Back To Chiropractic CE Seminars

Technique Sports Injuries:

Extremities Elbow, Wrist & Knee ~ 4 Hours

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Marcus Strutz, DC
Back To Chiropractic CE Seminars

TECHNIQUE FOR SPORTS INJURIES
PART 1: WRIST AND ELBOW

Instructor: Richard Belsky, DC, CCSP

Overview of Sports Injuries of the Wrist and Elbow

The wrist and elbow are involved with practically every sport and activity in some capacity. They are used for gripping, striking, throwing, catching, holding and protection with falls.

GOLF – SOCCER – BASKETBALL – BASEBALL – FOOTBALL – CYCLING – TENNIS - VOLLEYBALL

1) Type of activity or sport that is performed – acute vs overuse

2) Age of the athlete

3) Activity level / intensity and frequency of the activity

4) Prior injuries to the wrist & elbow or to other areas

5) Athlete's mindset

6) Goals for the treatment

Factors of Wrist and Elbow Injuries

Type of injury relates to the sport

- Proper **warm-up routine** can prevent many injuries from occurring
- Every sport and activity has certain potential risks
- Contact sports pose a greater risk than
- noncontact sports - falls
- Risk for injury is greater in sports that involve catching, throwing and striking or have a potential for falls

Acute Injuries vs Overuse

- Acute injuries can occur to a healthy, well conditioned wrist & elbow
- Acute injuries need to assessed for **fractures**, **dislocations**, and **soft tissue tears**
- Overuse injuries typically begin as a slight pain that after rest and self treatment become severe and either stops or limits the athlete's ability to participate
- Overuse injuries are likely to occur with repetitive actions and very little rest periods

Age of the Athlete

- **Pre-teens and teenagers** are very susceptible to wrist & elbow injuries and pain due to effects of growth. Bones are lengthening, ligaments and tendons may not have the strength to support the demands of the activity
- **Adults** are susceptible to early degeneration and muscle imbalances that can lead to wrist and elbow weaknesses
- **Seniors** may have loss of bone density, degeneration and coordination issues that can make the wrist and elbow prone to injury

Activity Level & Frequency

- **The weekend warrior**: If your patient is participating in their sport on the weekend and is sedentary during the week, the wrist & elbow are quite vulnerable to injury
- **The over-trainer**: If your patient is participating in their activity every day, the wrist & elbow joints will not have sufficient time to recover, leaving them prone to injury
- **The high-intensity athlete**: If your patient wants to surpass their “PR” or win in competition, they increase the risk of wrist and elbow injuries
- **The professional**: If your patient is a pro-athlete, then balancing activity, training and recovery is crucial

Prior Injuries

- Affect the wrist and elbow's ability to function correctly
- Scar tissue can create inflammation
- Compensation can create imbalances with surrounding muscles which can lead to dysfunction
- Past injuries to other regions (neck, shoulder) can affect the wrist & elbow
- Prior elbow & wrist surgeries and injuries can weaken components of the wrist & elbow

Seeing the whole athlete, not just the wrist & elbow

- It is important to see the whole forest and not just the trees
- Observing your patient's posture is helpful for evaluating the elbow & wrist
- Postural misalignment will affect wrist & elbow recovery
- Postural alignment of the shoulders, scapulae, cervical and thoracic regions influence the wrist and elbow

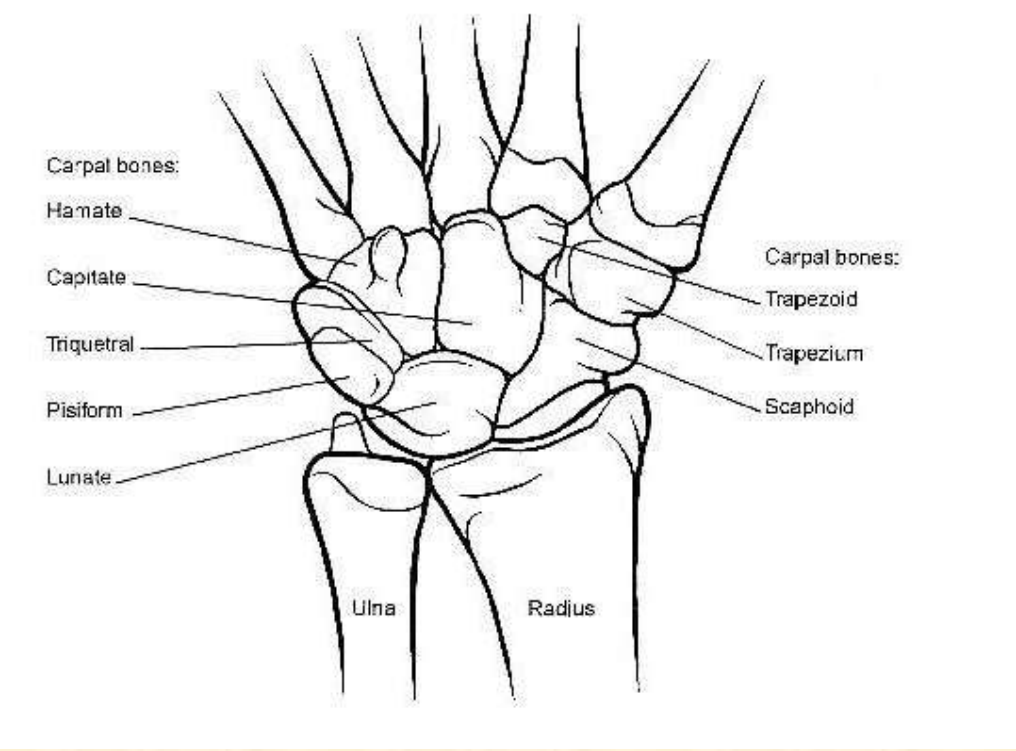
The mindset of an athlete

- An injured athlete will want to continue their sport or activity despite pain and further insult to their wrist or elbow
- They will become frustrated and feel hopeless when they cannot participate
- The treating chiropractor should redirect the injured athlete to another activity – so they can still be active, but not aggravate the injured wrist or elbow
- It is important for the athlete to feel that they are still participating in an activity
- This will facilitate their recovery

Goals

- Based on the diagnosis, discuss realistic recovery time
- Educate on the importance of rest and rehab
- Motivate for continued training in an alterative activity
- Learn about your patient's expectations with their recovery
- Support and encourage your patient through their frustration and feelings of hopelessness

Wrist Structure



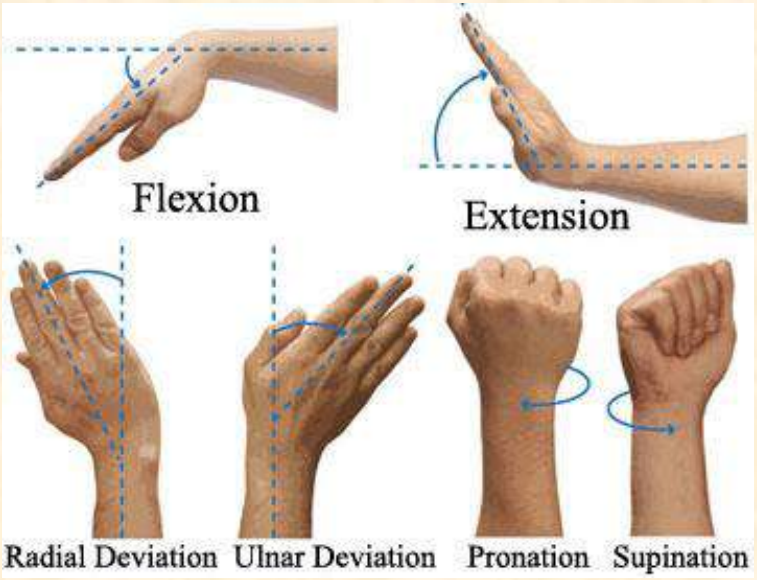
The bones of the wrist include **5 metacarpals**, **trapezoid**, **trapezium**, **scaphoid**, **lunate**, **triquetral**, **pisiform**, **capitate** & **hamate** as well as the **ulna** & **radius**

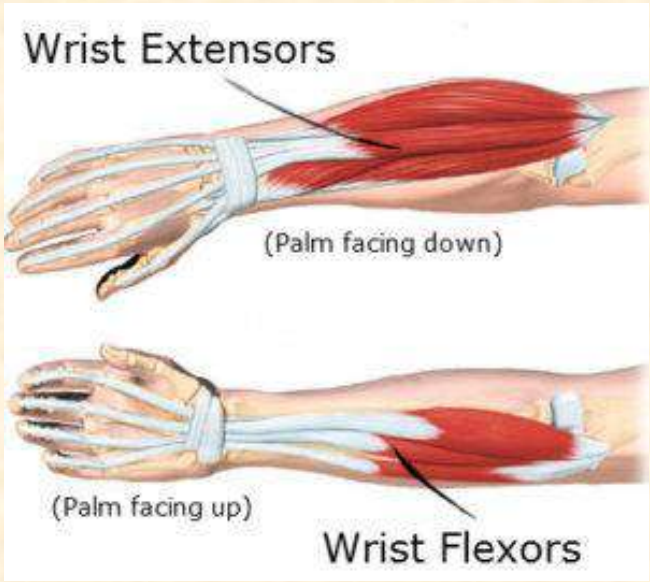
The bones are connected together by ligaments

At the ulnar side, there is the **TFCC** (triangular fibrocartilage complex) which is an important stabilizer of the wrist

The Wrist

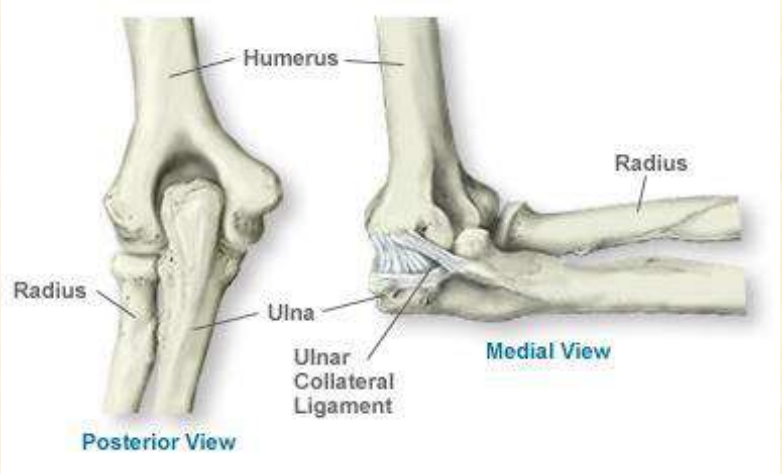
- The wrist, being made up of many bones, allows for complex movements
- The wrist is vulnerable to injuries due to the small bones and ligament connections without much muscular protection
- The wrist moves in flexion 80°, extension 70°, ulnar deviation 30° and radial deviation 20°
- The major muscles of the wrist are flexor carpi radialis / ulnaris and extensors carpi radialis / ulnaris

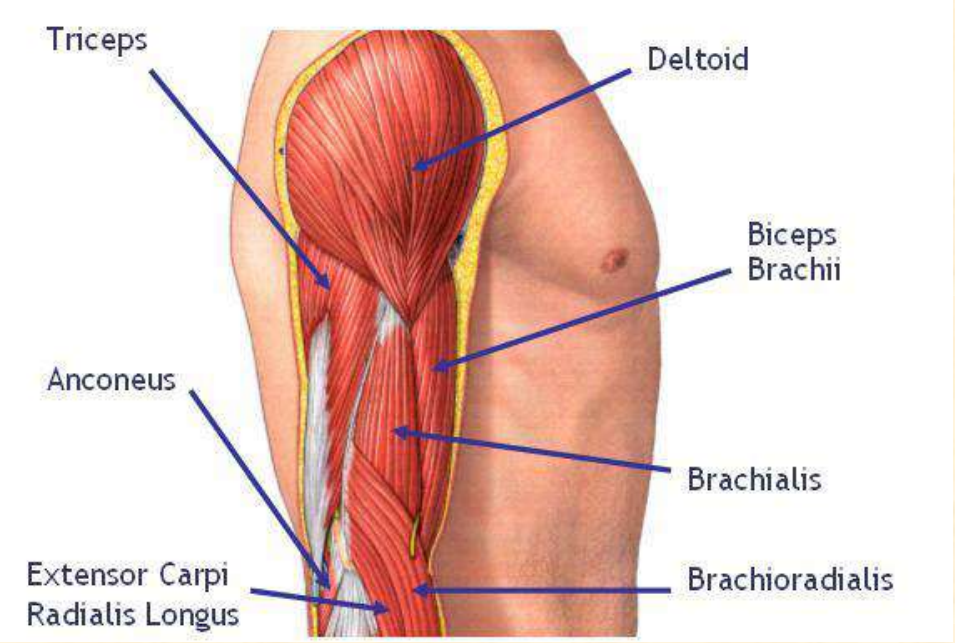




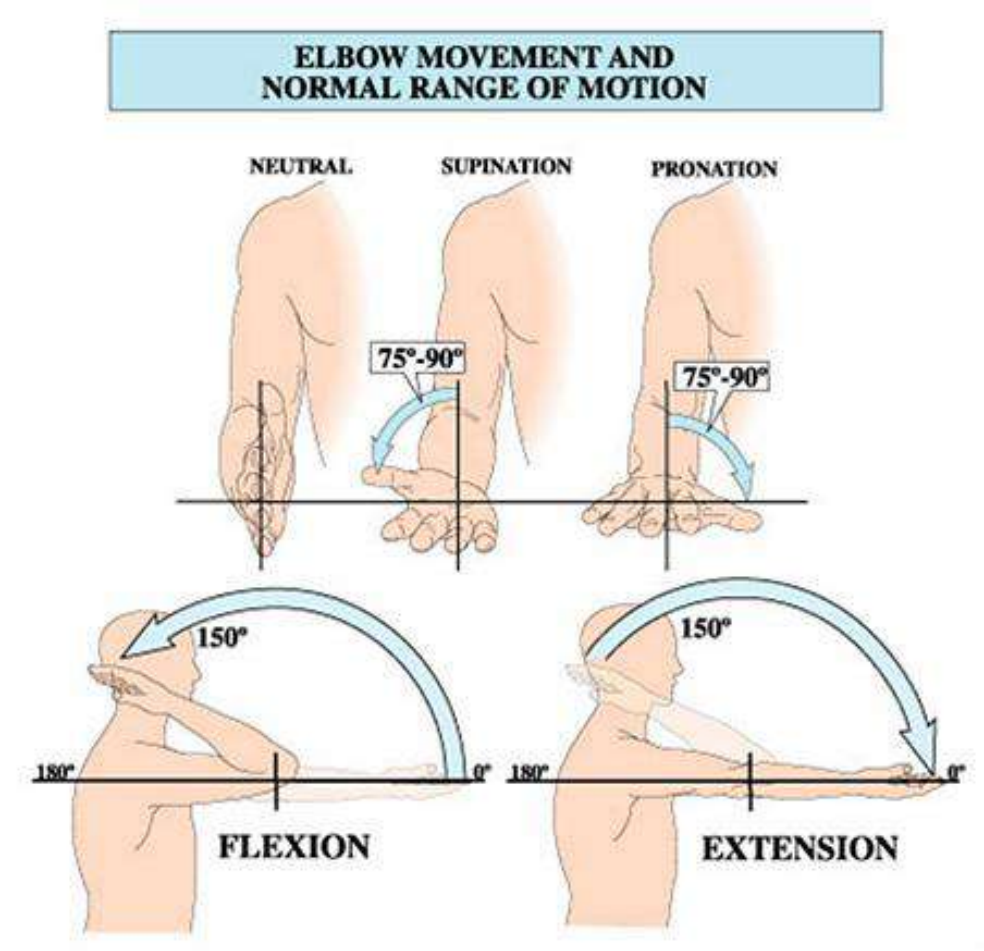
Elbow Structure

- The bones consist of the humerus, radius & ulna
- The elbow is a hinge joint and is a first-class lever with extension & a third-class lever with flexion
- Ulnar & radial collateral ligaments are important for elbow stability
- Annular ligament supports the radial head





