# Evaluation of the Injured Athlete

**Travis Randolph, MS, ATC, PA-C**
**Clinical Director of WVU Sports Medicine**

WVUMedicine

# Disclosure

- No disclosures to report.

# Evaluation of the Injured Athlete

- Pre-participation Physical Exam (PPE)
- Emergency Action Plans (EAP)
- On-field Evaluations
- Sideline Evaluations
- Injury Management and Treatment

# Pre-participation Physical Exam

- Medical and Family History
  - Assess for hereditary conditions (HCM, Marfan Syndrome, Long QT, Arrythmia, etc.)
  - Missing organs (kidney, eye, testicle, spleen, etc.)
  - Previous hospitalizations/ surgeries
- General Health Screening
  - Ht./ Wt./ Blood Pressure/ Pulse/ Visual Acuity
- Cardiovascular Screening
  - Auscultation for murmurs/ Pulses/ EKG/ Echo

# Pre-participation Physical Exam

- Neurologic Screening
  - History of Concussions/ Baseline testing
  - Spinal Cord/ Brachial Plexus injuries
- Musculoskeletal Screening
  - Functional screening (identify tight/ weak muscles)
  - Evaluation of previous surgeries/ x-ray hardware
- General Medical Screening
  - Sickle Cell Testing/ Other labs as indicated

# Pre-participation Physical Exam

- Medication Use
  - ADHD medications (Stimulants)/ Supplements??
- Nutritional Assessment
  - Disordered eating
- Heat/ Hydration-Related Illness Risk Factors
  - Syncopal episodes?
- Mental Health Considerations

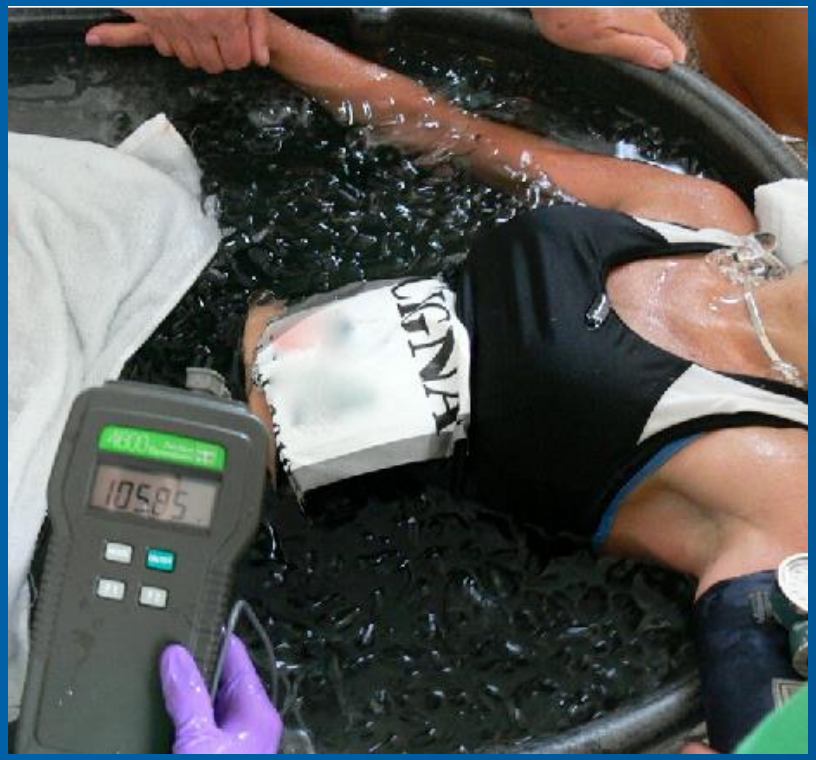
# Emergency Action Plans

- Address/ location
- Directions/ Venue access
- Personnel/ Roles
- Phone numbers
- Heat Policy
- Emergency Equipment (AEDs, first aid kits, spine board, splints)

# EAP: Lightning Protocol

- Monitor weather reports
- First sound of thunder, lighting is likely within 8-10 miles
- Seek shelter immediately and avoid using landline phones
- Allow 30 minutes from last thunder/ lightning before resuming play

# EAP: Heat Illness Protocol

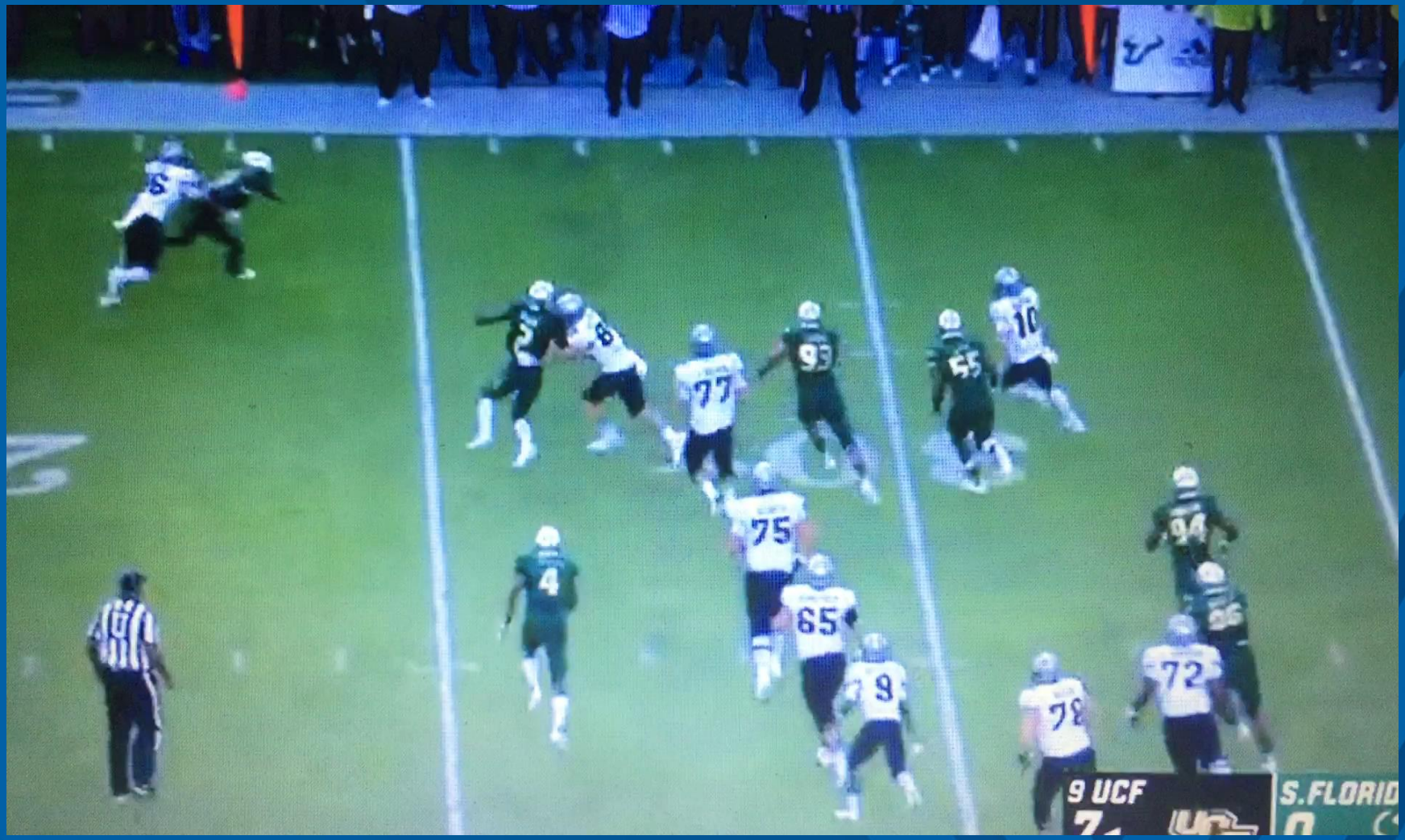


- Activate EMS
- Remove excess clothing and hydrate
- Monitor core temp. with a rectal thermometer
- Cool with fans, ice, cold water submersion
- Lower core temp. to 102 F prior to transport


SEC
CBS

# Injured Athlete: On Field Evaluation

- Quick assessment to determine the extent and severity of injury
- Determine the need for splinting or spine boarding
- How can athlete be safely removed from playing field for further evaluation?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# Injured Athlete: Fractures/ Dislocations

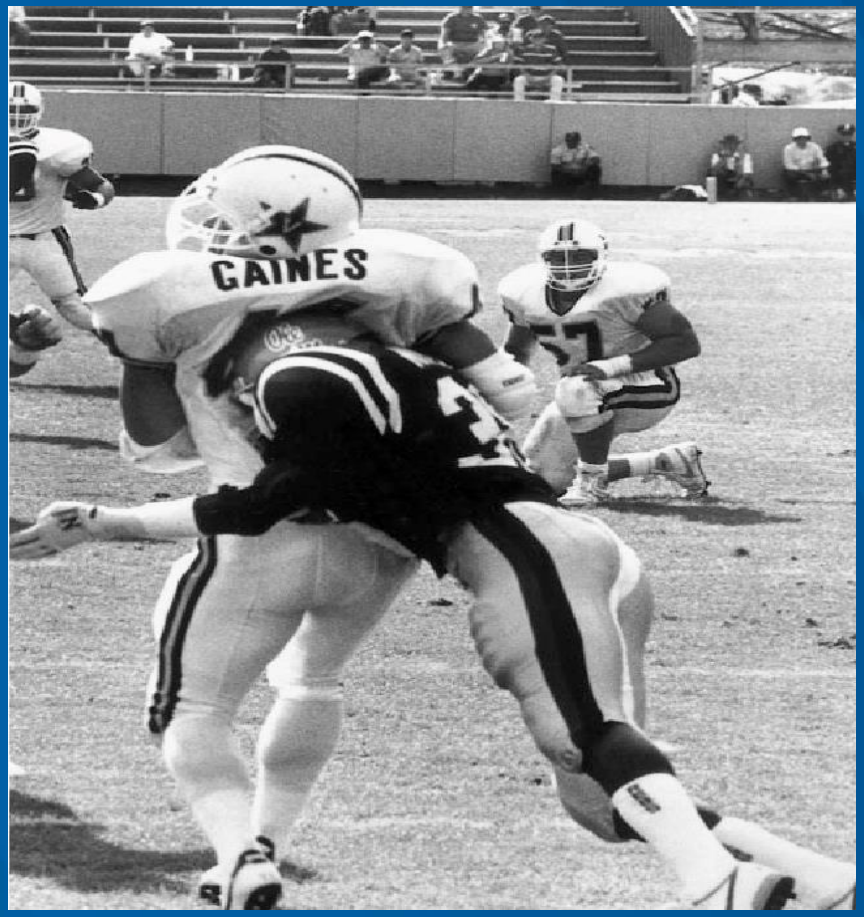

- Assess for deformities consistent with fractures or dislocations
- Assess movement of injured extremity
- Assess Neurovascular status


7
45
BOS

# Injured Athlete: Fractures/ Dislocations

- Vacuum Splints
- Splint joint above and below suspected fracture site
- Check for distal pulses after splint is applied

# Injured Athlete: C-Spine Injuries

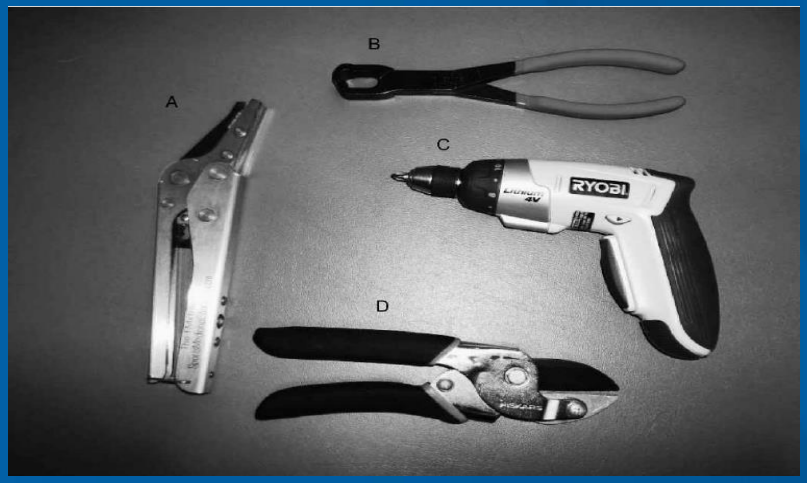



- Cervical Spine injuries can be catastrophic
- Axial Loading "Spearing" is the primary mechanism
- Athlete falls to ground with no movement

# Injured Athlete: C-Spine Injuries

- First responder on the scene must provide immobilization to the cervical spine
- Consider ABCs
- Palpate cervical spine
- Neurologic exam

# Injured Athlete: C-Spine Injuries




# Injured Athlete: C-Spine Injuries

- Face mask must be removed immediately
- Must have access to airway
- Helmet and shoulder pads stay in place
- If removed, helmet and shoulder pads must be removed simultaneously

# Injured Athlete: C-Spine Injuries

- Spine Boarding: log roll technique to maintain a neutral cervical position
- Person immobilizing C-spine is in command
- PRACTICE!!

