

### Viewing Time

The program will take up to one hour to complete.

### Target Audience

This program is designed for primary care physicians.

Other health care professionals working with patients and their families may also find this program of interest.

### Faculty Disclosure

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### Faculty Disclosure

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During this educational activity **Dr. Biltz** will not be discussing the use of any commercial or investigational product not approved for any purpose by the FDA.

### Functional Approach to the Management of Sports Injuries

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### Functional Approach to the Management of Sports Injuries

*A lecture presenting the importance of assessing an injury, recognizing at risk findings, identifying common features of joint effusion, and identifying the 4 functional stages for injury management.*

## Program Objectives

*Upon completion of this program, participants should be able to:*

- Assess an injury based on functional loss.
- Identify common features of joint effusion.
- Recognize at risk findings on exam.
- Identify the 4 functional stages for injury management.

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## Receiving CME Credit

To receive CME credit you must view the entire program and complete the evaluation form at the end.

## A Functional Approach to Sports Injuries

Dr. George R. Biltz, March 18, 2008

Children's Emergency Department  
School of Kinesiology, University of MN

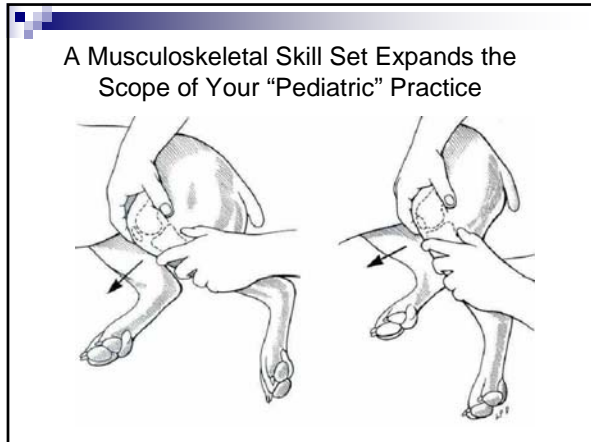


Lachman's test for anterior cruciate ligament



## Reasons for Developing a Musculoskeletal Skill Set:

- Sports injuries accounted for 41% of all musculoskeletal injuries treated in ED. (Ped. Emer. Care 19(2):65-76, 2003)
- Musculoskeletal problems estimated to be 10-15% of general pediatric practice.
- Pediatric residency programs survey reported only 37% had hands-on teaching in Sports Medicine. (Pediatrics 115(1): 28-33, 2005)
- Chief residents reported that 29% of programs did not include musculoskeletal examination teaching in their curriculums. If so, it was the most poorly taught. (ibid)



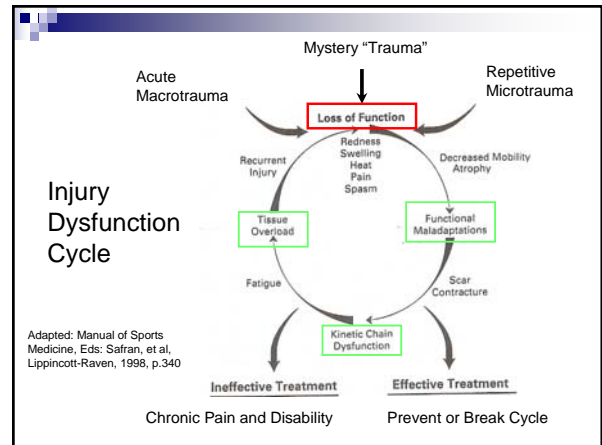
**Functional Orientation**

There are 3 basic questions for any sports injury:  
 What is the problem?  
 What can be done about it?  
 When can she/he return to participation?

My goal is to help you answer those questions by developing a functional approach to sports injuries.

*What's the Problem?*

- Our first goal is NOT to NAME the problem!
- Our fundamental clinical role is to manage uncertainty:  
 Our uncertainty about the problem  
 Parent/Patient uncertainty about the problem
- Our first goal is to determine the **functional loss** - that's the problem.