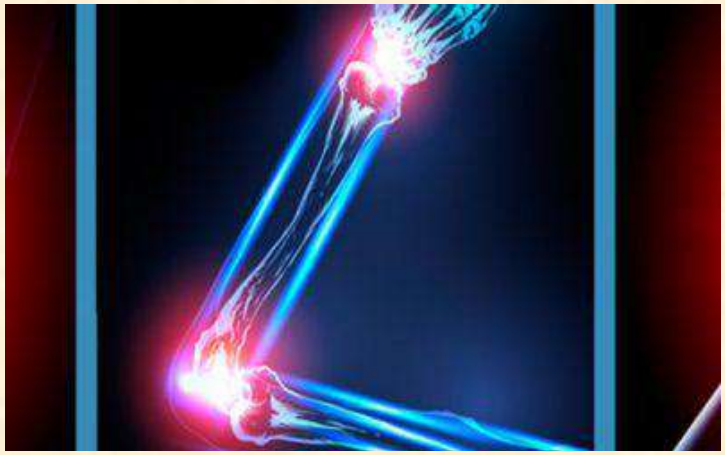
The Elbow



- The elbow moves in flexion 135°-150°, extension 0°, pronation 90° and supination 90°
- The primary muscles are biceps, triceps, brachialis & brachioradialis
- The olecranon bursa is important for flexion & extension motion

Function of the Wrist and Elbow

- The wrist & elbow perform variable movements that enable the fine motor skills of the hand
- The wrist & elbow function as lever mechanisms which increase strength for pushing, pulling and lifting
- The elbow allows for extension and flexion of the arm to reach for objects and bring them to the body
- The wrist & elbow are very versatile and can perform flexion, extension, pronation, supination, radial deviation & ulnar deviation
- The wrist & elbow are susceptible to traumatic injury from falls as they protect the body & from repetitive use causing arthritis & tendonitis



Questions

- asking the right questions -

- Taking a history requires skill and practice
- When the right questions are asked, useful information is provided
- Focus not only on the injury, but all aspects of the patient's life including social, work and family
- During the history taking, you can assess the patient's expectations regarding recovery and return to their sport

Questions of a Sports Injury
- What to Ask -

- What sport / activity doing when injured

(the actions of activity relate to the injury and recovery)

- At what time during the activity did the injury occur

(this is important to see if the patient was sufficiently warmed up or if fatigue played a role)

- Get details of the mechanism of injury (MOI)

(can tell you if there is possibly a ligament injury vs a tendon/muscle injury or both)

- Prior occurrences

(acute vs overuse)

Questions of a Sports Injury - What to Ask -

- Ask the patient to point to the site of pain
- Have the patient describe the pain
- What aggravates and relieves the pain
- Was there any self treatment or 1st aid provided
- Has the pain increased since the onset
- Did they stop their activity or were they able to continue – and if so, what affect did the injury have on performance

(tells if the injury was severe or mild, and if they played on, that may have worsened the injury)

Questions of a Sports Injury

Important Questions

- When did the athlete begin this particular sport
- Have they been active their whole life
- Exactly how do they “warm-up” prior to activity
- Do they perform “cool-down” exercises afterwards
- Did they increase their training sessions too quickly
- Exactly what type of stretching do they perform
- What is the condition of their shoes or equipment

The right questions will provide valuable recommendations

- Answers to your questions will direct you to give advice to your athlete patient that will help them to avoid flare-ups and re-injury and speed their recovery
- The Chiropractor treating sports injuries can offer much more than just hands on help
- Advise the patient on hydration, proper functional warm-up & cool down routine
- Advice on resting, modifying training, cross-training and over-training is necessary for the athlete's health

Review of the Wrist & Elbow for Chiropractic Adjusting

- Inspection
- Palpation
- Range of motion
- Joint stability tests
- Muscle tests
- Neurologic exam
- Special tests
- Motion Palpation

Inspection of the Wrist & Elbow

- Observe standing posture
  - -antalgic position
  - -carrying angle
    - cubitus valgus – stress lateral epicondyle
    - cubitus varus - results from prior trauma
- Observe for swelling or a mass (swollen bursa)
- Observe for redness
- Observe for guarding – holding the wrist or elbow with the other hand for protection

Palpation of the Wrist & Elbow

- Bony palpation all over the lateral epicondyle, olecranon fossa, medial epicondyle, olecranon, cubital fossa and ulnar groove (for ulnar nerve)
- Bony palpation over carpal bones, ulnar styloid and radial styloid
- Check for tender sites over ligaments or tendon insertions
- Soft tissue palpation around the wrist & elbow

  -inflammation, tenderness, warmth

Range of Motion

- Active range of motion - have the patient move the wrist & elbow – noting range and pain
- Passive range of motion – the patient may be apprehensive – assure the patient that you will stop when they tell you to – note any difference of range between passive and active ranges

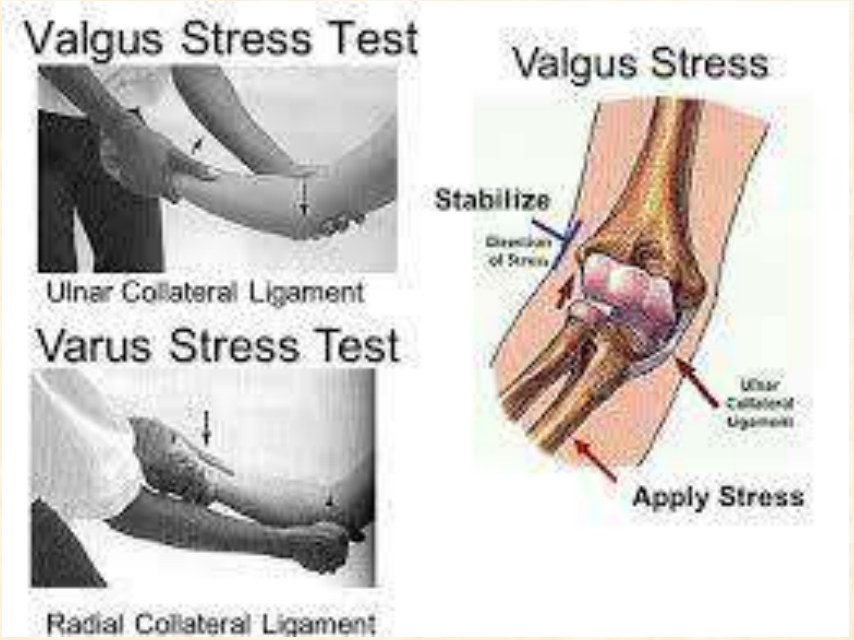
- **Wrist**: flexion 80°, extension 70°, ulnar deviation 30° and radial deviation 20°
- **Elbow**: 135°-150°, extension 0°, pronation 90° and supination 90°

Joint Stability Tests

- **Ulnar Collateral ligament**: apply medial (valgus) stress to the elbow joint- at 0° and at 30° flexion

- **Radial Collateral Ligament**: apply lateral (varus) stress to the elbow joint - at 0° and at 30° flexion

- **TFCC**: palpate and passively move the wrist into radial deviation



- **These tests check for instability and pain. If there is laxity, suspect a sprain or possible tear.**

Muscle Tests

- Resistance testing of muscles will provide useful information – if there is pain in the muscle or tendon with weakness, suspect a *muscle strain or tendonitis*

wrist extensors

wrist flexors

biceps

brachioradialis

supinator

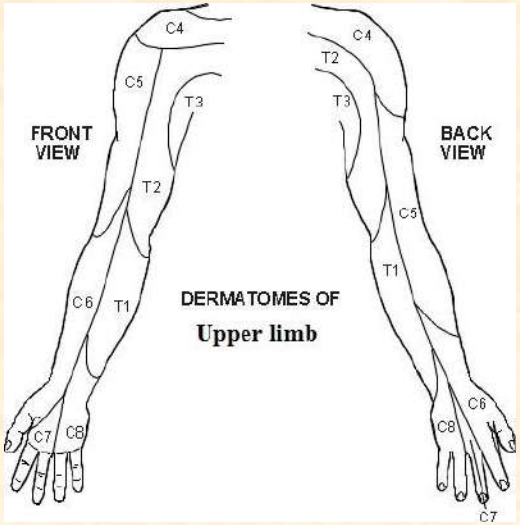
pronator

- To test a muscle, position it halfway to full in it's range – have patient hold that position against resistance

Neurologic Testing

- Biceps Reflex: checking the C5 nerve
- Brachioradialis Reflex: checking the C6 nerve
- Triceps Reflex: checking the C7 nerve

- Dermatomal testing: checking C5-T1 levels

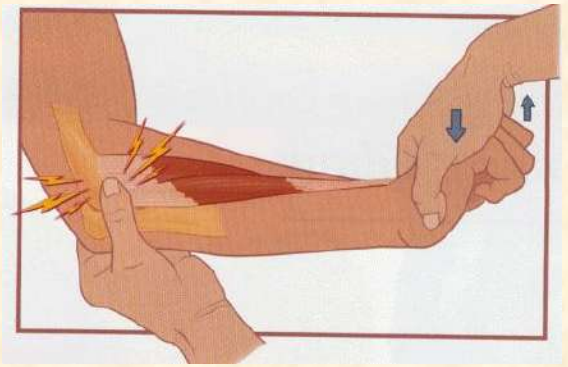


- Motor testing: C5-T1 levels

- Rule out a neurological issue

- Review history for possible gout, rheumatoid arthritis

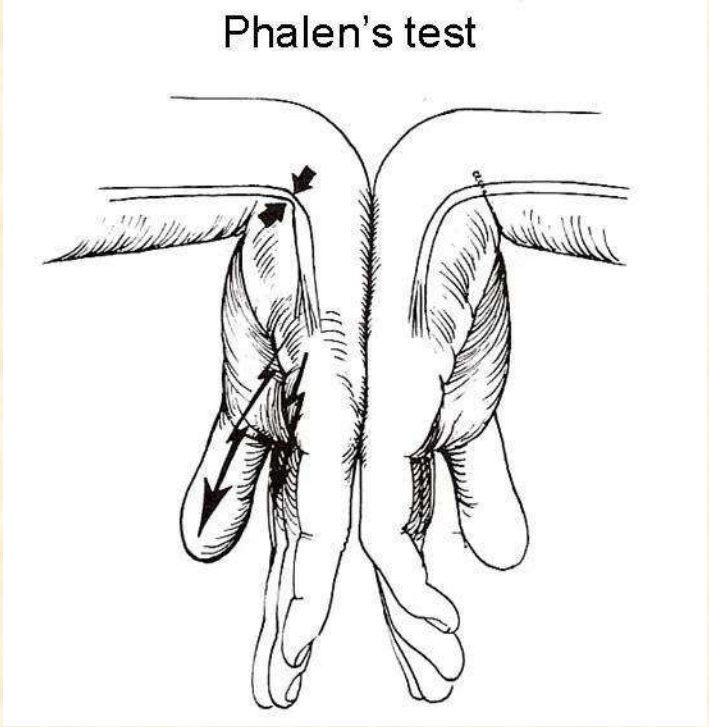
Special Tests

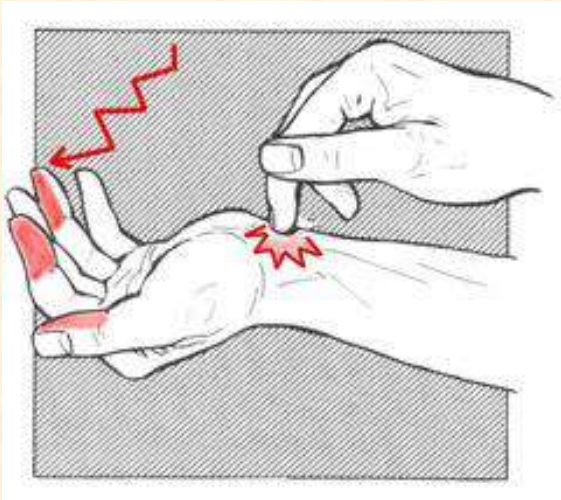


- **Functional Tests- a)** moving the wrist & elbow thru the motion of the activity **b)** performing a wall push-up or regular push-up – positive signs are pain & inability
- **Ligament Stability Tests** - **a)** assessing the elbow for ulnar & radial collateral stability – positive signs are laxity &/or pain **b)** assessing carpal bones for instability
- **Tinel's Sign Elbow**– tapping the ulnar groove – positive sign is tingling down the forearm, possible entrapment of the ulnar nerve or a neuroma
- **Cozen's Test for Tennis Elbow** – have patient make a fist & extend wrist, then have patient resist – positive test will reproduce lateral pain (see diagram)
- **Mill's Test for Tennis Elbow** – passively flex the wrist and extend the elbow - positive test is reproduction of lateral elbow pain
- **Finkelstein's Test** – have the patient make a fist with the thumb inside, then ulnar deviate – positive test produces pain at the radial side of the wrist - de Quervain's tenosynovitis (see diagram)

Special Tests

- **Prayer Test** – have the patient place hands together in a prayer position, after 30+ seconds the patient reports reproduction of symptoms of tingling / numbness
- **Phalen's Test** – have patient place hands in a reverse prayer position, after 30+ seconds the patient reports reproduction of symptoms of tingling / numbness
- **Tinel's Sign Wrist** – have patient slightly extend wrist while tapping over the anterior wrist, positive sign is reproduction of tingling symptoms in the hand





Motion Palpation of the Wrist & Elbow

- Wrist Flexion: assess for flexion restrictions
- Wrist Extension: assess for extension restrictions
- Wrist ulnar deviation: assess for medial motion restrictions
- Wrist radial deviation: assess for lateral motion restrictions

- Elbow Flexion: assess for flexion restriction
- Radial Head: assess for anterior or posterior radial head
- Elbow extension: assess for extension restriction

Types of Common Wrist & Elbow Injuries

- Wrist Sprain
- Elbow Sprain
- Lateral Epicondylitis (Tennis Elbow)
- Medial Epicondylitis (Golfer's Elbow)
- Olecranon Bursitis
- Tenosynovitis (de Quervain's)
- Carpal Tunnel Syndrome
- Ganglion Cyst
- Common Fractures – Scaphoid & Colles
- Overuse

