Assessment and Management of Common Musculoskeletal Problems

Dalhousie Fall Refresher 2024

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DALHOUSIE UNIVERSITY

CASEM ACMSE

Disclosures

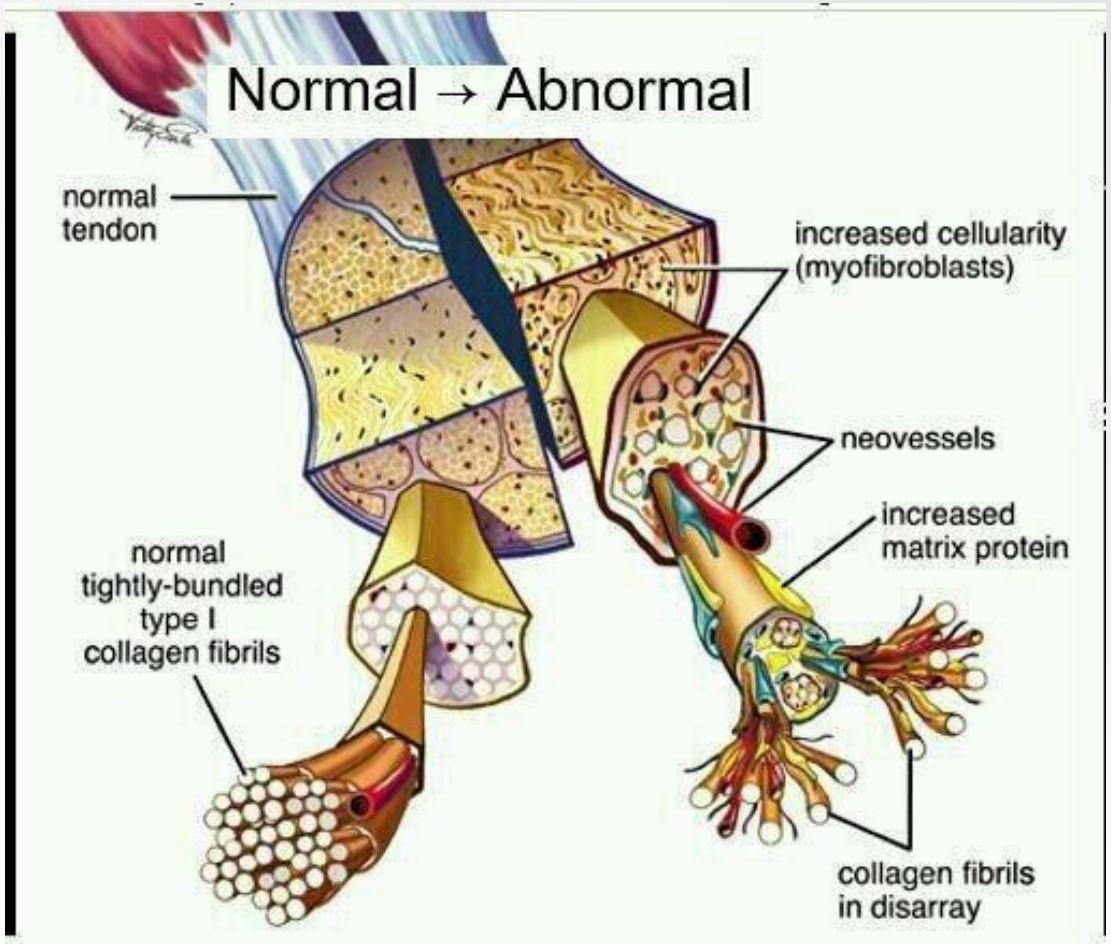
- NONE

Objectives

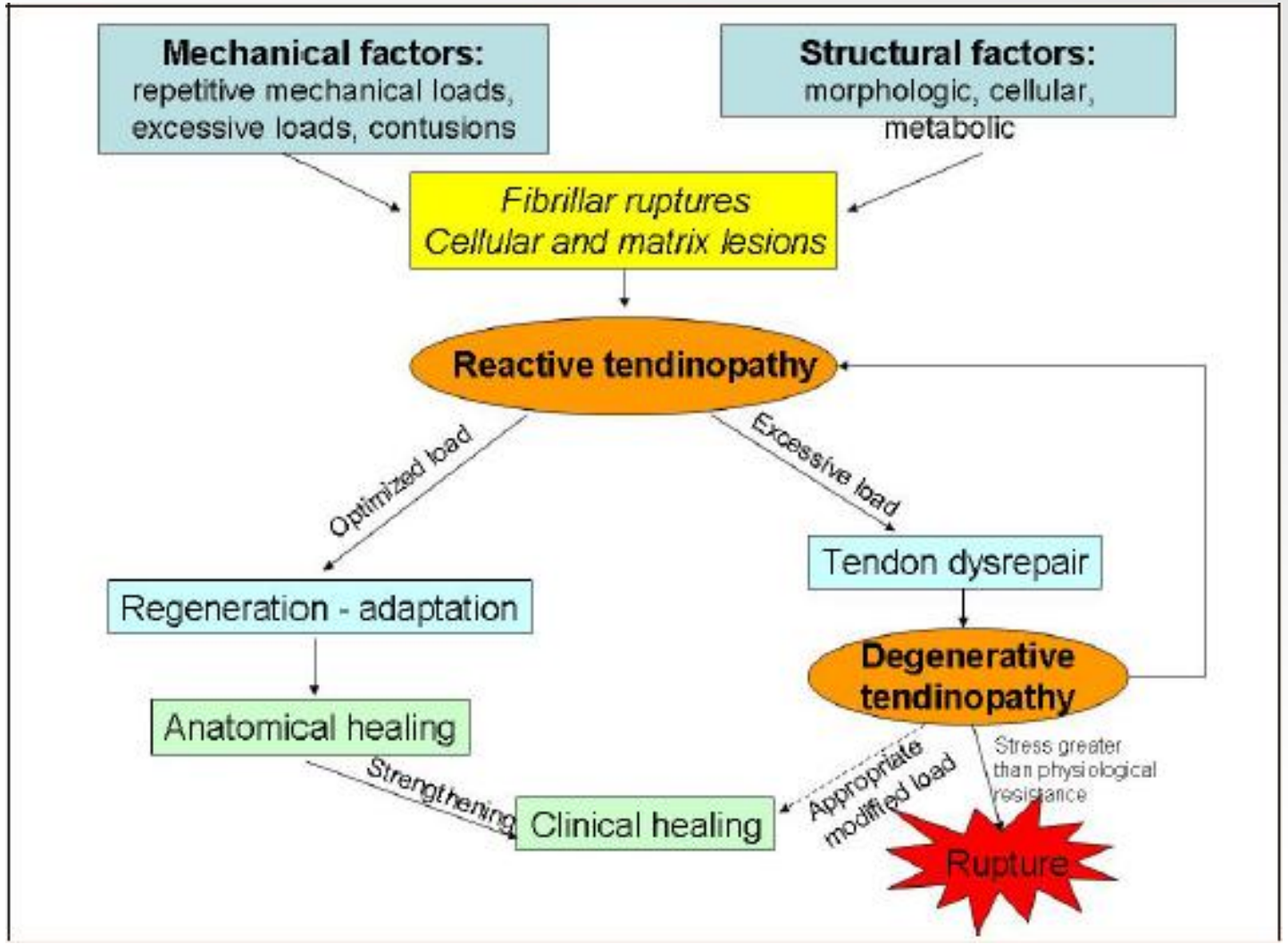
- Describe the pathogenesis and etiology of specific tendinopathies.
- Describe the pathogenesis and etiology of degenerative disorders of the knee.
- Discuss the clinical presentation, assessment and management of specific common musculoskeletal problems in adults.

Pathogenesis -Tendinosis

- Macroscopic
  - Intra-tendinous degeneration secondary to ageing, micro-trauma, vascular compromise
- Histopathology
  - Collagen disorientation, disorganization and fiber separation
  - Increased cells and vascular spaces possible neovascularization, focal necrosis or calcification
  - Proliferation of capillaries and arterioles



Tendinosis/ Tendinopathy



ETIOLOGY- ACQUIRED GENERAL FACTORS

- Nutrition (excess of protein)
- Excessive force
- New physical activities
- Poor technique
- Training errors
- High body weight/adiposity
- Weakness

- Environmental conditions
- Running surface
- Hyperthermia
- Drugs (oral corticosteroid, fluoroquinolones, cannabis, heroin, cocaine)
- Infectious diseases
- General diseases (RA, SLE, DM, Hyperparathyroid, Hypothyroid, CRF)

ETIOLOGY – ACQUIRED LOCAL FACTORS

- Decrease in local vascular perfusion
- Repetitive loading
- Excessive loading
- Abnormal and unusual movements
- Impingement
- New/old shoes and equipment

General **Management for Tendon Disorders**

- Reduce the load on the tendon (relative or complete rest)

- NSAIDS and/or cortisone injections unless contra-indicated
- Physiotherapy or athletic therapy
  - Anti-inflammatory treatment
  - Progressively increasing strength, endurance and function
- Other injectables such as PRP and Hyaluronic acid (Synvisc or Durolane)
- Investigations (Ultrasound or MRI) if failing conservative management

- Surgery rarely indicated unless a complete tear occurs

PRP (platelet rich plasma) injections

- The promotion of tendon healing through the delivery of **platelet-derived growth factors** and bioactive molecules in hyper physiologic doses, which should enhance tissue repair mechanisms.

The Role of Hyaluronic Acid for Soft Tissue Indications: A Systematic Review and Meta-Analysis

Moin Khan, MD, MSc, FRCSC,*†‡ Ajaykumar Shanmugaraj, BHSc,† Carlos Prada, MD, MHSc,† Ashaka Patel, BHSc,§ Eric Babins, MSc, MD, FCFP (SEM),‖ and Mohit Bhandari, MD, PhD, FRCSC†‡

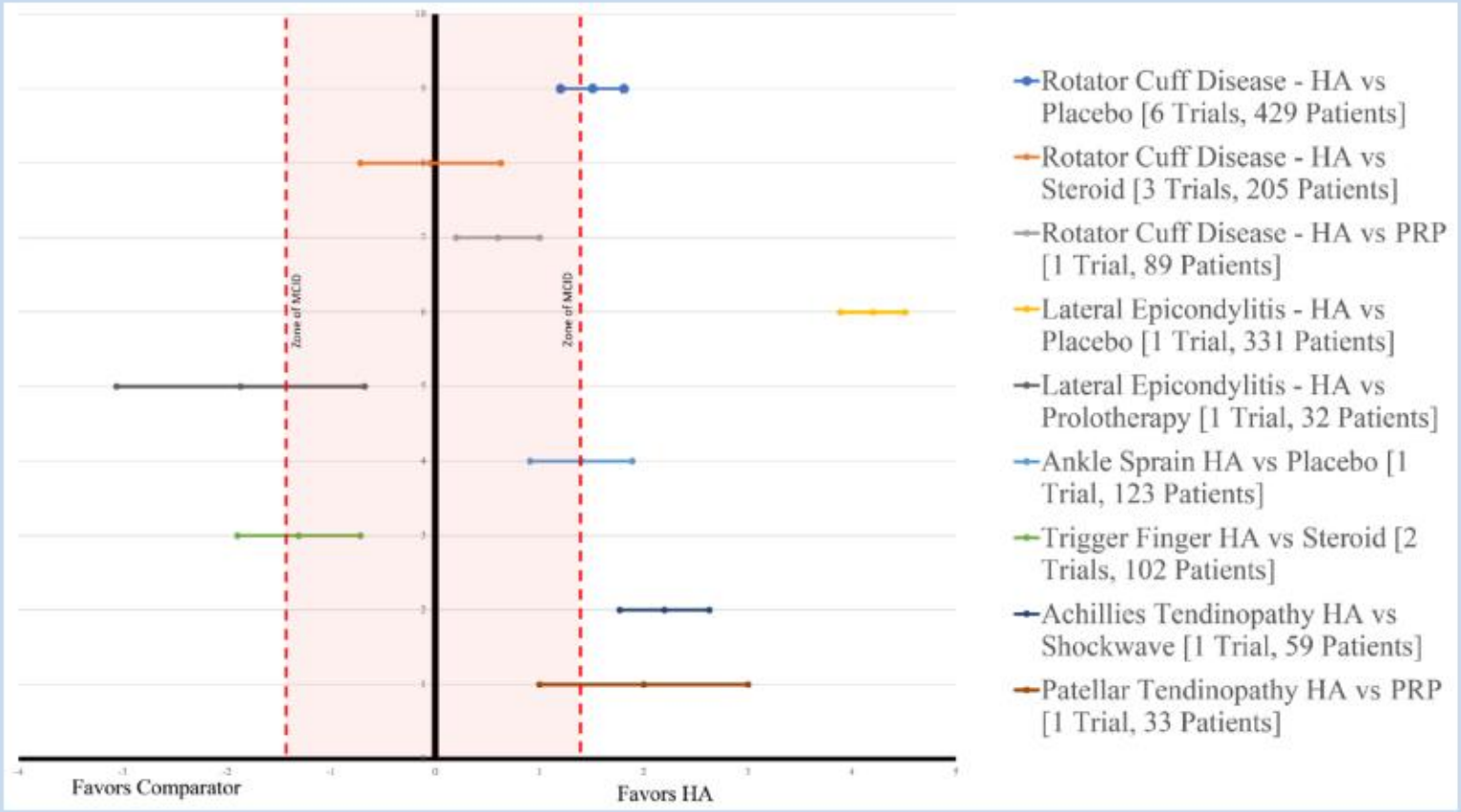


Figure 4. Effect of hyaluronic acid (HA) on pain relief by indication and comparator visual analogue scale scores (>6 weeks up to 12 weeks). PRP, platelet-rich plasma.