**Key Features of Functional Loss:**

- History of the injury and loss – think mechanically
- Reported pain - location, pattern, trend
- Appearance – deformity, discoloration, swelling, inflammation
- Active range of motion – strength against gravity

Compare findings to the opposite side

### Key Features of Functional Loss:

- Palpable exam – sites of pain, joint effusion, swelling, heat, muscle spasm
  - Passive range of motion - if loss of active rom
  - Weight bearing or tested strength
  - Joint specific functional tests – SM skill set
- Compare findings to the opposite side

### Managing the Uncertainty:

- What is the best explanation for the functional loss: macro-, micro-, mystery?
- Is the loss stable or progressive?
- Is the problem inside or outside of the involved joint? ( names of potential dx?)
- Will an X-ray or MRI be helpful?
- Do I need help managing the apparent uncertainty? (mine or parent's/patient's)

*Is the problem inside or outside the joint?*

Joint Effusion as a Marker for  
Intra-articular Problems:

loss of contour  
loss of ROM  
rapid onset suggests  
hemarthrosis  
fluid wave at knee  
patella “floats” in ext.



*Is the problem inside or outside the joint?*

Upper Extremity Assessment:

Fingers and Hand – flex, extend, spread fingers  
make finger-thumb circle, make fist

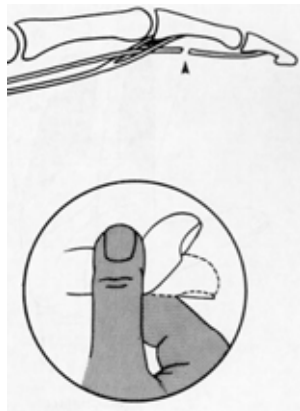
Wrist - flex, extend, pronate & supinate  
forearm ( pain at either end of radius)

Elbow – flex, extend (“sprains” are unlikely!)

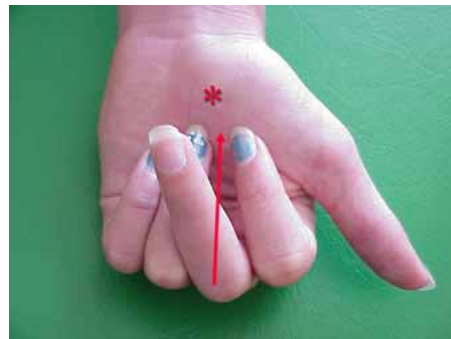
Shoulder- range of motion in 8 directions  
rotator cuff - abduction, int./ext. rotation  
instability - multidirectional / unidirectional  
SLAP – glenoid labral tear

## Risk Features to Recognize on Exam:

### Loss of Finger Tip Flexion



### Rotational Deformity

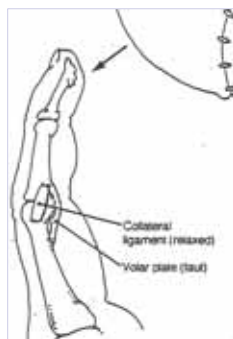


## Risk Features to Recognize on Exam

### Mallet Finger



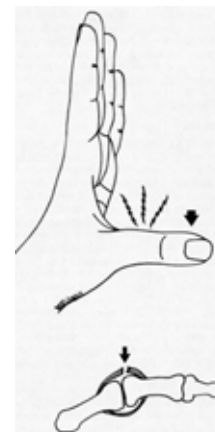
### Volar Plate



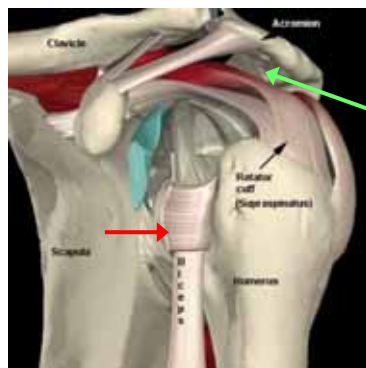
### Boutonniere Deformity



### Skier's Thumb



Impingement Syndrome - inflammation of →  
supraspinatus tendon  
Biceps Tendonitis →



Overhead “throwing” motion –  
tennis serve, volleyball spike

### Functional Tests at the Shoulder

Impingement:

Neer’s test (arm overhead  
internal rotation)

Hawkin’s sign (abduct, int. rotate)



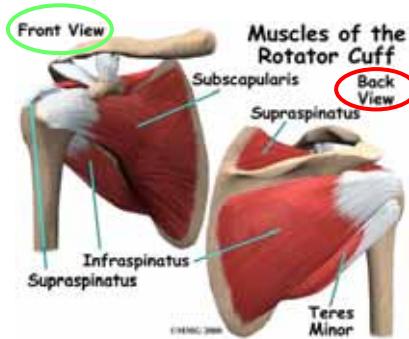
Biceps

Tendonitis:

Speed’s test



Rotator Cuff Tendinitis: abduct - supraspinatus  
external rotation - infraspinatus, teres minor  
internal rotation - subscapularis



