Sports Medicine Injuries

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Disclosures

- I have no financial disclosures pertaining to this talk.

Objectives

- Knee Injuries
  - Evaluation/Treatment
  - When to Refer?
- Shoulder Injuries
  - Evaluation/Treatment
  - When to Refer?
- Concussion
  - Texas Law Changes
  - Evaluation/Treatment
  - When to Refer?

KNEE INJURIES

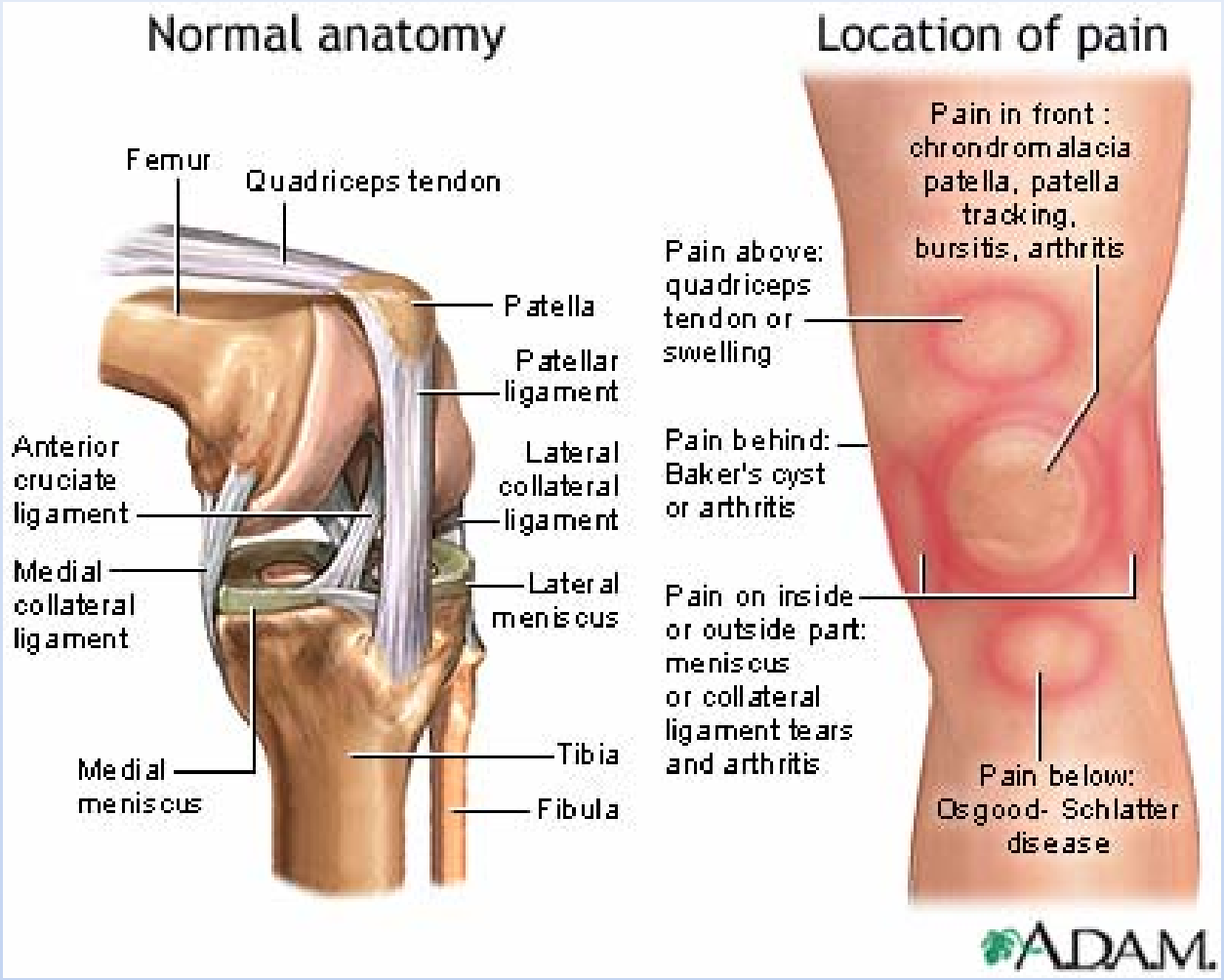
History

- Mechanism of Injury
- Quality and Intensity of Pain
- Acute versus Chronic Pain
- Mechanical or Instability Symptoms
  - Catching
  - Locking
  - Giving Way
  - Swelling
  - Weight-bearing
- Treatments attempted prior

Examination

- Inspect
  - Swelling versus effusion
  - Deformities
- Palpate
  - Where does it hurt?
- Range of Motion – Knee Flexion and Extension
- Strength – Knee Flexion and Extension
- Neurovascular Status
- Special Tests

Where does it Hurt?



Various Knee Injuries

- Ligaments
  - ACL
  - MCL
  - PCL
  - LCL
- Meniscus
  - Medial Meniscus
  - Lateral Meniscus
- Articular Cartilage
- Patellar Injuries
  - Chondromalacia Patella/PFPS

ACL Injury

- Mechanism of Injury
  - Non-contact (66% of time)
    - Deceleration and external rotation
    - Hyperflexion
  - Contact (33% of time)
    - Valgus and External Rotation
    - Hyperextension on planted foot
- History
  - Feeling a “pop” or “tear”
  - Immediate (<15min) swelling around knee
  - Cannot weight-bear right after injury