Wrist Sprain

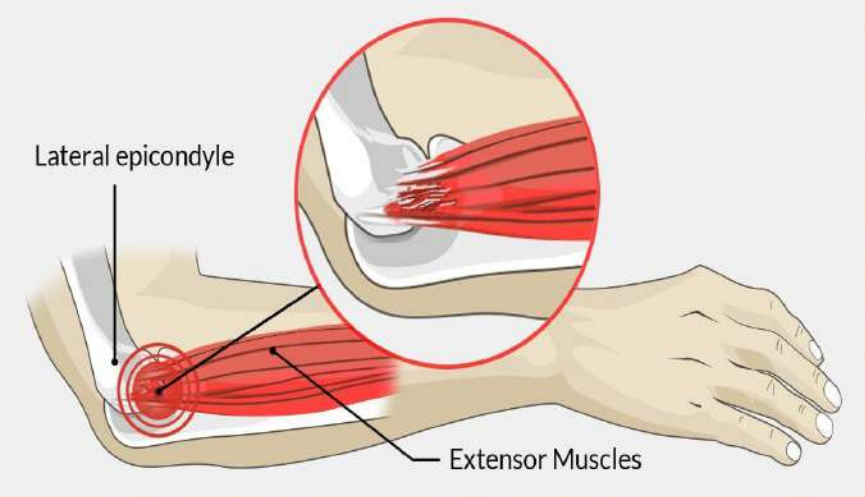
- Injury can disrupt the normal mechanics of the wrist, causing instability of the carpal bones which result in weakness, stiffness and eventually chronic pain & arthritis
-
- Sprains occur with falls, twisting, hyperflexion & hyperextension trauma
- Observe for deformity – possible fracture
- There will likely be swelling & limited ROM & grip weakness
- If the pain is at the ulnar side – evaluate the TFCC
- Always examine the Scaphoid & distal radius for tenderness – evaluate for fracture
- Evaluate for carpal & radiocarpal instability
- X-ray is the simplest & quickest to evaluate for fracture
- Evaluate the elbow & shoulder for additional injuries

Elbow Sprain

- Mechanism of injury is important to determine the injured ligaments
- Occurs from contact sports & falls
- Pain with limited AROM & PROM
- Clenched fist provokes pain
- Tenderness over the injury site
- Perform Ligament Stability Tests – assess for instability & pain

Lateral Epicondylitis (Tennis Elbow)

- Most common overuse type injury - related to wrist extension & is common in non-tennis tennis players – with repetitive gripping & improper technique / training
- Site - origin of wrist extensor muscles at the lateral epicondyle
- Pain goes away with rest, but returns with activity
- No swelling
- Negative Ligament Stability Tests
- Pain with resisted wrist extension
- Pain with resisted supination
- Positive Mill's & Cozen's Tests



Medial Epicondylitis (Golfer's Elbow)

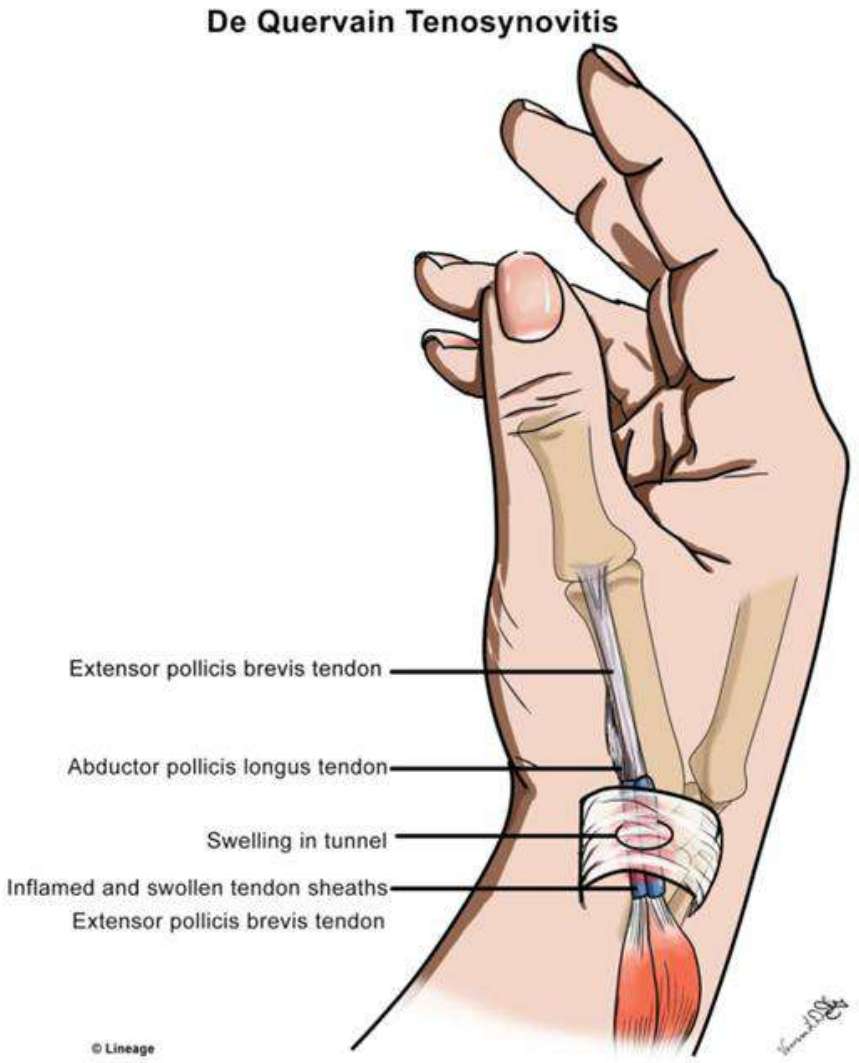
- Caused by overuse gripping & repeated valgus stresses & improper technique / training
- Pain is aggravated with activity
- Relieved by rest
- Pain over medial epicondyle
- No swelling
- Tenderness with palpation over medial epicondyle & wrist flexors
- Negative Ligament Stability Tests
- Pain with resisted wrist flexion
- Pain with resisted pronation

Olecranon Bursitis

- Caused from trauma from falls directly on posterior elbow, repetitive actions and from repetitive trauma of resting elbows on table/desk
- Tenderness olecranon bursa (posterior elbow)
- Mass of swelling behind elbow
- AROM & PROM painful with full flexion
- Negative Special Tests
- Possible referral for labs to rule of infection
- Negative Special Tests
- May require referral for aspiration / drainage

Tenosynovitis (de Quervain's)

- Tendons of the abductor pollicis longus & extensor pollicis brevis pass through a compartment - thickening of the tendons from acute or repetitive trauma affects the gliding of the tendons causing irritation

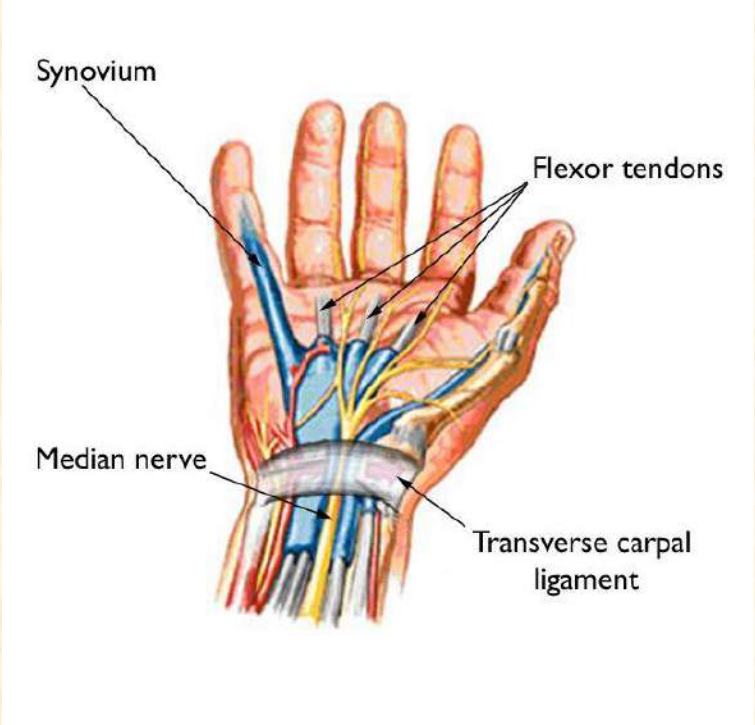


Tenosynovitis (de Quervain's)

- Caused by repetitive ulnar & radial deviation & use of the thumb
- Typically occurs in throwing (baseball) & gripping (lacrosse, hockey, tennis) sports
- Pain at thumb and radial wrist region
- Tenderness over the radial wrist muscles
- **Positive Finkelstein's Test**

Carpal Tunnel Syndrome

- Not typically a sports related injury on it's own, but can affect the athlete patient when they are both active with gripping or throwing (as in hockey, lacrosse, baseball) and performing repetitive tasks involving the wrist
- Presents with tingling / numbness in the hand along the median nerve distribution, pain, weakness with the hand
- Median nerve gets compressed under the flexor retinaculum / transverse carpal ligament
- Evaluate the LOAF muscles (Lumbricals, Opponens pollicis, Abductor pollicis brevis, Flexor pollicis brevis
- **Positive Tinel's, Phalen's & Prayer Tests**



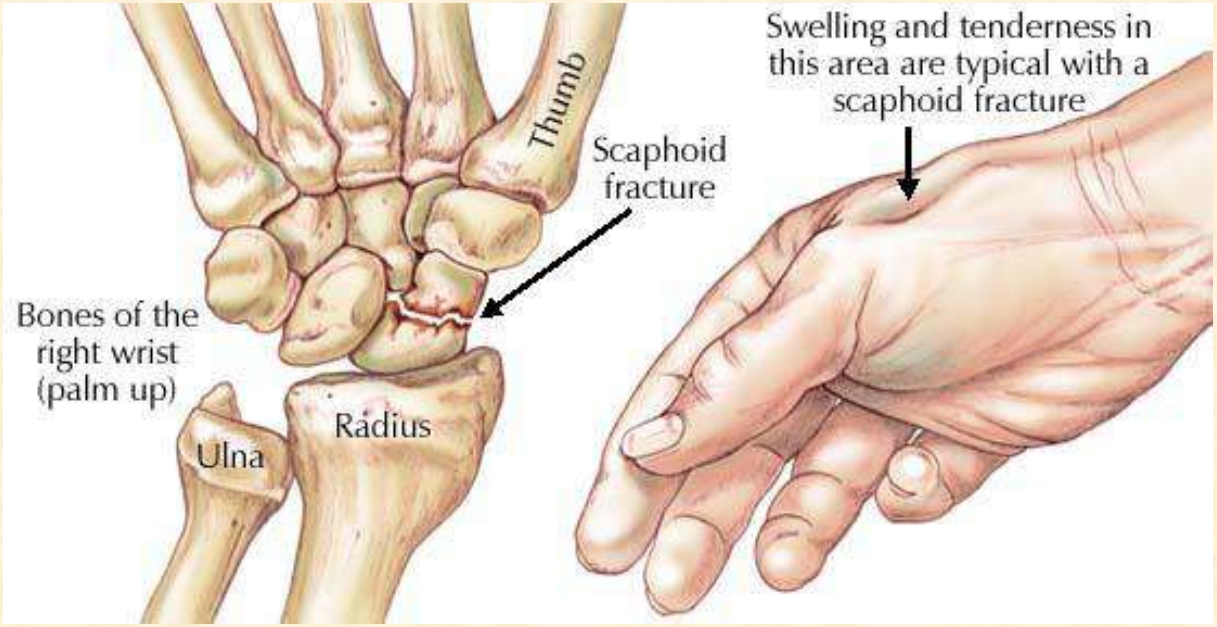
Ganglion Cyst

- Mass that appears mostly on the dorsal wrist (dorsal ganglia), but can appear on the ventral side & is usually painless
- 95% benign, but the location can affect the function of the wrist & can hamper the athlete's performance
- Likely develops from degeneration of connective tissue and cystic space formation in tendon sheath

Common Fractures

Scaphoid Fracture

- Most common type of wrist fracture
- Scaphoid is supplied with blood from the distal end to proximal end
- Vulnerable to having blood supply cut off – avascular necrosis
- Usual mechanism of injury is a fall onto the outstretched hand – causing forceful hyperextension of the wrist



Common Fractures

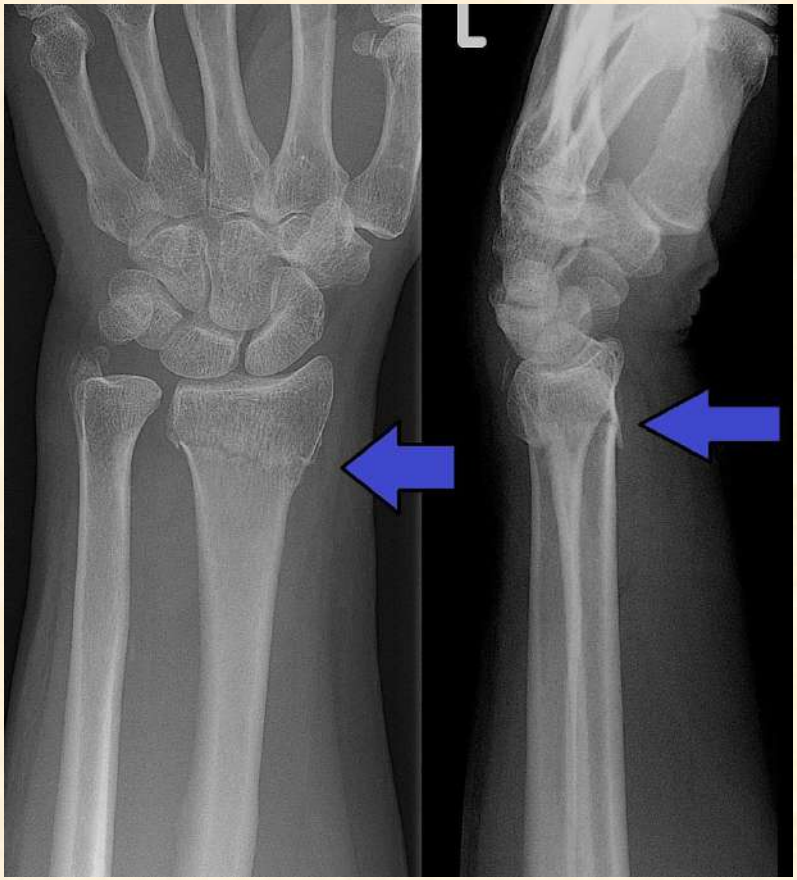
Scaphoid Fracture

- Pain at radial wrist / anatomical snuffbox with wrist or thumb movement
- Tenderness at radial wrist
- Limited AROM & PROM, swelling
- X-rays maybe be limited since it could take 2-4 weeks for a fracture to show – best to take image in ulnar deviation
- MRI is the best choice for immediate diagnosis since it is sensitive to assess bone healing and evaluate for ligamentous injuries