Topical glyceryl trinitrate for the treatment of tendinopathies: a systematic review

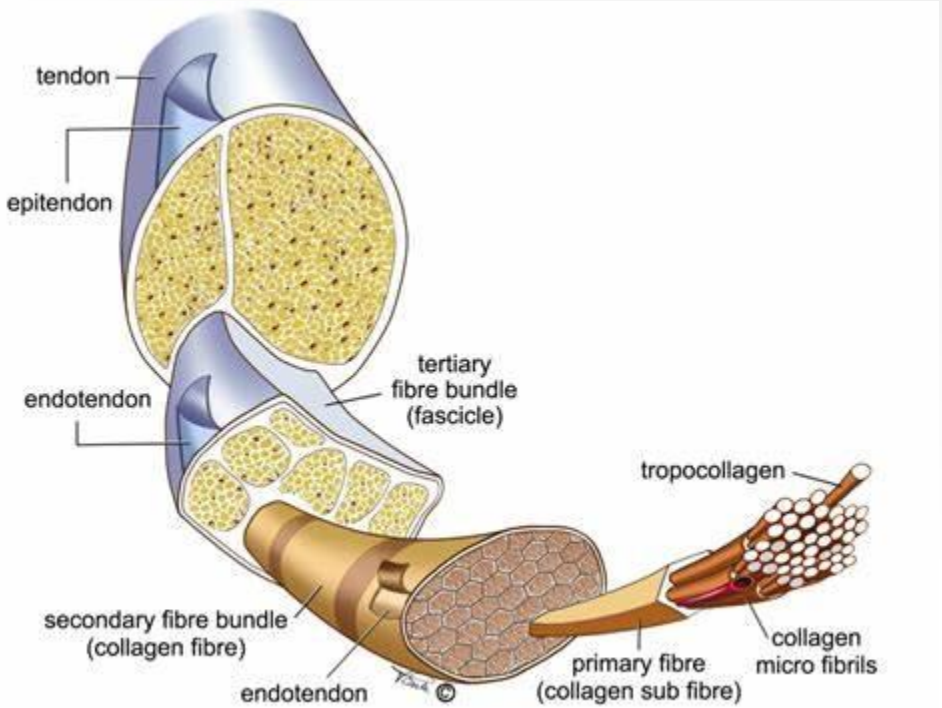
Challoumas D, *et al*. *Br J Sports Med* 2019;**53**:251–262. d

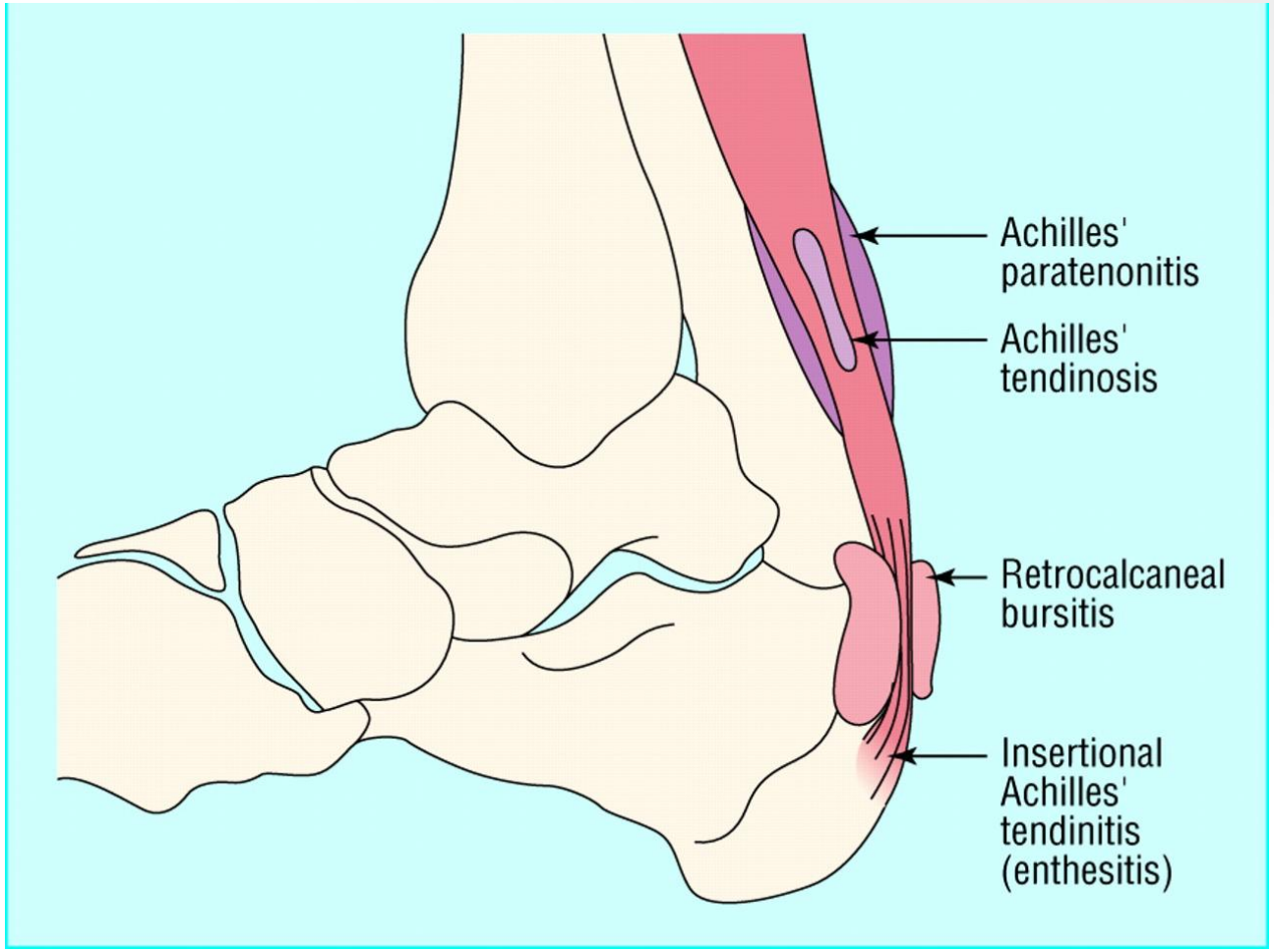
- Twenty years since concept of glyceryl trinitrate (GTN) therapy in tendinopathy with still no clear guidance/evidence of efficacy.

New findings

- Ten eligible randomised controlled trials in all tendinopathies reveal improved midterm (up to 6 months) improvements in pain, strength and patient satisfaction.
- Main adverse event is headaches in up to one in five patients.
- Topical GTN is useful for all chronic tendinopathies as an adjunct to loading programmes that fail to produce satisfactory resolution of symptoms.

Common Tendon Disorders

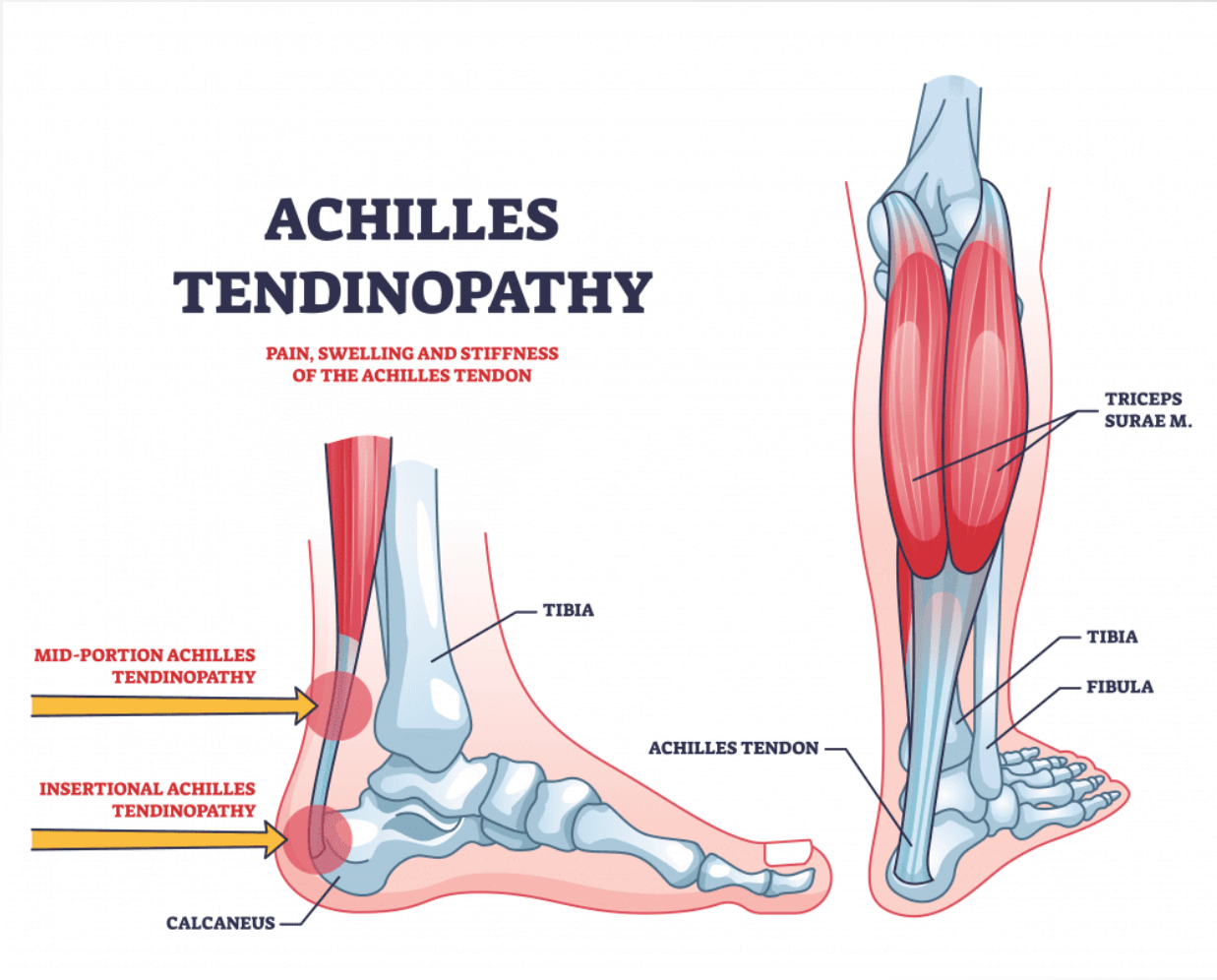




Achilles tendon problems

Achilles Tendinopathy

- Excessive repetitive overload such as jumping and sprinting
- Training errors in 70% of the running injuries
- Rapid increase in mileage, increased interval training, running on sloping and slippery roads or hills
- More common in runners and men
- New onset activity in previously sedentary individual



Clinical risk factors for Achilles tendinopathy: a systematic review

van der Vlist AC, *et al*. *Br J Sports Med* 2019;**53**:1352–1361.

What is already known

- Achilles tendinopathy is considered to be an overuse injury. However, the exact aetiology remains unclear.
- The disorder is most frequently seen in runners and running sports in the age range from 30 years old to 60 years old.
- Being overweight, chronic diseases that affect tendon quality (diabetes, rheumatoid arthritis or hypercholesterolaemia), the use of fluoroquinolones or statins, a reduced plantar flexor strength and a reduced ankle dorsiflexion are generally considered to be risk factors for Achilles tendinopathy. To date, conclusive evidence is missing.

Clinical risk factors for Achilles tendinopathy: a systematic review

van der Vlist AC, *et al*. *Br J Sports Med* 2019;**53**:1352–1361.

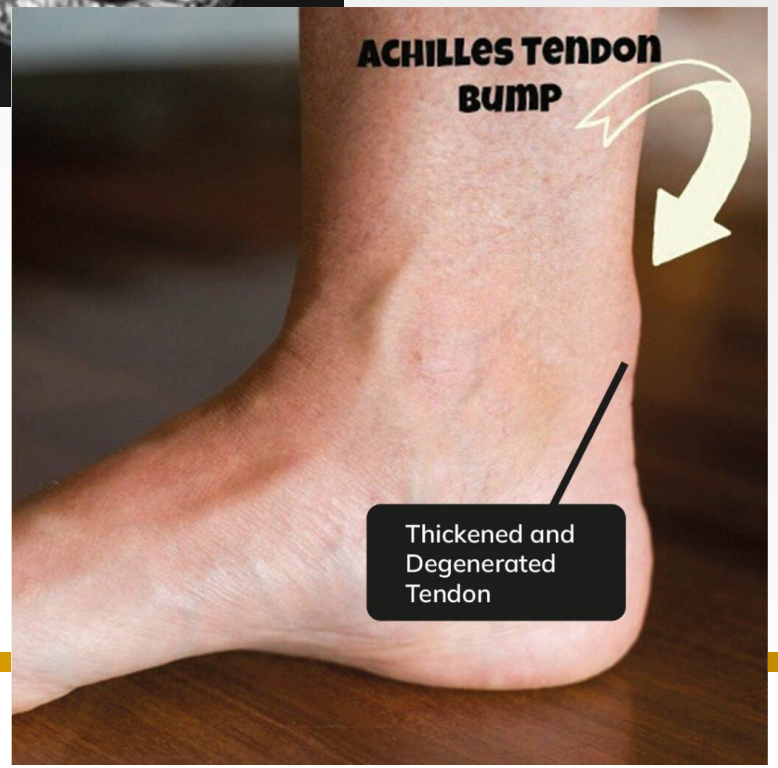
What are the new findings

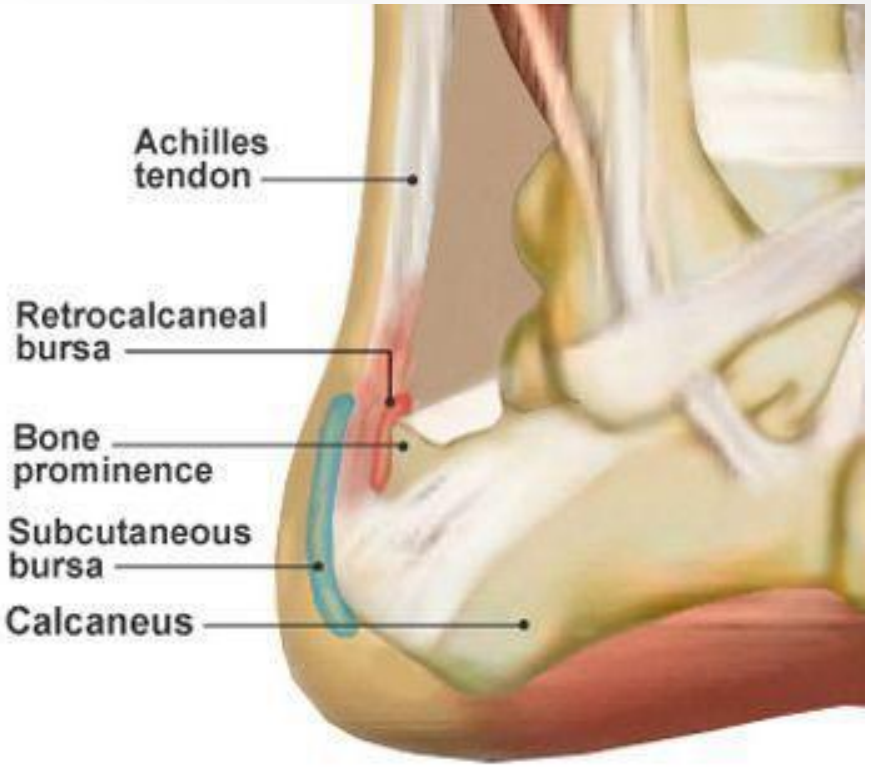
- There is a lack of high-quality studies regarding risk factors for Achilles tendinopathy.
- Ten cohort studies were identified, all with a high risk of bias.
- There is limited evidence for nine determinants as risk factors for Achilles tendinopathy: (1) prior lower limb tendinopathy or fracture, (2) use of ofloxacin antibiotics, (3) increased time between heart transplantation and initiation of quinolone treatment for infectious disease, (4) moderate alcohol use, (5) training during cold weather, (6) decreased isokinetic plantar flexor strength, (7) an abnormal gait pattern with decreased forward progression of propulsion, (8) more lateral foot roll-over at the forefoot flat phase and (9) creatinine clearance of <60 mL/min in heart transplant patients.