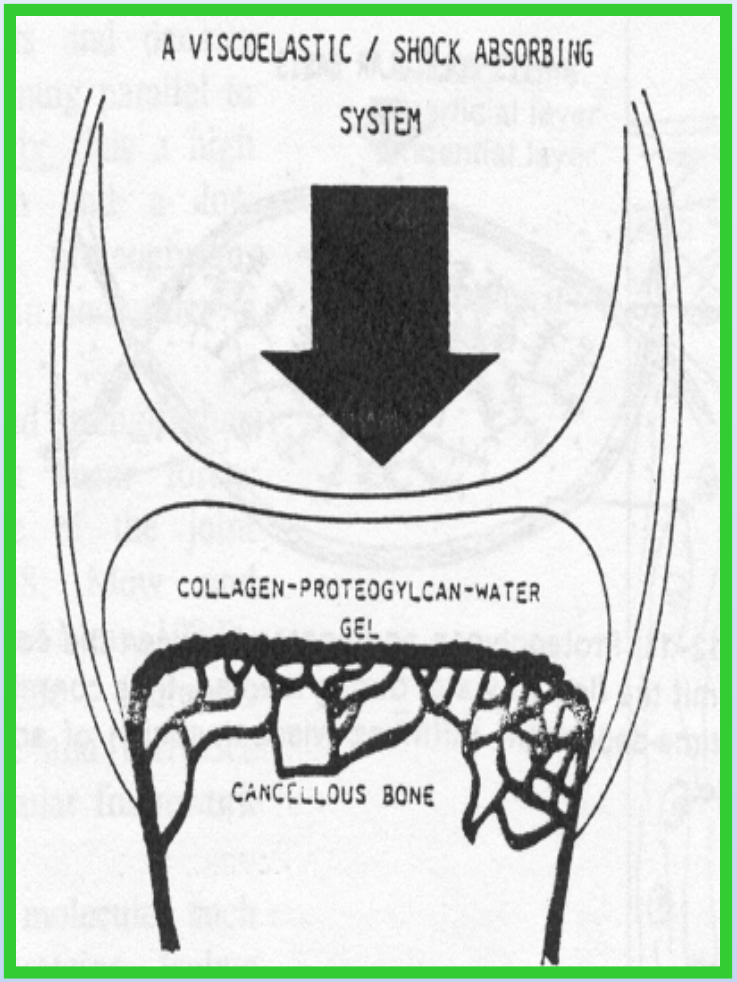
ACL Injury

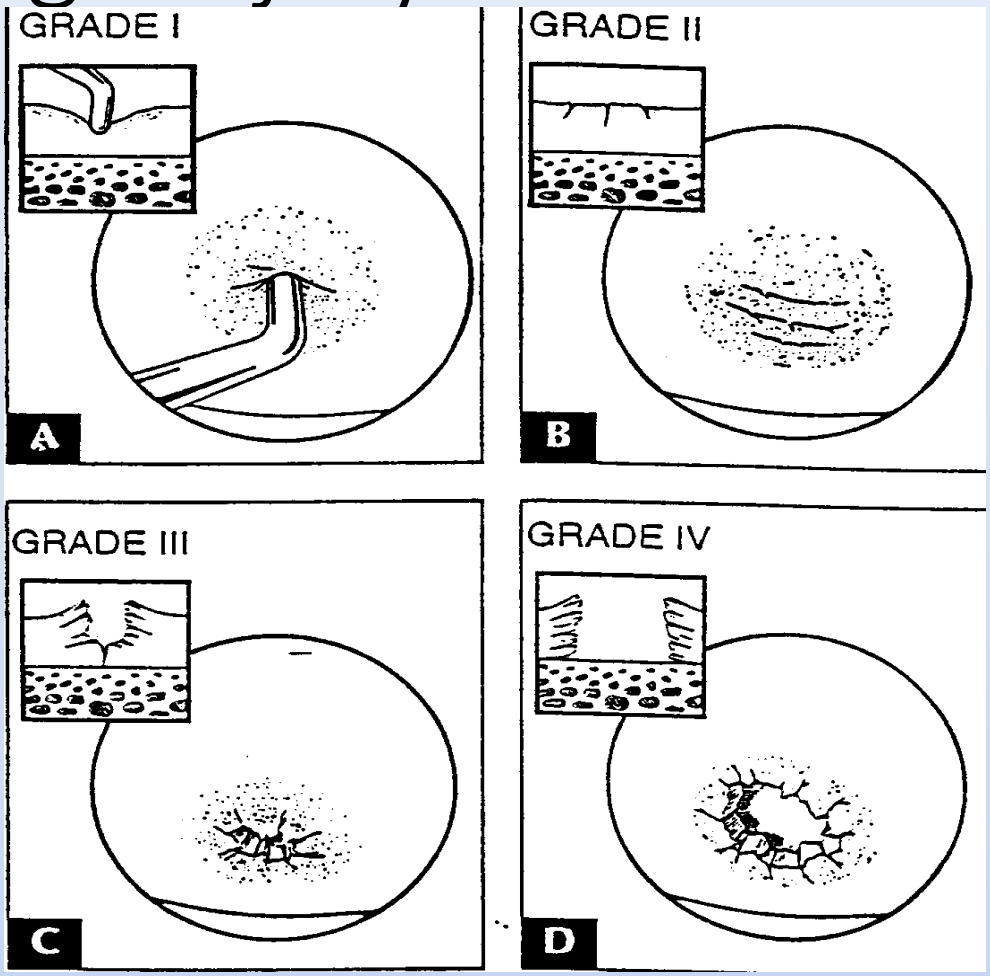
- Examination
  - Check Range of Motion and Strength
  - Check if able to Weight-Bear
  - Lachman/Pivot Shift Test
  - Rule out other ligament injuries
    - Posterior Drawer – PCL
    - Dial Test – Posterolateral Corner Injury
    - Valgus Stress – MCL +/- Medial Meniscus
    - Varus Stress – LCL +/- Lateral Meniscus

ACL Injury

- Initial Treatment
  - Ice and elevate for swelling
  - Knee brace
  - Crutches
- Imaging – will need Knee X-Rays and MRI to confirm
- Rationale for Surgical Treatment
  - ACL vital for Knee Function
  - If not fixed, can lead to early degeneration
  - Reconstruction can restore normal function
- Rationale for Non-surgical Treatment
  - Deficient knee may function reasonably well
  - Reconstruction does not necessarily prevent development of arthritis

Articular Cartilage Injury





Articular Cartilage Injury

- Types of Injuries
  - *Microdamage* - resulting from blunt trauma to the chondrocytes/ECM without visible disruption of the articular surface
  - *Chondral fracture* - with disruption of the articular cartilage of variable depth down to the tidemark
  - *Osteochondral fracture* - with a penetrating fracture through the articular cartilage and into the subchondral bone

Articular Cartilage Injury

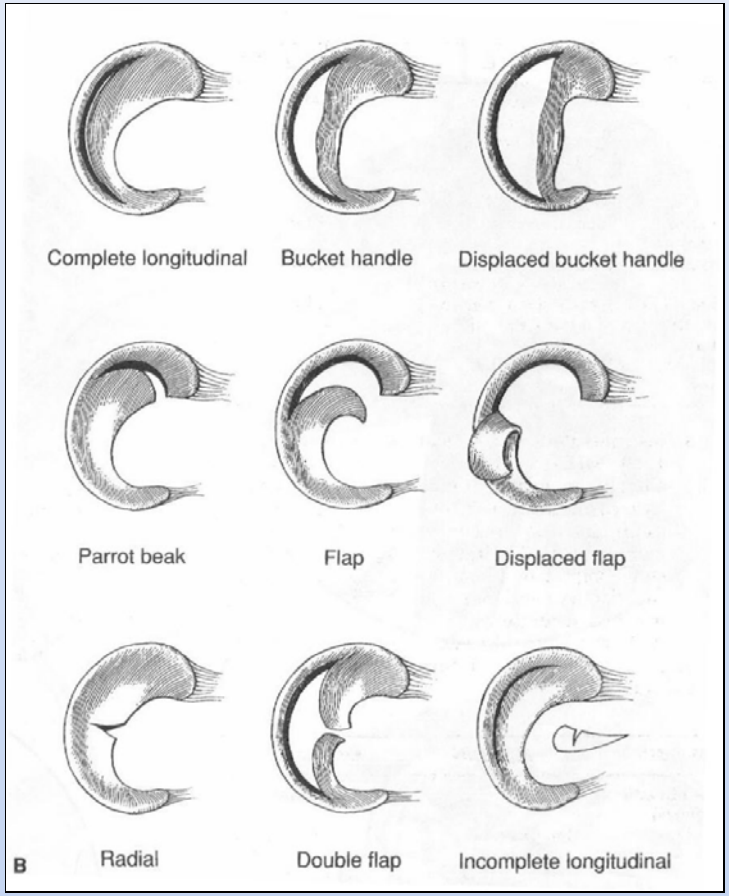
- History (as above)
- Physical Exam (as above)
  - Tenderness in the joint line with small effusion
- Diagnosis – Knee X-Rays and MRI to diagnose and stage
- Treatment
  - Non-operative
    - NSAIDs
    - Physical Therapy
    - Viscosupplementation
    - Nutrisupplementation
  - Operative
    - Variety of different methods

Meniscus Injury

- Background
  - 60-70/10,000 per year
  - Male-to-Female = 2.5-4:1
- Function
  - Knee Joint Stability
  - Joint lubrication
  - Load transmission
  - Joint proprioception

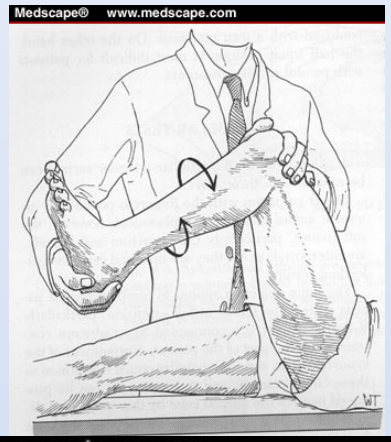
Meniscus Injury

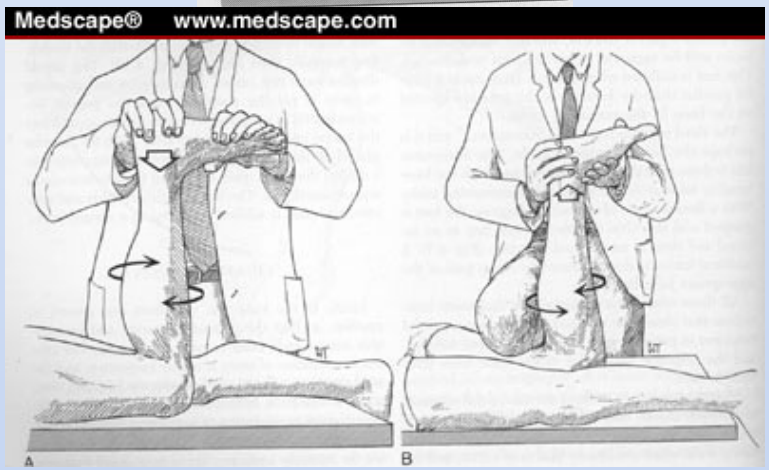
- History
  - Pain in joint line
  - Intermittent swelling
  - Loss of motion
  - Mechanical symptoms
- Physical Exam
  - Medial versus lateral joint line
  - McMurray's test



