. ORIF
  - Typical return to full activity: 6 months



The Root Cause & Treatment: Acromioclavicular Osteoarthritis

Acromioclavicular Arthritis

- Caused by:
  - Age
  - Carrying heavy loads
  - Repetitive loading of AC joint
- Symptoms:
  - Pain with cross body reaching/overhead reaching
  - Tender over AC joint
- Associated with impingement syndrome

The Root Cause & Treatment: Acromioclavicular Osteoarthritis

Treatment

- 1st line of defense
  - Formalized physical therapy program
- 2nd line of defense
  - Injection
  - Return to therapy
- Final option
  - Consider arthroscopic AC resection

The Root Cause & Treatment: Glenohumeral Osteoarthritis

- Progressive degeneration of glenohumeral cartilage with or without deformity
- Cause
  - Age (unknown cause)
  - Trauma
  - Previous surgery
- Symptoms
  - Crepitus
  - Progressive loss of ROM
  - Night pain

The Root Cause & Treatment:
Glenohumeral Osteoarthritis

Treatment:

- 1st line of defense
  - XR
  - Physical therapy program to preserve ROM
- 2nd line of defense
  - Fluoroscopic/Ultrasound-guided glenohumeral injection
- Final option
  - Consider total shoulder replacement

How does treatment for rotator cuff tears become treatment for osteoarthritis?

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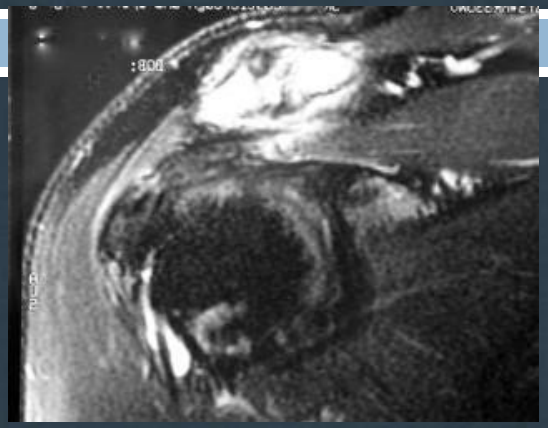
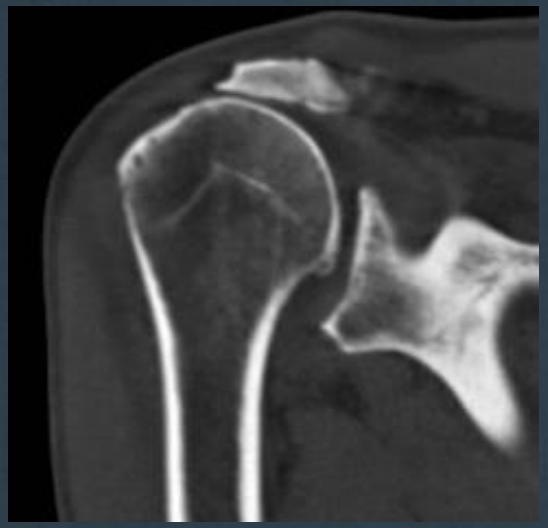


1. AC joint arthritis
   - Often found in conjunction with RC pathology

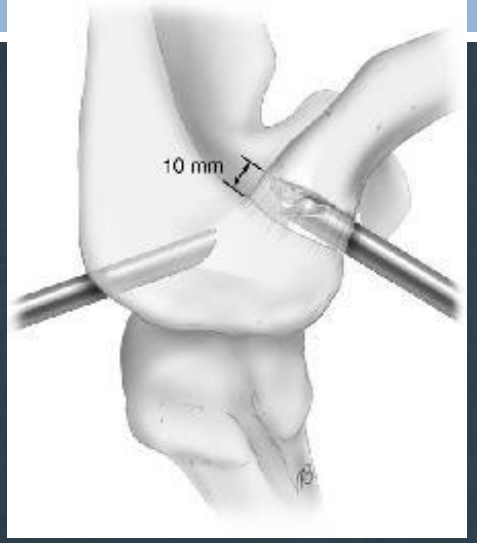


2. Rotator cuff tear arthropathy
   - Massive irreparable rotator cuff tear
     - Cause:
       - Untreated RCT
       - Failed RCR

How does treatment for rotator cuff tears become treatment for osteoarthritis?