Achilles Tendinopathy

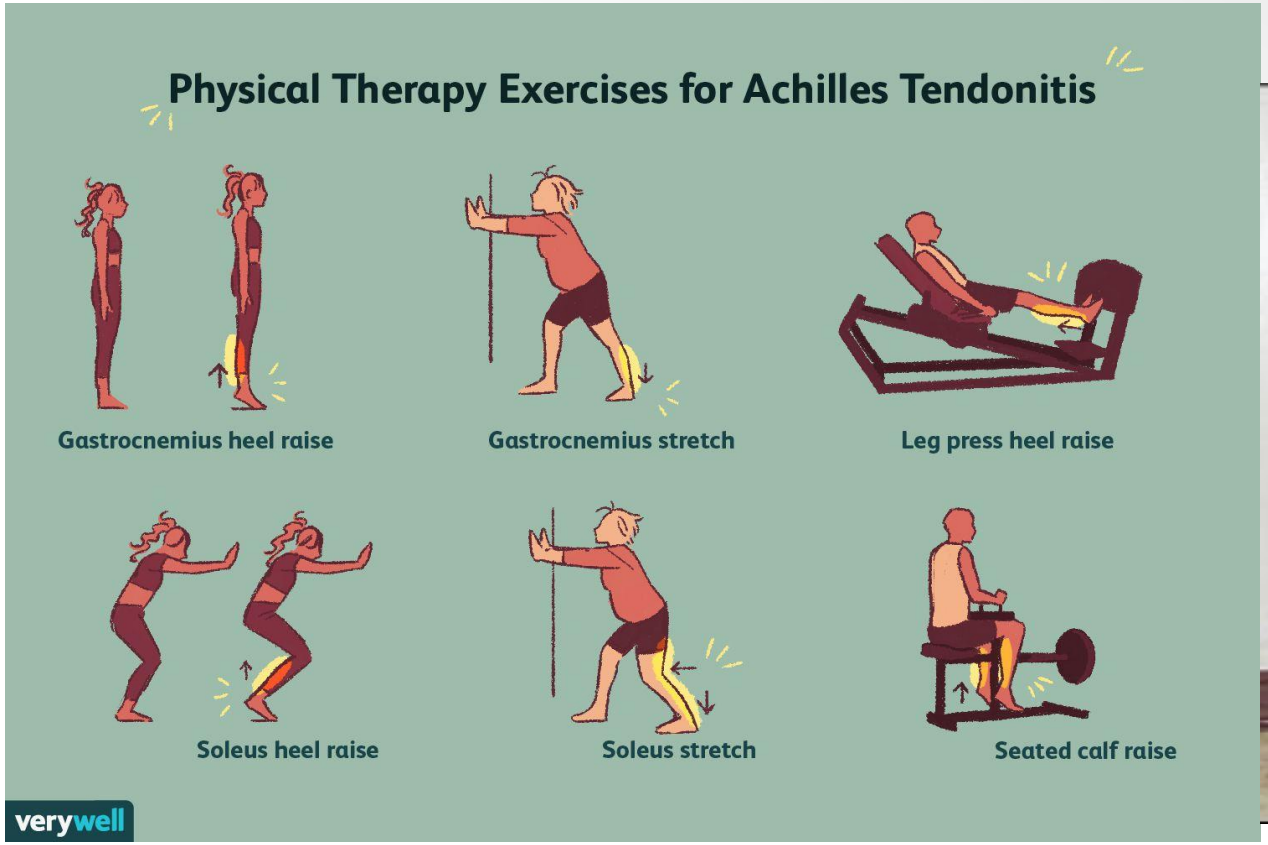
- Assess Heel Alignment and Gait
- ROM assessment with gastroc flexibility
- Assess strength by ability to walk on toes and heels also eversion and inversion as may have associated tibialis posterior tendinopathy and part of the differential
- Single leg heel raise often difficult

- Palpate the Achilles tendon looking for nodules and thickening





Insertional Achilles tendinopathy

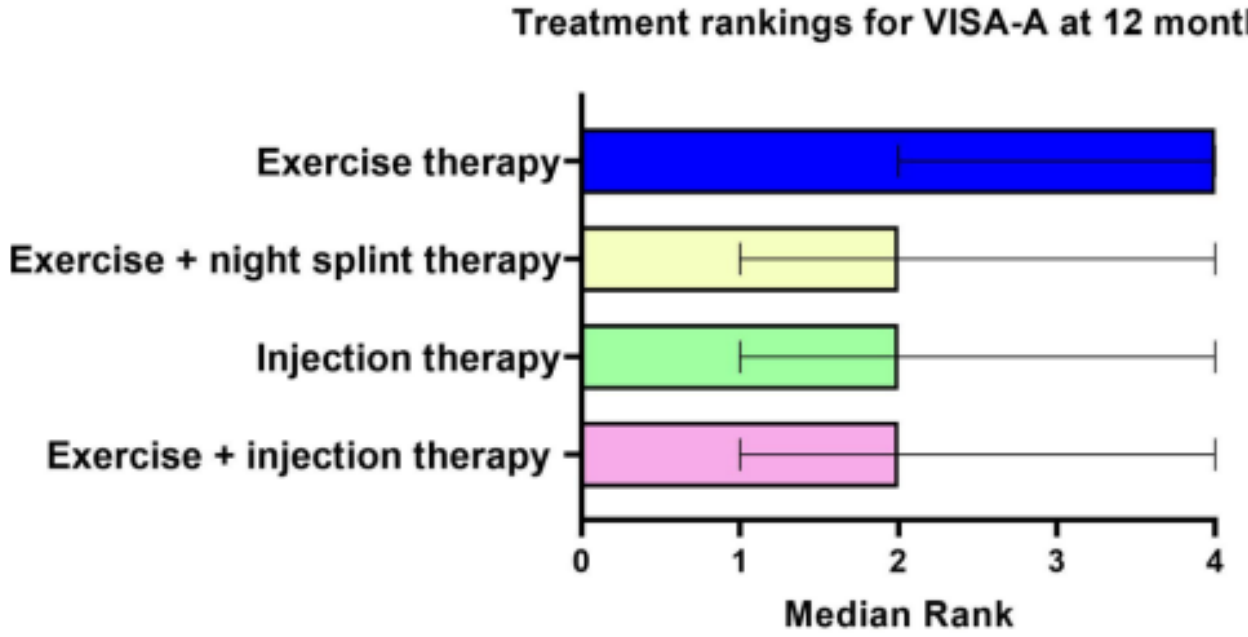


Eccentric exercises for achilles tendinopathy

Which treatment is most effective for patients with Achilles tendinopathy? A living systematic review with network meta-analysis of 29 randomised controlled trials

van der Vlist AC, *et al*. *Br J Sports Med* 2021;**55**:249–255.

Primary outcome measure The validated patient-reported Victorian Institute of Sport Assessment-Achilles questionnaire.



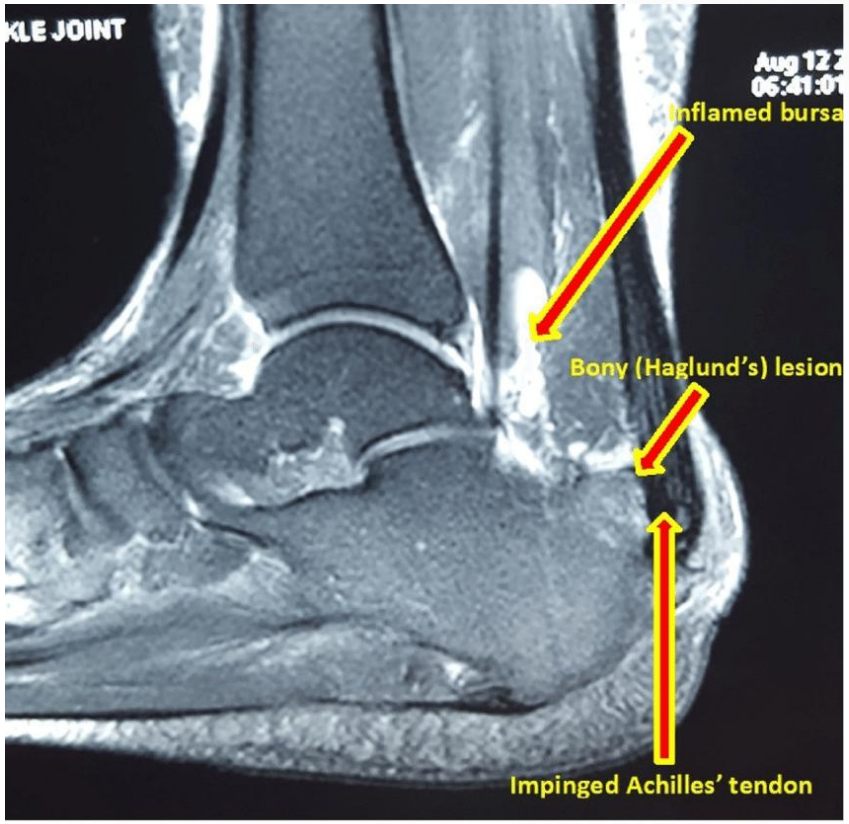
- In our living network meta-analysis of randomised controlled trials of patients with Achilles tendinopathy, wait-and-see is not recommended as all active treatments were found to be superior to it.
- Given the large uncertainty in comparative estimates and risk of bias in the studies, no specific treatment can be recommended over another.

Management of Achilles Tendinopathy

- Cast boot with wedges for severe symptoms (4 to 6 weeks)
- Heel lifts or Achillotrain brace after the boot

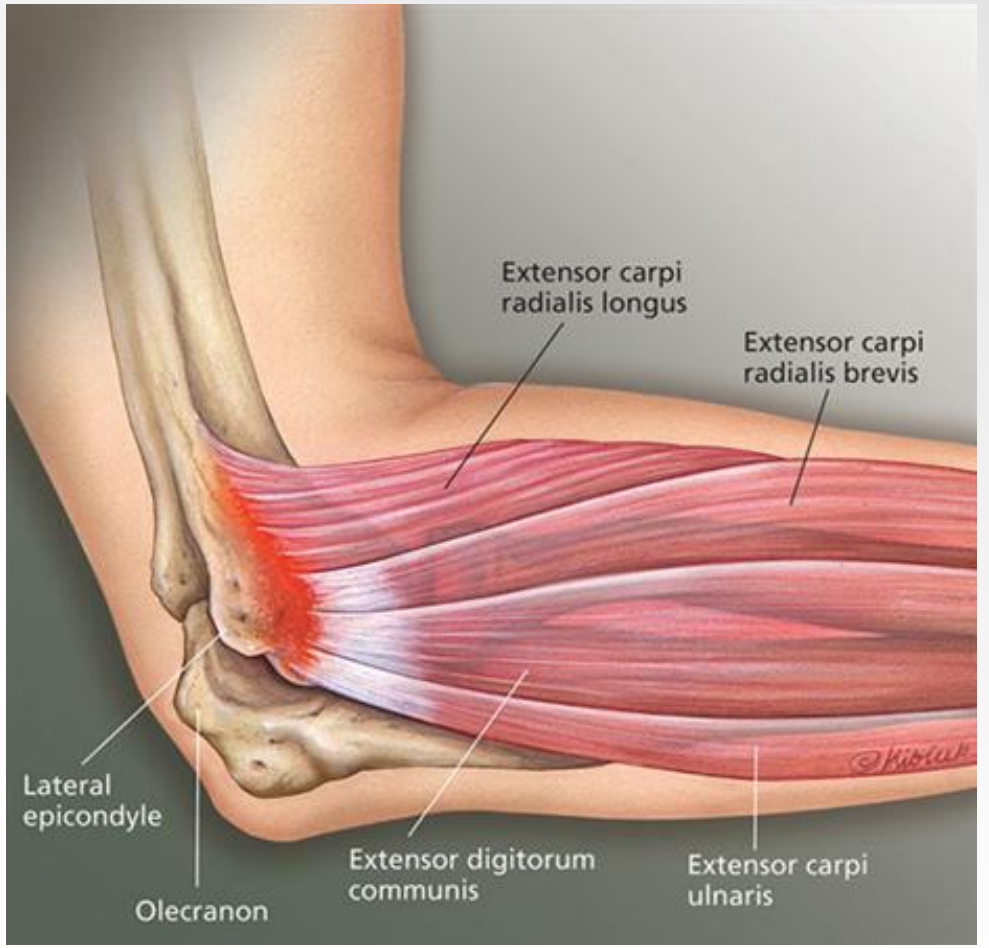
Management of Achilles Tendinopathy

- MRI if failure of all treatment, if any defect palpated in the tendon, or significant swelling at Achilles attachment for consideration of surgical referral.