Meniscus Injury

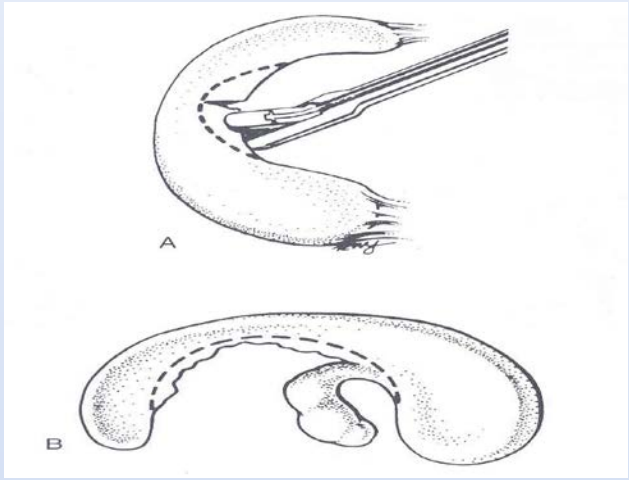
- Provocative maneuvers
  - McMurray's test
    - Sensitivity ~58%
  - Apley's Grind test
  - Squat test
    - Distinguishes menisci from PF pathology
    - Anterior joint line pain can indicate PF pathology
    - Test + if squatting reproduces pain

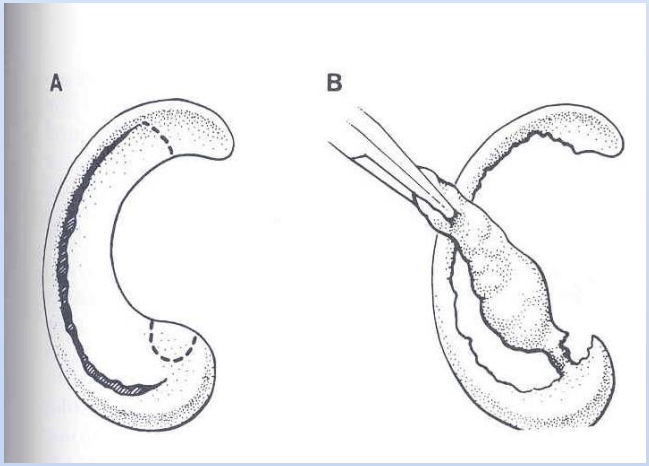




Meniscus Injury

- Treatment
  - Non-operative
    - NSAIDs
    - Physical Therapy
    - Rest
  - Operative
    - Partial Meniscectomy
    - Meniscus Repair





Miscellaneous

Quadriceps tendinitis

ITB Syndrome

Prepatellar bursitis

Patellar tendinitis
Sinding Larsen Johannsen

Osgood Schlatter

Pes anserine bursitis

When to Refer?

- Any knee injury that causes swelling within the first 24-48hrs
- Any loss of range of motion or strength (mechanical symptoms)
- Inability to weight bear (instability symptoms)
- Acute Injury in asymptomatic patient
- Persistent pain despite conservative treatment

SHOULDER INJURIES

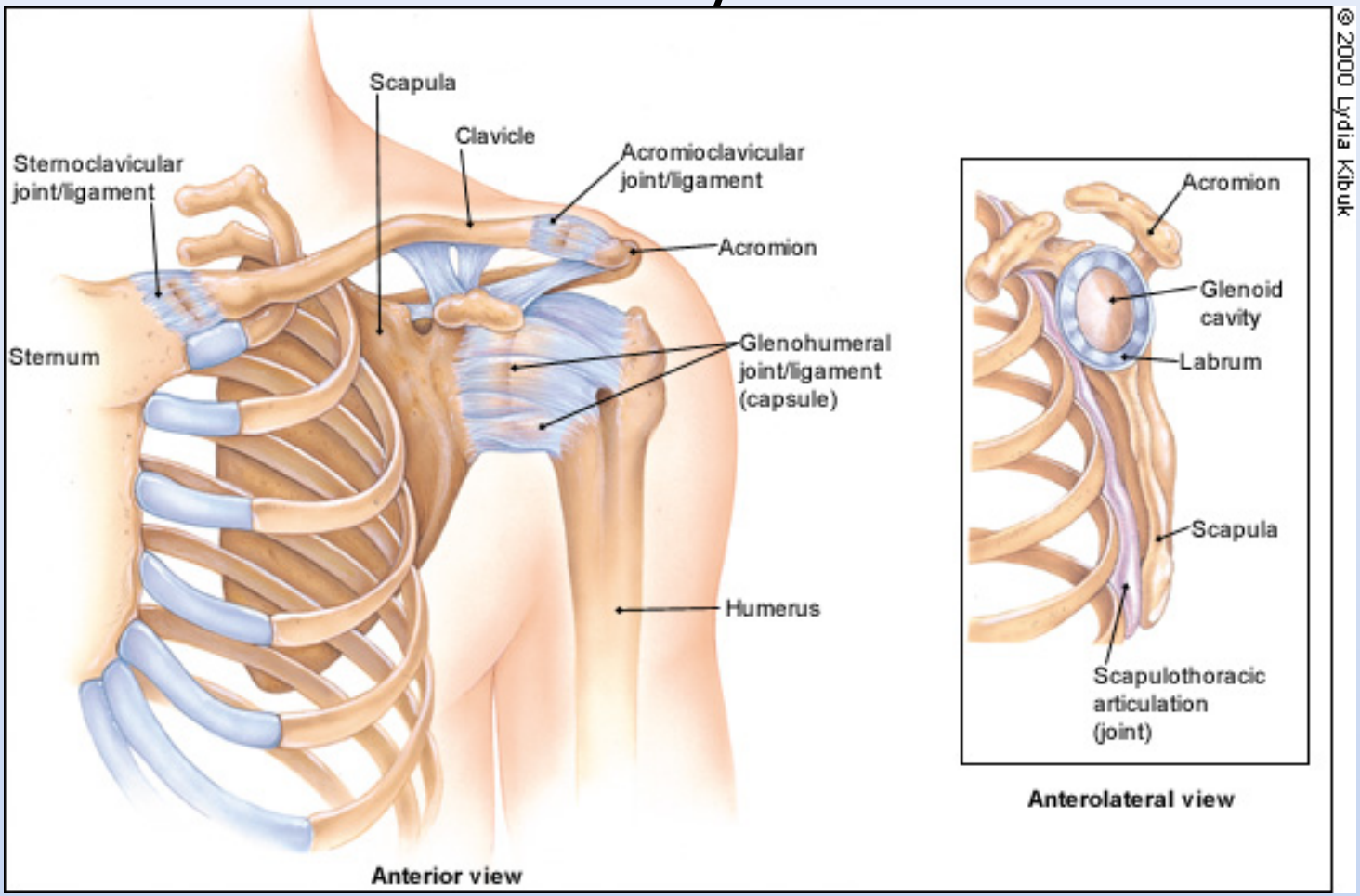
History

- Mechanism of Injury
- Quality and Intensity of Pain
- Acute versus Chronic Pain
- Mechanical or Instability Symptoms
  - Unable to lift objects
  - Feeling like shoulder is going to “pop” out
- Treatments attempted prior