# Injured Athlete: Sideline Evaluation

- Initial assessment by ATC
- Evaluation by appropriate healthcare provider
- Determine whether x-ray is indicated for injury
- Determine playing status and communicate to coaching staff

# Injured Athlete: Concussion

- May or may not be associated with LOC
- “Eye in the Sky”
- Important to have baseline testing
- Must be removed from game and evaluated
- Initiate concussion protocol

# Injured Athlete: Concussion

## SCAT2

Sport Concussion Assessment Tool 2

Name

Sport/team

Date/time of injury

Date/time of assessment

Age Gender M F

Years of education completed

Examiner

### What is the SCAT2?[1]

This tool represents a standardized method of evaluating injured athletes for concussion and can be used in athletes aged from 10 years and older. It supersedes the original SCAT published in 2005[2]. This tool also enables the calculation of the Standardized Assessment of Concussion (SAC)[3,4] score and the Maddocks questions[5] for sideline concussion assessment.

### Instructions for using the SCAT2

The SCAT2 is designed for the use of medical and health professionals. Preseason baseline testing with the SCAT2 can be helpful for interpreting post-injury test scores. Words in Italics throughout the SCAT2 are the instructions given to the athlete by the tester.

This tool may be freely copied for distribtion to individuals, teams, groups and organizations.

### What is a concussion?

A concussion is a disturbance in brain function caused by a direct or indirect force to the head. It results in a variety of non-specific symptoms (like those listed below) and often does not involve loss of consciousness. Concussion should be suspected in the presence of **any one or more** of the following:

- Symptoms (such as headache), or
- Physical signs (such as unsteadiness), or
- Impaired brain function (e.g. confusion) or
- Abnormal behaviour.

**Any athlete with a suspected concussion should be REMOVED FROM PLAY, medically assessed, monitored for deterioration (i.e., should not be left alone) and should not drive a motor vehicle.**

## Symptom Evaluation

### How do you feel?

You should score yourself on the following symptoms, based on how you feel now.

| | none | mild | | moderate | | severe | |
|---|---|---|---|---|---|---|---|
| Headache | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| "Pressure in head" | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Neck Pain | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Nausea or vomiting | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Dizziness | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Blurred vision | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Balance problems | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Sensitivity to light | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Sensitivity to noise | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Feeling slowed down | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Feeling like "in a fog" | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| "Don't feel right" | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Difficulty concentrating | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Difficulty remembering | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Fatigue or low energy | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Confusion | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Drowsiness | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Trouble falling asleep (if applicable) | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| More emotional | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Irritability | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Sadness | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Nervous or Anxious | 0 | 1 | 2 | 3 | 4 | 5 | 6 |

**Total number of symptoms** (Maximum possible 22)

**Symptom severity score**
(Add all scores in table, maximum possible: 22 x 6 = 132)

Do the symptoms get worse with physical activity? Y N
Do the symptoms get worse with mental activity? Y N

**Overall rating**

If you know the athlete well prior to the injury, how different is the athlete acting compared to his / her usual self? Please circle one response.

no different | very different | unsure

## Cognitive & Physical Evaluation

### 1 Symptom score (from page 1)

22 **minus** number of symptoms — of 22

### 2 Physical signs score

Was there loss of consciousness or unresponsiveness? Y N
If yes, how long? minutes
Was there a balance problem/unsteadiness? Y N

**Physical signs score** (1 point for each negative response) — of 2

### 3 Glasgow coma scale (GCS)

| | |
|---|---|
| **Best eye response (E)** | |
| No eye opening | 1 |
| Eye opening in response to pain | 2 |
| Eye opening to speech | 3 |
| Eyes opening spontaneously | 4 |
| **Best verbal response (V)** | |
| No verbal response | 1 |
| Incomprehensible sounds | 2 |
| Inappropriate words | 3 |
| Confused | 4 |
| Oriented | 5 |
| **Best motor response (M)** | |
| No motor response | 1 |
| Extension to pain | 2 |
| Abnormal flexion to pain | 3 |
| Flexion/Withdrawal to pain | 4 |
| Localizes to pain | 5 |
| Obeys commands | 6 |

**Glasgow Coma score (E + V + M)** — of 15

GCS should be recorded for all athletes in case of subsequent deterioration.

### 4 Sideline Assessment – Maddocks Score

*"I am going to ask you a few questions, please listen carefully and give your best effort."*

**Modified Maddocks questions** (1 point for each correct answer)

| | | |
|---|---|---|
| At what venue are we at today? | 0 | 1 |
| Which half is it now? | 0 | 1 |
| Who scored last in this match? | 0 | 1 |
| What team did you play last week/game? | 0 | 1 |
| Did your team win the last game? | 0 | 1 |

**Maddocks score** — of 5

Maddocks score is validated for sideline diagnosis of concussion only and is not included in SCAT 2 summary score for serial testing.

### 5 Cognitive assessment

#### Standardized Assessment of Concussion (SAC)

**Orientation** (1 point for each correct answer)

| | | |
|---|---|---|
| What month is it? | 0 | 1 |
| What is the date today? | 0 | 1 |
| What is the day of the week? | 0 | 1 |
| What year is it? | 0 | 1 |
| What time is it right now? (within 1 hour) | 0 | 1 |

**Orientation score** — of 5

**Immediate memory**

*"I am going to test your memory. I will read you a list of words and when I am done, repeat back as many words as you can remember, in any order."*

Trials 2 & 3:

*"I am going to repeat the same list again. Repeat back as many words as you can remember in any order, even if you said the word before."*

Complete all 3 trials regardless of score on trial 1 & 2. Read the words at a rate of one per second. Score 1 pt. for each correct response. Total score equals sum across all 3 trials. Do not inform the athlete that delayed recall will be tested.

| List | Trial 1 | Trial 2 | Trial 3 | Alternative word list | | |
|---|---|---|---|---|---|---|
| elbow | 0 1 | 0 1 | 0 1 | candle | baby | finger |
| apple | 0 1 | 0 1 | 0 1 | paper | monkey | penny |
| carpet | 0 1 | 0 1 | 0 1 | sugar | perfume | blanket |
| saddle | 0 1 | 0 1 | 0 1 | sandwich | sunset | lemon |
| bubble | 0 1 | 0 1 | 0 1 | wagon | iron | insect |
| **Total** | | | | | | |

**Immediate memory score** — of 15

**Concentration**

Digits Backward:

*"I am going to read you a string of numbers and when I am done, you repeat them back to me backwards, in reverse order of how I read them to you. For example, if I say 7-1-9, you would say 9-1-7."*

If correct, go to next string length. If incorrect, read trial 2. One point possible for each string length. Stop after incorrect on both trials. The digits should be read at the rate of one per second.

Alternative digit lists

| | | | | |
|---|---|---|---|---|
| 4-9-3 | 6-2-9 | 5-2-6 | 4-1-5 | |
| 3-8-1-4 | 3-2-7-9 | 1-7-9-5 | 4-9-6-8 | |
| 6-2-9-7-1 | 1-5-2-8-6 | 3-8-5-2-7 | 6-1-8-4-3 | |
| 7-1-8-4-6-2 | 5-3-9-1-4-8 | 8-3-1-9-6-4 | 7-2-4-8-5-6 | |

Months in Reverse Order:

*"Now tell me the months of the year in reverse order. Start with the last month and go backward. So you'll say December, November ... Go ahead"*

1 pt. for entire sequence correct

Dec-Nov-Oct-Sept-Aug-Jul-Jun-May-Apr-Mar-Feb-Jan 0 1

**Concentration score** — of 5

[1] This tool has been developed by a group of international experts at the 3rd International Consensus meeting on Concussion in Sport held in Zurich, Switzerland in November 2008. The full details of the conference outcomes and the authors of the tool are published in British Journal of Sports Medicine, 2009, volume 43, supplement 1.
The outcome paper will also be simultaneously co-published in the May 2009 issues of Clinical Journal of Sports Medicine, Physical Medicine & Rehabilitation, Journal of Athletic Training, Journal of Clinical Neuroscience, Journal of Science & Medicine in Sport, Neurosurgery, Scandinavian Journal of Science & Medicine in Sport and the Journal of Clinical Sports Medicine.

[2] McCrory P et al. Summary and agreement statement of the 2nd International Conference on Concussion in Sport, Prague 2004. British Journal of Sports Medicine. 2005; 39: 196-204

[3] McCrea M. Standardized mental status testing of acute concussion. Clinical Journal of Sports Medicine. 2001; 11: 176-181

[4] McCrea M, Randolph C, Kelly J. Standardized Assessment of Concussion: Manual for administration, scoring and interpretation. Waukesha, Wisconsin, USA.

[5] Maddocks, DL; Dicker, GD; Saling, MM. The assessment of orientation following concussion in athletes. Clin J Sport Med. 1995;5(1):32–3

[6] Guskiewicz KM. Assessment of postural stability following sport-related concussion. Current Sports Medicine Reports. 2003; 2: 24-30

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# Injured Athlete: Concussion

## 6 Balance examination

This balance testing is based on a modified version of the Balance Error Scoring System (BESS)[9]. A stopwatch or watch with a second hand is required for this testing.

**Balance testing**

*"I am now going to test your balance. Please take your shoes off, roll up your pant legs above ankle (if applicable), and remove any ankle taping (if applicable). This test will consist of three twenty second tests with different stances."*

(a) Double leg stance:
*"The first stance is standing with your feet together with your hands on your hips and with your eyes closed. You should try to maintain stability in that position for 20 seconds. I will be counting the number of times you move out of this position. I will start timing when you are set and have closed your eyes."*

(b) Single leg stance:
*"If you were to kick a ball, which foot would you use?* [This will be the dominant foot] *Now stand on your non-dominant foot. The dominant leg should be held in approximately 30 degrees of hip flexion and 45 degrees of knee flexion. Again, you should try to maintain stability for 20 seconds with your hands on your hips and your eyes closed. I will be counting the number of times you move out of this position. If you stumble out of this position, open your eyes and return to the start position and continue balancing. I will start timing when you are set and have closed your eyes."*

(c) Tandem stance:
*"Now stand heel-to-toe with your* ***non-dominant foot*** *in back. Your weight should be evenly distributed across both feet. Again, you should try to maintain stability for 20 seconds with your hands on your hips and your eyes closed. I will be counting the number of times you move out of this position. If you stumble out of this position, open your eyes and return to the start position and continue balancing. I will start timing when you are set and have closed your eyes."*

**Balance testing – types of errors**

1. Hands lifted off iliac crest
2. Opening eyes
3. Step, stumble, or fall
4. Moving hip into > 30 degrees abduction
5. Lifting forefoot or heel
6. Remaining out of test position > 5 sec

Each of the 20-second trials is scored by counting the errors, or deviations from the proper stance, accumulated by the athlete. The examiner will begin counting errors only after the individual has assumed the proper start position. **The modified BESS is calculated by adding one error point for each error during the three 20-second tests. The maximum total number of errors for any single condition is 10.** If a athlete commits multiple errors simultaneously, only one error is recorded but the athlete should quickly return to the testing position, and counting should resume once subject is set. Subjects that are unable to maintain the testing procedure for a minimum of **five seconds** at the start are assigned the highest possible score, ten, for that testing condition.

