

Shoulder Joint

Basic Structures:

- Clavicle
- Scapula
- AC joint
- Proximal humerus
- Greater tuberosity
- Rotator cuff muscles

http://commons.wikimedia.org/wiki/File:Shoulderjoint.PNG

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Acromioclavicular Injury

Young, active person with **direct fall onto shoulder**

S/S: -pain at top of shoulder, radiates to neck
 -**tender, swollen AC joint**, decreased ROM
 -positive crossover test

Dx: -clinical, x-rays if unsure

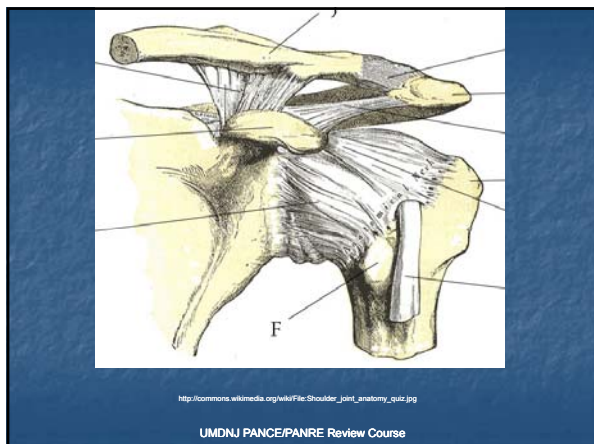
Tx: -ice, sling 2-4 wks, NSAIDs, early ROM
 -grades IV-VI f/u with orthopedic surgeon

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Grading Scale for AC Injury

I- contusion/sprain of AC joint
 II- rupture of AC ligament
 III- minor displacement of clavicle
 IV-VI- coracoclavicular ligament rupture, significant displacement of clavicle

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Clavicle Fracture

Most common bone fractured in children, due to direct trauma (sporting events) or fall on outstretched hand

S/S:

- pain over clavicle, possible deformity or tenting of skin
- decreased shoulder ROM
- document pulses, sensation, strength
- most fractured at middle 1/3

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Clavicle Fracture cont'd

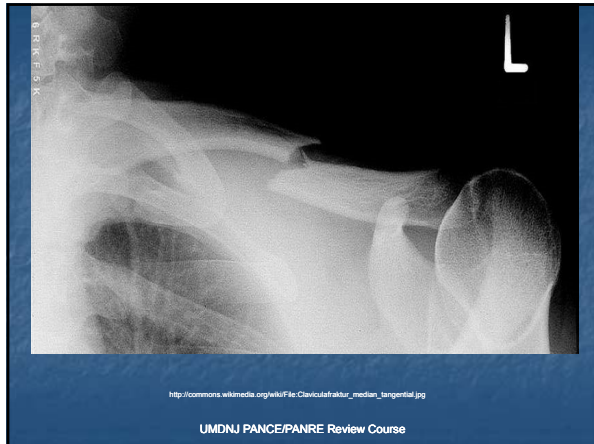
Dx:

- clavicle x-ray, if medial 1/3 fractured, study for subclavian artery or intrathoracic injury

Tx:

- sling or figure of 8 splint, 3-4 wks
- after 3-4 wks start range of motion

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Rotator Cuff

SITS Muscles

- S**upraspinatus
(most commonly injured)
- I**nfraspinatus
- T**eres Minor
- S**ubscapularis

Top 3 insert on the greater tuberosity

The diagram, titled "The Shoulder Joint", shows the following structures: Acromion, Acromioclavicular (AC) joint, Clavicle, Bursa, Rotator Cuff (comprising Supraspinatus, Infraspinatus, Teres Minor, and Subscapularis), Humerus, and Biceps muscle. It also labels the Glenohumeral joint and Scapula.

<http://upload.wikimedia.org/wikipedia/commons/9/90/Shoulderjoint.PNG>

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Rotator Cuff Disorders

Chronic, overhead work or fall on hand. Pain begins as inflammation, then becomes impingement then progresses to tear

S/S: -pain at greater tuberosity, lateral shoulder
-pain and difficulty abducting arm
-positive Neer impingement sign

Dx: -MRI

Tx: -rest, ice, NSAIDs, PT, steroid injection
-if no better after 6-12 wks, consider surgery

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Biceps Tendonitis

Caused by overuse of the biceps muscles, usually heavy or excessive lifting

S/S: -presents as anterior shoulder pain
-bicipital groove tenderness
 -pain with resisted supination of forearm

Dx: -clinical, x-ray to r/o other injury

Tx: -rest, ice, sling, NSAIDs, steroid injection-
 not into tendon sheath

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The Shoulder Joint

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Proximal Humerus Fracture


Fall onto outstretched hand, common in elderly women with osteoporosis

S/S: -pain, swelling proximal humerus with decreased shoulder ROM
 -evaluate axillary artery/nerve

Dx: -x-ray (Y-view to r/o dislocation)