Common Fractures

Colles Fracture

- Most common fracture of the distal forearm
- Occurs with falls on to an outstretched hand
- Occurs with contact sports, running sports, skiing / snowboarding, cycling
- Painful, swollen wrist, marked limited AROM, guarding
- X-rays or CT scan to diagnose



Overuse Injuries of the Wrist & Elbow

- Elbow and forearm overuse injuries are common in athletes
- Repetitive elbow flexion-extension or wrist motion
- Repetitive motions can cause tendinosis & capsule strain
- History & mechanism of injury are important to correlate with the pain site & action that provokes the pain
- The pain initially is slight, more of a nuance, then becomes too painful for the athlete to continue with the activity
- Typically the pain is slight & then is triggered by an event
- Involves muscles, tendons, ligaments & nerve compression

Overuse Injuries of the Wrist & Elbow

- Commonly seen with athletic patients who enjoy the competition of sports and want to improve their performance
- They think more training is better
- They tend to increase their practice and playing times
- Even when they have a wrist or elbow injury, they do not want to stop their activity or sport

Wrist & Elbow Sports Injuries

Additional Information

- Consider multiple structures injured, not just the obvious
- X-ray or MRI – MRI is the choice to view soft tissue and also can be used for sensitive structures of the wrist & can confirm diagnosis
- Referral to orthopedist for medicine, drainage of swelling and surgical consultation will facilitate the healing process
- When treating an athlete, you need to provide treatment that will speed recovery, so immediate referral rather than waiting 2 weeks is essential for proper treatment and for meeting the expectations of your patient athlete
- Develop relationships with orthopedic physicians and MRI facilities – for possible same day referrals

Formulating a Treatment Plan

- Determine the diagnose of the injury & rule out surgical need
- Consider the patient's sport, activity level, age, recovery expectations & severity of the injury
- Discuss a realistic time frame for recovery with the patient
- Acute care to reduce inflammation & pain
- Subacute care to begin improving function
- Rehabilitation to strengthen & re-condition the athlete
- Return to sport gradually, inform patient of possible set backs

Treatment for Sports Injuries of the Wrist & Elbow

- Adjustment Techniques
- Acute
- Subacute
- Chronic
- Post-surgical
- Overuse
- Rehabilitation
- Return to play

Wrist Adjustments

Following assessment with motion palpation

Apply high-velocity, low amplitude thrust in the direction of the restriction

- **Subluxation: Wrist**
- Motion Restriction: Wrist flexion
  - Patient Position: Patient seated
  - Doctor Position: hands grasp patient's wrist, doctors thumbs on ventral wrist
  - Thrust posteriorly into flexion

- **Subluxation: Wrist**
- Motion Restriction: Wrist extension
  - Patient Position: Patient seated
  - Doctor Position: hands grasp patient's wrist, doctors thumbs on dorsal wrist
  - Thrust anteriorly into extension

Wrist Adjustments

Following assessment with motion palpation

Apply high-velocity, low amplitude thrust in the direction of the restriction

- **Subluxation: Ulnar Deviation**
- Motion Restriction: Wrist ulnar deviation
  - Patient Position: Patient seated
  - Doctor Position: hands grasp patient's wrist, doctors thumbs on dorsal wrist
  - Thrust laterally into ulnar deviation

- **Subluxation: Radial Deviation**
- Motion Restriction: Wrist radial deviation
  - Patient Position: Patient seated
  - Doctor Position: hands grasp patient's wrist, doctors thumbs on dorsal wrist
  - Thrust medially into radial deviation

Elbow Adjustments

Following assessment with motion palpation

Apply high-velocity, low amplitude thrust in the direction of the restriction

- **Subluxation: Elbow Flexion / Extension**
- Motion Restriction: Elbow flexion / extension
  - Patient Position: Patient seated
  - Doctor Position: hands grasp patient's elbow and wrist
  - Thrust into flexion or extension

- **Subluxation: Radial Head**
- Motion Restriction: radial head Anterior or Posterior
  - Patient Position: Patient seated
  - Doctor Position: hand grasp patient's wrist, thumb on radial head
  - Thrust anteriorly or posteriorly

Treatment for **Acute** Injuries
Protocol

- Soft tissue massage to the wrist & elbow musculature to increase circulation
- Pain free active and passive mobilization of the wrist & elbow
- Bracing or taping to support the injured region
- Rest the wrist & elbow from activity
- Ultrasound, EMS, laser to reduce pain & speed healing

Treatment for **Acute** Injuries

for the patient at home

- RICE (Rest, Ice, Compression, Elevation)
- AROM exercises - in the pain free range – flexion & extension of wrist or elbow - a few times per day for 30-60 seconds
- AROM exercises can be performed under water for a little added resistance

Treatment for **Acute** Injuries- Taping

- **When applying kinesio-tape, patient feedback is very important**
- **Ask if the tape is comfortable and supportive**
-
- **Apply the tape to protect and support the injured region**
- **The tape will allow the joint to still function, but will limit the motion**
-
- **Wearing the tape makes the patient more aware of the injury so they will be more careful in their ADLs**

Treatment for **Acute** Injuries- Taping

- Apply kinesio-tape along the direction of the muscle or tendon for support
- Apply the kinesio-tape around or over the joint for added stability

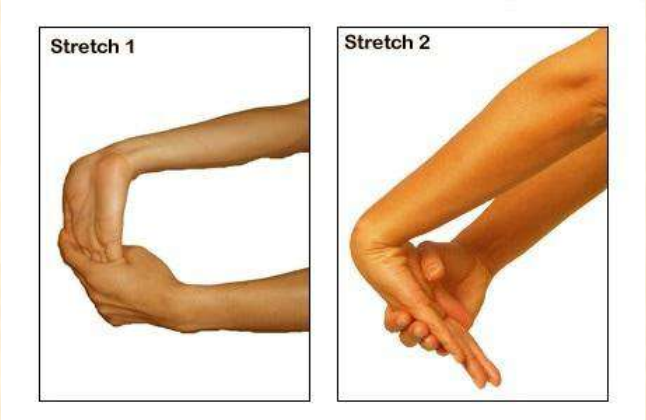
Treatment for **Subacute** Injuries

Protocol

- **Deeper soft tissue** - massage regional wrist & elbow / forearm muscles to increase circulation - blood flow is important for healing
- **Myofascial Release** for tendon / muscle injuries – apply massage of the injured muscle with either active or passive motion of the wrist & elbow joints
- **Isometric exercises** – have the patient resist against your hand for a few seconds *in various ranges* – to begin strengthening the injured tissue

Treatment for **Subacute** Injuries

- Apply passive mobilization to the wrist & elbow – pain free
- Chiropractic adjustments to the wrist & elbow of gentle joint distraction & mobilization– pain free – maybe performed at this time
- **Active Resistance ROM** – have the patient perform active ROM while you apply an opposite resistance force thru the full range
- **PNF stretching** (contract-relax)– stretch the muscle for 10 seconds, patient contracts the forearm muscle against your resistance, then apply a 30 second stretch – repeat 2-3 times for flexion and extension



- Continue with ultrasound, EMS, laser & kinesio-tape

Treatment for **Chronic** Injuries

Protocol

- If an injury has lasted longer than 3 months, it is considered to be chronic
- Chronic injuries typically will have adhesions & scar tissue which limits the function of the muscle or ligament and attracts inflammation
- **Evaluation other regions –** there is very likely another joint that is not functioning correctly that is causing the wrist & elbow to become chronically painful

Treatment for **Chronic** Injuries

- Ultrasound physiotherapy can help breakdown adhesions
- Myofascial Release to reduce scar tissue
- PNF Stretching
- Chiropractic adjustments
- Chiropractic assessment of the cervical spine and shoulder to screen for dysfunction that results in over compensation of the wrist or elbow

Treatment for the **Post-Surgical** Wrist & Elbow

After surgery the patient will be apprehensive and hesitant with using and moving their wrist or elbow

- Communicate with the orthopedic surgeon as to what surgery was performed & what they expect with the rehabilitation
- Follow the same protocol as with “acute” treatment
- As the patient progresses, advance to the “subacute” protocol
- Gradually introduce functional exercises that involve gripping, holding, pushing & pulling

Treatment for **Overuse** Injuries

Protocol

- If the patient does not want to rest from their activity, then advise them to supplement another activity that does not aggravate the wrist or elbow (stationary biking, walking, light swimming)
- Modify the activity to avoid further insult & pain –reduce frequency, duration & intensity
- Educate the patient on how they need time to repair the damaged / injured tissues

Chiropractic Adjustments - additional

- **Distraction Wrist** – with your both thumbs contact the dorsal radiocarpal joint and with your fingers contact the palm of the patient - press with thumbs as retract with fingers creating distraction of the radiocarpal joint
- **Mobilization/manipulation Elbow** – contact distal to the elbow joint and apply flexion – extension mobilization thru the physiological range adding range into the restriction beyond the physiological range as the patient tolerates
- **Radial Head mobilization/manipulation** - contact the radial head with your thumb and the wrist with your other hand - apply flexion – extension mobilization thru the physiological range adding range into the restriction beyond the physiological range as the patient tolerates

Myofascial Release

- Used for treating myofascial injuries such as tennis & golfer's elbow, tendonitis of the biceps, triceps, wrist flexors & wrist extensors
- The chiropractor will apply deep pressure along the direction of the muscle fibers at the belly or tendon regions
- This deep pressure can be administered along with the patient actively moving the joint associated with the muscle
- The deep tissue release can also be performed with the chiropractor passively moving the associated joint
- The benefits include increased circulation which promotes healing and reduction of scar tissue and adhesions

PNF (Contract-Relax Stretching)

- Used to lengthen tight muscles of the forearm
- Begins with passive stretch held at the point of discomfort for 10 seconds
- Then the athlete applies resistance pressure contracting the muscle being treated for about 10 seconds
- Then the chiropractor applies a greater stretching for about 30 seconds

Post-Adjustment Care

- Range of motion
- Strengthening
- Coordination
- Sport specific exercises

Post-Adjustment care
Range of Motion Exercises

- **Flexion - Extension** – patient will actively move the elbow or wrist thru the normal range of motion trying to gently increase the limited range to pain tolerance

- **Assisted ROM** – chiropractor assists the patient's AROM effort with pulling or pushing the elbow or wrist into to greater range as the patient actively engages that motion

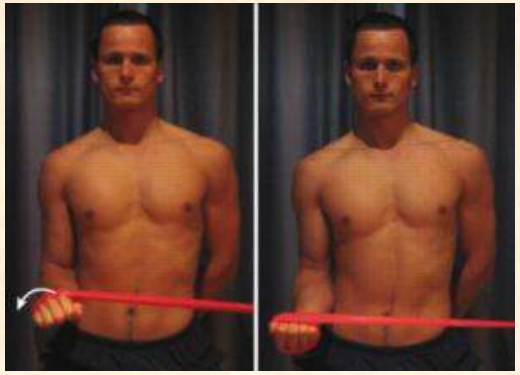
Post-Adjustment Care
Strengthening Exercises

- **Open Kinetic Chain** – used to isolate a muscle group. The patient uses resistance (weights, resistance band, TRX) to perform ***flexion*** (biceps, wrist flexors) or ***extension*** (triceps, wrist extensors), ***pronation*** & ***supination* -** 15 reps, 2-3 sets

- Triceps with weights

Biceps with TRX

Pronation with resistance band



Supination with resistance band

Post-Adjustment Care Strengthening Exercises

- **Open Kinetic Chain Sport Specific –**
  - Medicine balls throws with both or single hand
  - Resistance band motion to mimic sport action
  - Medicine ball motion to mimic sport action
  - Grip strengthening – squeezing a foam/rubber ball or clay

Medicine ball throws

Medicine ball motion

Resistance band motion

Post-Adjustment Care Strengthening Exercises

- **Closed Kinetic Chain** – exercises that strengthen the supporting muscles and core, begin easy
  - Push-up against the wall
  - Push-ups on the floor
  - Push-ups on a balance board or BOSU

Post-Adjustment Care

Coordination

Start off with slow actions, gradually increase speed & power

- **Throwing a ball & catching** – start with throwing with both hands & then move on to using the injured side for throwing & catching

- **Reaching to various points** – standing facing the athlete, have the athlete reach with the injured hand to touch your hand as you move it into a variety of positions – eventually increase speed & randomness of the exercise

Post-Adjustment Care

Sport Specific

Important to have the athlete practice their sport activity in a controlled environment & then gradually increase the intensity, duration and speed

- **Golf & Tennis** – practice swing without a club/racket, then practice with a light club/racket, progressing to hitting the ball, lightly at first, then stronger and longer

- **Soccer** – practice the motion of throwing in the ball, then using a soccer ball & then a medicine ball. Push-up strengthening as well is needed for contact sports

- **Football, Basketball, Baseball & Volleyball**– practice throwing, catching & striking with motion only at first then using the ball. Push-up strengthening as well for contact

Warm-up Routine

A good warm-up routine is important to prevent recurrences of Wrist & Elbow injuries and should consist of the following:

- Walking to jogging for 10 mins
- **Dynamic Stretching** – slow, exaggerated sport specific motion that induces a stretch of the region
  - **THROWING** – slow motion throwing that stretches the shoulder, biceps, wrist flexors, wrist extensors – perform 5-10 reps
  - **WRIST FLEXION / EXTENSION** – with a fist, flex & extend the wrist – perform 5-10 reps
  - **SWINGING** – either tennis or golf motion – stretch the surround muscles – perform 5-10 reps

Warm-up Routine

Hold stretches for 30 secs, repeat 2x

- **Static Stretching**

Biceps

Wrist Flexors

Triceps

Wrist Extensors

Cool-down Routine

To prevent flare-ups, post activity stretching is important

- After activity the athlete should walk & perform the dynamic stretches for about 5-10 mins
- Then static stretching of the biceps, triceps, wrist flexors & wrist extensors
- Applying ice or submerge wrist or elbow region in cold water for 5-10 mins
- About 1-2 hours after activity, the athlete should perform AROM exercises & light dynamic stretches

Return to Sport

- When the wrist or elbow region is **pain free**, **full range of motion**, **functional performance with all rehab exercises**
- Perform additional warm-up prior to practice
- Start with limited practice time
- Begin competition with limited playing time
- Important to do cool-down stretch routine

Case Discussion #1

Lateral Epicondylitis (tennis elbow) – 62YO male

- The patient presented with lateral elbow pain, just distal to the lateral epicondyle when he was golfing, shaking hands or gripping anything tightly
- He golfed 3x per week for about 2-3 hours and had been golfing regularly this way for about 5 years – he does not play tennis
- For the past 2 weeks he had to stop golfing after about 15 mins – there was pain holding the club, but much more pain when he hit the golf ball
- He iced, took ibuprofen, but the elbow pain persists
- Upon examination, there was tenderness to palpation at the lateral epicondyle & proximal wrist extensors, positive Mill's & Cozens Tests, painful & weak supination muscle test

Case Discussion #1 -Treatment -

Lateral Epicondylitis (tennis elbow) – 62YO male

- Rested patient from golfing and directed patient to other activities – swimming, stationary bike – that did not affect the elbow pain
- Administered ultrasound, EMS, myofascial release, PNF
- Kinesio-taping to support wrist extensors and lateral elbow
- Chiropractic manipulation of the elbow, wrist & radial head
- Exercised the wrist extensors, flexors, supinators & pronators
- Provided patient with resistance band for home strengthening
- Modified the grip size on clubs
- Return to golfing gradually, small hitting, less frequent golfing

Case Discussion #2

Wrist Sprain – 17YO female

- The patient presented with left wrist pain – central, dorsal
- She played volleyball on the high school team & club team
-
- She reported the she dove for the ball & landed hard on her left outstretched hand, feeling immediate pain
- She continued to play and each time she hit the ball, the pain became worse, so she had to stop within a few mins
- Upon examination, the wrist was swollen with limited motion, there was tenderness to palpation over the entire wrist
- Radiographs were negative for scaphoid & Colles fractures

Case Discussion #2 **-Treatment-**

Wrist Sprain – 17YO female

- Rested patient from volleyball
- Braced and taped wrist for support
- Applied ultrasound, EMS, myofascial release to the wrist region
- Began grip strengthening and AROM exercises
- Progressed to resistance band and weights
- Chiropractic mobilization to the wrist – distraction adjustments
- Rehabilitation with catching, throwing & bouncing/dribbling with the volleyball, then added medicine ball throws
- Practice volleyball hitting & striking easy, gradually increasing
- Returned to play when there was no longer wrist tenderness, full range of motion & no pain with hitting & blocking

Follow-up Care Chiropractic Care

- Educate your patient on the need to return for a re-evaluation at the first sign of pain return
- Active patients should have regular Chiropractic evaluations and treatment to prevent recurrences
- Educate your patient on the importance of regular rest, stretching and conditioning on their overall athletic performance

Thank you for completing Part 1:

Technique for Sports Injuries of the Wrist and Elbow

- **…and now for Part 2**

- **The Knee…**

Technique for Sports Injuries Part 2: Knee

Instructor: Richard Belsky, DC, CCSP

Overview of Sports Injuries of the Knee

The knee is involved with practically every sport and activity in some capacity. It is used for walking, running and jumping and is intricately involved with stopping, starting, acceleration, deceleration and changing directions.