1. AC joint arthritis treatment
   - Physical therapy
   - Injection
   - AC joint resection

2. Rotator cuff tear arthropathy treatment
   - Physical therapy
   - Reverse total shoulder arthroplasty

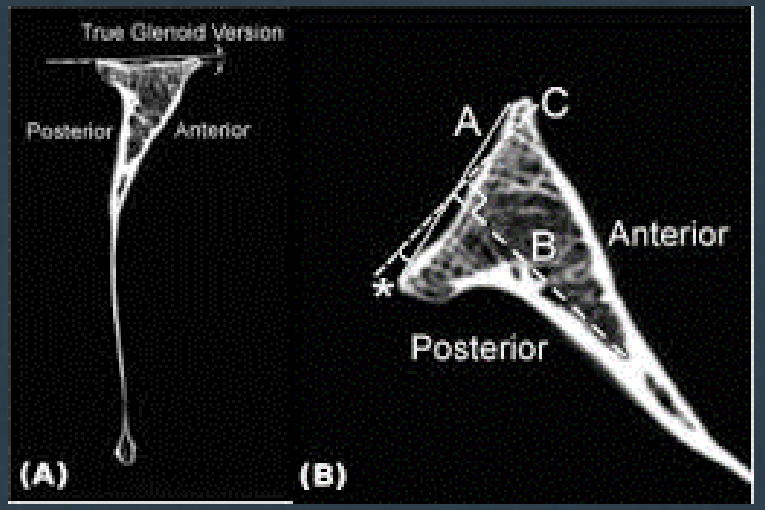


When is shoulder replacement a better idea than arthroscopy?

When is shoulder replacement a better idea than arthroscopy?

- Reverse total shoulder vs Rotator cuff repair
  - As previously discussed

- Total shoulder arthroplasty vs Glenohumeral debridement
  - Joint space
  - Loose bodies
  - Bone loss/glenoid version



Why is one year the magic number for recovery from shoulder arthroscopy?

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Tendon Healing

Hemostatis **5-15 minutes**

- Platelets initiate coagulation cascade
- Fibrin clot and fibronectin interaction > chemotaxis to stabilize torn tendon edges

Inflammation **1-7 Days**

- Fibroblasts produce type III collagen
- Macrophages help initiate healing and remodeling

Organogenesis **7-21 days**

- Tissue modeling via disorganized collagen and angiogenesis

Remodeling **Up to 18 months**

- Tissue remodeling replacing type III collagen to type I collagen

Criteria for Successful Tendon Healing

1. Tendon & ligament mechanical strength reestablished
2. Tendons must be able to glide freely through the tendon sheath for full ROM
3. Ligament healing must prevent joint laxity
4. If tendon-bone connection (enthesis) has been disrupted, must reestablish w/ functionally equivalent mechanical strength

Su B, O'Connor JP. *J Applied Phys* 2013

Tendon Healing

- Strength in Recovery:
  - Repair weakest at 7-10 days
  - Most of strength at 21-28 days
  - Maximum strength at 6-12 months
    - Some reports indicate final strength only reaches 2/3 normal

What types of underlying conditions slow down recovery?

What types of underlying conditions slow down recovery?

Negative Physiologic Factors

- Smokers
- Diabetics
- Obesity
- Depression
- H/O chronic pain
- Concomitant neck issues
- Advancing age
- Revision surgery/ failure to heal
- RSD
- “Red hair, fair skin”

What types of underlying conditions slow down recovery?

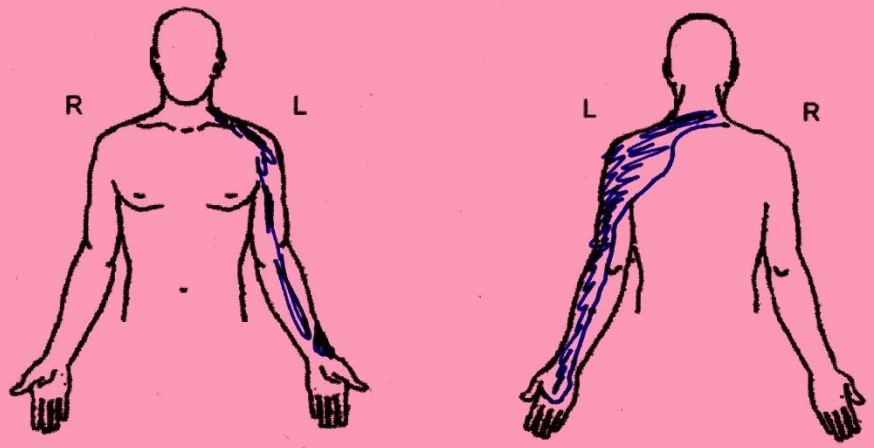
Negative environmental factors

- Repetitive motion
- Injury/occupation
- Overhead activity
- Job dissatisfaction
- Limited education
- Recent layoff
- Litigation

When it might not be a shoulder problem…

Affected Shoulder: ☐ Right ☒ Left ☒ Both
Hand Dominance: ☒ Right ☐ Left ☐ Ambidextrous

1. Are you having pain in your shoulders? ☒ Yes ☐ No
2. If yes, mark (below) where your pain is located:



3. Do you have pain in your shoulders at night? ☒ Yes ☐ No
4. Do you take pain medication (Aspirin, Advil, Tylenol, etc)? ☐ Yes ☒ No
5. How bad is your pain today (mark the box)?