## Functional Tests at the Shoulder

Supraspinatus test



Thumb should point  
down to floor

External Rotation: arm at  
side, elbow flexed 90 degrees

Internal  
Rotation:

Lift-off test

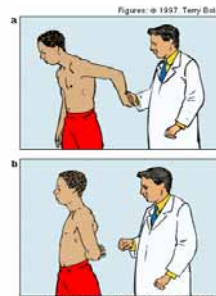
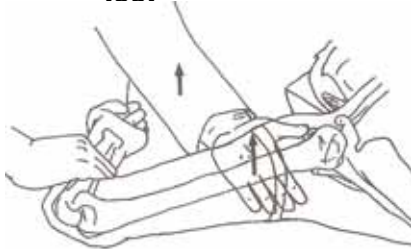


Figure 4. The subacromioclavicular joint is normal (a) when the patient can maintain the arm in a fully abducted, maximally externally rotated position with the thumb flexed against resistance. It is abnormal (b) when the patient is unable to move the back of the hand away from the back because of subacromioclavicular joint tear.

## Functional Tests at the Shoulder

Instability:  
Apprehension  
test



External rotation with  
pressure duplicating  
anterior dislocation

SLAP - superior labrum  
anterior posterior:  
O'Brien's test



## *Is the problem inside or outside the joint?*

Lower Extremity Assessment:

- Ankle – flex, extend, ext. rotation at 90 deg.  
lateral and medial ligaments + malleoli,  
Achilles tendon,  
drawer sign for stability
- Knee – collateral and cruciate ligaments,  
meniscal assessment  
patella: glide, tendons and attachments
- Hip – flex, extend, int. and ext. rotation

### Functional Tests at the Ankle



Drawer Test

Syndesmosis Test



### Functional Tests at the Knee

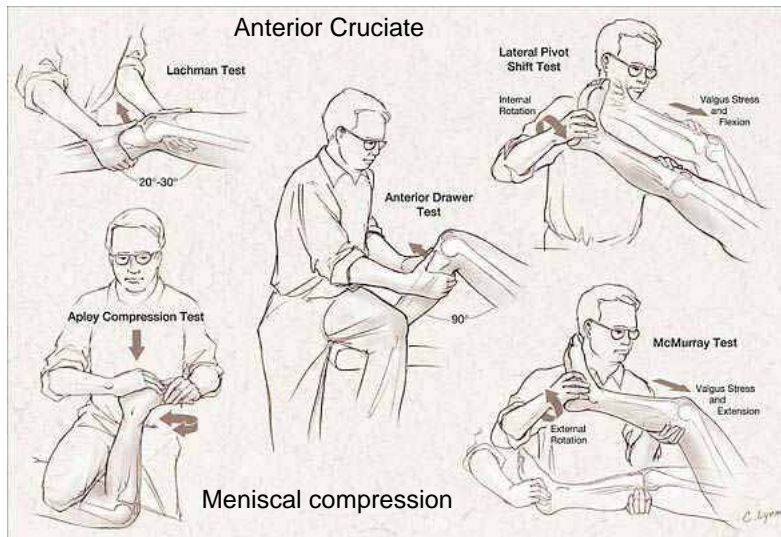


Medial Collateral Lig.



Lateral Collateral Lig.

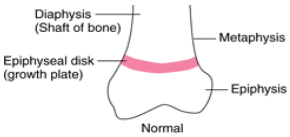
## Functional Tests for Intra-articular Knee Problems



### *Will an X-ray be helpful?*


- Assess joint effusion – intra-articular injury
  - articular fractures - Salter Harris II-IV, VI
  - osteocondritis dessicans
  - avascular necrosis – Legg Perthes
  - cruciate ligament avulsion
- Peri-articular pain and swelling – physeal fx.
  - Salter-Harris fractures I , V (compression)
  - torus fx.
  - tendon avulsion fx.

### Will an X-ray be helpful?




Diaphysis (Shaft of bone)  
Metaphysis  
Epiphyseal disk (growth plate)  
Epiphysis

Normal




Type I

A complete physeal fracture with or without displacement




Type II

A physeal fracture that extends through the metaphysis, producing a chip fracture of the metaphysis, which may be very small