Examination

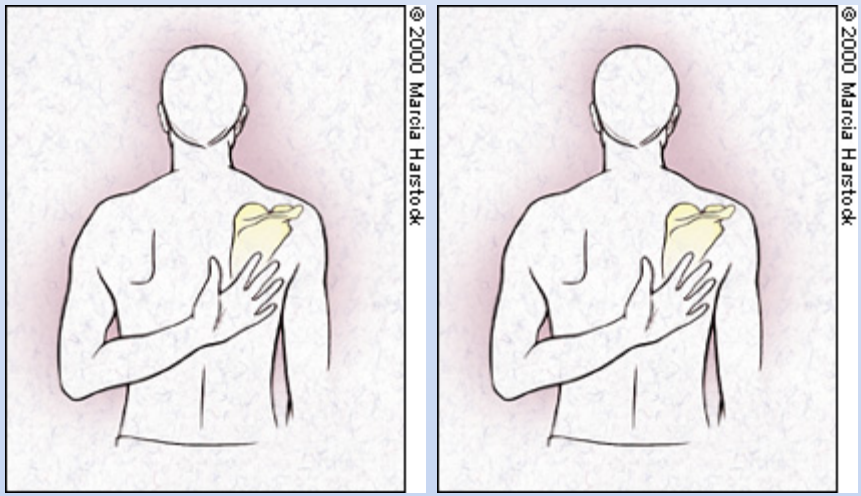
- Inspect
  - Swelling
  - Deformities
- Palpate
  - Where does it hurt?
- Range of Motion – Abduction, Forward Flexion, Internal and External Rotation
- Strength Exam
- Neurovascular Status
- Special Tests