Which foot was tested: ☐ Left ☐ Right
(i.e. which is the **non-dominant** foot)

| Condition | Total errors |
|---|---|
| Double Leg Stance (feet together) | of 10 |
| Single leg stance (non-dominant foot) | of 10 |
| Tandem stance (non-dominant foot at back) | of 10 |
| **Balance examination score** (30 **minus** total errors) | of 30 |

## 7 Coordination examination

**Upper limb coordination**

Finger-to-nose (FTN) task: *"I am going to test your coordination now. Please sit comfortably on the chair with your eyes open and your arm (either right or left) outstretched (shoulder flexed to 90 degrees and elbow and fingers extended). When I give a start signal, I would like you to perform five successive finger to nose repetitions using your index finger to touch the tip of the nose as quickly and as accurately as possible."*

Which arm was tested: ☐ Left ☐ Right

Scoring: 5 correct repetitions in < 4 seconds = 1

Note for testers: Athletes fail the test if they do not touch their nose, do not fully extend their elbow or do not perform five repetitions. Failure should be scored as 0.

**Coordination score** of 1

## 8 Cognitive assessment

**Standardized Assessment of Concussion (SAC)**

**Delayed recall**

*"Do you remember that list of words I read a few times earlier? Tell me as many words from the list as you can remember in any order."*

Circle each word correctly recalled. Total score equals number of words recalled.

| List | Alternative word list | | | |
|---|---|---|---|---|
| elbow | candle | baby | finger | |
| apple | paper | monkey | penny | |
| carpet | sugar | perfume | blanket | |
| saddle | sandwich | sunset | lemon | |
| bubble | wagon | iron | insect | |

**Delayed recall score** of 5

## Overall score

| Test domain | Score |
|---|---|
| Symptom score | of 22 |
| Physical signs score | of 2 |
| Glasgow Coma score (E + V + M) | of 15 |
| Balance examination score | of 30 |
| Coordination score | of 1 |
| **Subtotal** | **of 70** |
| Orientation score | of 5 |
| Immediate memory score | of 5 |
| Concentration score | of 15 |
| Delayed recall score | of 5 |
| **SAC subtotal** | **of 30** |
| **SCAT2 total** | **of 100** |
| **Maddocks Score** | **of 5** |

Definitive normative data for a SCAT2 "cut-off" score is not available at this time and will be developed in prospective studies. Embedded within the SCAT2 is the SAC score that can be utilized separately in concussion management. The scoring system also takes on particular clinical significance during serial assessment where it can be used to document either a decline or an improvement in neurological functioning.

**Scoring data from the SCAT2 or SAC should not be used as a stand alone method to diagnose concussion, measure recovery or make decisions about an athlete's readiness to return to competition after concussion.**

## Athlete Information

**Any athlete suspected of having a concussion should be removed from play, and then seek medical evaluation.**

### Signs to watch for

Problems could arise over the first 24-48 hours. You should not be left alone and must go to a hospital at once if you:

- Have a headache that gets worse
- Are very drowsy or can't be awakened (woken up)
- Can't recognize people or places
- Have repeated vomiting
- Behave unusually or seem confused; are very irritable
- Have seizures (arms and legs jerk uncontrollably)
- Have weak or numb arms or legs
- Are unsteady on your feet; have slurred speech

**Remember, it is better to be safe.**
**Consult your doctor after a suspected concussion.**

### Return to play

Athletes should not be returned to play the same day of injury. When returning athletes to play, they should follow a stepwise symptom-limited program, with stages of progression. For example:

1. rest until asymptomatic (physical and mental rest)
2. light aerobic exercise (e.g. stationary cycle)
3. sport-specific exercise
4. non-contact training drills (start light resistance training)
5. full contact training after medical clearance
6. return to competition (game play)

There should be approximately 24 hours (or longer) for each stage and the athlete should return to stage 1 if symptoms recur. Resistance training should only be added in the later stages.
**Medical clearance should be given before return to play.**

| Tool | Test domain | Time | Score | | | |
|---|---|---|---|---|---|---|
| | | Date tested | | | | |
| | | Days post injury | | | | |
| SCAT2 | Symptom score | | | | | |
| | Physical signs score | | | | | |
| | Glasgow Coma score (E + V + M) | | | | | |
| | Balance examination score | | | | | |
| | Coordination score | | | | | |
| SAC | Orientation score | | | | | |
| | Immediate memory score | | | | | |
| | Concentration score | | | | | |
| | Delayed recall score | | | | | |
| | **SAC Score** | | | | | |
| **Total** | **SCAT2** | | | | | |
| **Symptom severity score (max possible 132)** | | | | | | |
| **Return to play** | | | Y N | Y N | Y N | Y N |

**Additional comments**

## Concussion injury advice (To be given to concussed athlete)

This patient has received an injury to the head. A careful medical examination has been carried out and no sign of any serious complications has been found. It is expected that recovery will be rapid, but the patient will need monitoring for a further period by a responsible adult. Your treating physician will provide guidance as to this timeframe.

**If you notice any change in behaviour, vomiting, dizziness, worsening headache, double vision or excessive drowsiness, please telephone the clinic or the nearest hospital emergency department immediately.**

**Other important points:**

- **Rest and avoid strenuous activity for at least 24 hours**
- **No alcohol**
- **No sleeping tablets**
- **Use paracetamol or codeine for headache. Do not use aspirin or anti-inflammatory medication**
- **Do not drive until medically cleared**
- **Do not train or play sport until medically cleared**

**Clinic phone number**

Patient's name

Date/time of injury

Date/time of medical review

Treating physician

Contact details or stamp

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# Injured Athlete: Concussion


- Assess Cranial Nerves
- Smooth Pursuits and Saccades (vert./ horz.)
  - Eye tracking, EOM
- Convergence Testing
  - Normal: Object becomes blurry < 6 cm from nose
- Balance Testing

# Injured Athlete: Concussion

- SCAT 5/ C3/ Impact are tools for assessing symptoms but are not diagnostic for concussion
- Any athlete diagnosed with a concussion can not return to play that same day; take helmet away
- Determine need for diagnostic imaging to assess for any bleeding; Lab testing?????
- Athlete must be symptom free prior to progressing through concussion protocol
- RTP requires clearance from healthcare provider

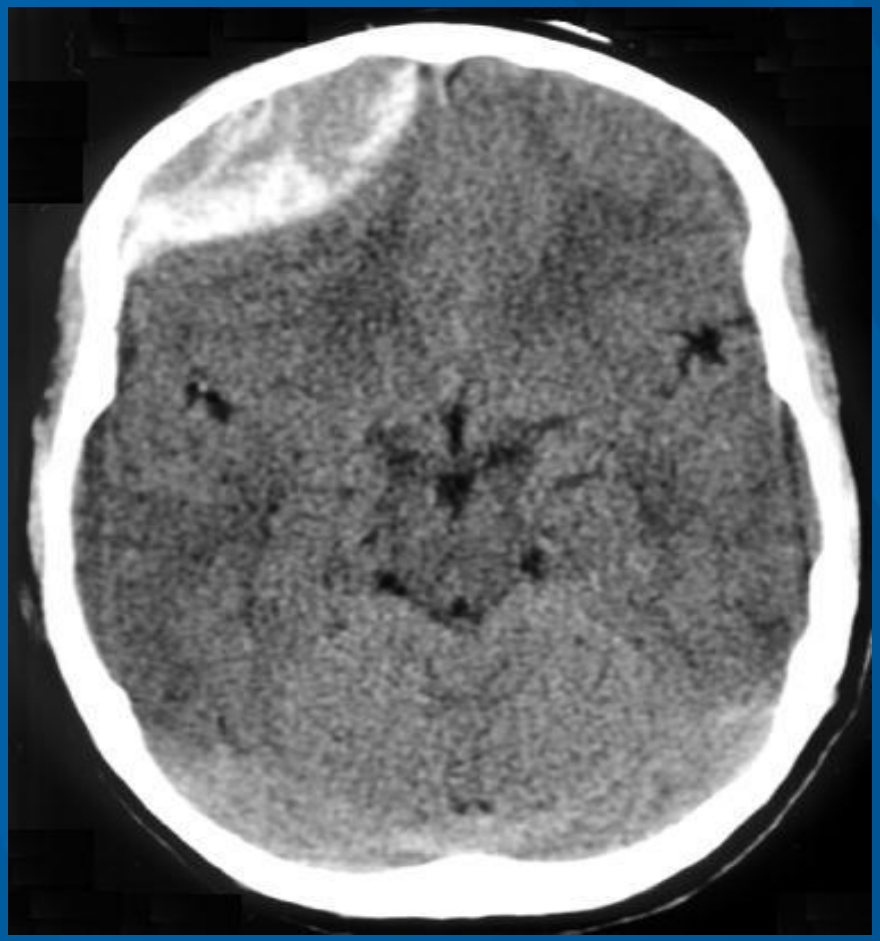
# Injured Athlete: Concussion Protocol

- **Step 1**
  - Light Aerobic exercise
  - No resistance training
- **Step 2**
  - Increase intensity of exertive activity

# Injured Athlete: Concussion Protocol

- **Step 3**
  - Sport specific activity/ drill with no head contact
  - Progressive resistance training
- **Step 4**
  - Full competitive practice
- **Step 5**
  - Return to play

# Injured Athlete: Epidural Hematoma

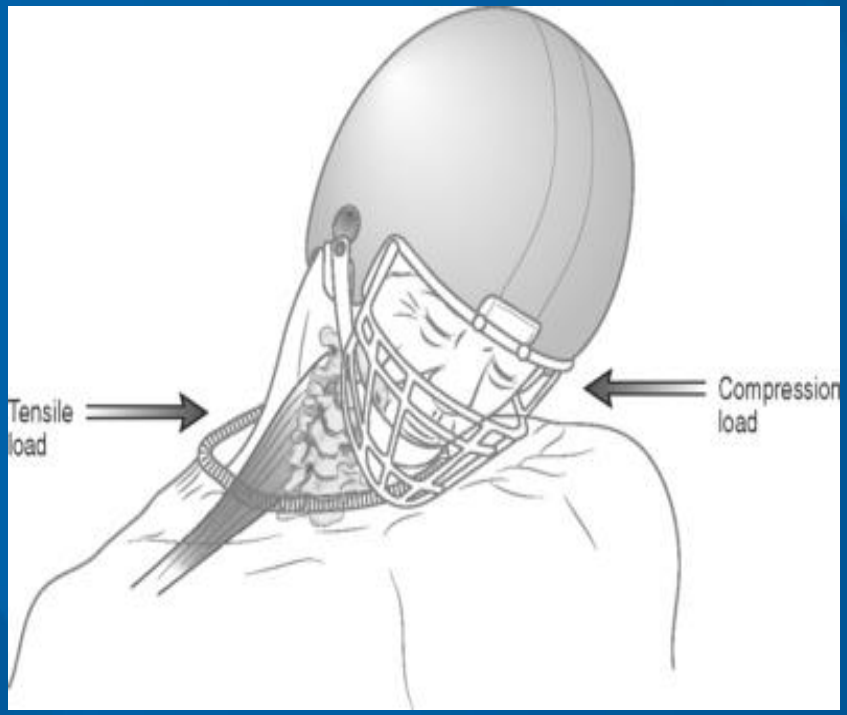


- Arterial tear between the skull and dura (can be venous)
- More common in younger individuals
- May experience lucid interval followed by unconsciousness
- Biconvex lens shaped on CT

# Injured Athlete: Subdural Hematoma

- Gradually increasing headache and confusion (i.e. concussion symptoms)
- Injury involves tear of bridging veins between the dura and arachnoid
- Crescent shaped

# Injured Athlete: Brachial Plexus




- Burner/ Stinger
- Transient neurapraxia of cervical nerve roots
- Unilateral upper extremity weakness
- Hold from competition until ROM/ strength returns; length of time is variable