What is a good light duty option for post-operative recovery?

What is a good light duty option for post-operative recovery?

- Highly dependent on procedure/patient
  - Avoid repetition
  - Avoid overhead activity
  - Weight restriction (remember tendon healing)

Is there a way to shorten the duration of necessary light duty or active physical therapy?

Is there a way to shorten the duration of necessary light duty or active physical therapy?

- Rehab and light duty typically designed to protect repair
- Accelerated rehabilitation programs may lead to complications/revision surgery
- More PT visits is not necessarily answer
  - 71 RCR in WC patients (28 on standard PT, 43 on home-based program)
    - Home based group = 7 PT visits
    - Standard group = 16 PT visits
  - No difference in time to return to work/claim closure
    - Di Paola J. *J Shoulder Elbow* Surg 2013

Is there a way to shorten the duration of necessary light duty or active physical therapy?

Functional Recovery After Scope RCR

- Studied 114 cases of full thickness RCT's fixed arthroscopically
- Functional recovery as soon as 3 months, although recovery process continued to 12 months when it reaches a plateau
- Recovery of mobility and strength significant at 6 months post-op
- Multi-tendon involvement slowed recovery rates
- Work comp mean recovery:
  - 8.6 months vs 4.3 months in non-work comp

- **Charousset, et al. *Arthroscopy* 2008**

Additional concerns with WC surgery:

- Studies show 4-10 week additional increase in recovery time compared to non-WC following acromioplasty
- In comparison to non-WC, RCR's 42 % returned to full activity compared to 94% ---- 54% excellent results to 92%
  - Misamore et al. JBJS 1995
- When taking confounding variables into account, WC reports worse outcomes following RCR
  - Henn et al. JBJS Oct 2008

Additional concerns with WC surgery:

- Patients with WC claims demonstrated a high rate of postoperative non-compliance (52%) compared with patients without WC claims (4%) after RCR
- WC patients without evidence of noncompliance had significant improvements and more favorable outcomes than the noncompliant WC patient
  - Cuff DJ, Pupello DR. J Shoulder Elbow Surg 2012

Are there any new treatments now or in the future that may reduce downtime following surgery or injury?

Are there any new treatments now or in the future that may reduce downtime following surgery or injury?

- Biologics
  - Autologous blood injections (ABI)
  - Platelet rich plasma (PRP)
  - Concept: Promote healing safely and naturally
  - Platelets
    - Clotting
    - Release bioactive proteins
      - Attracts macrophages, osteoblasts promoting removal of necrotic tissue
      - Enhances tissue regeneration and healing

Are there any new treatments now or in the future that may reduce downtime following surgery or injury?

PRP

- Attract healing cells to tendon tissues which have deteriorated
- Stimulate new growth of tendon cells
- Stimulate production of tendon collagen-the building blocks that give tendons their strength
  - Normal platelet concentration 150,000-350,000/uL
  - PRP = at least 1,000,000/uL in 5 mL plasma

PRP/ABI Evidence?

Conflicting evidence

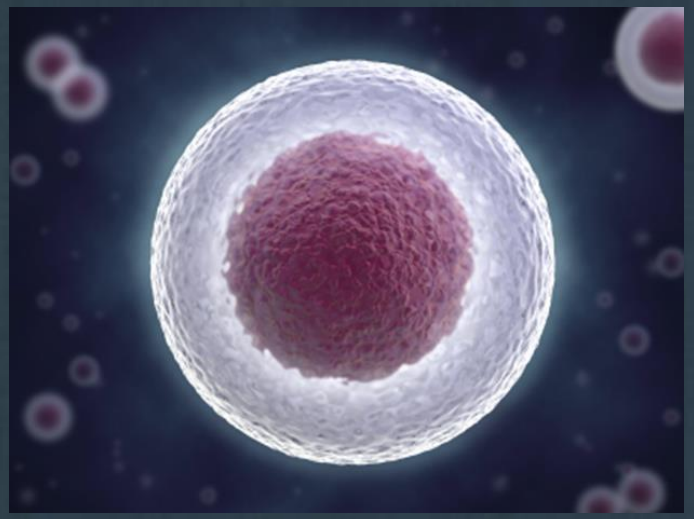
- *"…PRP use for musculoskeletal soft tissue injuries is currently unsupported. This review highlights the **difficulty with assessment** of the efficacy of PRP interventions in orthopaedics and leaves open the possibility that indeed they are not effective."*
  - Khan M, Bedi A. *Clin Orthop Relat Res* 2015
- *"Conclusion: There is **good evidence to support** the use of a single injection of LR-PRP under ultrasound guidance in tendinopathy. Both the preparation and intratendinous injection technique of PRP appear to be of great clinical significance."*
  - Fitzpatrick J et al. *Am J Sports Med* 2016