Tx: -sling and swath 4 wks, early ROM
 -surgery if head displaced or compound fx

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Proximal Humerus Fracture

Impacted, stable fracture

http://upload.wikimedia.org/wikipedia/commons/2/20/Surgical_neck_fracture_of_humerus.jpg

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Shoulder Dislocations

Fall on externally rotated, abducted arm
(trying to catch self while falling)

S/S: -present with arm abducted and in ER
-shoulder appears "squared off"
-evaluate axillary nerve and artery

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Shoulder Dislocations cont'd

Dx: -x-ray (A/P, lateral, Y-view)
-**97% are anterior dislocations**, posterior RARE (usually due to electric shock or seizure)

Tx: -**immediate** closed reduction with post-reduction x-ray
-sling/swath 4 wks, start ROM at 2 wks

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A patient c/o right shoulder pain after a fall. He has no weakness but a + crossover test. What is the most likely diagnosis?

1. Acromioclavicular injury
2. Adhesive capsulitis
3. Biceps tendonitis
4. Rotator cuff rupture

Diagnosis	Percentage
Acromioclavicular injury	87%
Adhesive capsulitis	1%
Biceps tendonitis	3%
Rotator cuff rupture	10%

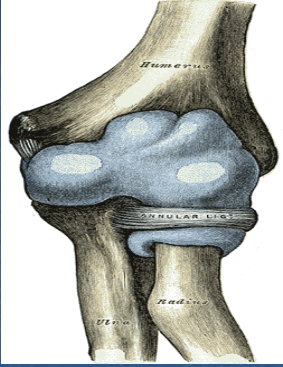
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Of the SITS muscles, which is most likely to be torn?

1. Infraspinatus
2. Subscapularis
3. Supraspinatus
4. Teres minor

Muscle	Percentage
Infraspinatus	1%
Subscapularis	3%
Supraspinatus	95%
Teres minor	1%

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Elbow Joint

Basic Structures:

- Proximal ulna
- Proximal radius
- Distal humerus
- Radial nerve
- Ulnar nerve

http://upload.wikimedia.org/wikipedia/commons/7/73/Grey311.png

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Lateral Epicondylitis
(Tennis Elbow)

Overuse-repetitive supination and wrist extension

S/S: -point tenderness over lateral epicondyle, pain on resisted wrist extension

Dx: -clinical, x-ray to r/o arthritis or loose body

Tx: -rest, ice, NSAIDs, counter force strap, steroid injection

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Medial Epicondylitis
(Golfer's Elbow, Pitcher's Elbow)

Overuse-repetitive wrist flexion and pronation

S/S: -point tenderness over medial epicondyle, pain on resisted wrist flexion

Dx: -clinical, x-ray to r/o arthritis or loose body

Tx: -rest, ice, NSAIDs, steroid injection, stretching exercises

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Supracondylar Fracture

Common in children, caused by direct blow or fall on outstretched hand

S/S: -pain and swelling over distal humerus
-evaluate radial/ulnar nerve and artery

Dx: -x-ray, **look for posterior fat pad sign**
-bilateral x-rays helpful

Tx: -non-displaced- long arm cast
-displaced- refer to surgeon

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Radial Head Fracture

Result of a **fall on outstretched hand**

S/S: -present splinting in flexion
-swelling and diffuse elbow pain over lateral elbow

Dx: -x-ray, look for **posterior fat pad sign**
(demonstrates blood in joint)

Tx: -non-displaced or occult- sling 2-4 wks

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Wrist and Hand

Basic Structures:

- Distal radius
- Distal ulna
- Carpals
- Metacarpals
- Phalanges

Radial artery Ulnar artery

http://upload.wikimedia.org/wikipedia/commons/1/1c/Gay1237.png

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Colles Fracture
(distal radius fracture)

Elderly person, fall on an outstretched hand

S/S: -swelling, tenderness and contusion over distal radius/ulna
-appearance often called a **“silverfork” deformity**

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Colles Fracture cont'd

Dx: -x-ray, distal radius fracture with dorsal angulation (Smith's fx- distal radius fracture with volar angulation)

Tx: -closed reduction and cast 6-8 wks
-if intra-articular requires surgery

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Gamekeeper's Thumb
Thumb forced into radial deviation,
stresses ulnar collateral ligament (ski pole)

S/S: -pain with radial stress of thumb

Dx: -radial deviation > than opposite side

Tx: -partial lig. rupture- thumb spica cast
-complete lig. rupture- ORIF

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Scaphoid Fracture
Most common carpal fracture, due to fall on
outstretched hand

S/S: -**snuff box tenderness**, pain with ulnar
deviation of the wrist
-high index of suspicion with negative x-rays