# Injured Athlete: Hip Pointer

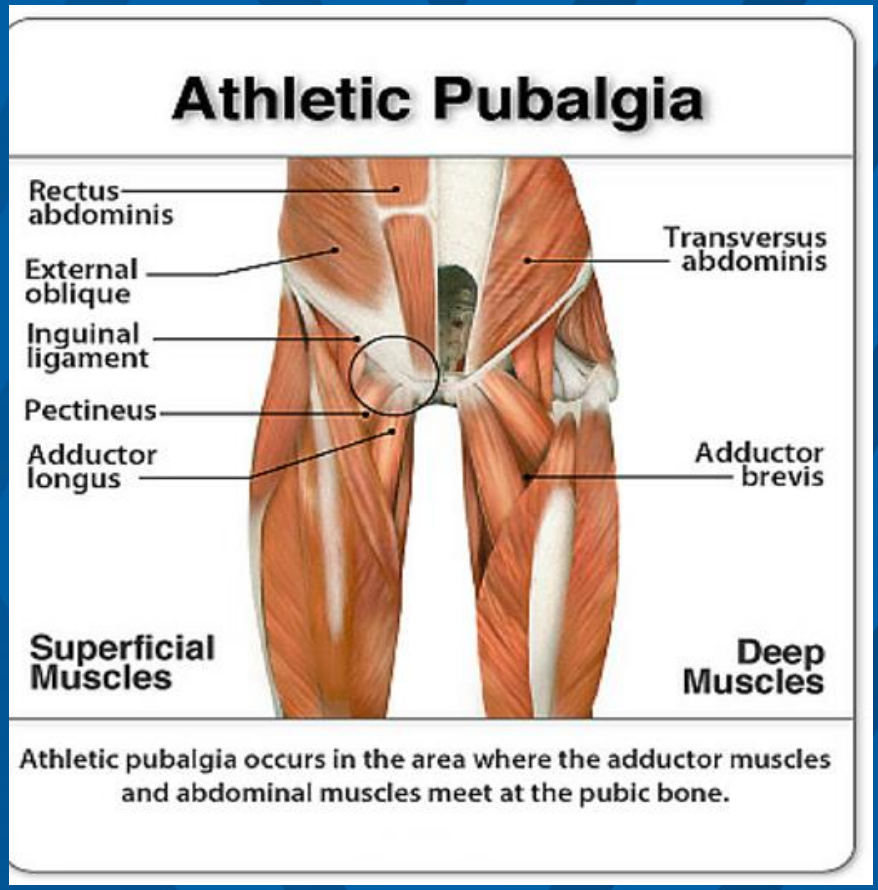
- Common injury in football and hockey
- Deep bruise to the Iliac Crest of the pelvis
- Treat with NSAIDs, Ice and possible injection
- Pad the area well
- Early ROM exercises to avoid stiffness

# Injured Athlete: Thigh Contusion

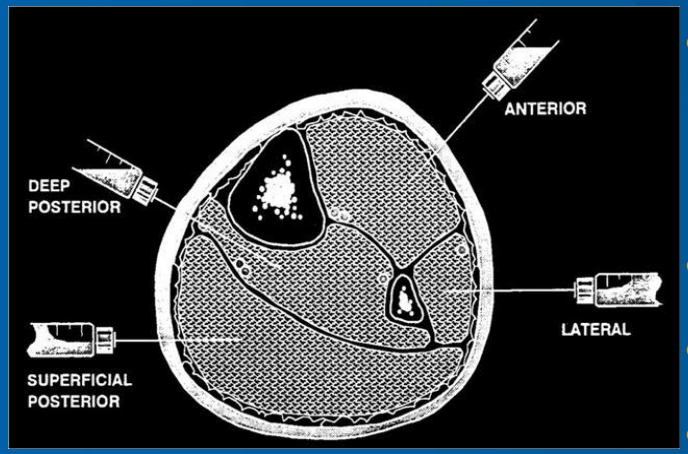
- Apply compression wrap with knee in maximal flexion to fully stretch quad
- Treat with ice and NSAIDs
- Ultrasound and early ROM
- Start treatment immediately to reduce the risk of Myositis Ossificans

# Injured Athlete: Athletic Pubalgia

- Also referred to as a Sports Hernia
- Common in hockey, football, soccer and wresting
- Foot planted with associated twisting motion
- Tx: rest, PT, NSAID; may consider surgery if conservative tx fails



# Injured Athlete: Exercise Induced/ Exertional Compartment Syndrome




- Exercise induced condition of leg with reversible ischemia to muscles in specific compartment
- Common in runners
- Anterior compartment (70%)
- Present with pain/ burning in lower leg with paresthesias over dorsum of foot with activity and relieved with rest
- Check compartments at rest and post-exercise (1/5/15 min.)
- Tx: activity modification; consider fasciotomy if fail 3 mon. tx

# Injured Athlete: Medial Tibial Stress Syndrome (Shin Splints)

- Overuse injury or repetitive load to the shin leading to dull anterior leg pain
- Caused by a traction periostitis
- Tenderness along the posteromedial distal tibia (most common) made with worse with plantarflexion
- Radiographs to rule out stress fracture
- Evaluate gait/ arches (pes planus)/ shoe wear
- Tx: rest, PT/ stretching, activity modifications, NSAIDs

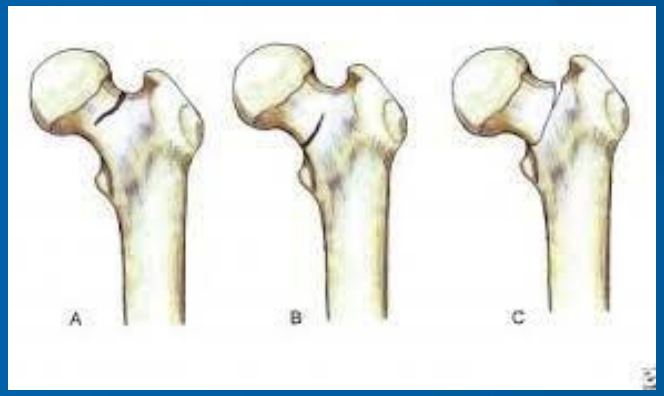
# Injured Athlete: Stress Fractures

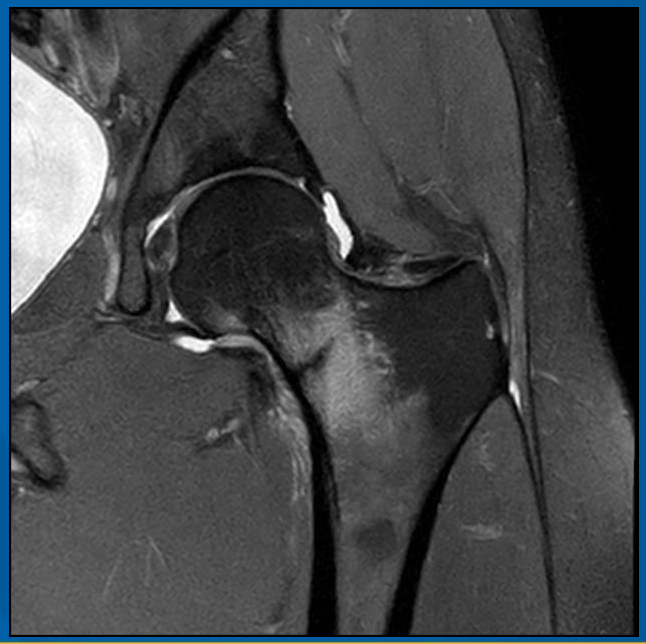
- More than 50% occur in the lower extremity
- MOI: Overuse injury, increasing activity too rapidly, unfamiliar surface, improper equipment, poor nutrition
- Female Athlete Triad: Eating Disorder/ Amenorrhea/ Osteoporosis

# Evidenced Based Medicine: Stress Fractures

- X-rays
  - Sensitivity of 15-35% on initial examination
  - Sensitivity increases to 30-70% at 2-3 week follow-up evaluation
  - Should obtain plain film x-rays prior to advanced imaging
- MRI
  - MRI has surprassed bone scans in imaging for stress fractures
  - MRI is 90-100% sensitive and up to 85% specific
  - Bone Scans are 90% sensitive but only 50% specific for stress fractures

# Injured Athlete: Femoral Neck Stress Fracture



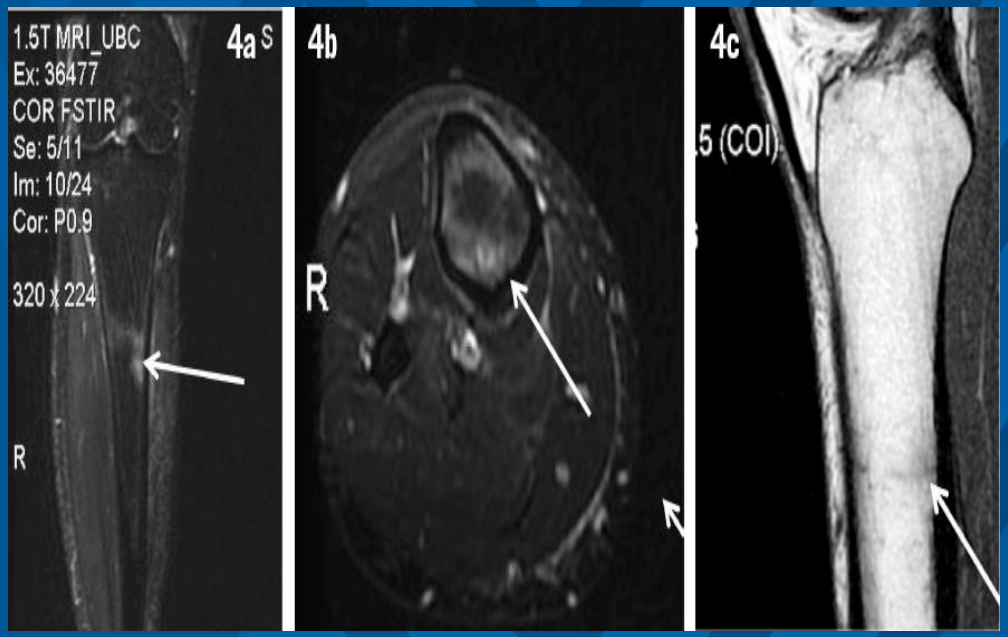
- More common in middle-age white females; military or runners (Groin pain)
- Non-op tx for compression sided fx <50% femoral neck width; crutches for 6 wks
- Cannulated screw fixation with tension side or >50% width or hip effusion

# Injured Athlete: Stress Fractures

## Treatment

- REST
- Alleviate activity causing stress; cross train
- Evaluate and correct any biomechanical issue
- Correct nutritional deficiencies; Vit. D
- Gradual return to play progression after pain free

## MRI

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# Injured Athlete: 5th Metatarsal Fracture


- Stress Fracture
- Jones Fracture
  - Watershed Area
  - Surgical fixation
- Avulsion Fracture
  - Most Common
  - Non-op tx
  - WBAT in TALL boot

# Injured Athlete: 5th Metatarsal Fracture

- Mechanism:
- Jones fracture-mechanism is seen frequently with a forced adduction of the forefoot while the ankle is in a plantar flexion position
- Avulsion type fracture-seen with an inversion of the ankle (Peroneal brevis attachment)
- Stress fractures-associated with repetitive activity and pes cavus

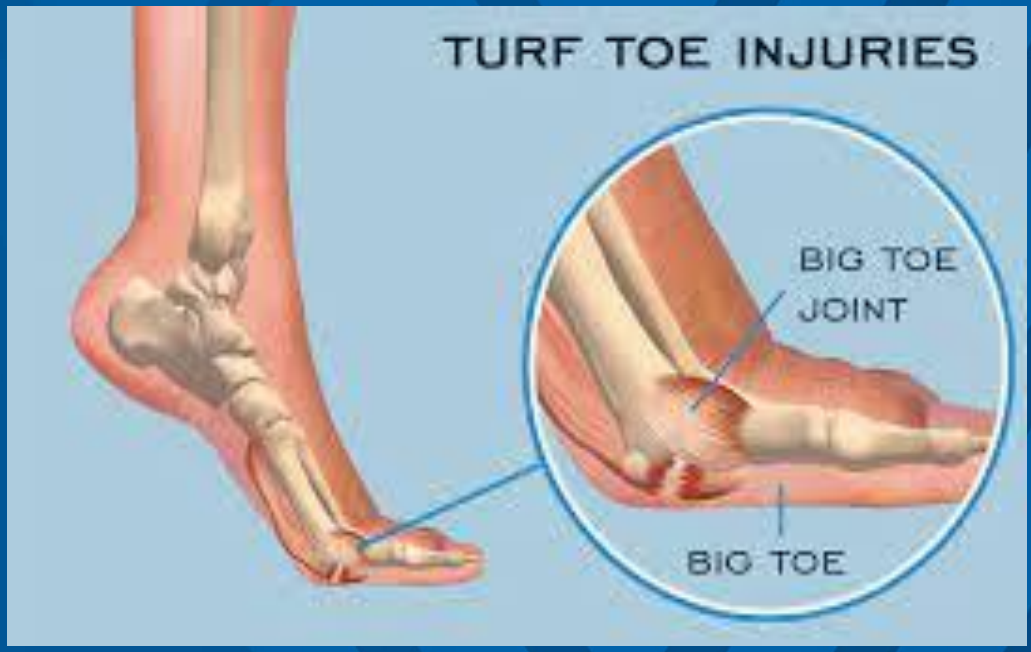
# Injured Athlete: Jones Fracture


# Injured Athlete: 5th Metatarsal Fractures

- PLAN:
  - Protective weight bearing
  - CAM/walking boot or Splint
  - Follow-up 5-7 days with physician
- Complications:
  - Jones Fracture - 10-15% delayed or non-union