Type III

A physeal fracture that extends through the epiphysis




Type IV

A physeal fracture plus epiphyseal and metaphyseal fractures




Type V

A compression fracture of the growth plate

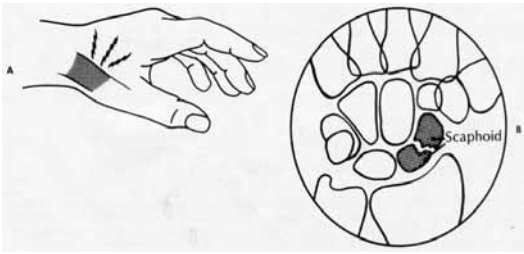


### Will an X-ray be helpful?

**Focal pain over distal radius – Salter I**  
 [ Recall: distal radial and ulnar physes close concurrently.]



**Focal pain in “snuff box” or on volar scaphoid tubercle – scaphoid fx.**



## Elbow Epiphyseal Centers: X-ray visibility order

CRITOE: 1,3,5,7,9,11

Capitellum, Radius, Int. epicondyle, Trochlear, Olecranon, Ext. epicondyle



## Risk Feature to Recognize at Elbow: posterior fat pad sign



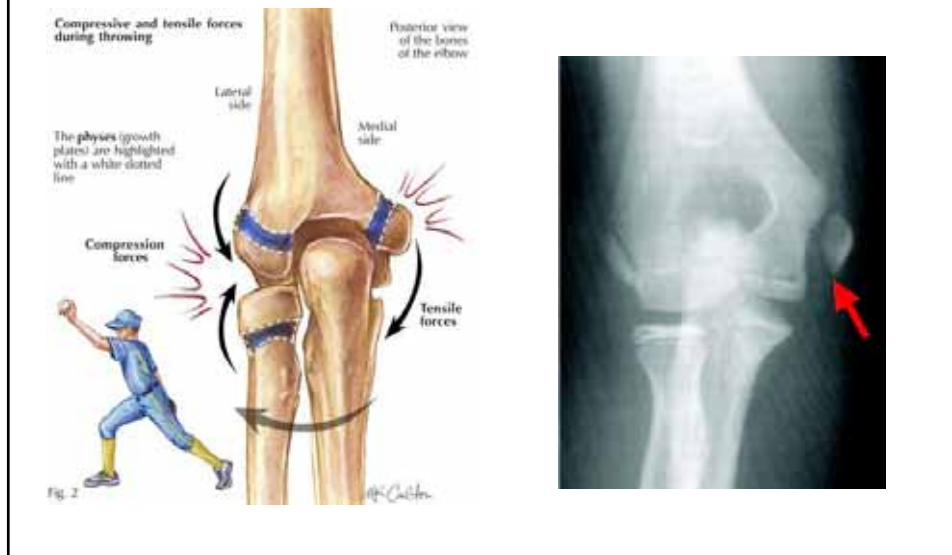
Anterior Humeral Line: abnormal if it intersects anterior 1/3 of capitellum



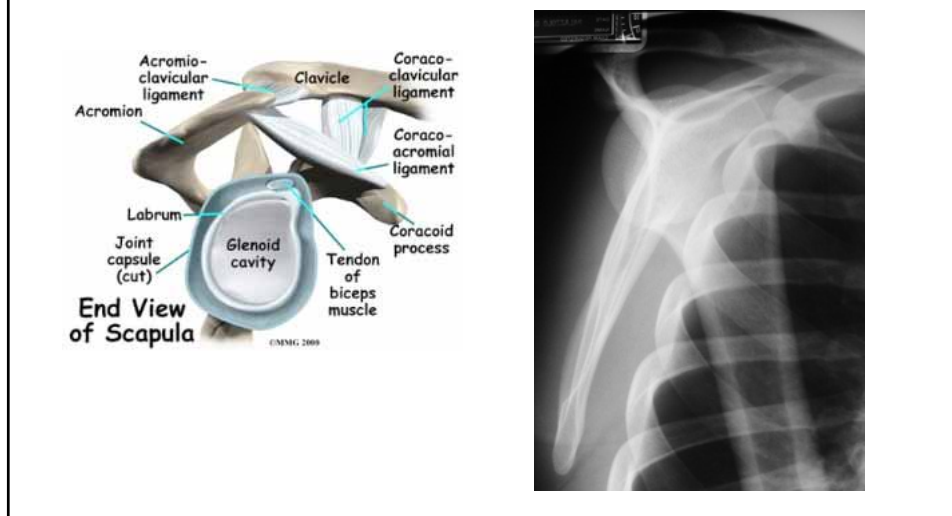
Radiocapitellar Line: radial axis aligns with middle of capitellum



## Medial Epicondyle Avulsion Fracture



## Helpful Shoulder View - Y View for Glenohumeral Alignment



*Will an X-ray be helpful ?*



Osgood-Schlatter's



Osteochondritis dissecans

*Will an X-ray be helpful ?*



Figures – Radiologists and orthopedists refer to the Klein line (a line drawn medially from the superior portion of the femoral neck through the head of the femur) when making a diagnosis of SCFE. If the Klein line does not intersect the femoral head on either the AP or frog-leg lateral view, then SCFE is likely.  
(Images courtesy of William Yach, MD)

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Diagnosis?