Jogging – Soccer – Basketball – Baseball – Football – Cycling – Tennis

Factors of Knee Injuries

1) Type of activity / sport that is performed

2) Age of the athlete

3) Activity level / intensity and frequency of the activity

4) Prior injuries to the knee or to other areas

5) Athlete's mindset

6) Goals for the treatment

Type of injury relates to the sport

* Proper **warm-up routine** can prevent many injuries from occurring
* Every sport and activity has certain potential risks
* Contact sports pose a greater risk than
* noncontact sports
* Sports that demand acceleration and deceleration have more risk of injuries

Acute Injuries vs Overuse

* Acute injuries can occur to a healthy, well conditioned knee
* Acute injuries need to assessed for fractures, dislocations, soft tissue tears
* Overuse injuries typically begin as a slight pain that after rest and self treatment become severe and either stops or limits the athlete's ability to participate
* Overuse injuries are likely to occur with repetitive actions and very little rest periods

Age of the Athlete

* **Pre-teens and teenagers** are very susceptible to knee injuries and pain due to effects of growth. Bones are lengthening, ligaments and tendons may not have the strength to support the demands of the activity
* **Adults** are susceptible to early degeneration and muscle imbalances that can have a detrimental affect on the knee
* **Seniors** may have loss of bone density, degeneration and coordination issues that will make the knee prone to injury

Activity Level & Frequency

* **The weekend warrior:** If your patient is participating in their sport on the weekend and is sedentary during the week, the knee is quite vulnerable to injury
* **The over-trainer:** If your patient is participating in their activity every day, the knee joint will not have sufficient time to recover, leaving it prone to injury
* **The high-intensity athlete:** If your patient wants to surpass their "PR" or win, they increase the risk of knee injury
* **The professional:** If your patient is a pro-athlete, then balancing activity, training and recovery is crucial

Prior Injuries

* Affect the knee's ability to function correctly
* Scar tissue can create inflammation
* Compensation can create imbalances with surrounding muscles which can lead to dysfunction
* Past injuries to other regions can affect the knee
* Prior knee surgeries and injuries can weaken components of the knee

Seeing the whole athlete, not just the knee

* It is important to see the whole forest and not just the trees
* Observing your patient's gait and posture is necessary for evaluating the knee
* Postural misalignment will affect knee recovery
* Pronation and supination of the feet directly affect the knee alignment

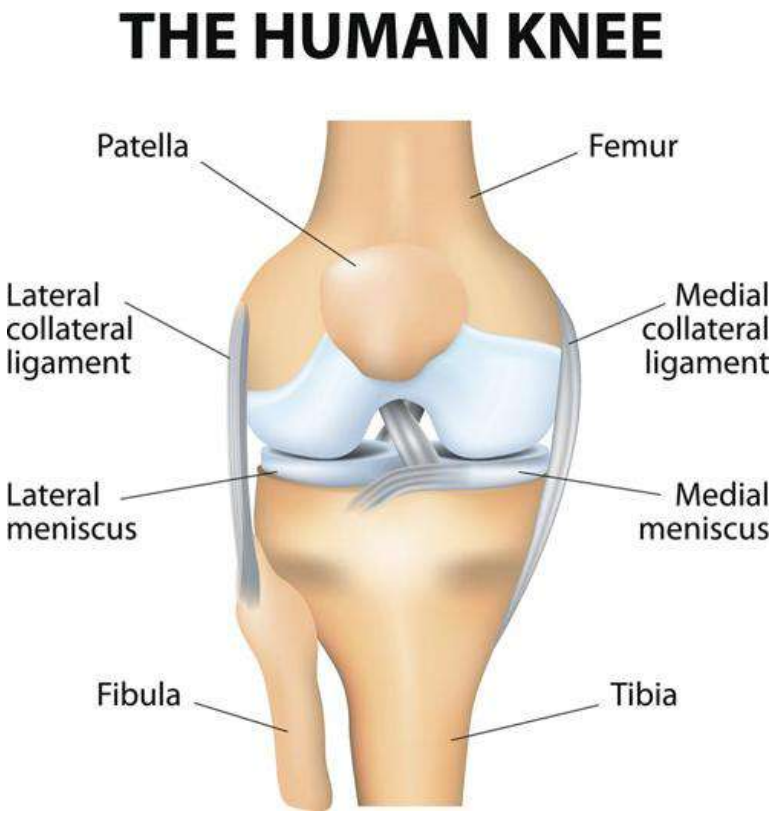
The mindset of an athlete

* An injured athlete will want to continue their sport or activity despite pain and further insult to their knee
* They will become frustrated and feel hopeless when they cannot participate
* The treating chiropractor should redirect the injured athlete to another activity – if they need to rest from running, get them to cycle or swim
* It is important for the athlete to feel that they are still participating in an activity
* This will facilitate their recovery

Goals

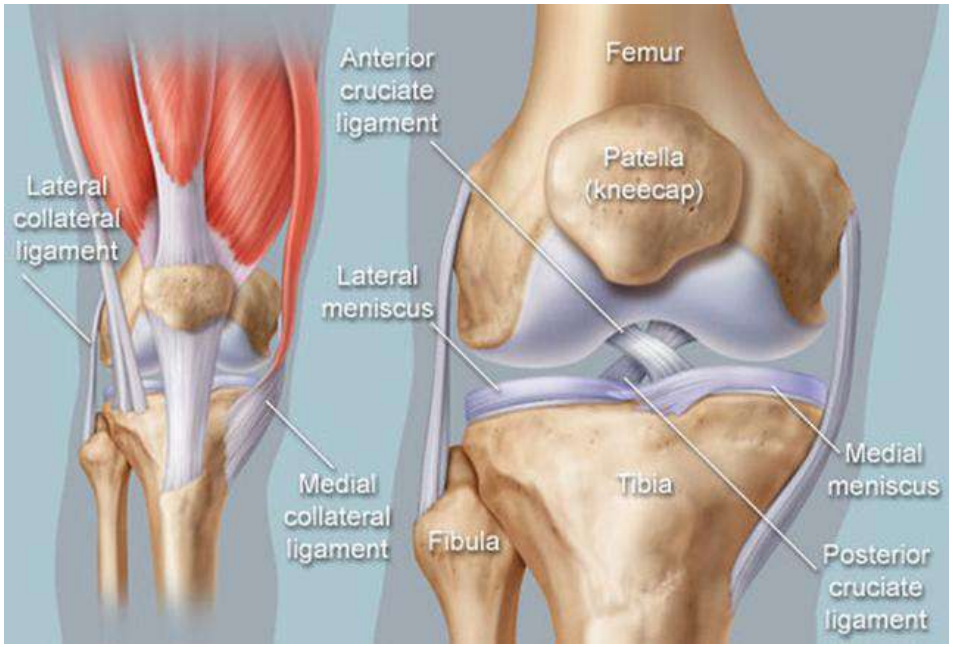
* Based on the diagnosis, discuss realistic recovery time
* Educate on the importance of rest and rehab
* Motivate for continued training in an alterative activity
* Learn about your patient's expectations with their recovery
* Support and encourage your patient through their frustration and hopelessness

Structural Awareness of the Knee for chiropractic adjusting



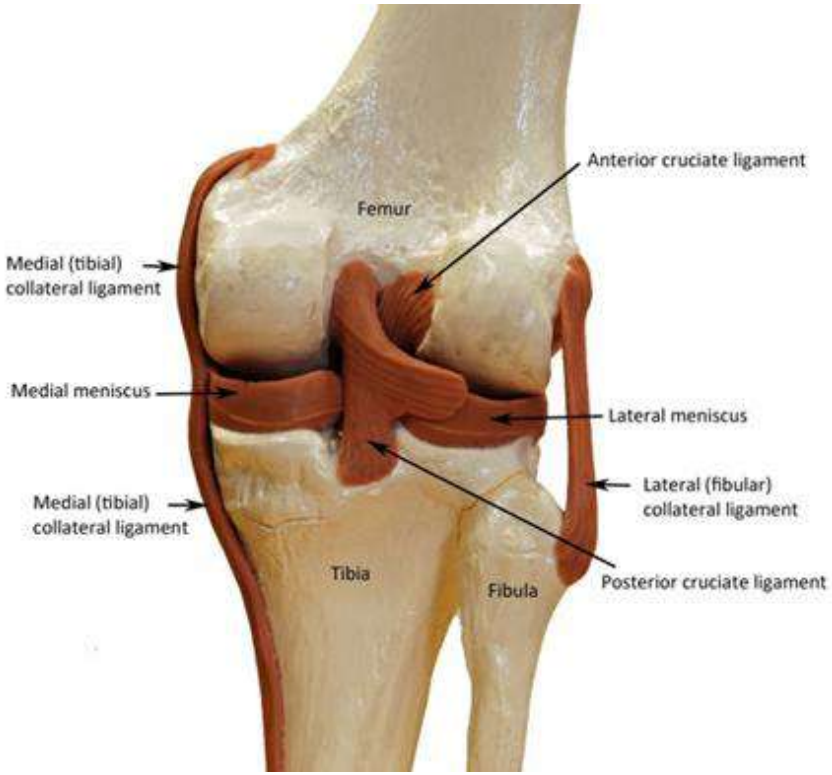
* The knee consists of the femur, tibia, patella and fibula
* The main muscle groups associated are the hamstring, quadriceps and calves
* VMO (vastus medialis oblique) part of the quadriceps – important for correct tracking of the patella
* The knee can flex, extend and rotate
* The patella increases the mechanical advantage of the quadriceps

Knee Structures



* The **ACL** (anterior cruciate ligament) supports anterior glide and prevents hyperextension
* The **PCL** (posterior cruciate ligament) support posterior glide
* The **MCL** (medial collateral ligament) and LCL (lateral collateral ligament) support Valgus and Varus stress
* The **meniscus** cushions the femur on the tibia
* The **patella tendon** supports the patella

Function of the Knee



* The knee is the largest joint in the body
* The knee is a modified synovial hinge joint
* The knee primarily performs flexion and extension
* The patella increases the mechanical advantage
* Range of motion is 130° flexion, 0° extension and 10° internal and external rotation
* It is susceptible to traumatic injury since it is at the end of two long bones and is not protected by fat or muscle

Questions

- asking the right questions -

* Taking a history requires skill and practice
* When the right questions are asked, useful information is provided
* Focus not only on the injury, but all aspects of the patient's life including social, work and family
* During the history taking, you can assess the patient's expectations regarding recovery and return to their sport

A Sports Injury…
- What to Ask -

* What sport / activity doing when injured

(the actions of activity relate to the injury and recovery)

* At what time during the activity did the injury occur

(this is important to see if the patient was sufficiently warmed up or if fatigue played a role)

* Get details of the mechanism of injury (MOI)

(can tell you if there is a ligament or meniscus injury vs a tendon or muscle injury)

* Prior occurrences

(acute vs overuse)

A Sports Injury…
- What to Ask -

* Ask the patient to point to the site of pain
* Have the patient describe the pain
* What aggravates and relieves the pain
* Was there any self treatment or 1st aid provided
* Has the pain increased since the onset
* Did they stop their activity or were they able to continue – and if so, what affect did the injury have on performance

(tells if the injury was severe or mild, and if they played on, that may have worsened the injury)

Sports Injury

Important Questions

* When did the athlete begin this particular sport
* Have they been active their whole life
* Exactly how do they “warm-up” prior to activity
* Do they perform “cool-down” exercises afterwards
* Did they increase their training sessions too quickly
* Exactly what type of stretching do they perform
* What is the condition of their shoes or equipment

Answers will provide valuable recommendations

* Answers to your questions will direct you to give advice to your athlete patient that will help them to avoid flare-ups and re-injury and speed their recovery
* The Chiropractor treating sports injuries can offer much more than just hands on help
* Advise the patient on hydration, proper functional warm-up & cool down routine
* Advice on resting, modifying training, cross-training and over-training is necessary for the athlete's health

Review of the Knee for Chiropractic Adjusting

* Inspection
* Palpation
* Range of motion
* Joint stability tests
* Muscle tests
* Neurologic exam
* Special tests
* Motion Palpation

Inspection of Knee

* Observe standing posture
  -antalgic position
  -valgus vs varus or recurvatum
  -redness
  -swelling / bruising
  -position of patella
* Observe gait for limping or guarding
* How the patient positions the knee

Palpation of the Knee

* Bony palpation all around the knee joint & patella
  -tender sites over ligaments or tendon insertions

* Soft tissue palpation around the knee
  -inflammation, tenderness, warmth

Range of Motion

* Have the patient squat or lunge
* Active range of motion - have the patient move the knee – noting range and pain
* Passive range of motion – the patient may be apprehensive – assure the patient that you will stop when they tell you to – note any difference of range between passive and active ranges

* Flexion - 130° , Extension - 0°, Internal & External Rotation - 10°

Joint Stability Tests

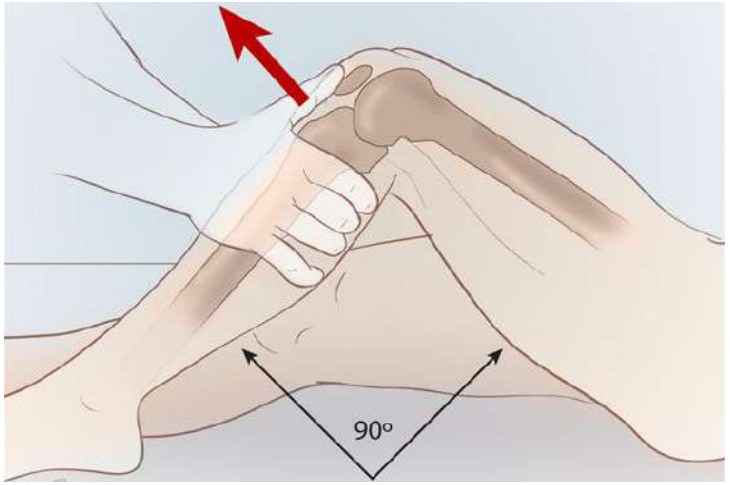
* Medial Collateral ligament: apply medial (valgus) stress to the knee joint- at 0° and at 30° flexion
* Lateral Collateral Ligament: apply lateral (varus) stress to the knee joint - at 0° and at 30° flexion

* **These tests check for instability and pain. If there is laxity, suspect a sprain or possible tear.**
* **The medial collateral ligament attaches with the meniscus – which then may also be injured.**

Joint Stability Tests

* **Anterior Cruciate Ligament (ACL):**

Draw Test – with the knee flexed to 90° and the foot flat on the table, stabilize the foot & contact the superior, posterior tibia and pull the tibia towards you.