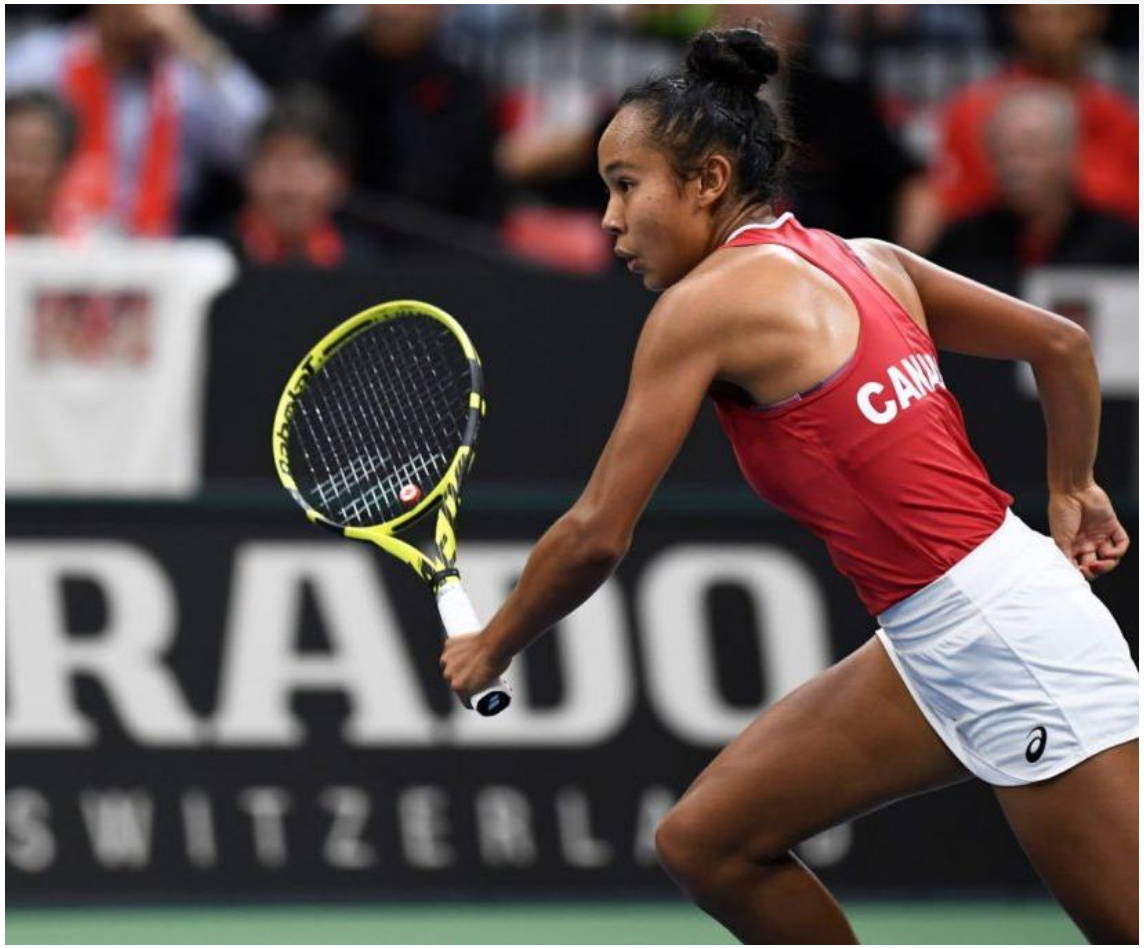
Risk Factors for Lateral Epicondylitis

- Overuse in athletics
- Tobacco smoking
- Obesity
- Age 45–54 y
- Repetitive movement (at least 2 h daily)
- Oral steroid use
- Other tendinopathies/tenosynovitis
- Diabetes
- Caucasian, Female
- Eccentric contraction



• Eccentric contraction

Tennis Elbow (Lateral Epicondylitis)



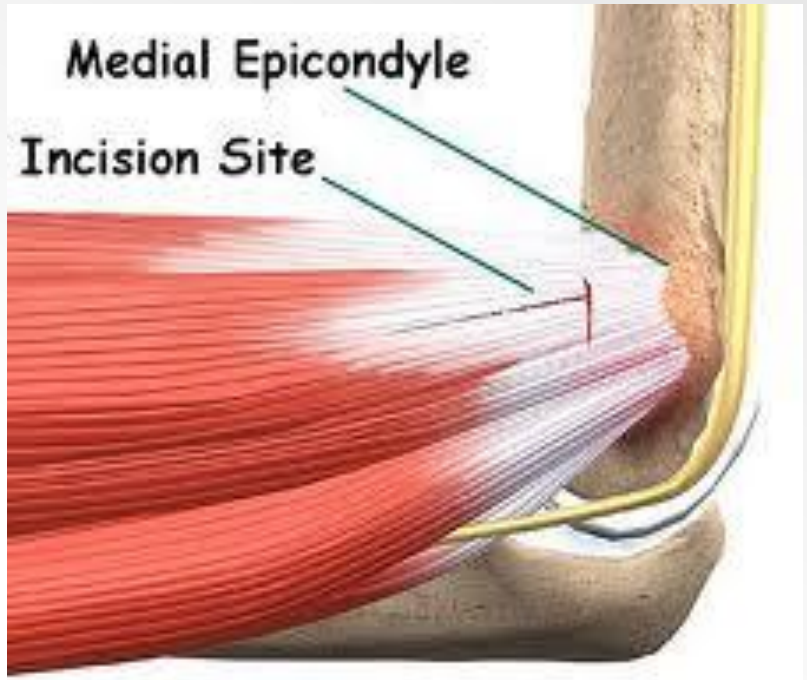
- Caused by activities that stress the wrist extensor and supinator muscles
- Forceful gripping or lifting of heavy objects
- Microtears and vascular ingrowth of involved tissues
- Extensor carpi radialis brevis

Risk Factors for Medial Epicondylitis

- Overuse in athletics
- Repetitive movement
- Forceful activity off the upper extremity
- Caucasian
- Eccentric contraction

Golfer's Elbow- Medial Epicondylitis

- Golf, Baseball and Javelin throwing
- Overuse of forearm wrist and finger flexors (flexor carpi radialis and pronator teres)
- Tender over anterior aspect medial epicondyle
- Often associated with ulnar nerve pathology



Tennis elbow (Lateral Epicondylitis) Physical Exam

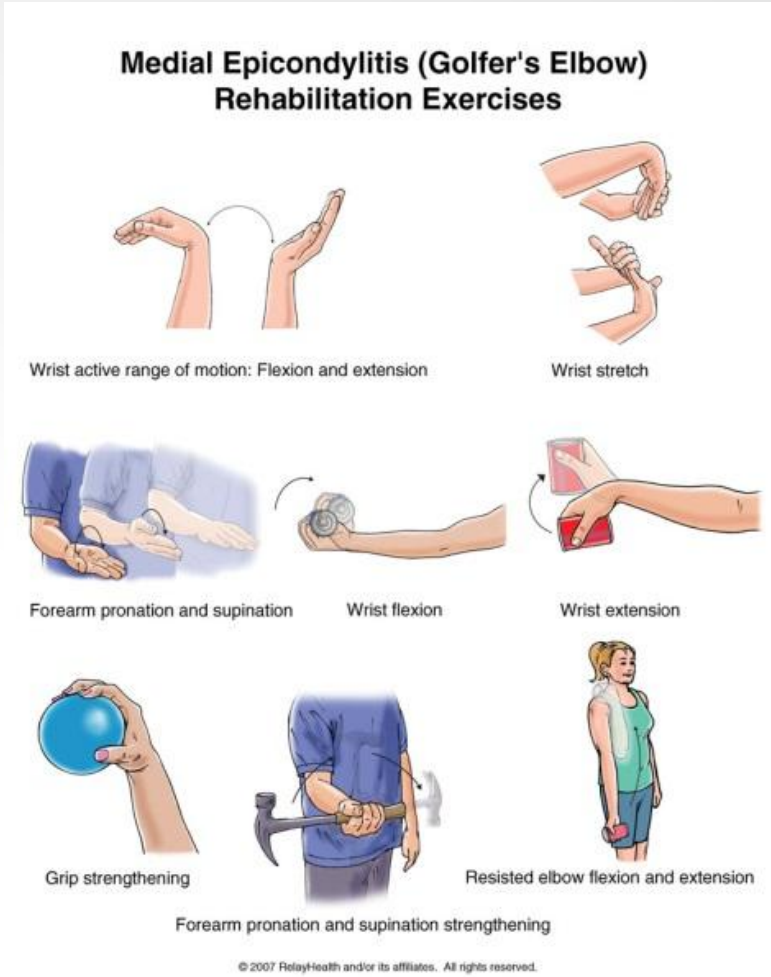
- Assess ROM of elbow and forearm
- Tender on palpation lateral epicondyle
- Pain on resisted dorsiflexion of wrist and supination
- Pain on passive stretch extensors

Medial Epicondylitis (Golfer's Elbow)

- ROM assessment elbow and forearm
- Tender over medial epicondyle
- Pain on passive stretch Wrist Flexors, resisted palmar flexion wrist and pronation
- Assess motor and sensory function in hand specifically ulnar nerve
- Tinel's sign at the elbow

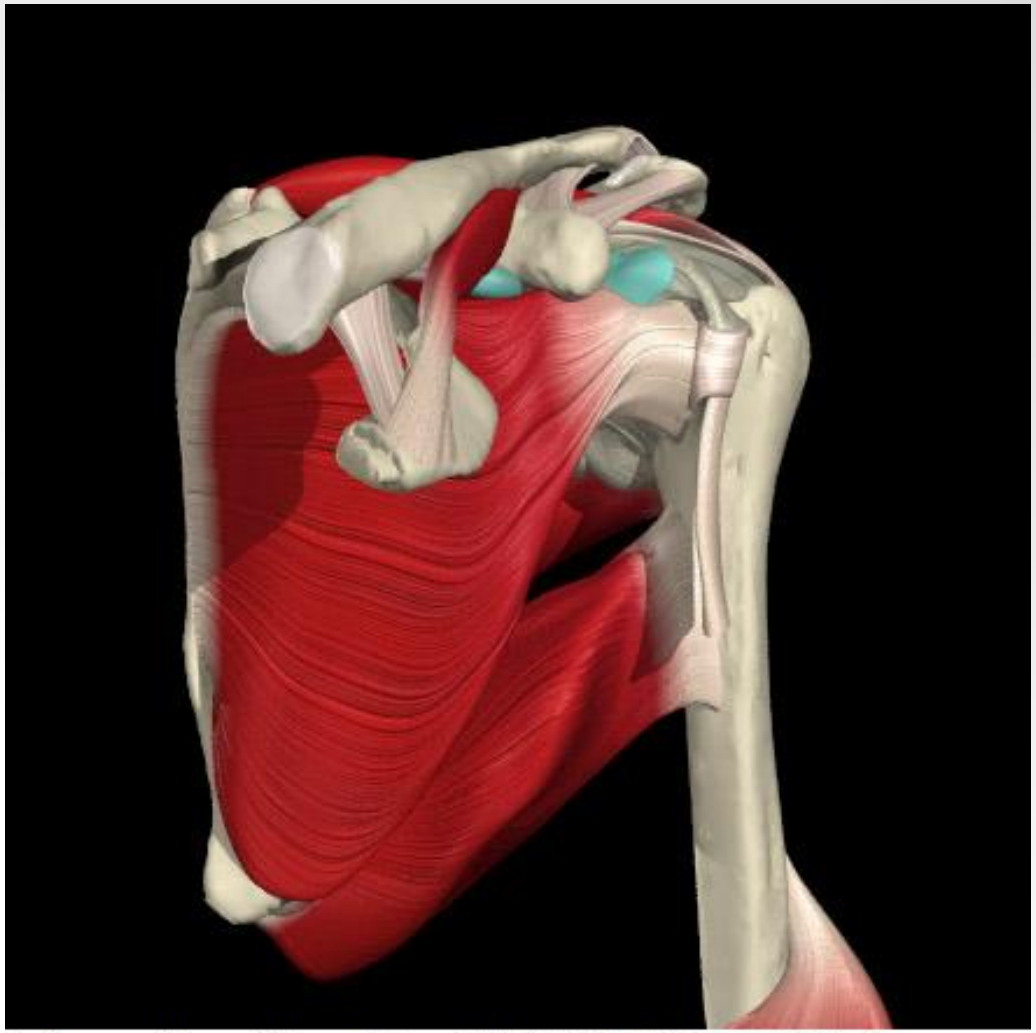
Management: Medial and Lateral Epicondylitis

- Modalities, Ice, NSAIDS, stretching, strengthening
- Corticosteroid Injections
- Nitro-patch
- PRP injection, Hyaluronic acid injection
- Counterforce bracing
- Resting wrist splint at night



Rotator Cuff Disease

- Anatomy
  - Supraspinatus – elevation and depression
  - Subscapularis – internal rotation and anterior stabilizer
  - Infraspinatus and Teres minor – external rotation



Interactive Shoulder © 2000 Primal Pictures Ltd.

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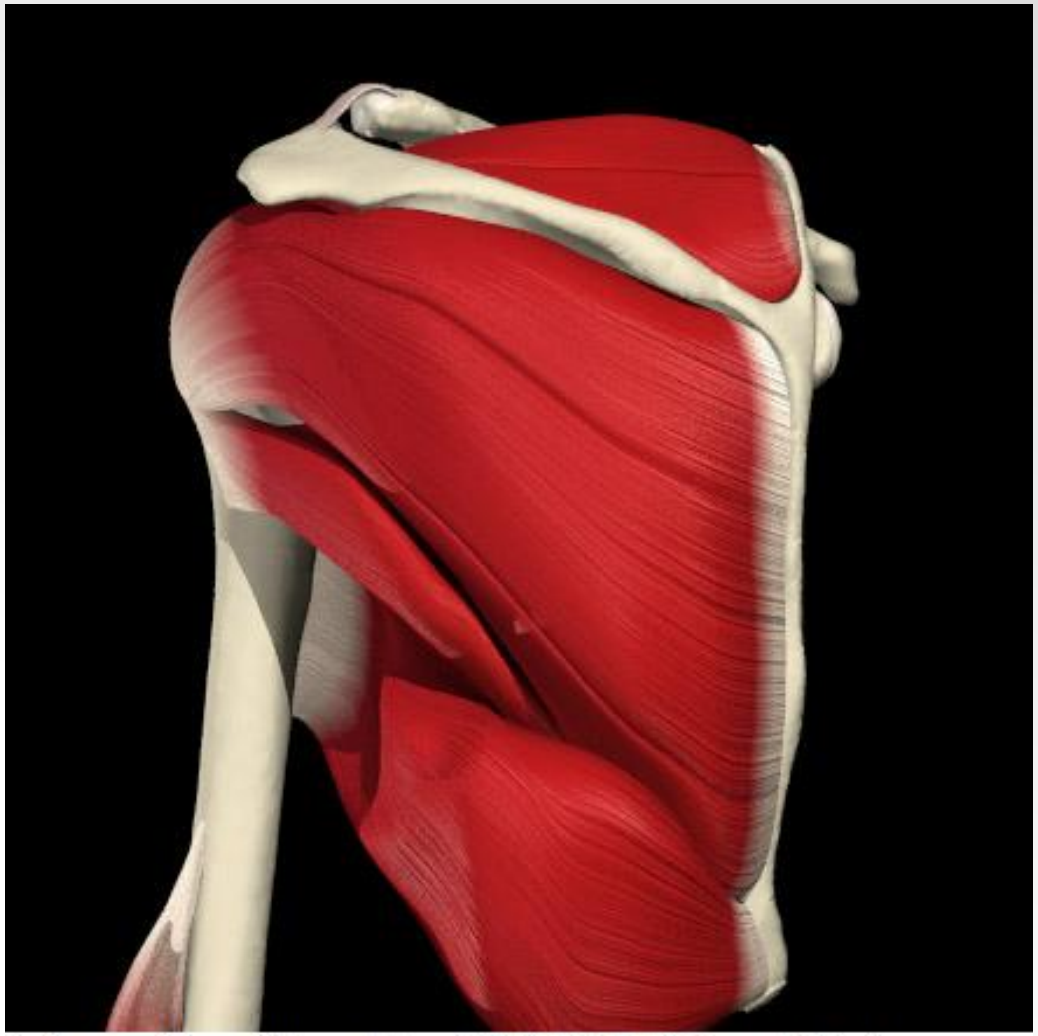