Shoulder Anatomy

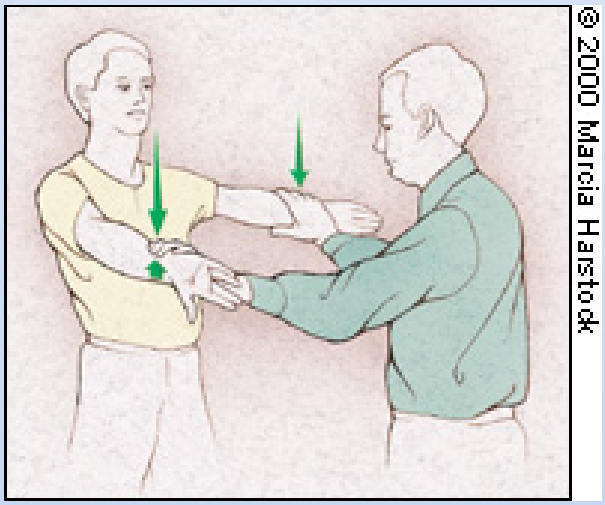


Special Tests

- Apley Scratch Test
  - Assesses ROM

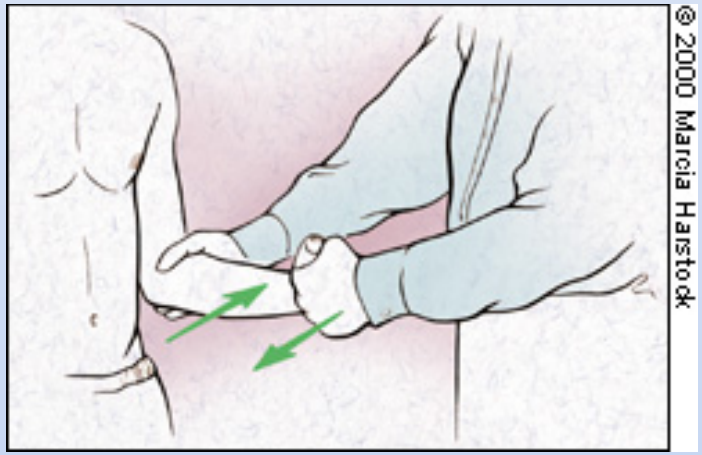


- Jobe Empty Can Test
  - Assesses supraspinatus function

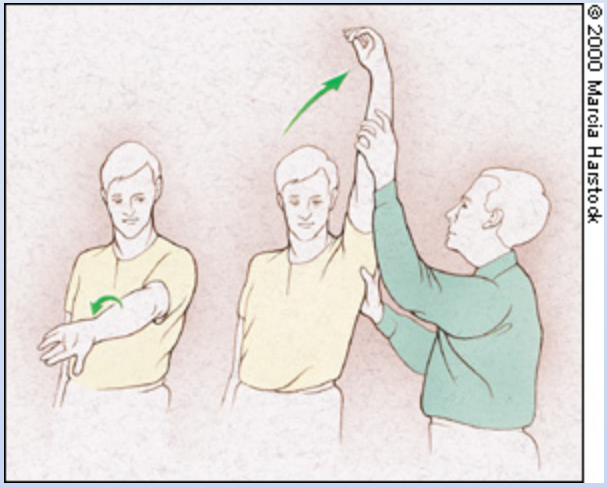


Special Tests

- Infraspinatus/Teres Minor Tests

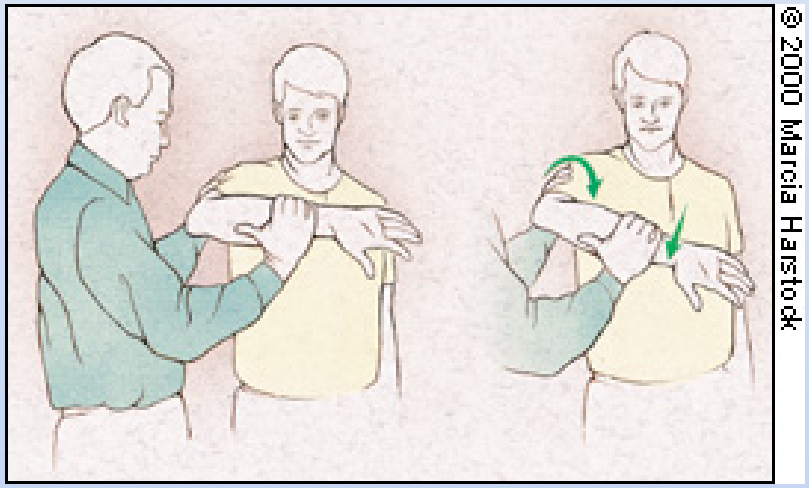


- Neer Tests
  - Rotator cuff impingement

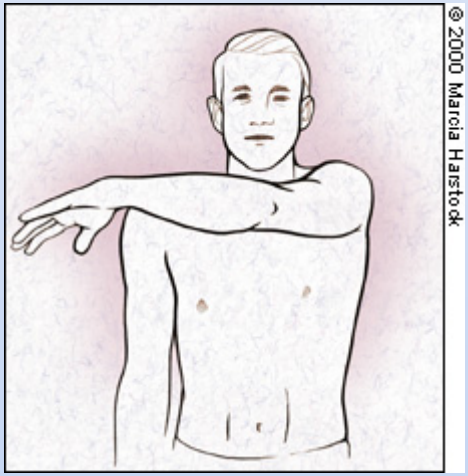


Special Tests

- Hawkins' Test
  - Subacromion impingement

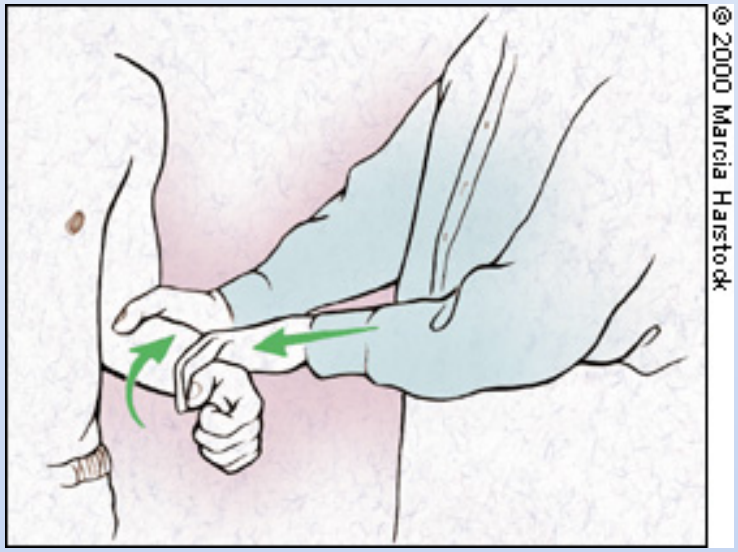


- Cross-Arm Test
  - AC joint pathology

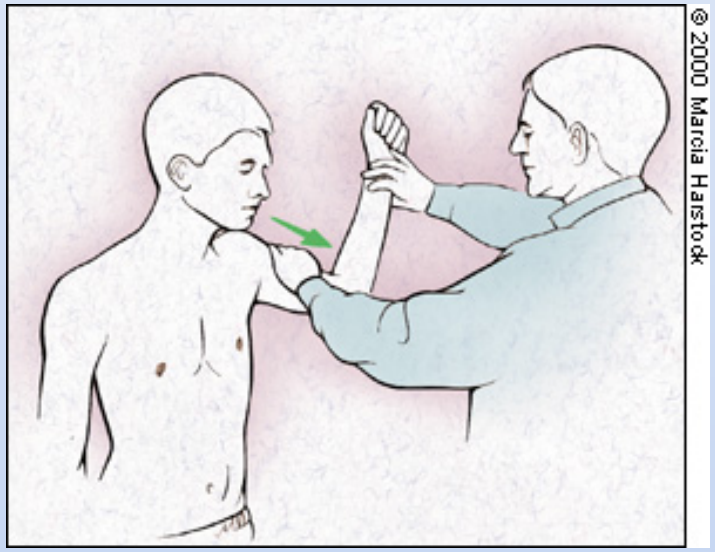


Special Tests

- Yergason's Test
  - Biceps Tendinitis



- Apprehension Test
  - Shoulder Instability



Shoulder Instability

- Definitions
  - *Laxity* – passive motion of a joint in a particular direction or rotation
  - *Instability* – sensation of excessive humeral head movement in relation to the glenoid rim associated with pain and discomfort
- Types
  - *Degrees* – subluxation vs. dislocation
  - *Direction* – anterior, posterior, inferior, multidirectional
  - *Etiology* – traumatic, atraumatic

Shoulder Instability

- Traumatic Mechanisms
  - *Anterior* – arm in abducted, external rotation position
  - *Posterior* – arm in adducted, internal rotation position
- Recurrent Instability
  - The younger you are, the more likely you are to have another dislocation/subluxation event

Shoulder Instability

- Examination – as above
- Imaging – needs X-Rays and likely MRI/MRA
  - Do not attempt to reduce a dislocated shoulder unless you have been trained on how to, send to ER
  - Check axillary nerve function with touching lateral shoulder and shrug shoulder
- Treatment
  - Physical Therapy for 4-6 weeks
  - External Rotator Shoulder Sling
  - Surgery – depends on age, concomitant injuries

SLAP Tears

- Superior Labrum Anterior to Posterior Tear
- History
  - Deep posterior > anterior pain
  - Occurs at late cocking phase of throwing motion
  - Aggravated by rotational movements
  - Loss of velocity in throws

SLAP Tear

- Physical Exam
  - **<u>Anterior slide test</u>**- hands on hips, examiner push elbow superiorly with other hand on acromion
    - pain in front of shoulder, pop or click
  - **<u>O' Brien's</u>** -90 forward flex, 10-15 add, full internal rotation-push down
    - pain that is reduced with supination considered positive test- nearly 100% accurate
    - internal impingement

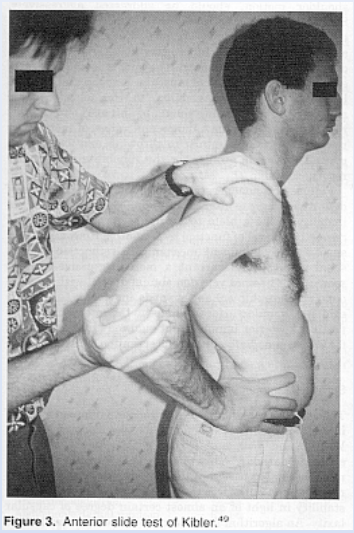


Figure 3. Anterior slide test of Kibler.[49]

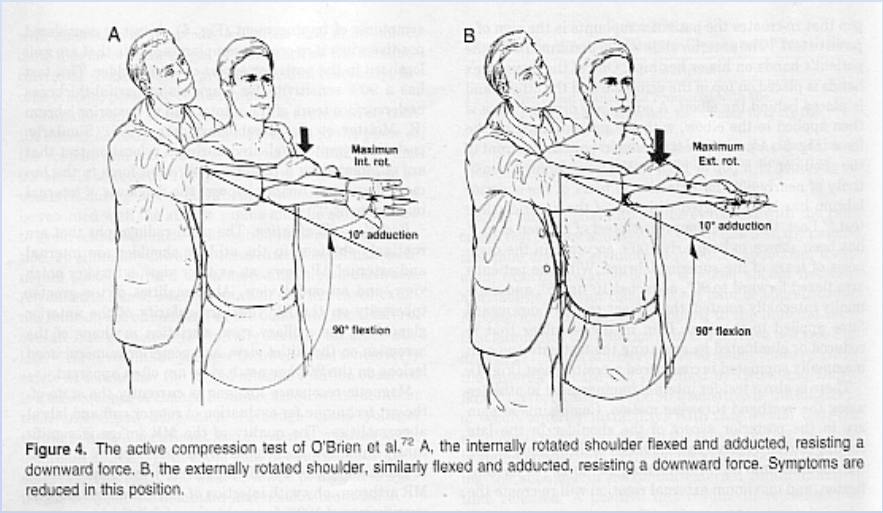
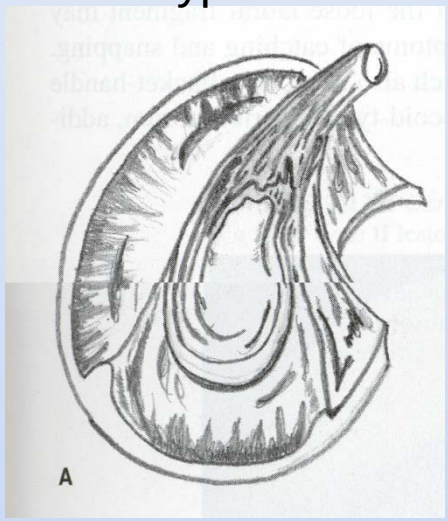


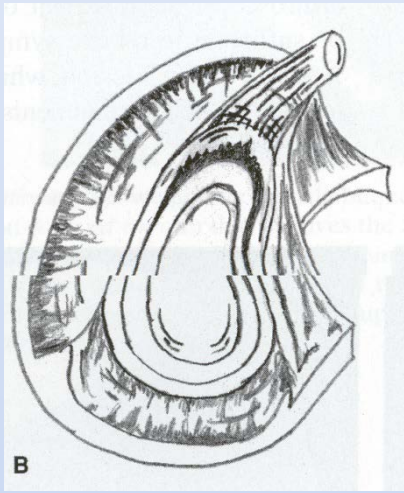
Figure 4. The active compression test of O'Brien et al.[72] A, the internally rotated shoulder flexed and adducted, resisting a downward force. B, the externally rotated shoulder, similarly flexed and adducted, resisting a downward force. Symptoms are reduced in this position.