Positive test- if the tibia slides forward

Check the uninjured knee to see what is "normal glide" for the patient

Joint Stability Tests


Posterior drawer sign (PCL)

* **Posterior Cruciate Ligament (PCL):**

Posterior Draw Test – with the knee flexed to 90° and the foot flat on the table, stabilize the foot & contact the superior, anterior tibia and push the tibia posteriorly

-Positive test: If the tibial slides back, posteriorly

-Check the other knee for a reference of the motion

Muscle Tests

* Resistance testing of muscles will provide useful information
* For the knee, testing of the **hamstrings**, **quadriceps**, **IT Band**, **adductors**, **popliteus** & **calf** is necessary
* To test a muscle, position it halfway thru it's range
* Pain in the muscle or tendon upon resistance testing often means that the injury involves the muscle or tendon

Neurologic Testing

* Patella Reflex: checking the L4 nerve
* Dermatomal testing: checking L3, L4 and L5 levels
* Motor testing: L3-L5 levels
* Rule out a neurological issue
* Review history for possible gout, rheumatoid arthritis

Special Tests

* **Functional Tests-** squatting or forward lunge to assess meniscus and patellofemoral joint – positive signs are pain & inability
* **McMurray's Test** - assessing torn meniscus – positive signs are clicking &/or pain,
* **Apley's Distraction & Compression Tests** – torn meniscus-positive signs are pain
* **Bounce Home Test** – torn meniscus – positive signs are not able to fully extend knee or rubbery resistance to end feel
* **Patella Grind** – assesses under surface of patella- positive signs are pain & a crepitus feel
* **Apprehension Test for Patella** – assesses if the patella is prone to lateral dislocation, tracking disorder & patellofemoral dysfunction

Motion Palpation

* **Fibular head:** Patient seated or prone with the knee at 90° palpate the fibular head for anterior and posterior glide restrictions

* **Tibial-Femoral:** Patient seated or prone with the knee at 90° palpate the tibial plateau for anterior and posterior glide restrictions

* **Patellofemoral:** Patient supine and the knee straight palpate the patella for anterior, medial, lateral and posterior glide restrictions

Types of Common Knee Injuries

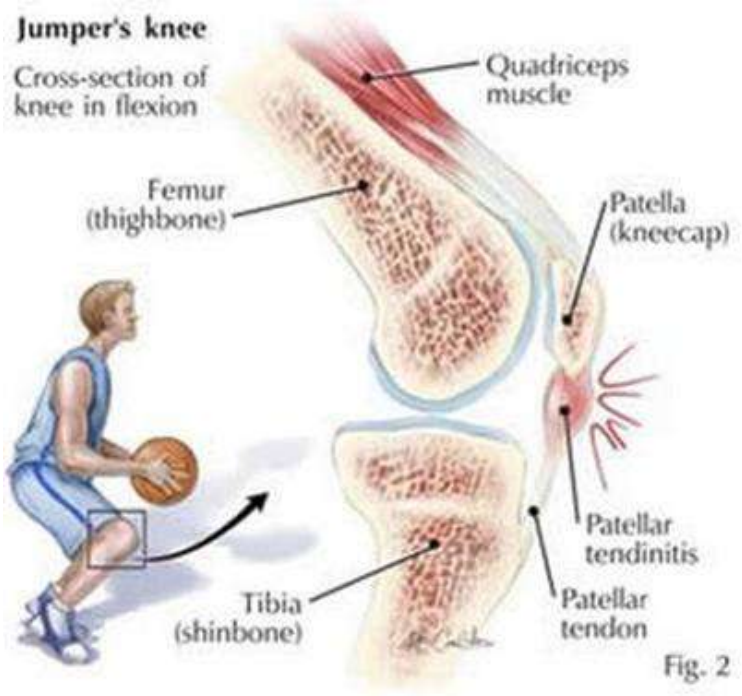
* Patella tendonitis (Jumper's Knee)
* Patellofemoral pain syndrome (Runner's Knee)
* Hamstrings strain
* Calf strain
* IT Band syndrome
* Baker's cyst
* Popliteal strain
* Ligament strains
* Meniscus injury
* Overuse

Patella Tendonitis (Jumper's Knee, patella tendinopathy)

* Typically caused from repetitive stress on the patella tendon from jumping
* Caused from basketball, soccer, rapid stopping
* Risk factors include over weight, not conditioned, previous injuries
* Pain at the patella tendon
* Pain also underneath patella
* Pain with running, jumping
* Pain subsides with rest

Patella Tendonitis (Jumper's Knee) Examination Hi-Lights

* Pain over patella tendon of inferior pole of patella
* Possible mild edema at anterior knee
* Painful, limited squatting with pain over site
* AROM & PROM normal, but pain at end range
* Special tests negative



Patellofemoral Pain Syndrome (Runner's Knee)

* Pain under the patella
* Caused from repetitive stress and misalignment of the patellofemoral joint that results in a tracking dysfunction

Patellofemoral Pain Syndrome (Runner's Knee)

Patellofemoral Pain Syndrome

* Caused with overuse and insufficient rest periods
* The lateral muscles pull the patella laterally which disrupts normal patella movement with activity
* Caused when a running athlete tries to increase their distance
* Worse with activity, but also painful with knee bent for prolonged periods

Patellofemoral Pain Syndrome

(Runner's Knee)

Examination Hi-Lights

* Tenderness over patella
* **Positive Apprehension Test** & **Patella Grind Test**
* Crepitus with active range of motion
* Look for foot over-pronation and genu valgus
* AROM & PROM normal, painful at end range flexion
* Negative Special Tests
* Mild inflammation about patella

Hamstrings Strain

* Hamstrings consist of 3 muscles in the posterior thigh: the semitendinosus, semimembranosus, and biceps femoris.
* Typically occurs without contact in running, jumping, and kicking sports.
* Can affect the **origin, belly or insertion** of the muscle.
* Occurs during **eccentric contraction** of the hamstrings.
* Usually occurs during **acceleration**.

Hamstrings Strain
Examination Hi-Lights

* Tenderness over site of injury
* Possible mass or knot palpable
* Bruising & ecchymosis – which will likely increase in size over several days, change colors & last for over 4 weeks
* Pain with hamstrings stretch
* Pain with hamstring muscle resistance testing

Calf Strain

* Pain in the calf with walking, greater pain with running
* Tenderness to touch
* Bruising and ecchymosis
* Caused by starting up a running program
* Caused by increasing distance of running program
* Pain & difficulty with toe-off in attempted running
* Most common in the medial gastrocnemius

Calf Strain
Examination Hi-Lights

* Tender to palpation
* Resistance testing of the calf usually does not evoke pain
* **Single sided toe raise** will be difficult and painful
* Stretching calf sometimes elicit pain

Iliotibial Band Syndrome

* Most common cause of lateral knee pain among athletes
* Occurs with volleyball, tennis, soccer, football, skiing, weight lifting, cycling and running / jogging
* Running often on uneven terrain may be a cause
* Cycling motion causes friction & irritation of the IT Band

Iliotibial Band Syndrome

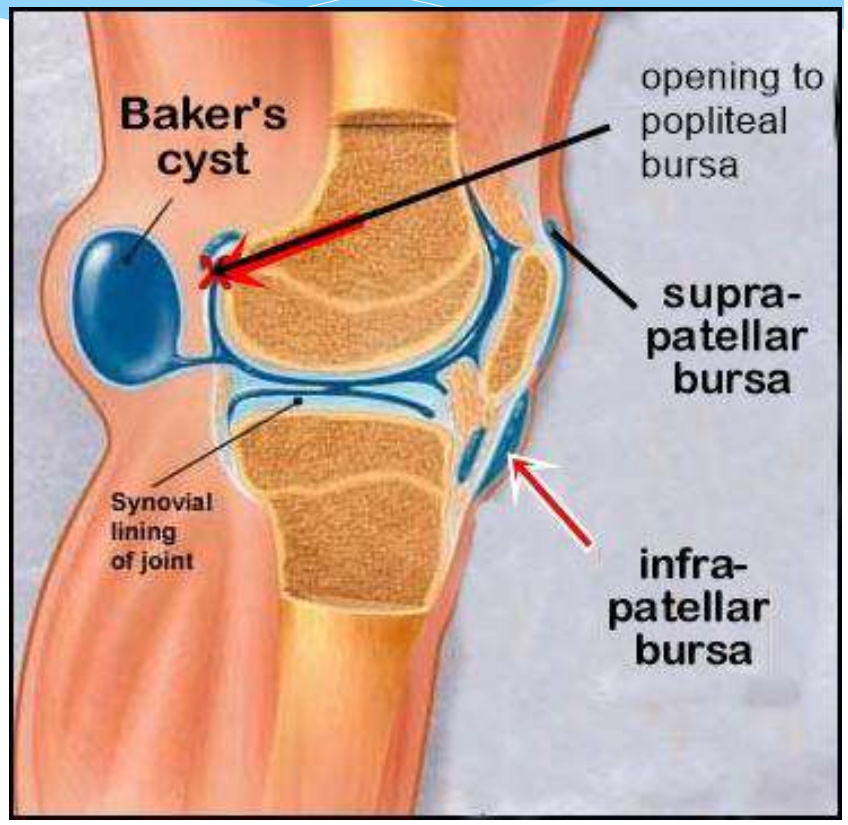
* Pain with running, pain subsides with rest
* Localized pain at the lateral knee
* Painful descending stairs
* Pain with running down hills

Iliotibial Band Syndrome
Examination Hi-Lights

* Walking down stairs provokes lateral knee pain
* Tenderness to palpation at lateral knee
* Hypertonic / tight IT Band, especially at insertion site
* **Positive Apprehension Test** – assesses patella tracking disorder – with the IT Band pulling the patella laterally
* Pain reproduced with knee flexion & varus stress applied

Baker's Cyst

* Most common mass in the popliteal fossa – associated with degenerative joint disease
* Located in the medial aspect of the popliteal fossa
* Results from fluid distention of the gastrocnemio-semimembranosus bursa
* DDX includes tumor, Popliteal artery aneurysm, ganglion cyst
* Diagnostic ultrasound & MRI helpful for diagnosis



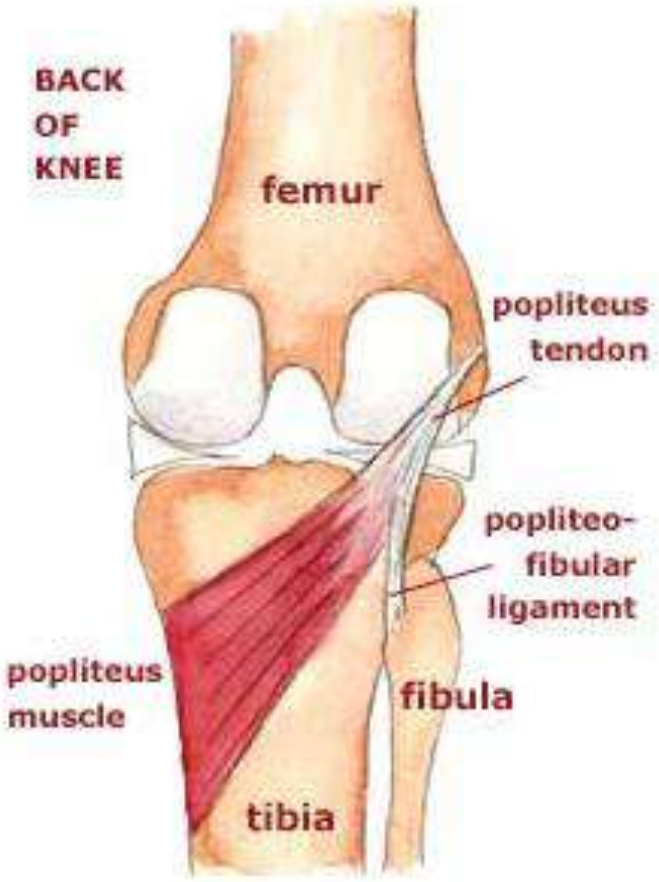
Baker's Cyst

Treatment Options

* Baker's cyst is fluid filled & may need to be drained
* Cortisone injection may be provided for the pain & inflammation
* Baker's cyst diagnosis should be referred for orthopedic consult and imaging
* If you patient had the cyst drained or had a steroid injection, then you should advise them to return to your office for follow up care
* Evaluate the patient for an underlying cause to the Baker's cyst occurrence
* Treatment would follow the acute subacute or chronic protocols

Popliteal Strain

* Popliteus is a small muscle located at the back of the knee joint that stabilizes the knee
* Rotates the tibia medially
* Injury or strain to the muscle or tendon can cause pain at the back of the knee
* Injuries occur with falls or impact where the knee is hyperextended
* Overuse injuries typically occur in runners