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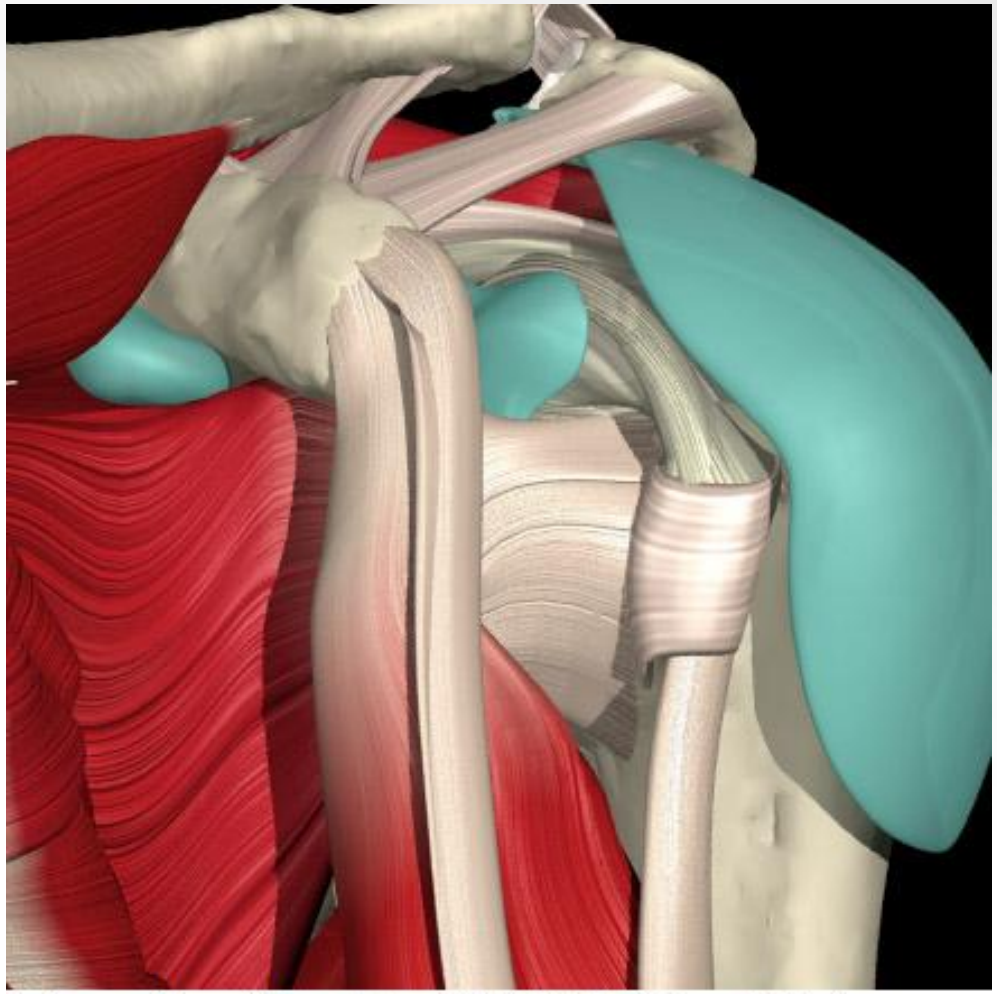
Bursae of the Shoulder



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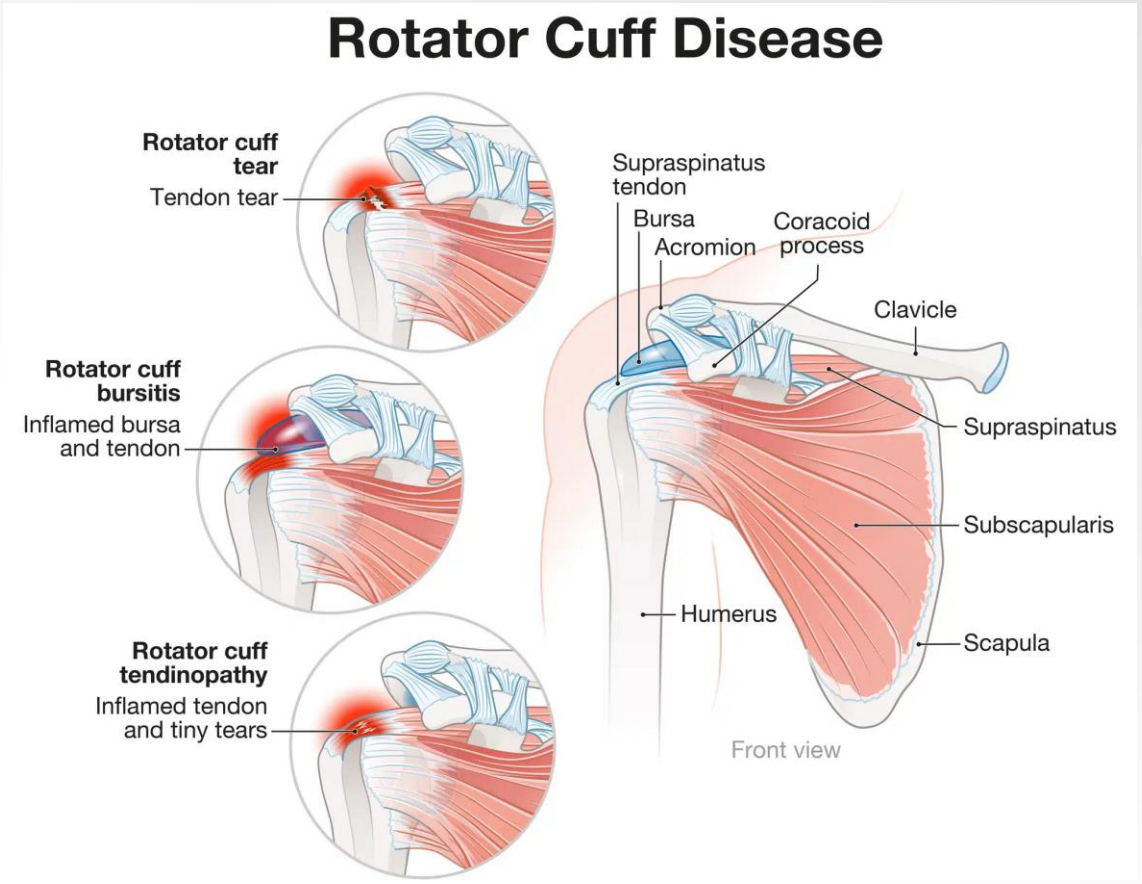
Rotator Cuff Disease

- ETIOLOGY
  - Traumatic
    - Fall on outstretched arm, fall on shoulder or elbow
    - Associated with an anterior dislocation in 50 plus
  - Degenerative
    - Wear and tear with overhead usage of shoulder
    - Carpenters, electricians, labourers, fishing industry, medical workers, life

Rotator Cuff Disease : History

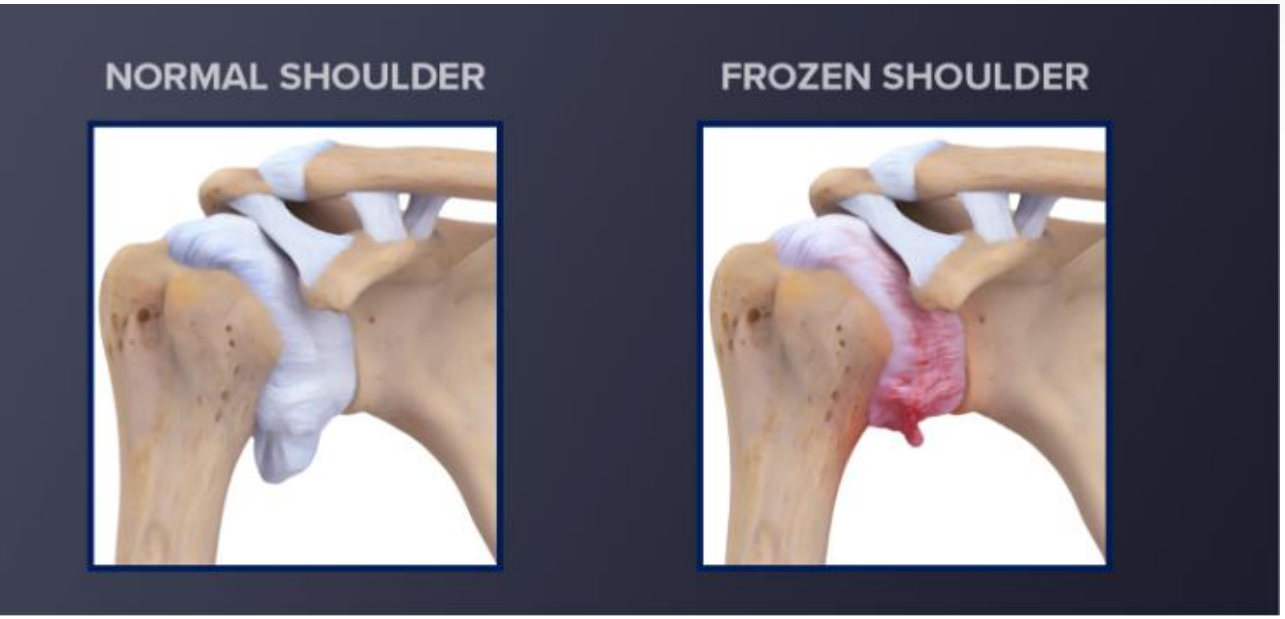
- Pain on overhead movements forceful or repetitive
- Pain at night not uncommon and often reason for seeking medical RX
- Weakness at/or above the shoulder level
- Fall on outstretched hand or directly onto shoulder
- History of dislocation in 50 years and up



Rotator Cuff Disease: Physical Exam

- May have loss of active elevation, ER, and/or IR on ROM testing (normal passive ROM)
- Painful arc of motion
- May have weakness of elevation, ER, or IR
- Speed's and Yerganson's tests
- Positive impingement signs
  - Forced forward flexion (Neer's sign)
  - Abduction internal rotation (Hawkins-Kennedy)

Adhesive Capsulitis vs Rotator Cuff Disease

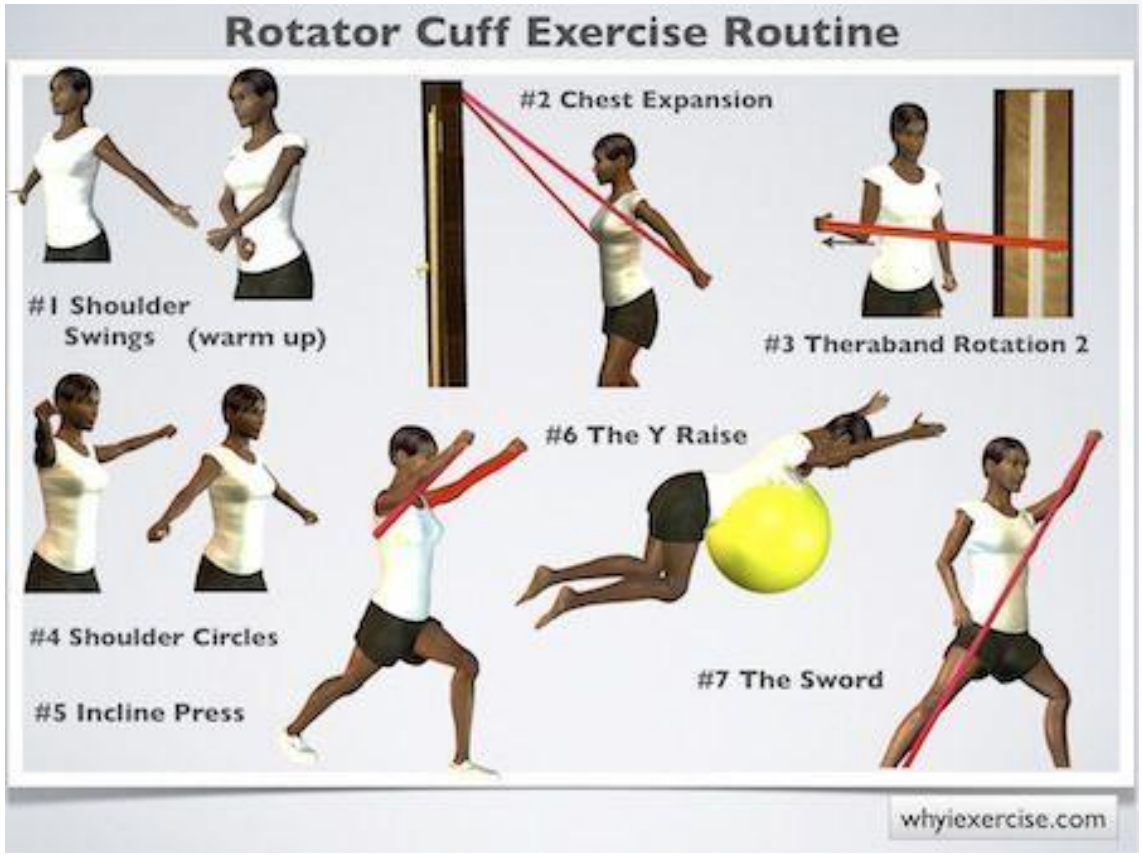


- Insidious onset of pain that is severe, sometimes after an injury
- Often rapid onset of loss of ROM
- Active and Passive motion are the same on physical exam
- Usually normal rotator cuff strength
- Normal Xray as presents similar to OA on examination