SLAP Tears

Type I



Type II



Type III

Type IV

Treatment

- Nonoperative Treatment
  - PT, cessation from throwing with gradual progression into a return to throwing program
- Surgical
  - Type I – debride
  - Type II – repair
  - Type III – debride
  - Type IV – repair (acute), debride and tenodesis

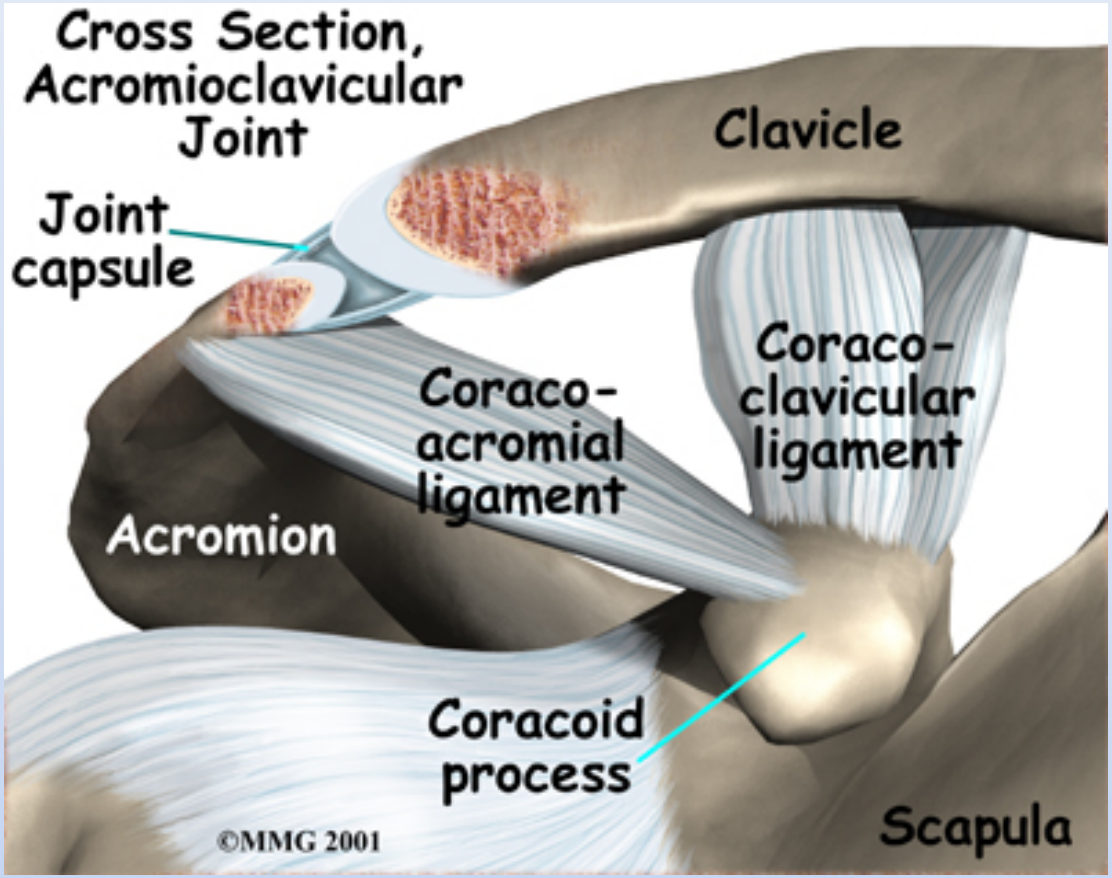
Rotator Cuff Injuries

- History
  - Anterolateral pain, worsens with overhead activity
  - Takes longer to warm-up
  - Feels ok after warm-up, pain comes later in activity
- Physical Exam
  - As above with special tests
- Imaging = X-Rays, U/S, MRI
- Treatment
  - Physical Therapy (goal is to avoid surgery)
  - >50% tear = surgery

AC Joint Injuries

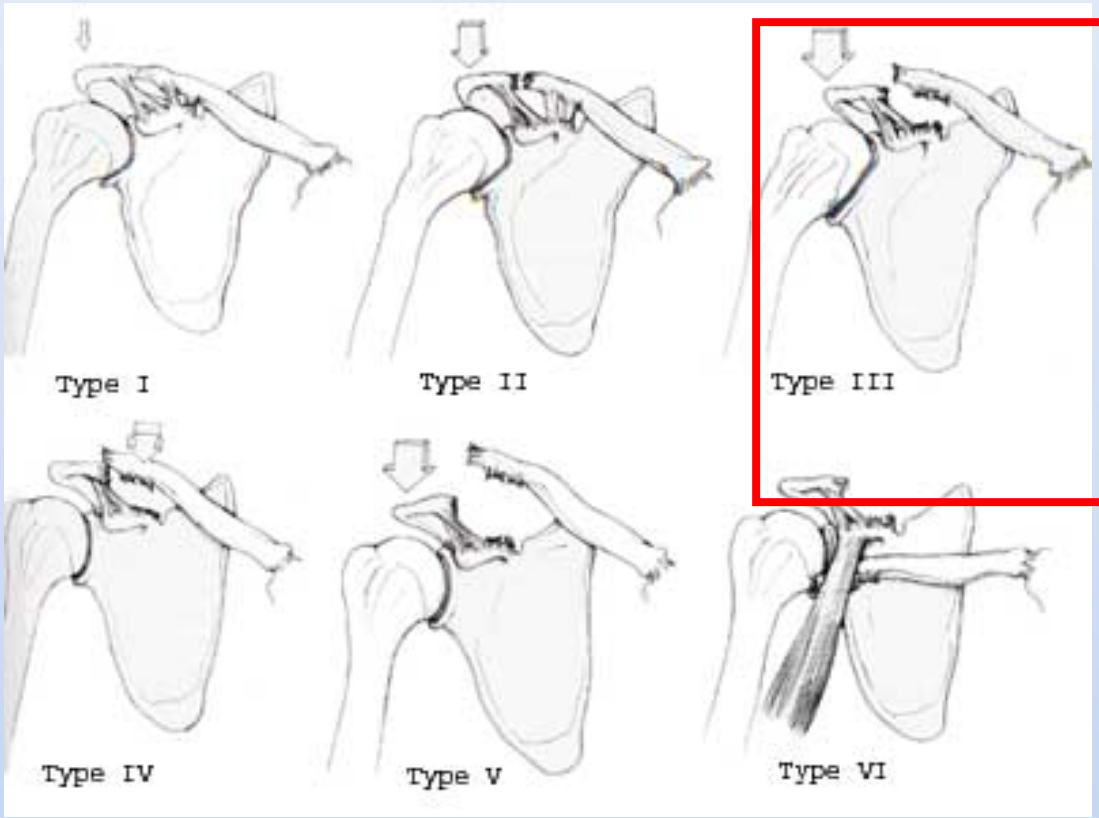
- Mechanism
  - Direct blow to AC Joint
  - Sometimes force to UE affecting AC joint
- Physical Exam
  - Pain on palpation
  - Deformity
  - Cross-Arm Adduction Test
- Imaging = X-Rays (AP, Axillary, Zanca, Stryker Notch views)
- Treatment – see next

AC Joint Anatomy



AC Joint Injuries

Allman & Tossey with Rockwood modification Classification



AC Joint Injuries

- Type I/II
  - Ice and protection until pain subsides (7 to 10 days).
  - Return to activity as pain allows (1-2 weeks)
  - No apparent benefit to the use of specialized braces (Kenny Howard)

AC Joint Injuries

- Type II
  - Avoidance of heavy lifting or unprotected contact sports for 8 – 12 weeks
  - Operative treatment is reserved for those with persistent pain
    - Osteolysis
    - Arthritis
    - Interposed capsular ligaments
    - Detached intraarticular meniscus
  - Surgical Options
    - Distal clavicle resection
    - AC reconstruction (CC ligaments)
    - Menisci debridement

AC Joint Injuries

- Type III – noncontact athletes
  - Clear non-operative indications: non-dominant shoulder of a patient who does not engage in vigorous over-head activities
  - Most surgeons recommend conservative treatment except in the throwing athlete or manual laborer
  - Need for acute surgical treatment remains very controversial
- Type III – Contact Athletes
  - Skillful neglect"
  - Repair generally avoided in contact athletes because of the risk of reinjury
  - Sling immobilization recommended for 1-2 weeks followed by progressive exercises

When to refer?