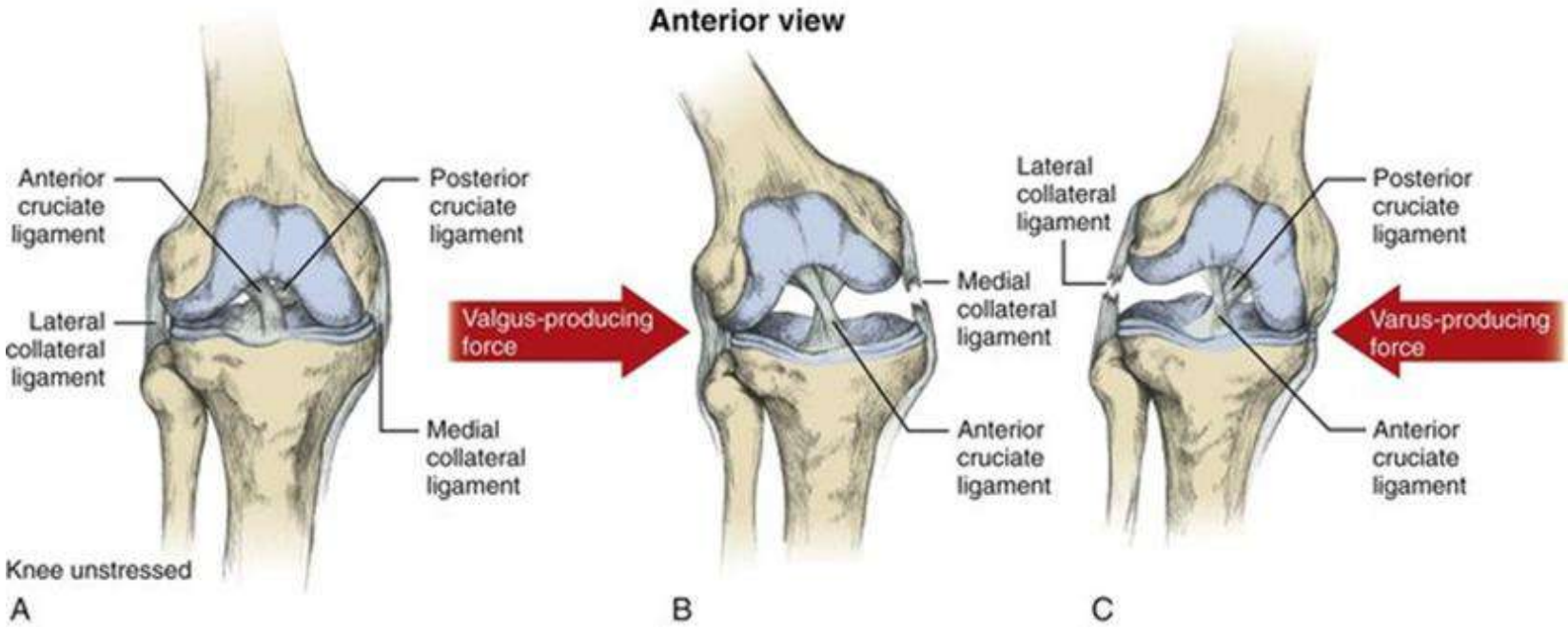


Popliteal Strain
Treatment

* Follow acute, subacute or overuse protocols
* Stretching of the hamstrings & calf
* Myofascial release – gentle initially as it is tender
* Popliteal strengthening with active assisted resistance or resistance band – exercising medial rotation of the leg with the knee bent to 90°
* Resting from aggravating activities

Lateral Collateral Sprain

* Caused by impact to the medial side of the knee or a noncontact injury like hyperextension
* Mechanism of injury will relate to LCL injury
* Pain over lateral knee



Lateral Collateral Sprain
Examination Hi-Lights

* Tender to palpation at lateral knee directly over LCL
* Sitting crossed leg will be painful
* Guarded with gait & bending knee
* Squatting and lunging will be limited & painful
* AROM extension & flexion may be limited
* PROM will be normal
* Pain and possible laxity with **Varus Stress Test**

Medial Collateral Ligament Sprain

* MCL attaches to the medial meniscus-potential meniscus injury as well
* MCL injuries are the most common knee sprain, but rarely require surgery
* Caused by lateral force applied to knee, such as a football tackle or soccer slide tackle
* Contact sports are mostly responsible for MCL injuries

Source: Patel DR, Greydanus DE, Baker RJ: *Pediatric Practice: Sports Medicine:* www.accesspediatrics.com

Medial Collateral Ligament Sprain
Examination Hi-Lights

* AROM painful & limited with flexion
* Squatting & lunging will be limited & painful
* PROM is normal
* Tender to palpation at medial joint line
* **Valgus Stress Test** will be painful & possible laxity
* McMurray's Test will be painful, but no audible click

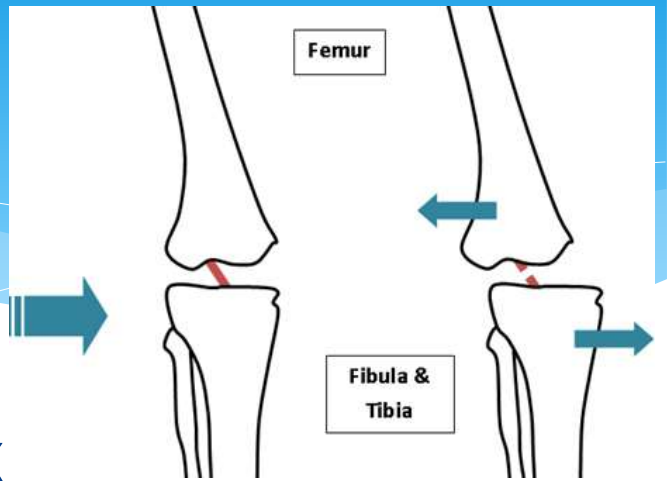
Anterior Cruciate Ligament

Mechanism of Injury

- Contact :
- Non contact:
  - Rapid deceleration
  - Jumping
  - Cutting

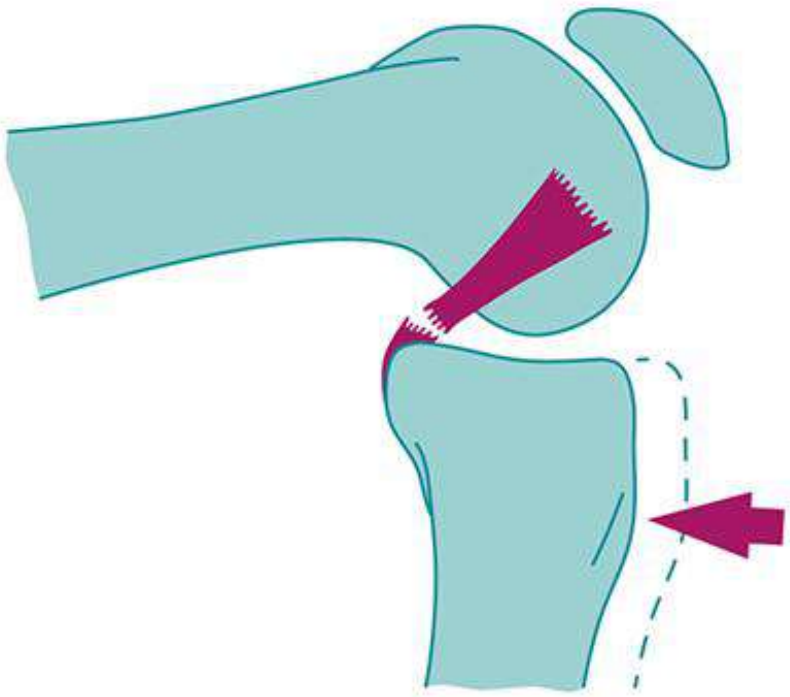
* Female athletes have greater prevalence for ACL injury
* Associated with meniscus tears
* Mostly caused by non-contact
* Caused by cutting, pivoting & rapid deceleration
* Does not always require surgical repair, but surgery may be necessary in the young, active patient

Anterior Cruciate Ligament
Examination Hi-Lights



* Mechanism of injury is important for DX
* Acute injury will present guarded & apprehensive, so may not detect laxity in exam
* AROM extension will be limited and painful
* Laxity with **Draw Test** – unless guarding
* Unable to lunge & squatting limited
* Swelling about the anterior knee
* Patient reports instability with walking & descending stairs

Posterior Cruciate Ligament



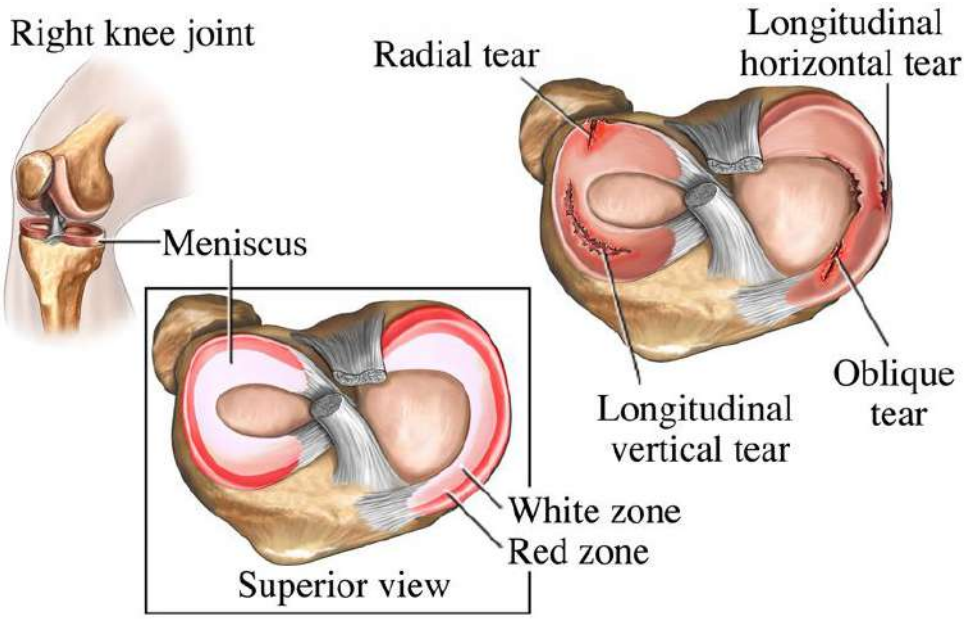
* Less common than ACL
* Multiple causes
* Can occur with hyperextension when the foot is planted
* Can occur with a fall onto a flexed knee (posteriorly directed force on a flexed knee)

Posterior Cruciate Ligament
Examination Hi-Lights

* Minimal pain, behind the knee (retropatella)
* Inspect for a "sagging sign" – knee bent with foot resting on table, observe tibia settling posteriorly
* Full AROM & PROM
* Positive **Posterior Draw Test** for laxity
* Mechanism of injury is important for DX

Meniscus Injury

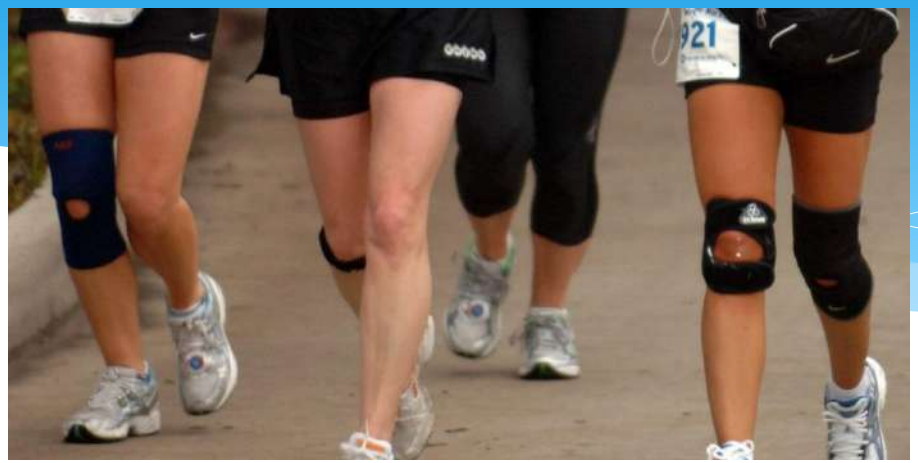
* Mechanism of injury - twisting, squatting, rapid changes in direction
* Joint line pain & swelling
* Complaints of clicking, catching, locking, pinching & a sensation of giving way
* Various sites of the meniscus can be torn or injured



Meniscus Injury
Examination Hi-Lights

* Guarding & limping
* Joint line tenderness and swelling
* Difficultly performing a squat
* AROM & PROM limited & possible locking
* Positive **McMurray's Test** & **Apley's Test** & **Bounce Home Test**

Overuse Injuries



* Commonly seen with athletic patients who enjoy the competition of sports or strive for their Personal Record
* They think more training is better
* They tend to increase their distance, speed and endurance too quickly
* Even when they have a knee injury, they do not want to stop their activity or sport

Knee Sports Injuries

Additional Information

* Consider multiple structures injured, not just the obvious
* X-ray or MRI – MRI is the choice to view soft tissue and should be performed to confirm diagnosis
* Referral to orthopedist for medicine, drainage of effusion and surgical consultation will facilitate the healing process
* When treating an athlete, you need to provide treatment that will speed recovery, so immediate referral rather than waiting 2 weeks is essential
* Develop relationships with orthopedic physicians and MRI facilities – for possible same day referrals

Formulating a Treatment Plan

* Determine the diagnose the injury & rule out surgical need
* Consider the patient's sport, activity level, age, recovery expectations & severity of the injury
* Discuss a realistic time frame for recovery with the patient
* Acute care to reduce inflammation & pain
* Subacute care to begin improving function
* Rehabilitation to strengthen & re-condition the athlete
* Return to sport gradually, inform patient of possible set backs

Chiropractic Adjustment Treatment for Sports Injuries of the Knee

* Adjustment Techniques
* Acute
* Subacute
* Chronic
* Post-surgical
* Overuse
* Rehabilitation
* Return to play

Knee Adjustments

Following assessment with motion palpation

* **Fibular Head:** apply high-velocity, low amplitude thrust in the direction of the restriction

  * **Subluxation: Posterior Fibular Head**
  * Motion Restriction: Anterior glide of fibular head
    * Patient Position: Patient supine with knee flexed 90°, foot stabilized on table
    * Doctor Position: contact posterior fibular head
    * Thrust anteriorly

  * **Subluxation: Anterior Fibular Head**
  * Motion Restriction: Posterior glide of fibular head
    * Patient Position: Patient supine with knee flexed 90°, foot stabilized on table
    * Doctor Position: contact anterior fibular head
    * Thrust posteriorly

Knee Adjustments

Following assessment with motion palpation

* **Tibia-Femoral:** apply high-velocity, low amplitude thrust in the direction of the restriction

  * **Subluxation: Posterior Tibia**
  * Motion Restriction: Anterior glide of tibia on femur
    * Patient Position: Patient supine with knee flexed 90°, foot stabilized on table
    * Doctor Position: contact posterior tibial plateau
    * Thrust anteriorly

  * **Subluxation: Anterior Tibia**
  * Motion Restriction: Posterior glide of tibia on femur
    * Patient Position: Patient supine with knee flexed 90°, foot stabilized on table
    * Doctor Position: contact anterior tibial plateau
    * Thrust posteriorly

Knee Adjustments

Following assessment with motion palpation

* Patellofemoral: apply a repeated low-velocity, low amplitude thrust / mobilization in the direction of the restriction

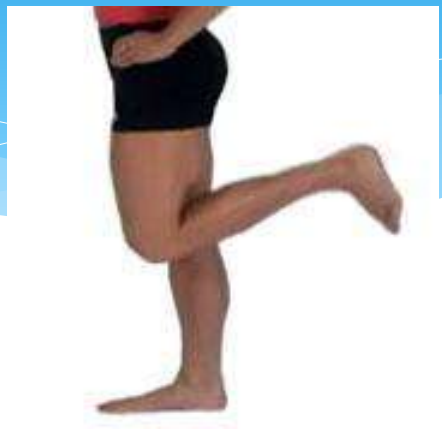
  * **Subluxation: Patella (medial, lateral, superior, inferior)**
  * Motion Restriction: glide of patella
    * Patient Position: Patient supine with knee straight on table
    * Doctor Position: contact patella
    * Thrust in the direction of the restriction, gentle, repeated mobilization

Treatment for Acute Injuries

Protocol

* Soft tissue massage to the knee to increase circulation
* Pain free active and passive mobilization of the knee
* Bracing or taping to support the injured region
* Rest knee from activity, crutches if weight bearing is painful
* Ultrasound, EMS, laser to reduce pain & speed healing

Treatment for Acute Injuries
for the patient at home



* RICE (Rest, Ice, Compression, Elevation)
* AROM exercises - in the pain free range – of non-weight bearing flexion & extension - a few times per day for 30-60 seconds
* AROM exercises can be performed **sitting** in a chair or **standing** on the uninjured leg or **supine**

Treatment for Acute Injuries- Taping

When applying kinesio-tape, patient feedback is very important. Ask if the tape is comfortable and supportive. Apply the tape to protect and support the injured region. The tape will allow the joint to still function, but will limit the motion. Wearing the tape makes the patient more aware of the injury so they will be more careful in their ADLs.