Rotator Cuff Disease

- **Radiological investigations**
  - Xray views including Glenohumeral AP, lateral, and axillary view to assess if associated OA
  - **MRI**
    - only if fail trial of therapy and anti-inflammatory (NSAID/Injection)
    - If significant weakness noted on strength testing
  - **Ultrasound**
    - operator dependent
    - Ease of access

Rotator Cuff Disease : Treatment



NSAIDS

- Important for pain management to start therapy

Physio or Athletic therapy

- Key for regaining ROM (stretching) and strength

Cortisone injections

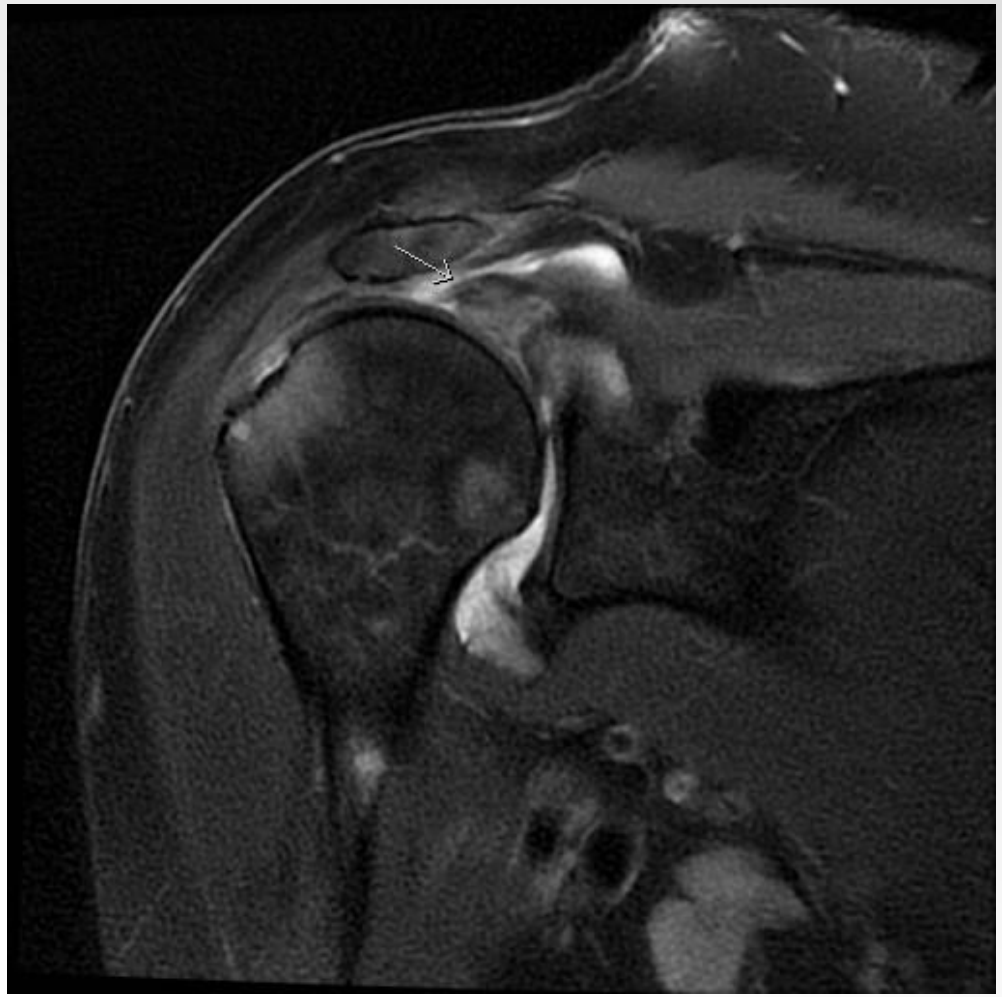
- Especially if pain at night or failing rehab

Modification of activities

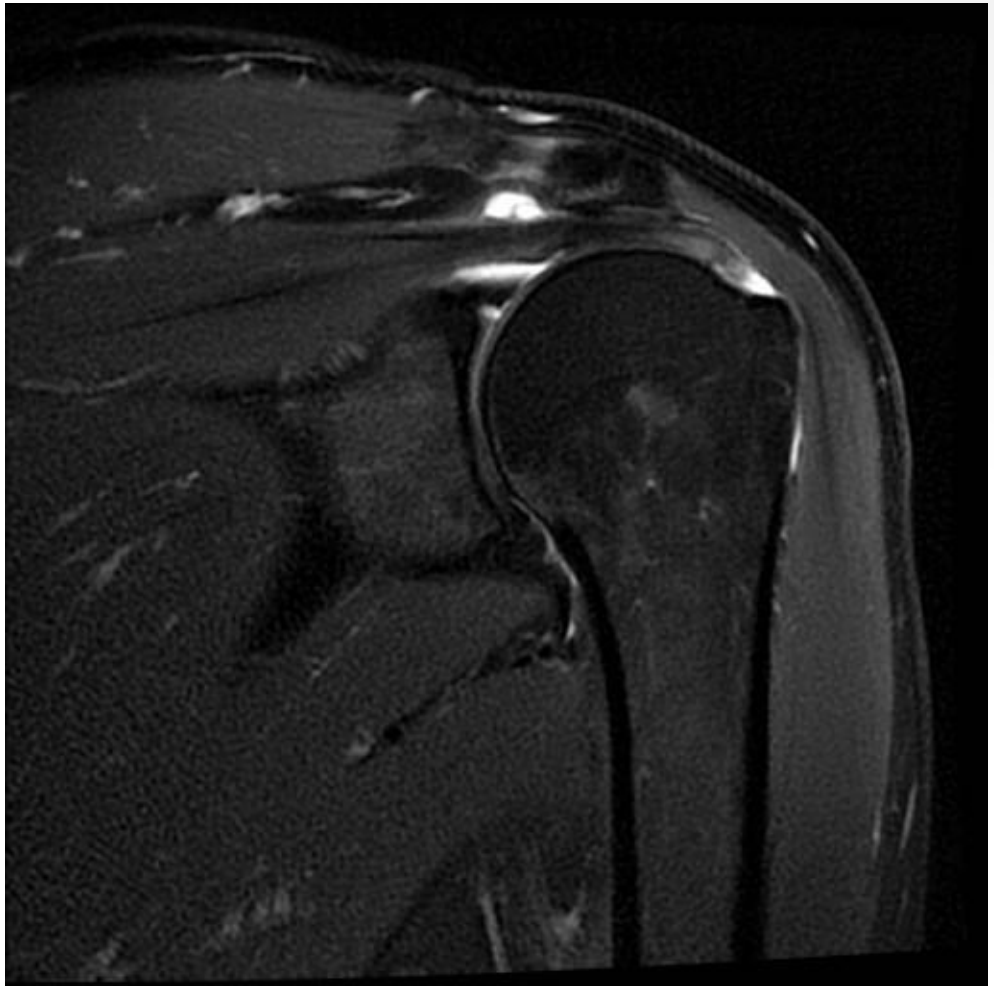
- Stop sport or work for a period of time

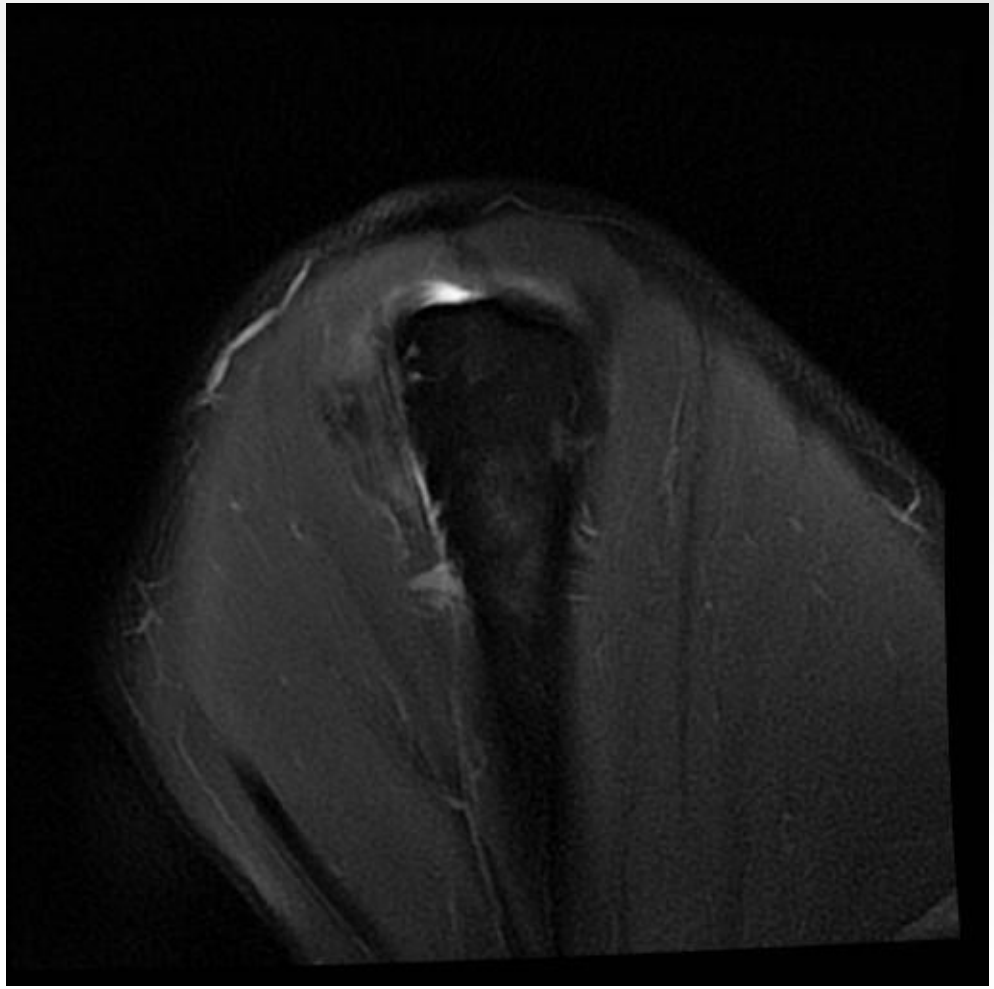
Rotator cuff disease

- Rotator cuff tears are common (prevalence ~ 15-23%)
- Increasing prevalence with age
- ~50% of tears will progress
  - Tears <1cm likely stable
- Tear progression is highly correlated with symptom development



Small cuff tear on T2 fat sat





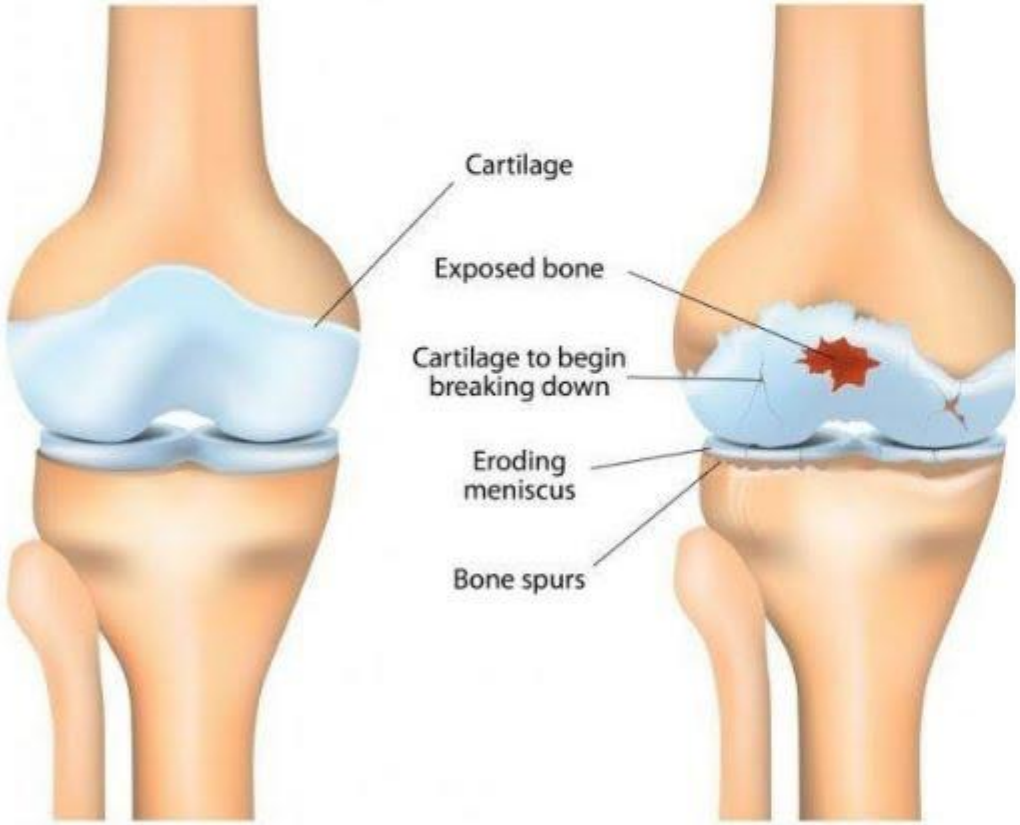
Outcomes: Non-operative vs Operative Management of Rotator Cuff Tears

- Moosmayer et al, JBJS 2014
  - Repair vs physio did not show MCID (minimum important clinical difference) for small and medium size cuff tears at 5 yrs
- Kukkonen et al, JBJS 2015
  - Repair and/or acromioplasty not superior to physio at 2 yrs in pts 55 or older
- Piper et al, JSES 2018
  - Meta-analysis of RCTs comparing operative to non operative treatment showing no MCID between groups

The main indication for surgery is failure of non-operative management.