- Any primary dislocations
- SLAP tears that need work-up
- Full thickness rotator cuff tears
- Partial thickness tears that fail conservative treatment
- Grade III or greater ACJ injuries
- Any ACJ injury that failed conservative treatment

CONCUSSIONS

Texas HB 2038 (Natasha's Law)

- Bill defines who licensed healthcare professionals (MD, DO, ANP, PA) are that will develop district/school concussion oversight team
- Student and guardian must sigh a form say they received and read written information that explains concussion prevention, symptoms, treatment
- Mandates a Concussion Oversight Team with at least one PHYSICIAN WITH CONCUSSION MANAGEMENT TRAINING
- Requires students to be removed IMMEDIATELY from activity if sustained a concussion

Texas HB 2038

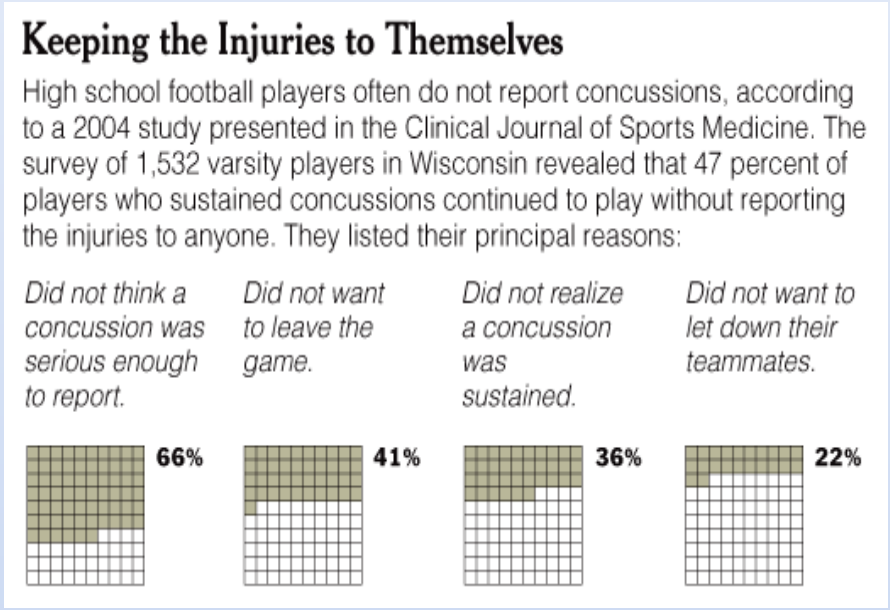
- The concussed athlete must be evaluated by a physician
- Treating physician shall sign a written statement that in his/her professional judgment, it is safe for student to start return-to-play protocol
- Coach of team may not authorize a student's return-to-play
- Provides immunity from liability for school districts/members of concussion oversight team complying with this act

Definition (Prague 2004)

- Concussion = complex pathophysiological process affecting the brain, induced by traumatic biomechanical forces
- Common features include the following:
  - Caused by direct blow to the head/face/neck/etc on body with 'impulsive' force transmitted to head
  - Typically results in rapid onset of short-lived impairment of neurologic function that resolves spontaneously
  - May result in neuropathological changes, but acute clinical symptoms largely reflect functional disturbance rather than structural injury
  - Results in graded set of clinical syndromes that +/- LOC; resolution of the clinical and cognitive symptoms typically follows a sequential course
  - Associated with grossly normal neuroimaging studies

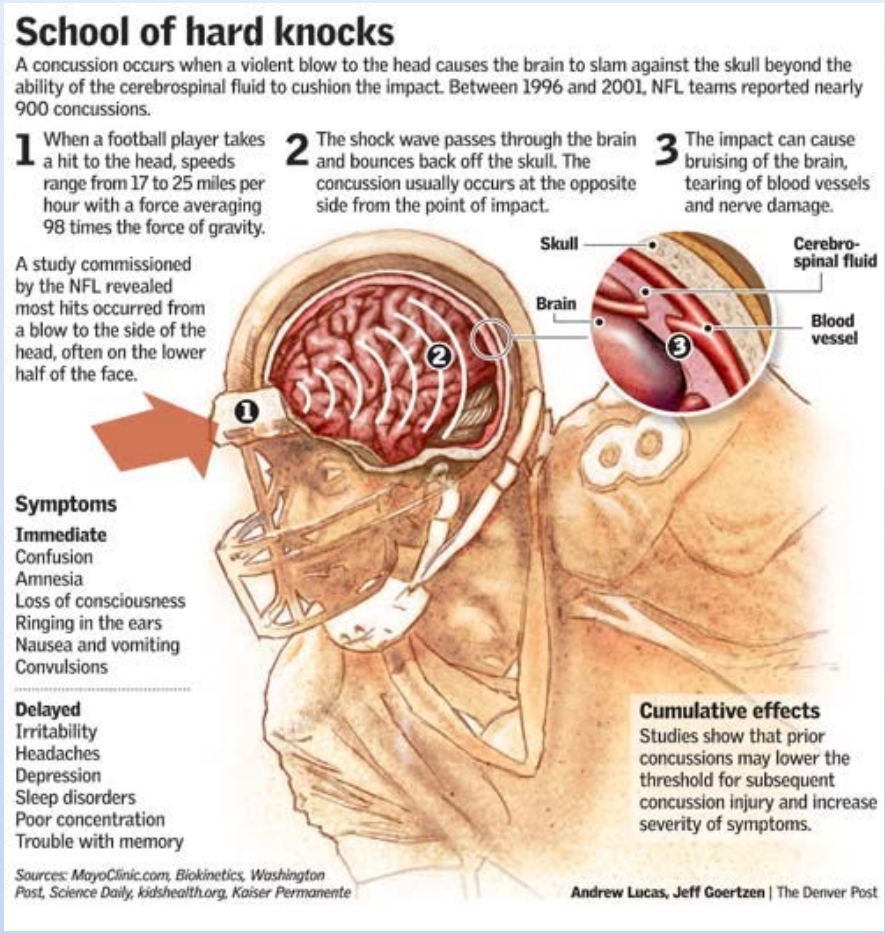
Unreported Concussions

- There is an estimated occurrence of “250,000 cerebral concussions” every year among football players in U.S. (Sallis 2000)
- Incidence of soccer related concussion in college players is probably higher than previously reported, with 40% of players reporting concussion symptoms in the past season and 10% reporting them in their last game (Sallis 2003)



Significance of LOC

- May play a role in early neurological deficits
- Does not play a role in determining severity
- Not part of criteria of classifying concussion as complex



Typical Symptoms

- Headache / “pressure” in head
- Dizziness
- Balance problems
- Nausea / vomiting
- “Dinged” “Foggy” “Dazed”
- Double vision / floaters / flashing lights
- Ringing in ears
- Emotional changes (anger, rage, laughing, crying)

Physical Signs

- Poor coordination or balance
- Convulsions / seizures
- Gait instability
- Slow to answer questions / follow commands
- Poor concentration or easily distracted
- Vacant state (“glassy eyes”)
- Slurred speech
- Inappropriate behavior

What to Look out for in School?

- Attention/Concentration Problems:
  - "Drifts off" during class
  - Hard to focus on difficult material
  - Hard to focus for long periods of time
  - Restlessness
- Difficulty with Memory:
  - Learning new information
  - Recalling previously learned information
  - Forgetful, repetitive

Evaluation

- On field/sideline
  - ABCs
  - Is patient alert, responsive to vocal/pain only, or unresponsive?
  - HPI
    - Retrograde and posttraumatic amnesia?
    - Event specifics (score, teammates, etc)
    - Signs/symptoms
  - Prior hx concussions
    - Dates?
    - Sequelae?
    - Risk Factors: intoxication, childhood, anticoagulant use, hemophilia, inadequate postinjury supervision

Evaluation (cont.)