* **Hamstrings / Calf Strain / IT Band injury:** apply kinesio-tape along the injured muscle for support

* **Knee Sprains:** apply kinesio-tape over the injured ligament for added stability

* **Patella Tendon injuries:** apply the tape over the patella tendon

Treatment for Subacute Injuries

Protocol

* **Deeper soft tissue** - massage regional knee muscles to increase circulation. Blood flow is important for healing

* **Myofascial Release** for Hamstrings / Calf / IT band injuries – apply massage of the injured muscle with either active or passive motion of the knee

* **Isometric exercises** – have the patient resist against your hand for a few seconds *in various ranges* – to begin strengthening the injured tissue

Treatment for Subacute Injuries

* Apply passive mobilization to the knee – pain free
* Chiropractic adjustments to the knee of gentle joint distraction – pain free – maybe performed at this time
* **Active Resistance ROM** – have the patient perform active ROM while you apply an opposite resistance force thru the full range
* **PNF stretching** (contract-relax)– stretch the muscle for 10 seconds, patient contracts the muscle against your resistance, then apply a 30 second stretch – repeat 2-3 times

* Continue with ultrasound, EMS, laser & kinesio-tape

Treatment for Chronic Injuries

Protocol

* If an injury has lasted longer than 3 months, it is considered to be chronic

* Chronic injuries typically will have adhesions & scar tissue which limits the function of the muscle or ligament and attracts inflammation

* **Evaluation other regions** – there is very likely another joint that is not functioning correctly that is causing the knee to become chronically painful

" It`s my knee, Doctor. It`s still giving me problems."

Treatment for Chronic Injuries

* Ultrasound physiotherapy can help breakdown adhesions
* Myofascial Release to reduce scar tissue
* PNF Stretching
* Chiropractic knee adjustments
  * **Distraction** – contacting the superior tibia / calf, translate an adjustment impulse inferiorly. This adjustment can be performed with the at 0° or with slight flexion & the patient can be positioned supine or prone
  * **Mobilization/manipulation** – with the patient supine, contact behind the knee for support & the lower leg, then move the knee thru flexion & extension as well as medial & lateral rotation trying to increase the range
* Chiropractic assessment of the lumbar spine, feet, hips to screen for dysfunction that results in over compensation of the knee

Treatment for the Post-Surgical Knee

Typically after surgery the patient will be apprehensive and hesitant with walking, standing or moving their knee

* Communicate with the orthopedic surgeon as to what surgery was performed & what they expect with the rehabilitation
* Follow the same protocol as with “acute” treatment
* As the patient progresses, advance to the “subacute” protocol
* Gradually introduce functional exercises such as stair climbing / descending, squatting & gait re-training

Treatment for Overuse Injuries

Protocol

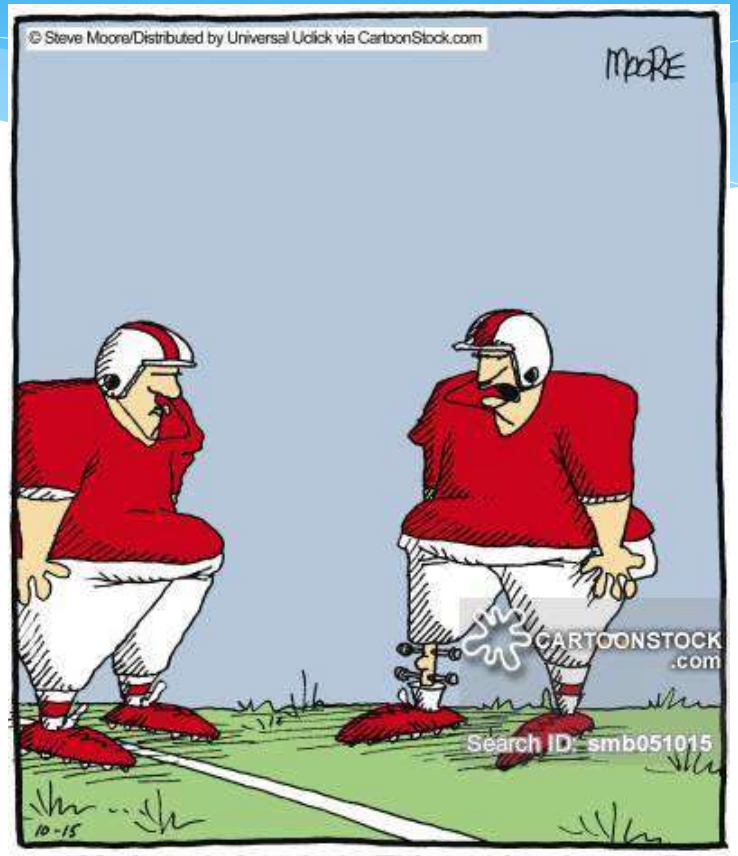
* If the patient does not want to rest from their activity, then advise to supplement another activity that does not aggravate the knee (biking or swimming instead of running)

* Modify the activity to avoid further insult & pain –reduce frequency, duration & intensity

* Educate the patient on how the needs time to repair damaged / injured tissues

Post-Adjustment Care

* Range of motion
* Strengthening
* Coordination
* Balance
* Sport specific exercises



"My knee's in rehab. This one's a loaner."

Post-Adjustment Care
Range of Motion Exercises

* **Extension** – patient sits with foot up on table have a towel under heal – slides leg from flexion into extension – trying to fully extend

* **Flexion** – patient used band/towel around ankle to pull knee into flexion

* **Assisted** – chiropractor assists the patient's AROM effort with pulling or pushing the leg as the patient actively engages into the motion

Post-Adjustment Care
Strengthening Exercises

* **Open Kinetic Chain** – used to isolate a muscle group Resistance at the ankle to perform - 15 reps, 2-3 sets
* ***flexion*** (hamstrings) – patient is prone or sitting
  * Resistance Band
  * Active Assisted – chiropractor will apply resistance as patient moves the limb thru the full range
* ***extension*** (quadriceps) – performing with leg in lateral rotation will affect the VMO
  * Resistance band
  * Active Assisted – chiropractor applies resistance
* ***side lying abduction*** (IT Band)
  * Resistance Band
  * Active Assisted – chiropractor applies resistance

Post-Adjustment Care Strengthening Exercises

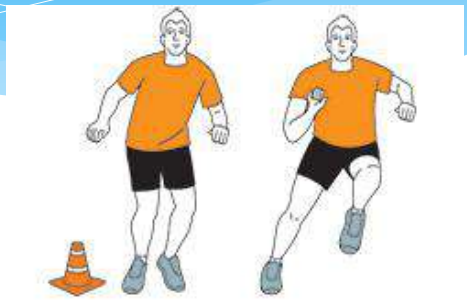
* **Closed Kinetic Chain** – functional exercise
  * Squatting – ¼ squats, slow with controlled balance
  * Water-Skiing Squats – patient holds on to a rope or a doorknob while squatting – being sure not to bend knee more than 90°
  * Reverse Lunge - stepping backward has more stability than the forward lunge
  * Calf Raises – holding a wall or free for balance control
  * Wall Squats - isometric hold in various positions – staring easy, working way to 90°, holding for 10-30 seconds

Post-Adjustment Care

Coordination

Start off with slow speeds, gradually increase agility

* **Running Figure 8s** – larger figure 8 initially, going smaller & faster



* **Running Squares** – athlete always faces same direction as they move around the square (about 10 yards per side) – this will train forward, lateral & backward running

Post-Adjustment Care

Balance

Balance Board training is key for knee rehab

* **Rocker Board** – easier, moves in one plane. Patient, with knees bent, to practice controlled front to back & side to side movements. Also perform ¼ squats

* **Wobble Board** – more challenging, moves 360°. Practice controlled movements of side to side or front to back or diagonally

* **BOSU** – use either side for balance exercises

* Perform for 1-10 mins, keep knees bent

Post-Adjustment Care

Sport Specific

Important to have athlete practice their sport activity in a controlled environment & then gradually increase the intensity, duration and speed

* **Cycling** – use stationary bike
* **Running** – treadmill, running in pool (resistance)
* **Soccer, football, tennis, basketball**– practice running, dribbling the ball, light kicking, jumping both legs, then single leg, acceleration & deceleration and larger "squares" & "figure 8s".
* **Plyometrics** – jumping & bounding strengthens concentric & eccentric muscle contractions

Warm-up Routine

A good warm-up routine is important to prevent recurrences of knee injuries and should consist of the following:

* Walking to jogging for 10 mins
* **Static Stretching** – Hamstrings, Quads, Calves
* **Dynamic Stretching** – exaggerated sport activity movements that induce a stretch and contraction the calf, hamstrings & quadriceps
  * Lunge Walk
  * Walking Knee Lift
  * Heel-To-Toe Walk

Cool-down Routine

To prevent flare-ups, post activity stretching is important

* After activity the athlete should walk & perform some dynamic stretches for about 10 mins
* Then static stretching of the hamstrings, quadriceps, IT Band and calves
* Applying ice or submerge knee in cold water for 5-10 mins
* About 1-2 hours after activity, the athlete should perform AROM exercises & light dynamic stretches

Return to Sport

* When knee is pain free, full range of motion, functional performance with all rehab exercises
* Perform additional warm-up prior to practice
* Start with limited practice time
* Begin competition with limited playing time
* Important to do cool-down stretch routine

Case Discussion #1
15 YO male soccer player

* Presents with right anterior knee pain that hurts after about 5 minutes of running & kicking
* He kicks mostly with the right foot
* Has been playing soccer since he was 6 YO
* Currently he plays on a club team & plays every day for 2 hours
* He recently had a growth spurt & grew 6 inches in a year
* He points to the patella tendon as the pain site
* Examination shows tenderness over the patella tendon, no swelling, very short/tight hamstrings & quads, weakness of the VMO, painful squat & lunge, negative special tests

Case Discussion #1
15 YO male soccer player
Treatment

* Myofascial release quads, VMO, hamstrings, patella tendon
* PNF stretching hamstrings & quads & calf
* Chiropractic mobilization of the knee
* Open kinetic chain resisted knee extensions with slight external rotation of the leg to emphasize VMO strengthening
* Closed kinetic chain “water-skiing” squats
* Rest from play for 1-2 weeks
* Gradual return to play – limited running & kicking over 4 weeks
* Daily stretch routine – 3-4x per day for hamstrings, quads, calf

Case Discussion #2
54 YO female cyclist

* Presents with lateral knee pain that starts about 30 mins into her ride & then hurts walking up & down stairs for 1-2 hours after
* Pain is worse with cycling up hills
* Having pain for past month, Ibuprofen helps
* Typically rides 4x per week for 2-4 hours, tries to go fast
* Examination shows normal AROM & PROM, no swelling, tender at lateral knee, very tight IT band & hamstrings & glutes
* Pain elicited with knee flexion & varus stress applied

Case Discussion #2
54 YO female cyclist
Treatment

* Myofascial release of the IT Band, hamstrings, lateral quads
* Possible ultrasound to lateral knee at IT band insertion
* PNF stretching IT Band, hams, quads
* Chiropractic mobilization of the knee
* Instruction of home stretching of IT Band, hams, quads 3-4x per day
* VMO strengthening exercises in office – active assisted
* VMO home strengthening exercises & “water-skiing” squats
* Return to riding on stationary bike then street cycling on flat terrain for 2 -4 weeks, gradually adding hills & speed

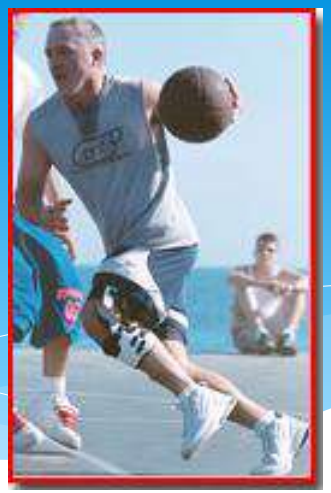
Case Discussion #3
34 YO male basketball player

* Presented with swollen knee (anterior knee) & limping
* Painful to bear weight & unable to squat more than 1/8 squat
* While playing basketball, he was running fast & had to stop & turn – he heard a "pop" and felt immediate pain & could not continue to play, went home iced, but worse next day
* Examination showed limited AROM & PROM & Draw & McMurray's Tests were inconclusive due to guarding & pain
* Referred patient for MRI & Orthopedic consult
* MRI showed complete ACL tear & medial meniscus tear
* Patient had surgery to repair both

Case Discussion #3

34 YO male basketball player

Treatment- post surgical care



* AROM exercises to increase flexion & extension
* Stationary bike exercise for 30 mins 2-3x per day
* Balancing on Rocker board & then Wobble board & BOSU
* Walking & resisted walking in pool (if possible)
* Step up & step down – stairs practice
* Open kinetic chain exercises – active assisted
* Closed kinetic chain exercises – squats, lunges, water-skiing squats
* In conjunction with surgeon, return to slow running, dribbling the basketball, shooting & passing – Running Figure 8s & Squares
* Gradual return to play when there is no pain with full (or nearly full) ROM, improved strength & wearing brace for support

Follow-up Care Chiropractic Care

* Educate your patient on the need to return for a re-evaluation at the first sign of pain return
* Active patients should have regular Chiropractic evaluations and treatment to prevent recurrences
* Educate your patient on the importance of regular rest, stretching and conditioning on their overall athletic performance

Part 2: Technique for Sports Injuries of the Knee completed

* Thank you for participating in this course!

Dr. Richard Belsky, DC, CCSP

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I hope you enjoyed the course. Please feel free to provide feedback.

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