OSTEOARTHRITIS IN KNEE

OSTEOARTHRITIS



Healthy joint

Osteoarthritis

STAGE OF KNEE OSTEOARTHRITIS

I
Doubtful

Minor Wear and Tear Osteophytes may start to develop on the edge of

II
Mild

The Articular cartilage has begin to breakdown

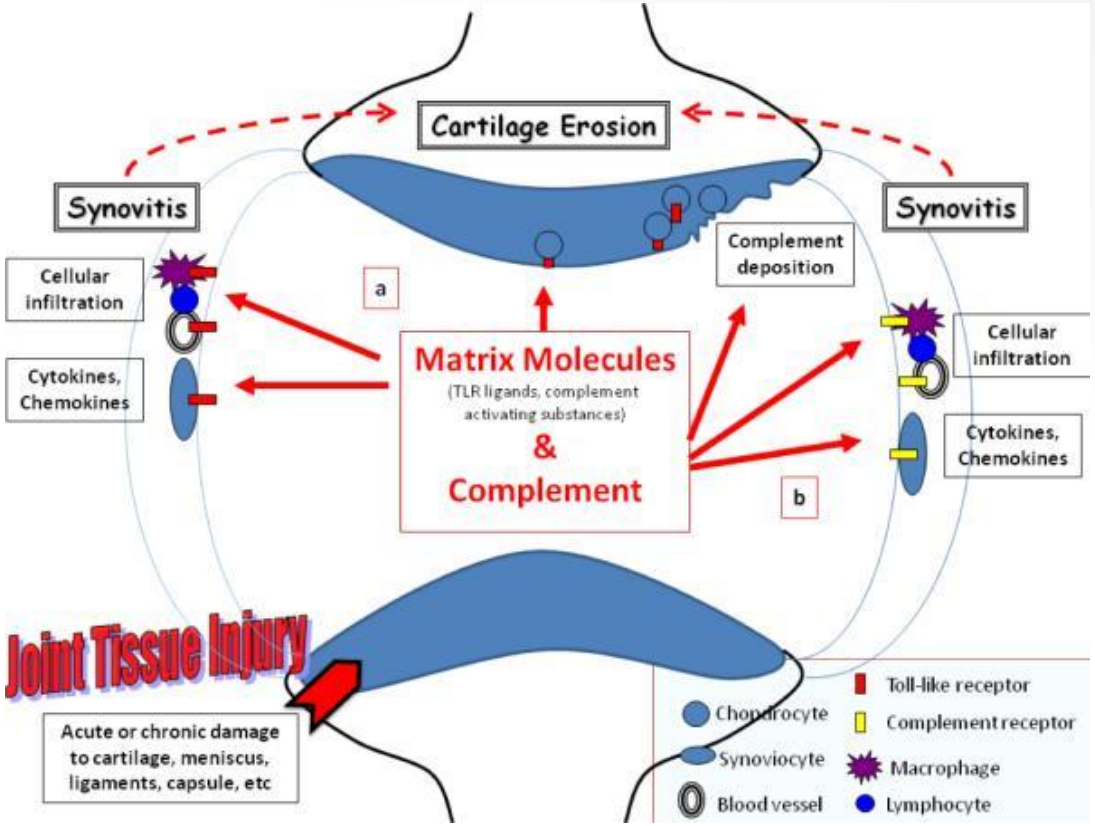
III
Moderate

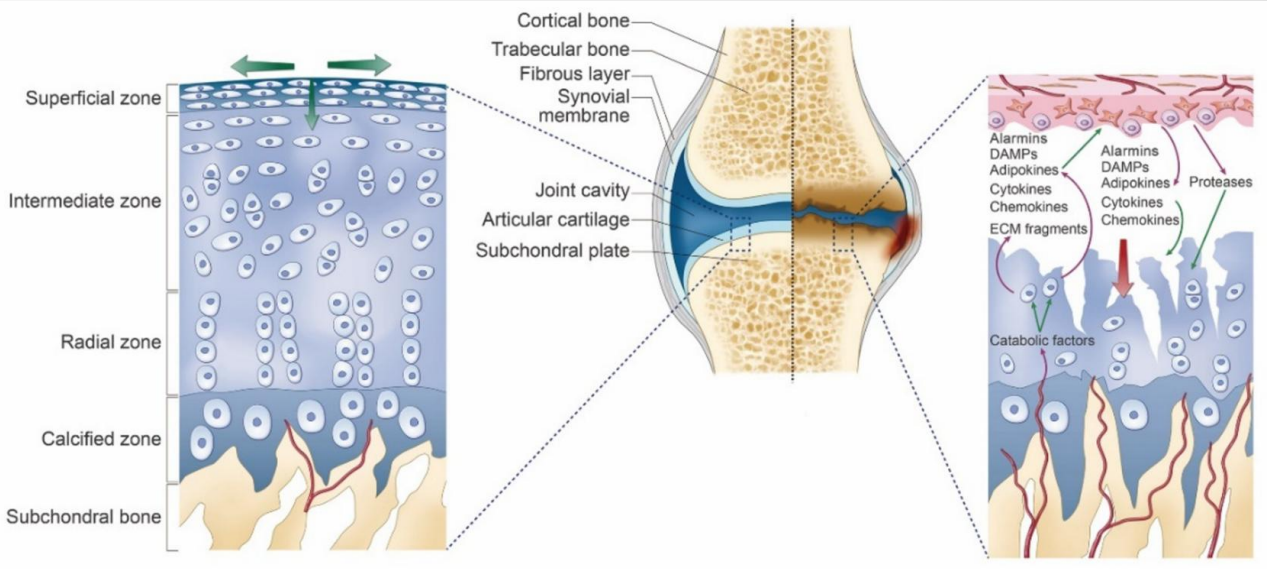
Appearance of small tiny cracks that narrows the gap between the bones.

IV
Severe

Joint space greately reduced

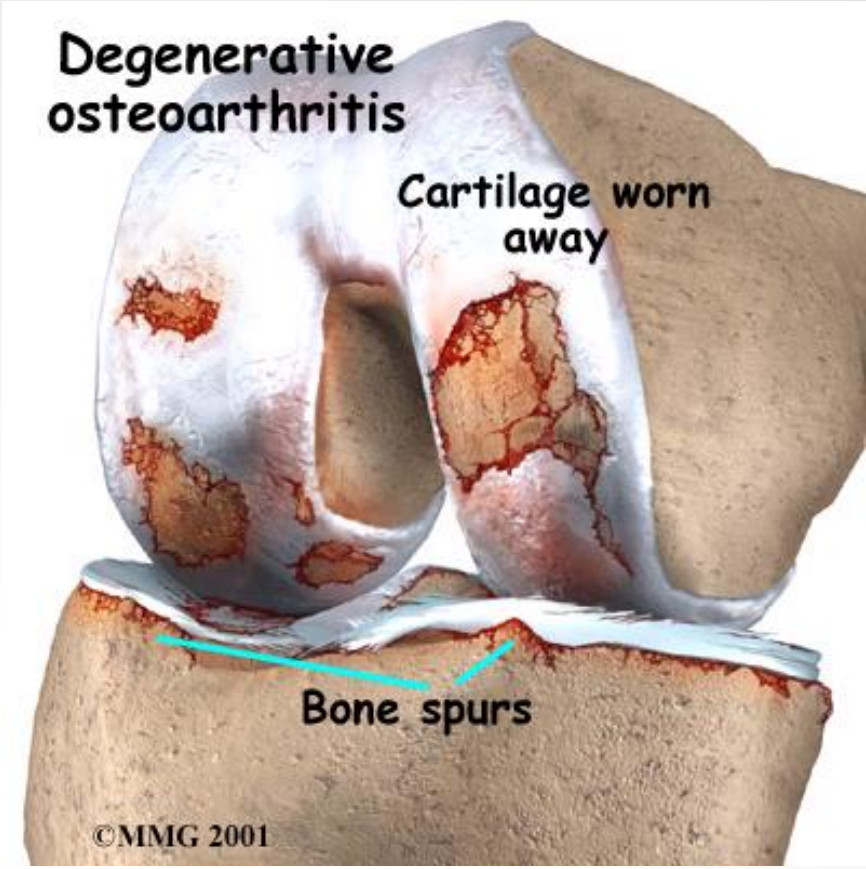
Pathophysiology of Osteoarthritis





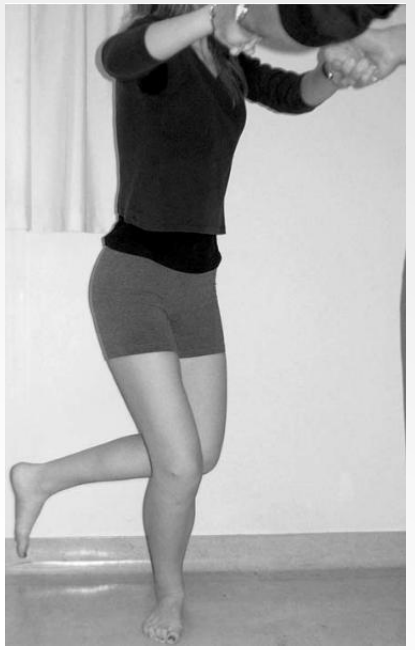
Osteoarthritis of the knee - History

- Pain can seem to come on suddenly or gradually
- Occasionally noted after a minor trauma
- May have swelling associated
- Difficulty squatting, climbing or descending stairs
- Getting off a chair/ toilet problematic
- May affect sleep health
- May be history of prior major trauma such as ACL tear or fracture



Osteoarthritis : Physical Examination

- Gait assessment
- Functional tests such as squat (shows lack of strength!)
- Palpation for effusion and tenderness
- Flexibility assessment hamstrings, quads, IT band, hip flexors
- Ligamentous exam
- Meniscal tests McMurray's and Thessaly's
  - May be positive if degenerative tears



Osteoarthritis of the Knee : Investigations

- **Weight bearing x-rays are key** ! Standing AP, lateral and skyline patella

- **MRI not indicated in Osteoarthritis management unless mechanical symptoms present and minimal OA**

General Management – Knee Osteoarthritis

- Reduce the load on the joint (relative or complete rest)

- NSAIDS, Acetaminophen, Duloxetine
- **Physiotherapy or athletic therapy**
  - **Anti-inflammatory treatment**
  - **Progressively increasing strength, endurance and function**
  - **GLA:D**

- Unloader braces for sports or physically demanding work (soft vs. custom)

The GLA:D™ Canada Program: What is it?

GLA:D™ Canada is an 8-week education and exercise program for those with stiff and/or painful knees and/or hips, or those with knee and/or hip osteoarthritis. Research from GLA:D® in Denmark shows participants report less pain, reduced use of pain killers, fewer individuals on sick leave, and being more physically active.

GLA:D™ CANADA IS MADE UP OF 3PARTS:

2-3 Education Sessions

2 or 3 90-minute education sessions will teach **GLA:D™ Canada participants about:**

- What is osteoarthritis, risk factors and symptoms
- Current available treatment for osteoarthritis
- How to self-manage your symptoms
- Why and how exercise can help with your osteoarthritis
- How to cope with the difficulties of daily activities associated with osteoarthritis

12 Neuromuscular Exercise Sessions

60 minute group exercise sessions twice a week **for 6 weeks led by a certified therapist. You will:**

- Learn how to control your movements and proper posture
- Build muscular strength through functional exercises
- Learn how to apply these exercises to everyday activities

Data Collection for Quality Monitoring

The program measures how you're doing at your first visit, 3 and 12 months after you have started the program. This information will help us monitor how the program is working for people with osteoarthritis all over Canada and ultimately will help us improve the program.

Visit gladcanada.ca for more information.