- Associated injuries
  - Assume unstable C/S til cleared
  - Evaluate for skull fractures
  - Suspect vascular or focal injuries
- Neuro Exam
  - Orientation
  - Short-term memory recall
  - UE/LE motor/sensory/reflex
  - CNII-XII
  - Cerebellar function (finger to nose)

Initial Management

- Monitor on sideline if stable for 15-20min
- Send to emergency room IF:
  - Worsening headaches
  - More than one vomiting episode
  - Difference in pupil size
  - Vision changes
  - Slurred Speech
  - Loss of consciousness
  - Seizure Activity
  - Unstable Vital Signs

SCAT5: Sport Concussion Assessment Tool

- Combination of various other assessment tools
- Validated for content from literature and clinical experience
- More general sport oriented

SCAT5 Form

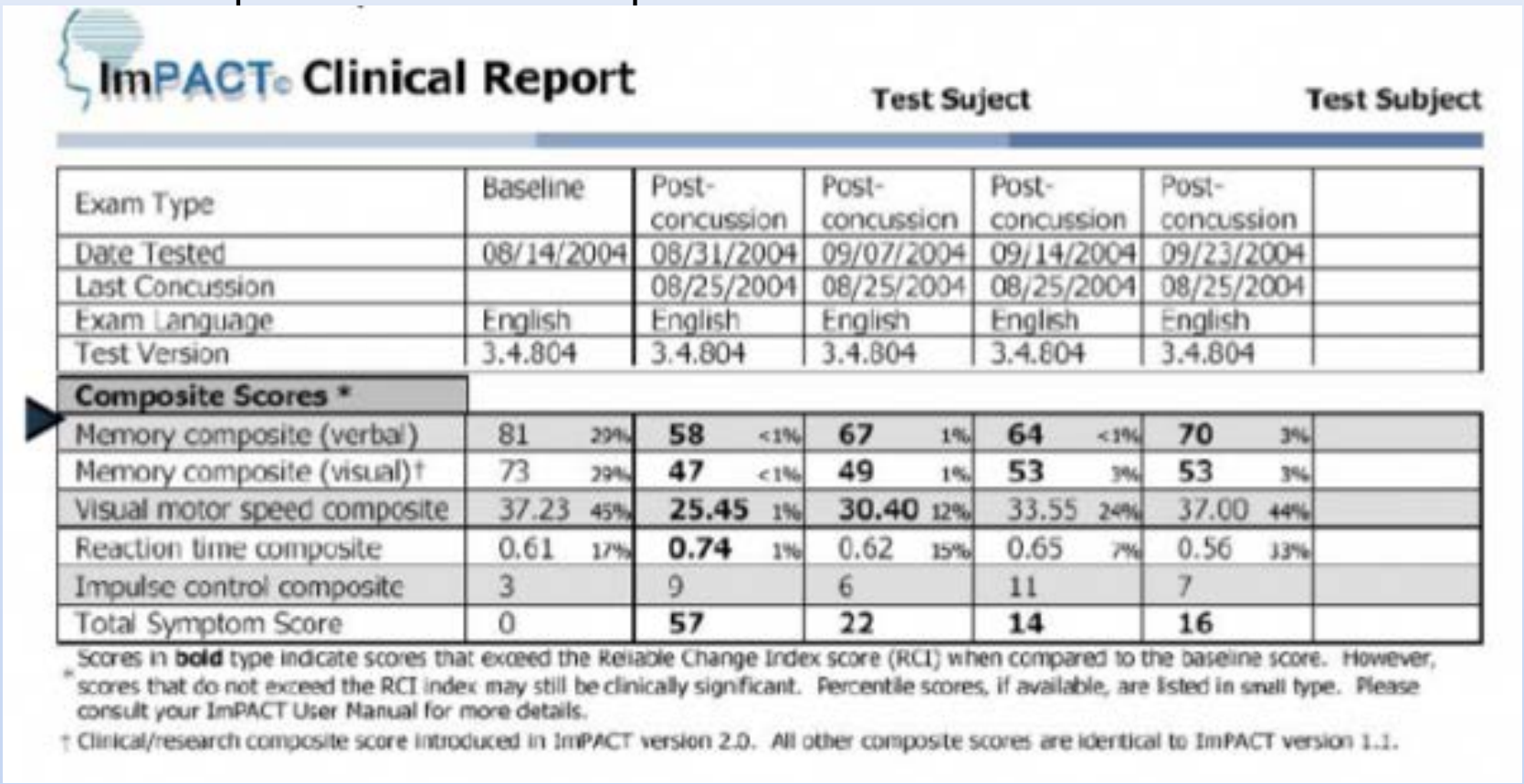
- SCAT5 Form

Neuropsychological Testing

- Should not be done while patient is overtly symptomatic
- Not used as sole basis for return-to-play
- Increased benefit if you have baseline/pre-injury test and serial f/u tests
- Non-computerized tests have no normal ranges, unknown sensitivity/specificity
- Computerized tests are more accurate, $$$$$

ImPACT

- Based out of UPMC – used by all professional sports organizations
- UT Orthopaedics uses this as part of our concussion evaluation



ImPACT® Clinical Report

Test Suject

Test Subject

Exam Type	Baseline	Post-concussion	Post-concussion	Post-concussion	Post-concussion	
Date Tested	08/14/2004	08/31/2004	09/07/2004	09/14/2004	09/23/2004	
Last Concussion		08/25/2004	08/25/2004	08/25/2004	08/25/2004	
Exam Language	English	English	English	English	English	
Test Version	3.4.804	3.4.804	3.4.804	3.4.804	3.4.804	
Composite Scores *						
Memory composite (verbal)	81 29%	**58** <1%	**67** 1%	**64** <1%	**70** 3%	
Memory composite (visual)†	73 29%	**47** <1%	**49** 1%	**53** 3%	**53** 3%	
Visual motor speed composite	37.23 45%	**25.45** 1%	**30.40** 12%	33.55 24%	37.00 44%	
Reaction time composite	0.61 17%	**0.74** 1%	0.62 15%	0.65 7%	0.56 33%	
Impulse control composite	3	9	6	11	7	
Total Symptom Score	0	**57**	**22**	**14**	**16**	

* Scores in **bold** type indicate scores that exceed the Reliable Change Index score (RCI) when compared to the baseline score. However, scores that do not exceed the RCI index may still be clinically significant. Percentile scores, if available, are listed in small type. Please consult your ImPACT User Manual for more details.

† Clinical/research composite score introduced in ImPACT version 2.0. All other composite scores are identical to ImPACT version 1.1.

Treatment

- Complete mental and physical rest
  - May need to be pulled out of school for this!
  - No running, jogging, horseplay
  - No TV, no computers, no reading
  - Adjust restrictions per MD
- No alcohol, driving, NSAIDs
- Tylenol or Codeine for headaches
- Medication Management – off label vs. on label use
- Close follow-up by physician

School Modifications

- Notify principal, counselor, nurse of injury
- Accommodations for school
  - Half-day or no school
  - Frequent rests/breaks in nurses' office
  - No driving to/from school
  - Elevator pass
  - Not attending PE/workout classes
  - Workload/homework reduction
  - Extra time or postponement of tests/quizzes
  - Home Bound School

School Accommodations

- Repeating new information
- Delayed assignments
- Checklists for end of day to do at home
- Quiet environment
- Preferential seating in classroom

Concussion Signs in School

- Increased problems paying attention/concentrating
- Increased problems remembering or learning new information
- Difficulty organizing tasks
- Inappropriate/impulsive behavior
- Greater irritability
- Answers questions slowly
- Forgets class schedule/work assignments

Return to Play Protocol

- Must be asymptomatic for 24hrs to start and subsequently progress to next step (in 24hr intervals)
- If symptomatic, go to previous step for 24hrs

1. Light aerobic exercise, no resistance training (5-10 minutes on an exercise bike or light jog)
2. Moderate aerobic exercise (15-20 minutes of running without equipment)
3. Non-contact training in full uniform (may begin weight lifting, resistance training)
4. Progress to more complex, sport specific drills.
5. Full contact training after medical clearance
6. Full Game play

References

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THANK YOU

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