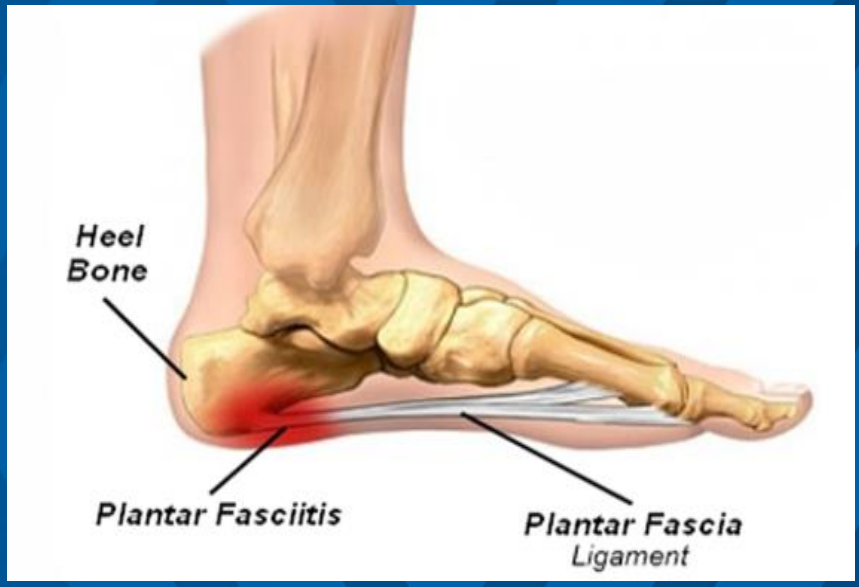
# Injured Athlete: Turf Toe

- Sprain of the 1st MTP joint with forced hyperextension
- Common in football players
- May injure plantar plate/ collateral ligaments/ Flexor Hallucis Brevis and Sesamoid bones
- Tx: taping straps/ carbon fiber inserts



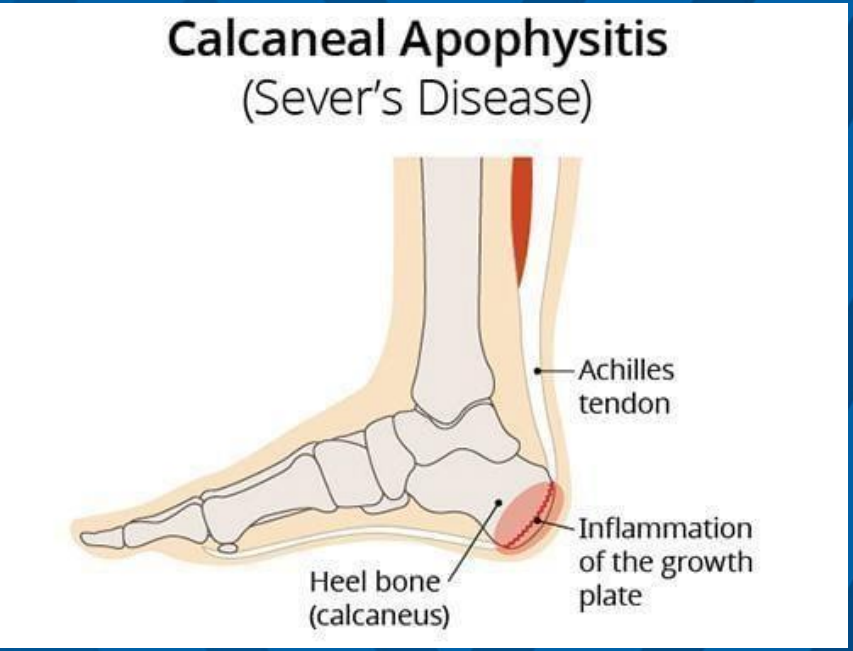
# Injured Athlete: Plantar Fasciitis

- Subjective: heel pain with walking; most severe with initial steps out of bed
- X-ray may reveal a calcaneal bone spur
- Treatment: NSAIDs, Ice massage, stretching, night splint in neutral position
- Injections may increase risk of fascia rupture



# Injured Athlete: Sever's Disease

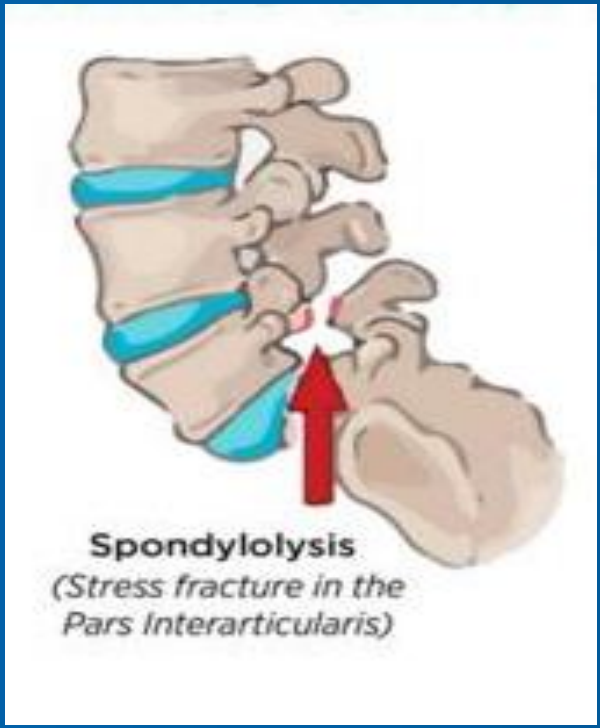
- Most common cause of heel pain in children and adolescents (8-14)
  - Closes by age 15
- Inflammation/ Apophysitis of the calcaneal growth plate
- X-ray will look normal
- Tx: avoid run/ jump to limit stress, heel cups, stretching, NSAIDs

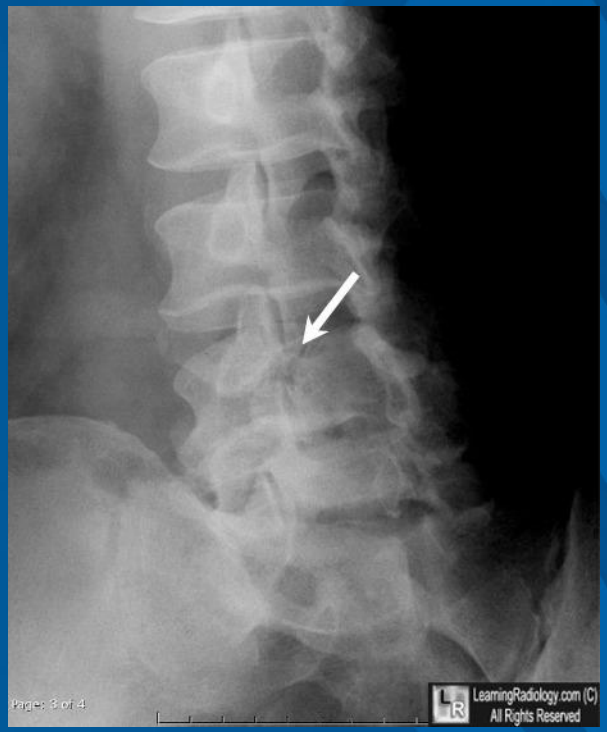


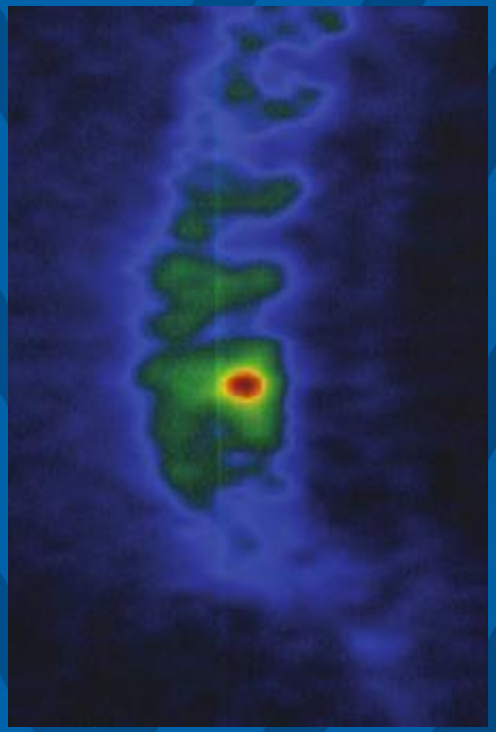
# Injured Athlete: Spondylolysis

- Defect or stress fracture to the pars interarticularis
- Most commonly occurs at L5; associated with repetitive lumbosacral ext.
- Pain with ext. and rotation (Stork); tight hamstrings
- Requires adequate rest to allow for healing

# Injured Athlete: Spondylolysis

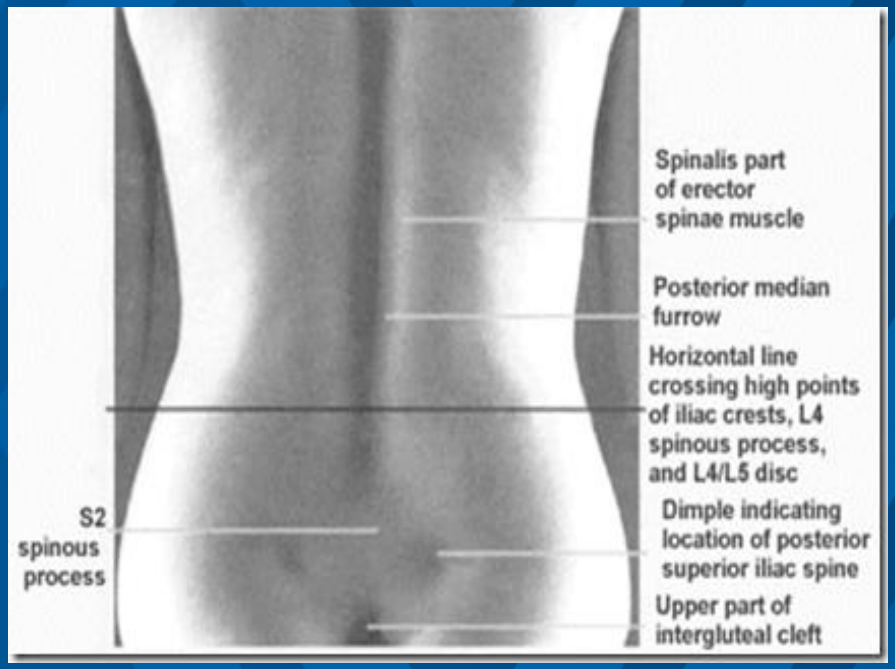


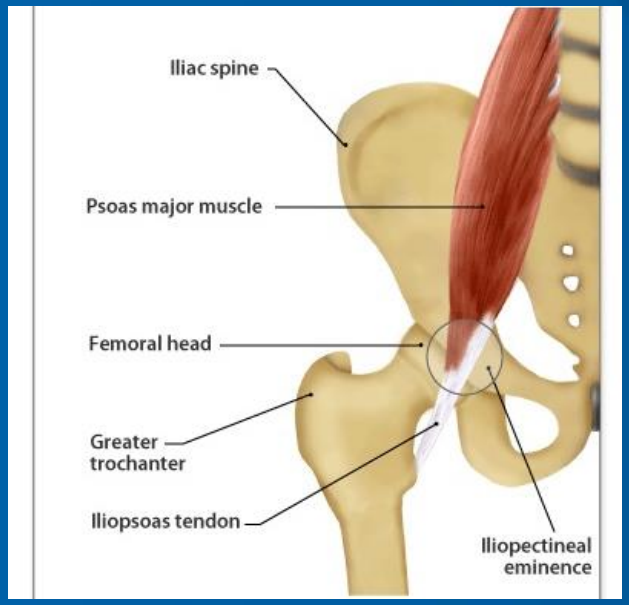



# Injured Athlete: SI Joint Dysfunction

- Low back pain localized near PSIS (dimple)
- May present with sciatic like pain, limited lumbar ROM, leg length discrepancy
- + FABER
- Tx: PT/ Chiro adjust./ Stretching/ Injection