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BONE and JOINT CANADA

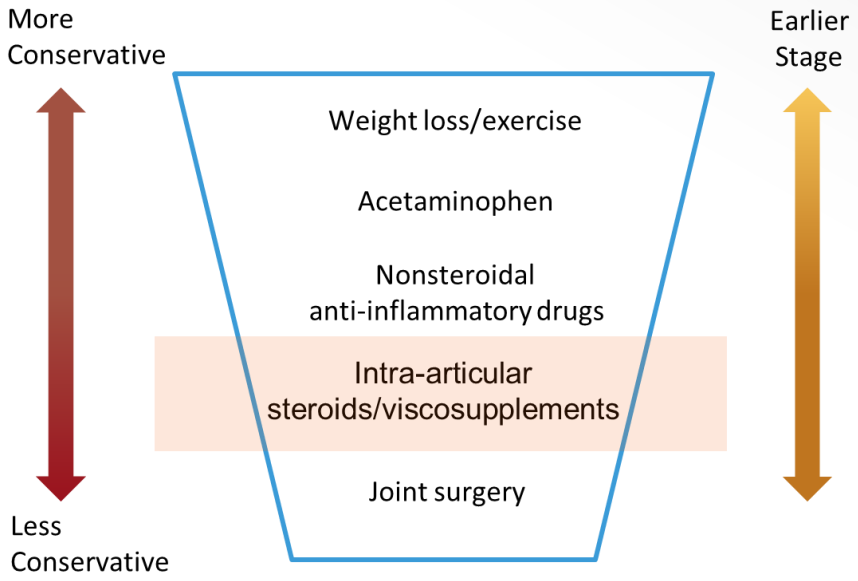
Canadian Orthopaedic Foundation

This infographic was funded by Ontario Trillium Foundation

DALHOUSIE UNIVERSITY

Treatment of Knee OA

CONVENTIONAL



MULTI-MODAL APPROACH

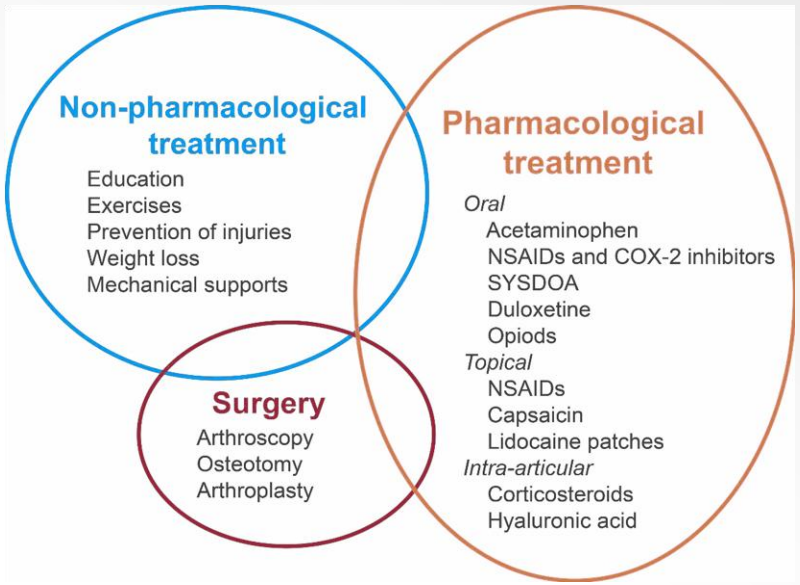


Figure adapted from Langworthy MJ et al. Phys Sportsmed 2010;38(2):133-45.
OA, osteoarthritis and Roubille et al. Medicographia 2013, available at http://www.medicographia.com/2013/10/osteoarthritis-treatments-where-do-we-stand-at-the-moment/
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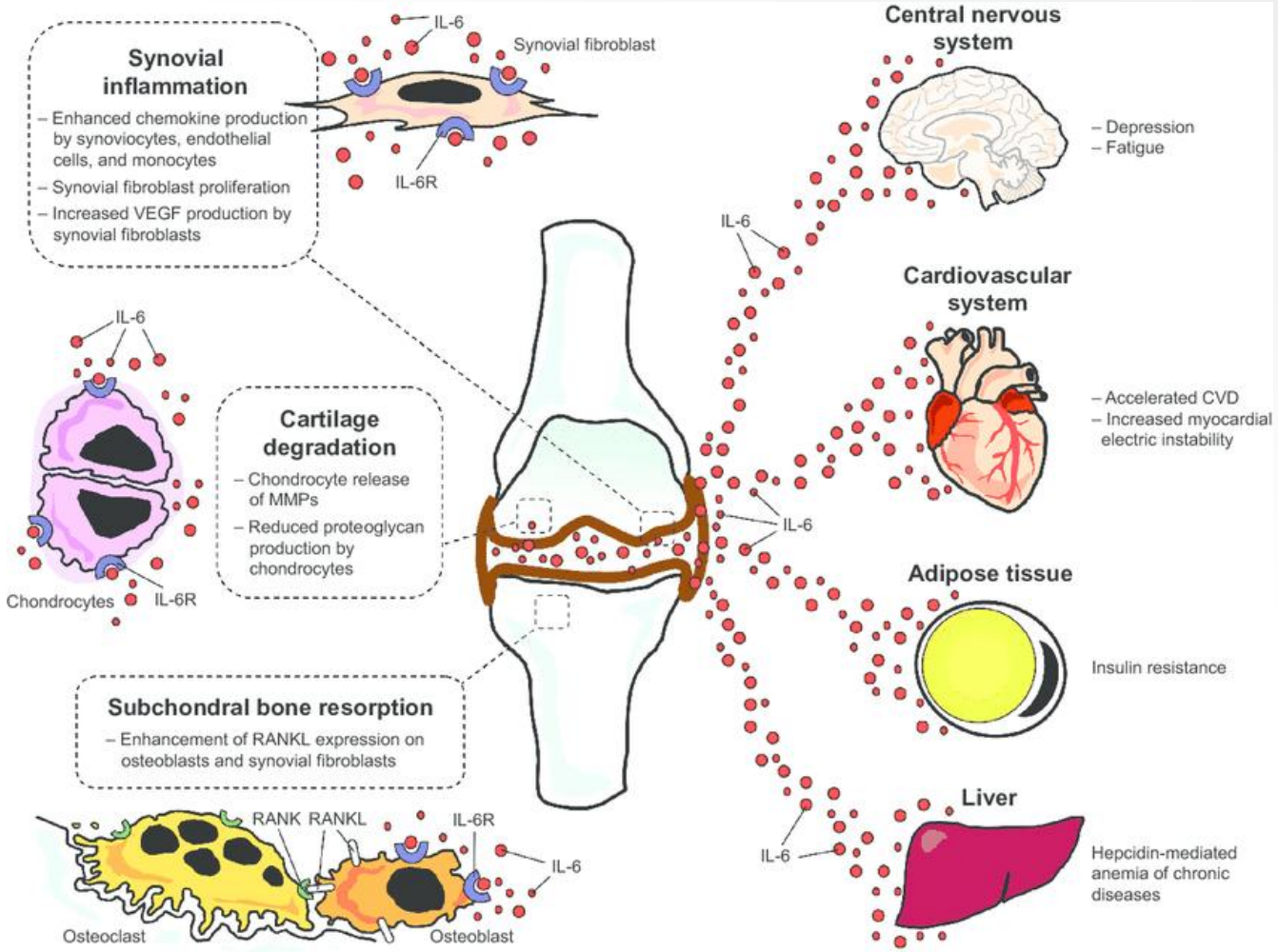


Corticosteroids: Review of the History, the Effectiveness, and Adverse Effects in the Treatment of Joint Pain Shane Stone, MD et al. Pain Physician 2021

- Hypothesized that corticosteroids protect against osteoarthritis through inhibition of IL-6 and IL-8, suppression of NF-κB and STAT3, and reduction of collagen I, MMP-1, and MMP-13 expression. Though the mechanism is still unclear

Recommendations on 5 interventions:

Intervention	Recommendation	Strength
Corticosteroids	IACS **provide short-term, moderate pain relief**.	A – Good evidence for
Hyaluronic Acid	**HMW HA provides improved pain relief and function** compared with placebo for **mild to moderate knee OA**	A – Good evidence for
Combination therapies	(1) Combined HA and CS can improve pain outcomes and may provide a **more rapid onset** and **longer duration of action** than either therapy alone.	B – Fair evidence for CS-HA combination
	(2) There is **insufficient evidence to support other combinations** of intra-articular injection therapy.	I – Insufficient evidence
Platelet-Rich Plasma	PRP has **potential to improve pain and function up to 1 year** post injection in **mild to moderate** knee OA.. **Heterogeneity** of the evidence and lack of data on the ideal preparation/composition prevent a recommendation for or against its use	C – Conflicting/Poor-quality evidence preventing recommendation for or against
Cell-based Therapies	There is **insufficient evidence to support the use of MSCs or BMAC in the treatment of knee OA**. Their use should be limited to registered control trials	I – Insufficient evidence

PRP in Knee Osteoarthritis

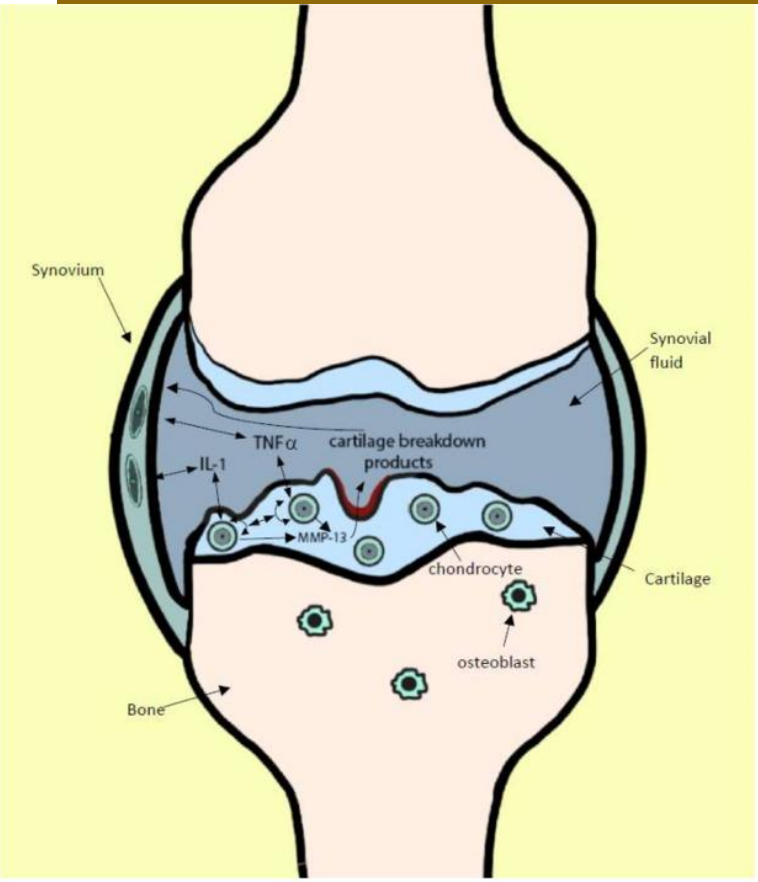


Figure 1. Model of feed-forward loop of pro-inflammatory cytokine-driven OA progression. IL-1β and TNFα bind to chondrocytes and induce expression of MMP-13. MMP-13 causes cartilage matrix breakdown. Cartilage breakdown products inflame cells in the synovium, inducing more production of IL-1β and TNFα.

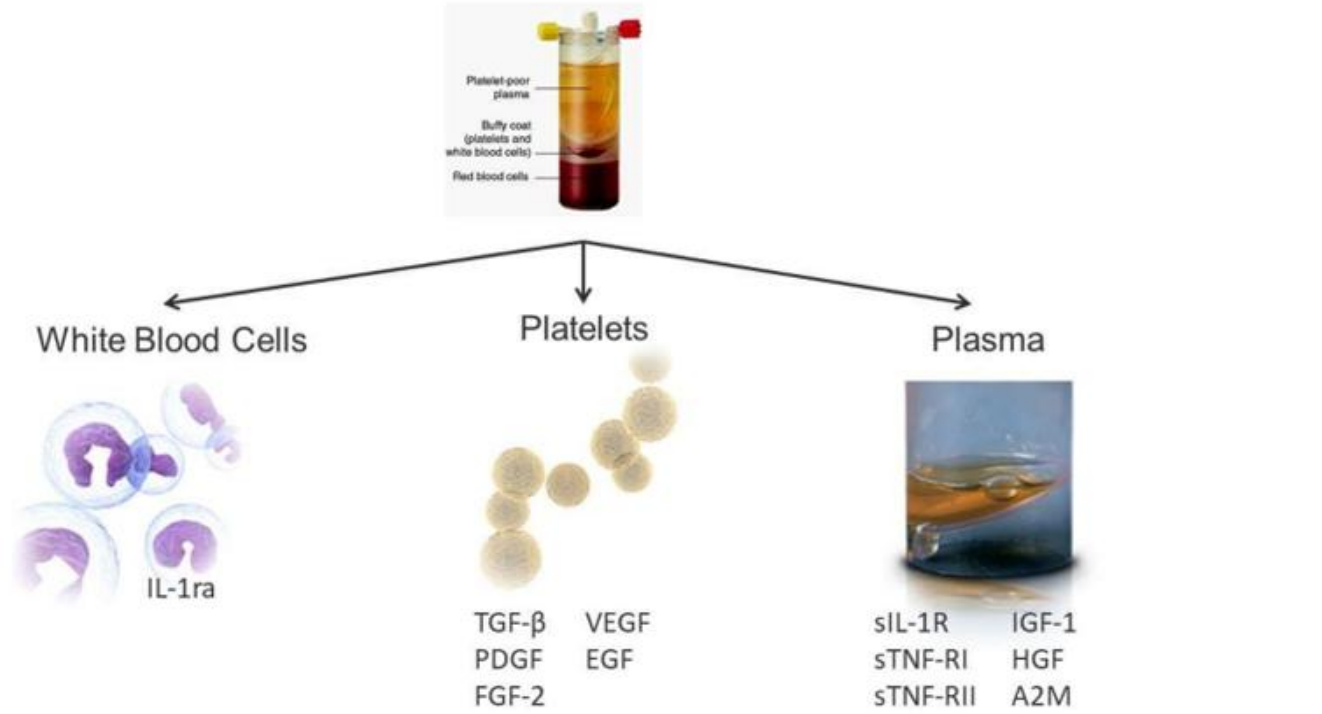
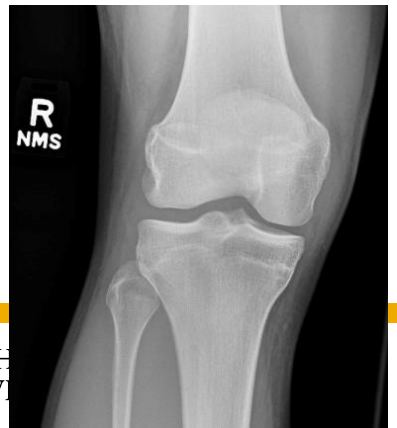


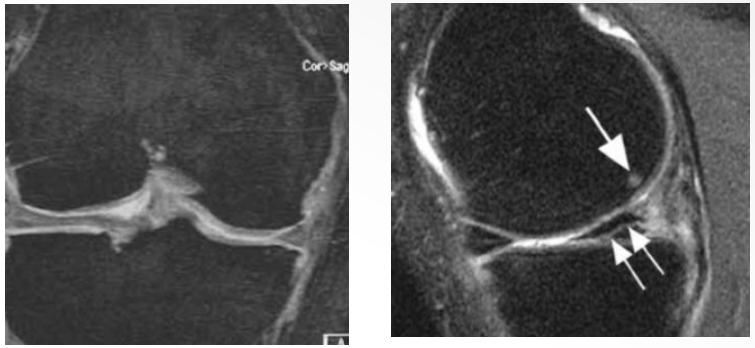
Figure 2. Cytokine contribution from components of blood used to make autologous therapies.

Degenerative Knee Arthroscopy: What are we talking about?

- The Spectrum of Degenerative Knee Disease
  - Isolated deg meniscal lesion → osteoarthritis +/- meniscal tear

Deg Meniscal tear (complex/horizontal)

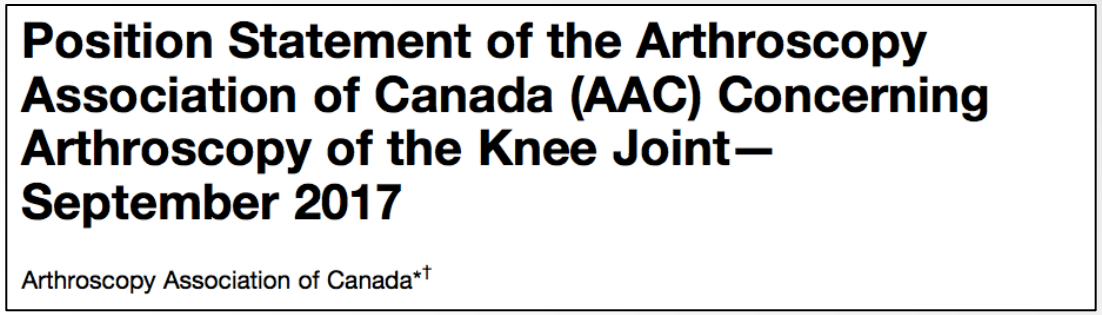




Meniscal tear with Knee OA

Knee OA w/o meniscal pathology

AAC Position Statement



Position Statement of the Arthroscopy Association of Canada (AAC) Concerning Arthroscopy of the Knee Joint—September 2017

Arthroscopy Association of Canada*†

- Knee arthroscopy should NOT be used as a primary treatment for arthritis
  - No medium or long term benefit
- Knee arthroscopy has no beneficial effect on the natural history of OA

So, is there still a role for arthroscopy for deg meniscal pathology?

Yes

BUT, only when:

- used with appropriate knowledge of the literature
- done after a trial non op management
- used judiciously and not as a primary treatment for OA
- for mechanical symptoms of locking and catching

When to Refer for Total Knee Arthroplasty

- Quality of life severely affected
- Daily pain and night pain
- Restriction of ordinary activities
- Evidence of significant radiographic changes

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QUESTIONS?