### *What can be done about it? 4 Moves*

- Stabilization and Referral- Obvious Problem
- Staged Reassessment :4 Functional Stages
  - Limit acute pain, swelling, and re-injury
  - Re-establish range of motion, proprioception
  - Regain strength throughout ROM
  - Progress to sport specific activities
- Reassurance and Recheck if Changing
- Work-up “Mystery Trauma”

### *When can she/he return to participation?*

#### Staged Reassessment : 4 Functional Stages

- Limit acute pain, swelling, and re-injury
- Re-establish range of motion, proprioception
- Regain strength throughout ROM
- Progress to sport specific activities and demands

Recovery stages are the same but rate of progress varies – degree of injury, individual...  
Injuries do not come with expiration dates!

### Staged Reassessment : 4 Functional Stages

#### 1. Limit pain, swelling, re-injury and dysfcn. cycle

Clinical moves 48-72  
hours:

Ibuprofen

Ice massage

Elevation

Sling/splint - removeable

Off weight bearing

Follow-up X-ray results



### Staged Reassessment: 4 Functional Stages

#### 2. Re-establish range of motion and proprioception

Clinical moves 3 - 5 days:

Warmth (if swelling has improved)

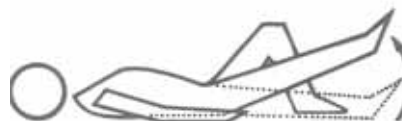
Relax muscle tightness (massage)

Pattern and extend ROM

Warmth-ROM-ice massage repeats

Partial weight bearing

Isometric muscle tension  
(straight leg lifts at knee)



### Staged Reassessment : 4 Functional Stages 3. Regain strength throughout ROM

Clinical moves 5 -10 days:

Strength against gravity upper extrem.

Elastic resistance / small weight

Advance weight bearing lower extrem

Non-impact activities (exercise bike)

Body weight activities of daily life

Reassess functional capacity (office)



Figure 1. Showing bike set up with saddle at correct height at top (A) and bottom (B) of pedal stroke.

### 3. Regain strength throughout ROM

Elastic resistance exercises rotator cuff



Internal rotation muscle?



External rotation muscles?

### Staged Reassessment : 4 Functional Stages 3. Regain strength throughout ROM

Wall Sits



Single Leg  
Knee Dip



### Staged Reassessment : 4 Functional Stages 4. Progress to sport specific activities

Clinical moves 10 -14 days

Demonstrated functional readiness

Approve return to conditioning

Transfer follow up to team trainer

Protect joint during return

Not Improving:

Further evaluation – MRI ?

Referral Physical Therapy



Staged Reassessment : 4 Functional Stages  
4. Progress to sport specific activities



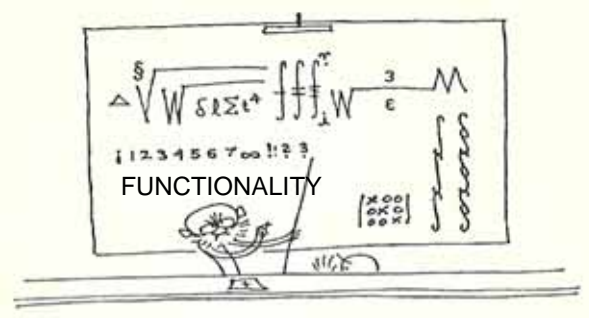
Single Foot Toe Raise



Duck Walk

4. Progress to Sport Specific Activities:  
Protect joint during return to full activity  
Variety of ankle and knee braces





A cartoon illustration of a man with glasses and a mustache, wearing a suit, pointing at a whiteboard. The whiteboard is filled with nonsensical symbols and characters, including a triangle, a square root symbol, and various letters and numbers. The word "FUNCTIONALITY" is written on the board. Below the whiteboard, the text "WIDE ROAD" is written, followed by a quote: "To make a name for learning when other roads are barred, take something very easy and make it very hard."

FUNCTIONALITY

WIDE ROAD

To make a name for learning  
when other roads are barred,  
take something very easy  
and make it very hard.

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