# Injured Athlete: Snapping Hip Syndrome (Coxa Saltans)

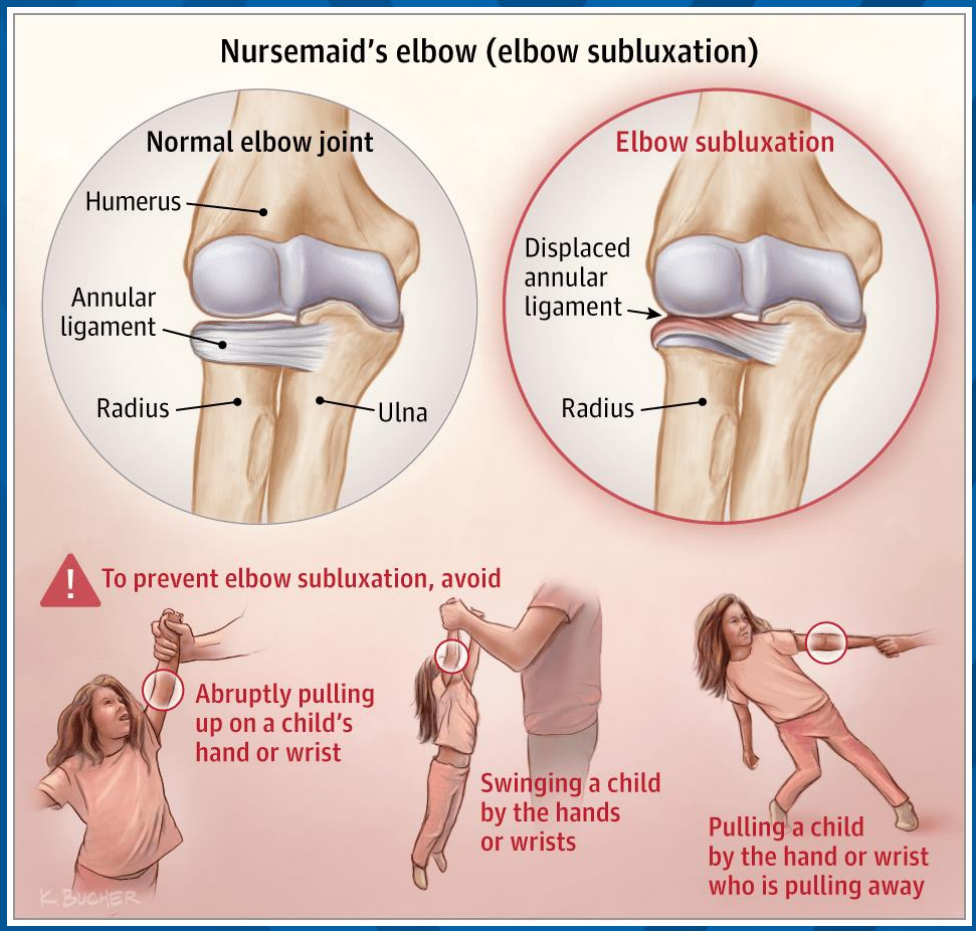




- External: IT band sliding over greater trochanter
- Internal: Illiopsoas tendon catches on the femoral head causing “click” +/- pain
- Tight hip flexors due to sitting/ ab workout/ etc.
- Tx: PT/ stretching, Psoas injections vs Surgical release

# Injured Athlete: Nurse Maid's Elbow

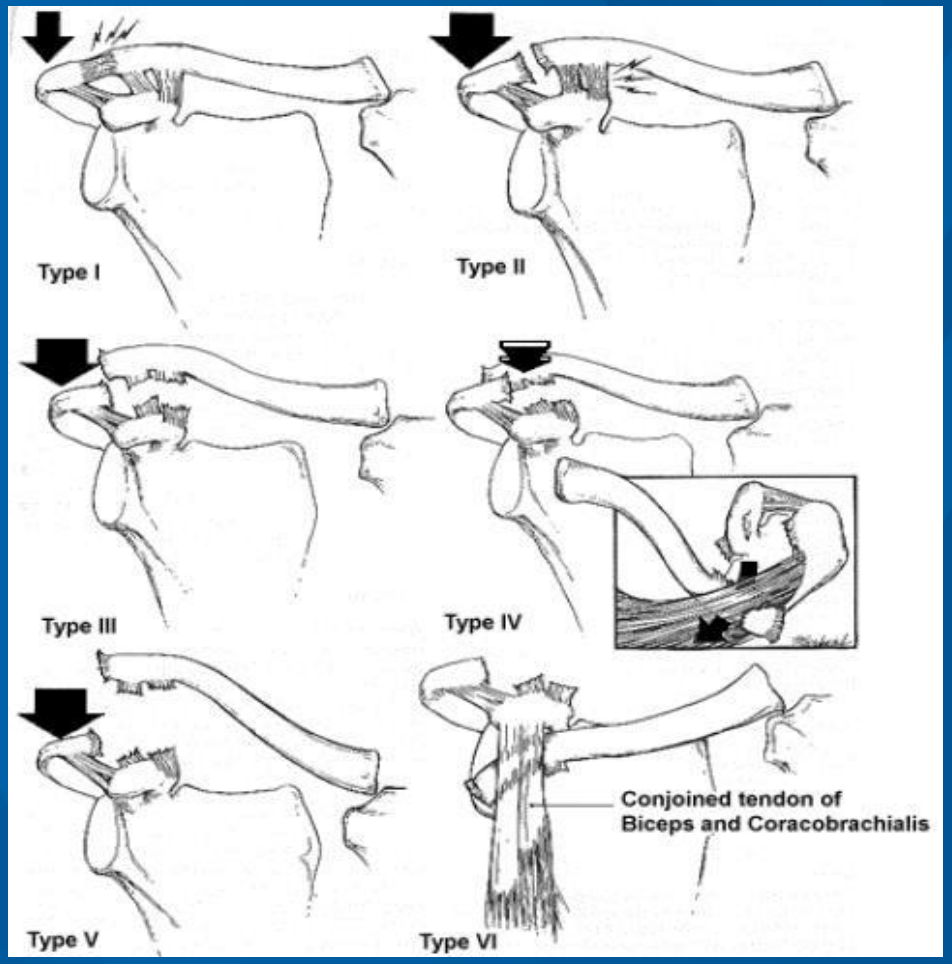
- Exam: child won't move elbow
- Reduction:
  - Apply pressure at radial head
  - Grasp wrist and apply slight traction
  - Supinate wrist while flexing elbow to 90 degrees



# Injured Athlete: AC Joint Separation

- MOI: fall on shoulder
- Subjective: pain at AC joint
- Exam: noticeable deformity; piano key
- Non-op tx: Grade I-II
- Grade III: tx depending on symptoms/ function
- Operative tx: Grade IV-VI

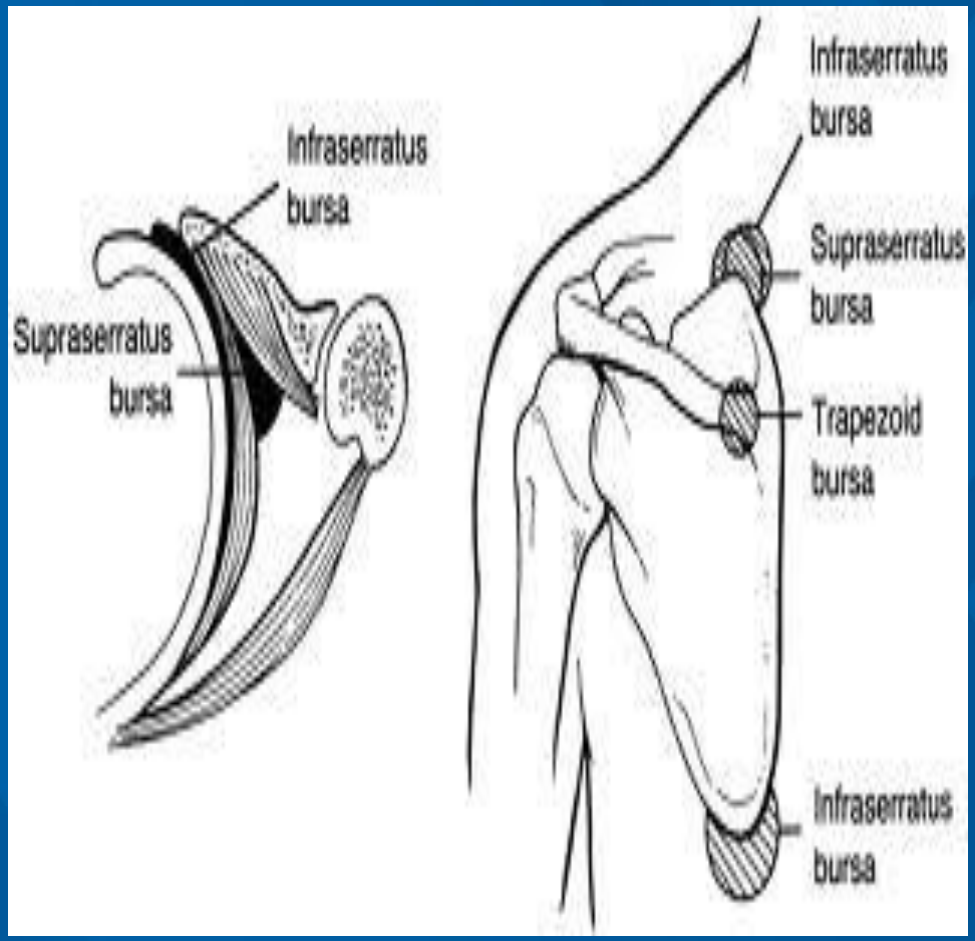
# Injured Athlete: AC Joint Separation




- Rockwood Grading
- I: sprain
- II: < 25 %
- III: 25-100 %
- IV: posterior
- V: > 100%
- VI: Inferior