2018 PRP/ABI Update

- PRP has not been shown to improve (RCR) healing rates or patient reported outcomes in large level one studies and meta-analyses
  - Charles et al. Curr Rev Musculoskelet Med 2018
- Limited research regarding PRP injections and treatment of osteoarthritis, still inconclusive

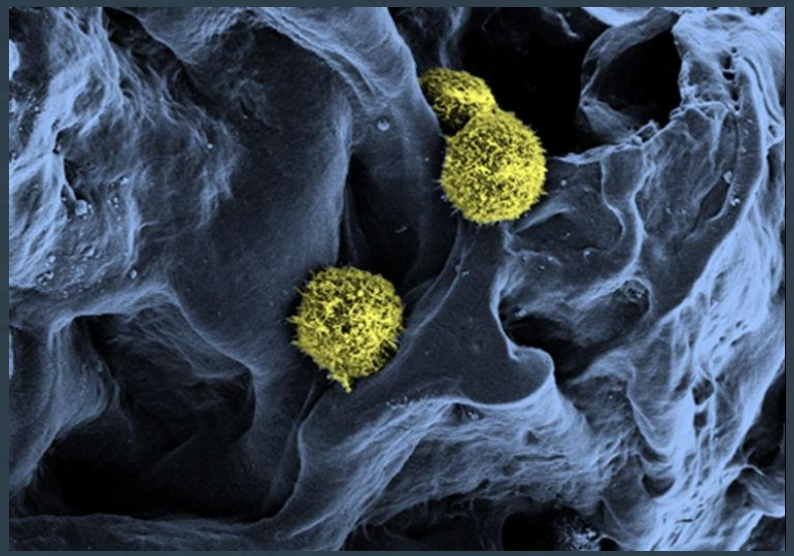
Are there any new treatments now or in the future that may reduce downtime following surgery or injury?

- Biologics
  - Stem Cells
    - Have ability to:
      - Reproduce
      - Differentiate
      - Influence other cells
    - Obtaining stem cells
      - Embryonic (pre-implantation embryos)
      - "Adult"-derived
        - From fully formed pediatric or adult donors
        - Tissue specific: need signals to differentiate/de-differentiate



Stem Cell Evidence?

- Encouraging results in small trials
  - Osteoarthritis/cartilage show most promise
- Again, limited evidence at this time



Questions?

Thank You!

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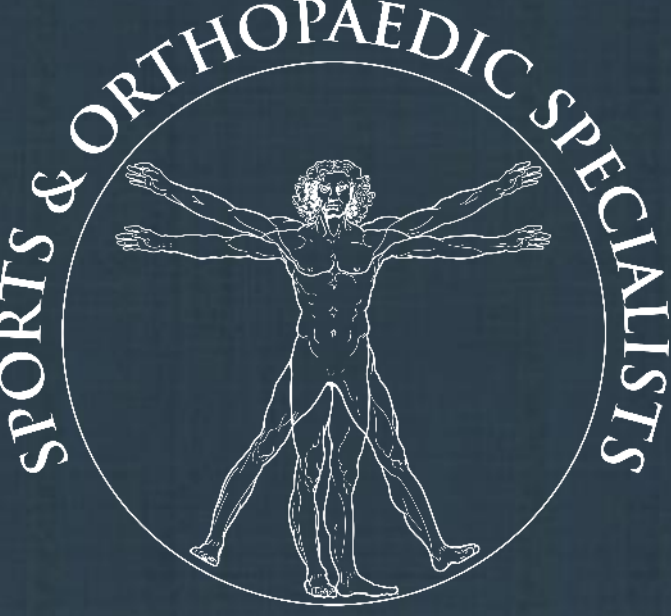

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