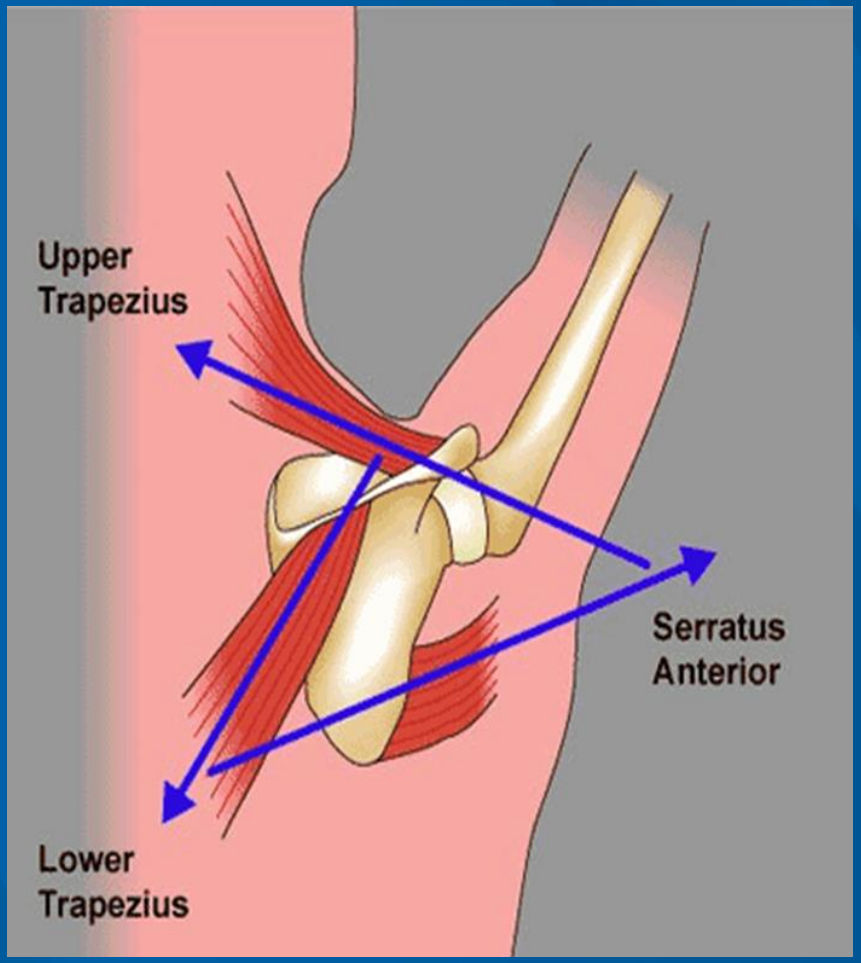
# Injured Athlete: AC Joint Separation

# Injured Athlete: Scapulothoracic Anatomy



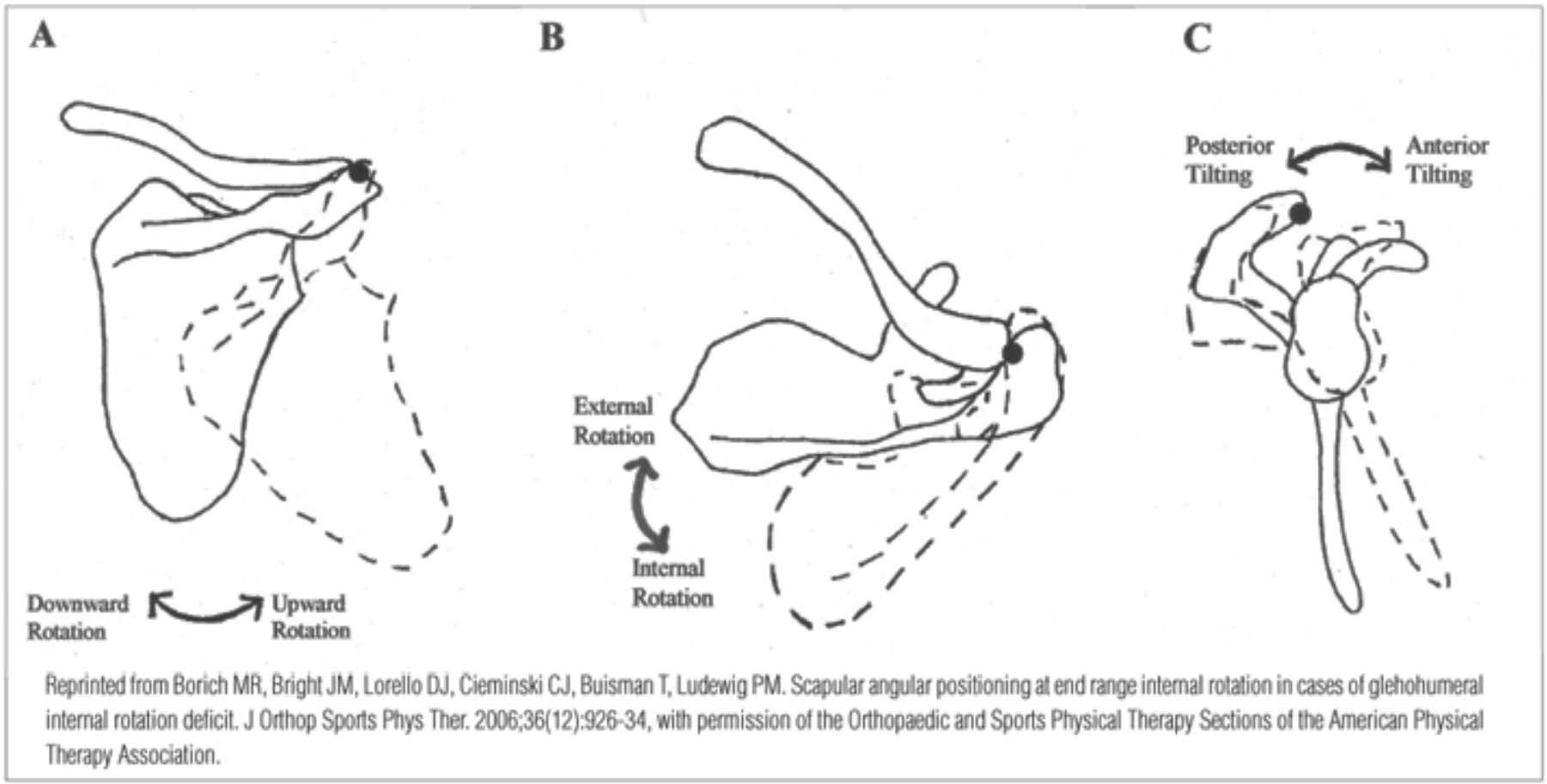

- <u>Scapular Bursa</u>
- Infraserratus Bursa: inferior/ superior medial angle
- Supraserratus Bursa: near superior medial angle
- Trapezoid Bursa: located at medial base of spine of scapula

# Injured Athlete: Scapulothoracic Motion




- Movements include protraction, retraction, elevation, depression and rotation
- For every 2 degrees of GH elevation, there is 1 degree of scapulothoracic elevation[1]

# Injured Athlete: Scapulothoracic Motion




Reprinted from Borich MR, Bright JM, Lorello DJ, Cieminski CJ, Buisman T, Ludewig PM. Scapular angular positioning at end range internal rotation in cases of glehohumeral internal rotation deficit. J Orthop Sports Phys Ther. 2006;36(12):926-34, with permission of the Orthopaedic and Sports Physical Therapy Sections of the American Physical Therapy Association.

**Figure 1.** Scapular Motions. A) Upward/downward rotation about an axis perpendicular to the plane of the scapula; B) Internal/external rotation about a superiorly directed axis; and C) Anterior/posterior tilting about a laterally directed axis.

# Injured Athlete: SICK Scapula

- **S**: Scapular Malposition
  - Abnormal scapula position at rest that is inferior, protracted and tilted anteriorly
- **I**: Inferior Medial Border Prominence
  - Secondary to winging position
- **C**: Coracoid Pain and Malposition
  - Tender to palpation along medial edge of Coracoid
- **K**: dysKinesis of Scapular Movement
  - Possibly due to Pectoralis Minor muscle spasm

# Injured Athlete: Scapulothoracic Injuries

Patient Presentation:

- Shoulder pain (most commonly around coracoid or superior medial border of scapula); may only complain of GH joint pain[2]
- Decreased ROM with shoulder flexion
- Scapular Crepitus/ Snapping Scapula

# Injured Athlete: Scapulothoracic Injuries

## Physical Exam:

- Examine patient from the back to evaluate for scapular dyskinesia
- Have patient elevate arms at about half speed
- Resisted forward flexion at approximately 30 degrees of forward flexion
- Have patient perform push-up, wall push or observe pushing up from a seated position
- Patient may have a history of head/ neck surgery resulting in a nerve injury

# Injured Athlete: Scapulothoracic Injuries

- Scapular Assistance Test
  - Looking to see if ROM is improved and pain decreases
- Scapular Stabilization Test: stabilize scapula against thoracic cage to see if pain is relieved with forward flexion[3]
- May also have patient forward flex arm while in a supine position

# Injured Athlete: Scapulothoracic Injuries

- Serratus Anterior Palsy
  - Long thoracic nerve injury (stretch or blunt trauma)
  - Scapula will be elevated and inferior border rotated towards mid-line
  - Difficulty with arm elevation above 120 degrees
  - EMG recommended to confirm
  - Nerve palsy may resolve spontaneously

# Injured Athlete: Scapulothoracic Injuries

- Trapezius Palsy
  - Injury to Spinal Accessory nerve (blunt trauma, stretching or penetrating trauma)
  - May see in wrestlers
  - Scapula will appear depressed and inferior border away from mid-line
  - Difficulty with shoulder shrug and weakness with forward flexion and abduction

# Injured Athlete: Scapulothoracic Injuries

Treatment:

- Serratus Anterior Palsy
  - Non-operative: ROM to prevent stiffness, braces (?), most neuropraxic injuries resolve on their own in 1-2 years
  - Operative: Pectoralis Major muscle transfer
- Trapezius Palsy
  - Non-operative: place in sling to rest periscapular muscles, ROM exercises
  - Operative: nerve grafting if nerve has been severed; Eden-Lange Procedure (levator/ rhomboids transferred laterally)
- Winging Scapula
  - Rehab with rotator cuff and periscapular exercises
- Scapulothoracic Crepitus/ Bursitis
  - Rehab/ Injections/ Surgery

# Case Presentation

History:

- 41 year-old male presents to clinic with right shoulder pain
- Patient reports pain throughout the glenohumeral joint
- He denies any specific trauma or mechanism of injury
- He has been experiencing pain and weakness with overhead movement
- Patient reports a history of Thyroid cancer with previous neck surgery for thyroidectomy and cervical lymph node biopsy
- He has also been experiencing numbness and tingling into his right hand
- He denies any prior history of treatment for his shoulder

# Case Presentation

Objective:

- Noticeable atrophy in the right trapezius muscle
- Lateralization of the scapula away from midline
- Patient had full forward flexion with pain and difficulty above 90 degrees
- Noticeable lateral scapular winging
- Scapular stabilization facilitates overhead movement with less pain
- Pain with Impingement test; RTC strength 5/5

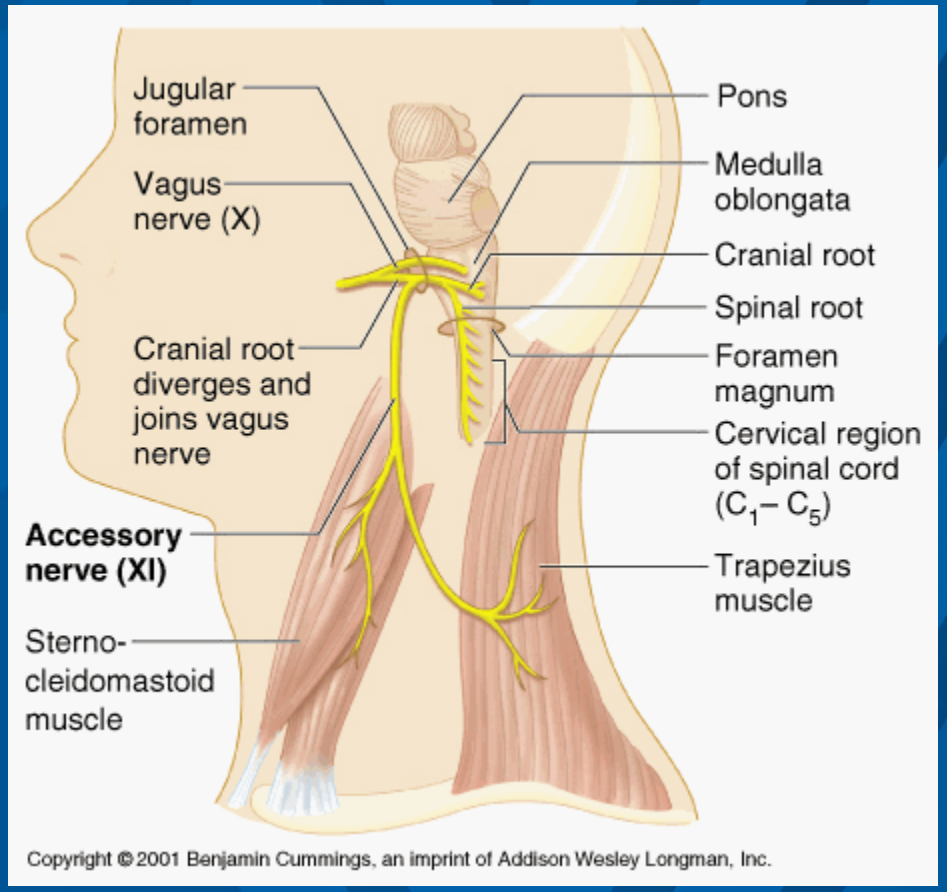
# Case Presentation

Video by T. Randolph, PA-C

# Case Presentation

Treatment:

- EMG/ NCS was ordered to confirm an injury to the Spinal Accessory Nerve
- Conservative tx: trial of PT for periscapular strengthening
- Surgical tx: Eden-Lange Procedure

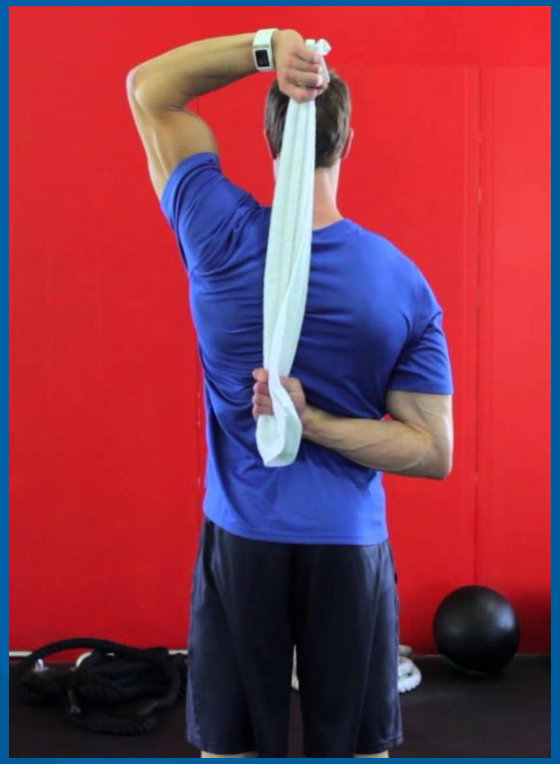


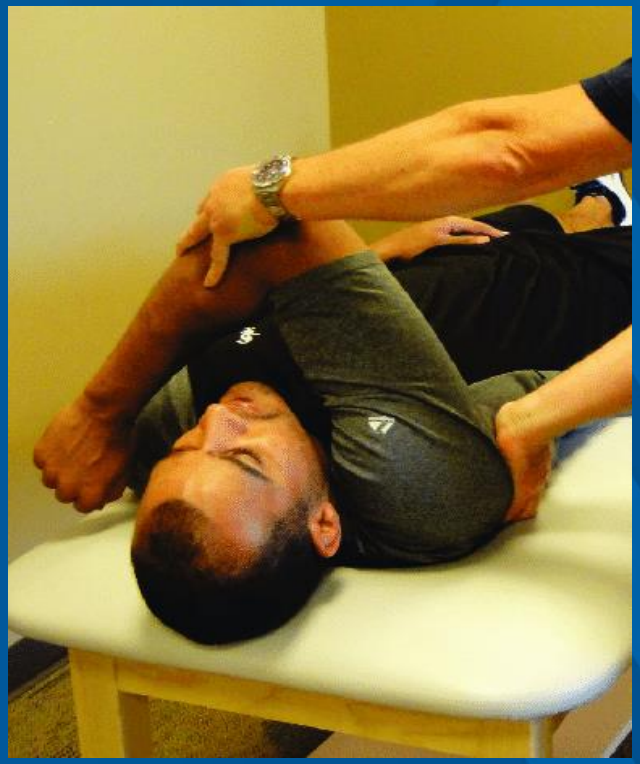
# Injured Athlete: GIRD

- Glenohumeral Internal Rotation Deficit
- May have increased external rotation; need to maintain 180 deg. arc of motion in throwers
- Can lead to internal impingement; posterior shoulder pain with abduction and external rotation
- Tx: posterior capsule stretching

# Injured Athlete: GIRD

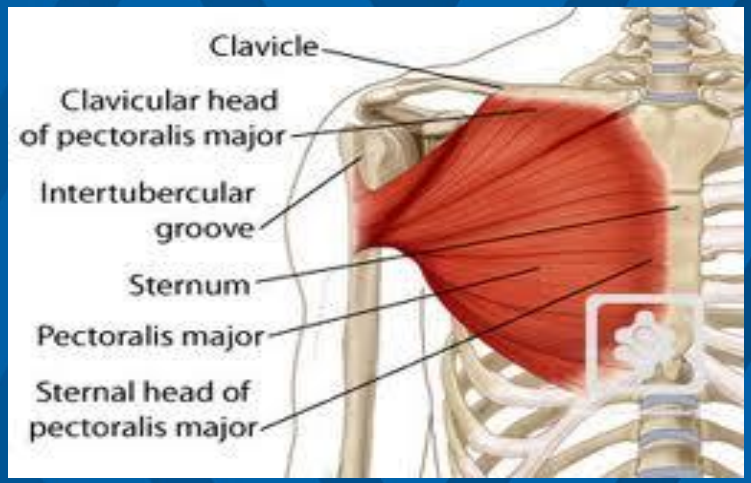
# Injured Athlete: GIRD





# Injured Athlete: Pectoralis Rupture

- Typically associated with bench pressing
- May experience “tearing” sensation
- Ecchymosis, swelling and deformity seen on exam
- Surgical repair for tendon avulsions




# Injured Athlete: Anterior Knee Pain


- Patella Tendonitis
- Patellofemoral Syndrome
- Pes Anserine Bursitis
- Remember to evaluate hip mechanics/ strength; muscle imbalances
- Avoid Open Kinetic Chain leg extension

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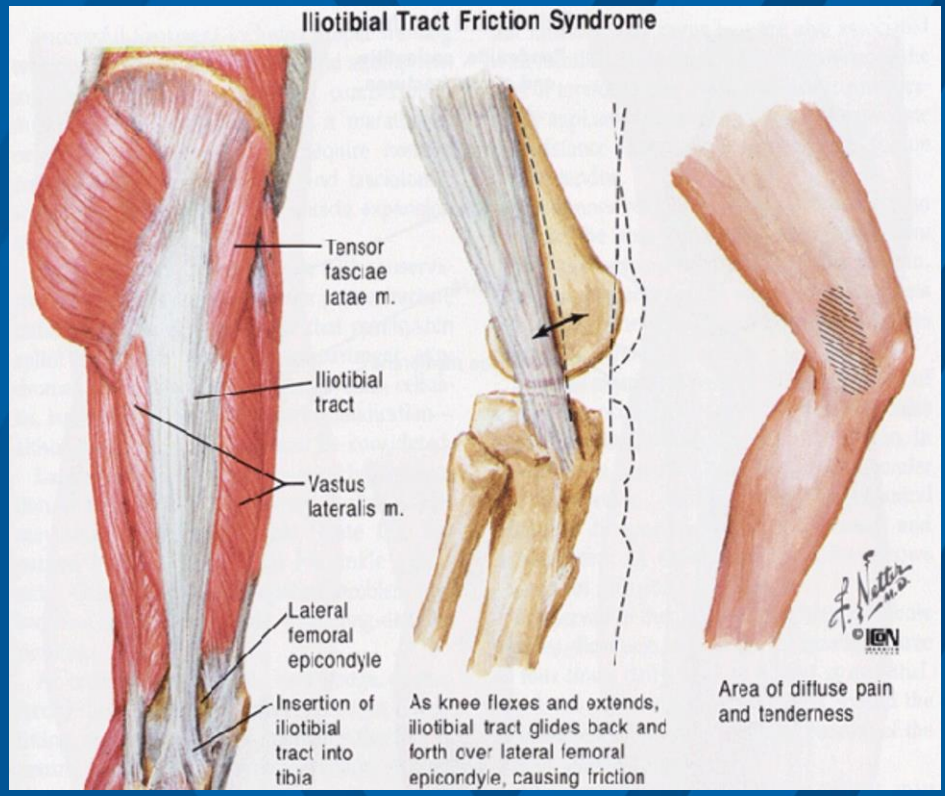
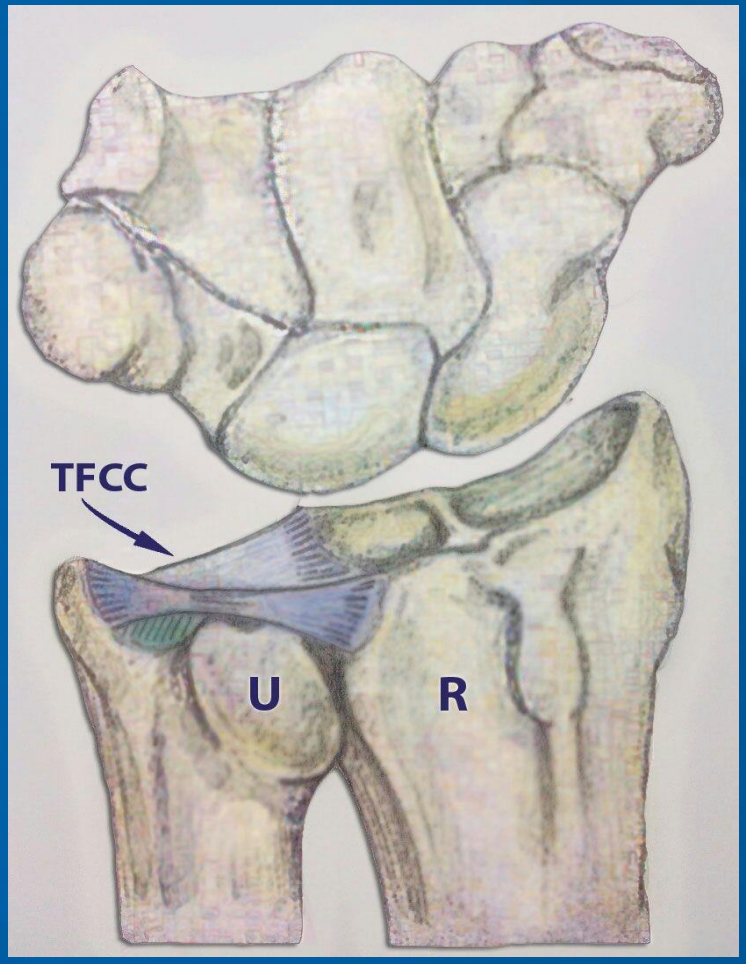
# Injured Athlete: IT Band Syndrome

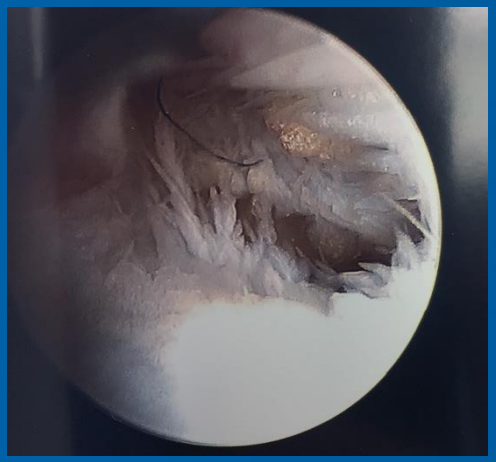
- Seen in runners, cyclists, basketball, hockey, skiers, soccer
- Can be secondary to genu varus, leg length discrepancy, weak glutes
- Symptoms: clicking/ pain over lateral knee
- Tx: PT/ foam rolling/ stretching/ injections/ occasional surgery

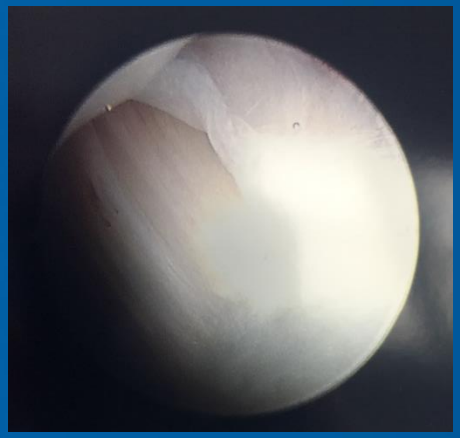


# Injured Athlete: TFCC




# Injured Athlete: TFCC





- Triangular Fibrocartilage Complex
- Helps stabilize DRUJ
- MOI: FOOSH
- Common in Tennis/ Gymnasts
- Pain with ulnar deviation (compression) and radial deviation (tension)
- Pain with turning key; Positive Grind test
- Tx: Injection/ Surgical repair

# Injured Athlete: Return to Play


- Full Range of Motion
- Full Strength
- Ability to protect self
- Taping/ bracing if necessary
- Complete functional testing

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trandolph@hsc.wvu.edu
(706) 247-1094
@TLRWVUFan

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