Dx: -x-ray, all views may be negative
-bone scan will confirm diagnosis

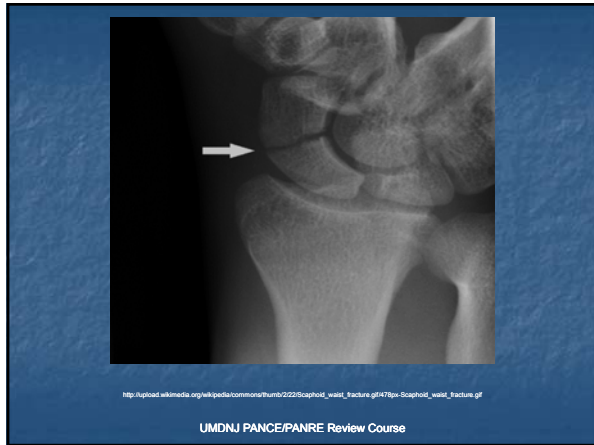
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Scaphoid Fracture cont'd

Tx: -non-displaced- thumb spica cast 6-20 wks
-if suspect- immobilize and repeat x-ray in 1 wk or r/o with bone scan

High non-union rate with waist and proximal fractures

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Boxer Fracture

Closed fist injury, usually a wall or person

S/S: -swelling, tenderness over 4th/5th metacarpals

Dx: -x-ray, fracture of neck of metacarpal with volar angulation

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Boxer Fracture cont'd

Tx: -closed reduction and **ulnar gutter splint**

-close f/u for loss of reduction

Always suspect "**closed fist syndrome**";
punch to teeth= human bite= OR + IV antibiotics.

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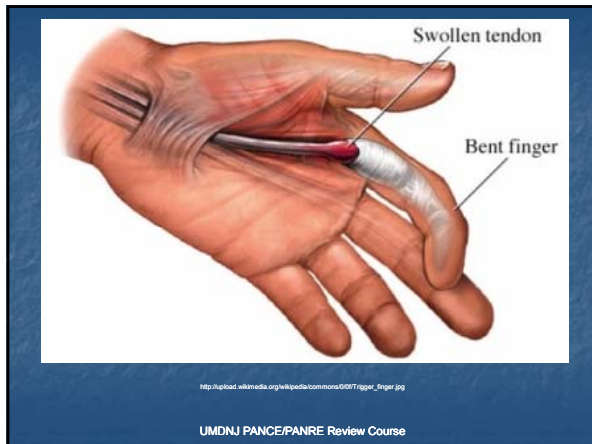
http://upload.wikimedia.org/wikipedia/commons/thumb/3/3f/Boxer_fracture.JPG/450px-Boxer_fracture.JPG

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de Quervain's Tenosynovitis
Overuse due to **repetitive gripping**
S/S: -pain along radial aspect of wrist
-**positive Finkelstein test**
Dx: -clinical
Tx: -thumb spica splint for rest, NSAIDs, steroid injection
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Trigger Finger
Stenosing tenosynovitis
S/S: -**painless nodule in flexor tendon**
-snap when tendon passes thru sheath
Dx: -clinical
Tx: -steroid injection into tendon sheath
-surgical release
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Carpal Tunnel Syndrome

Median nerve compression, due to repetitive wrist flexion

S/S: -numbness and night-time pain in thumb, index and middle finger
- +/- thenar muscle wasting (late in disease)
-positive Phalen & Tinel sign

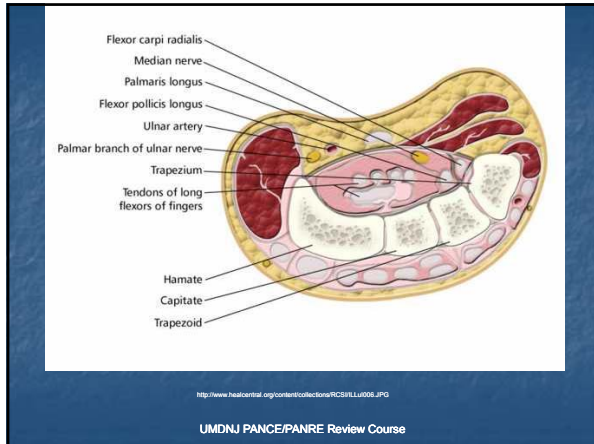
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Carpal Tunnel Syndrome cont'd

Dx: -clinical, EMG/NCV if unsure of diagnosis

Tx: -night-time splinting, steroid injection, surgical release

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A new mother presents with pain on the radial aspect of her wrist when she picks up her baby. What test on physical exam will most likely be positive?

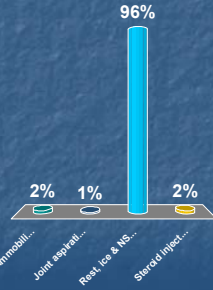
- ✓ 1. Finkelstein test
- 2. Neer sign
- 3. Phalen maneuver
- 4. Tinel sign

Option	Percentage
Finkelstein test	90%
Neer sign	4%
Phalen maneuver	2%
Tinel sign	3%

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A patient c/o medial elbow pain when he flexes his wrist. He is a big golfer, what is your treatment plan?

1. Elbow immobilization
2. Joint aspiration
3. Rest, ice & NSAIDs
4. Steroid injection

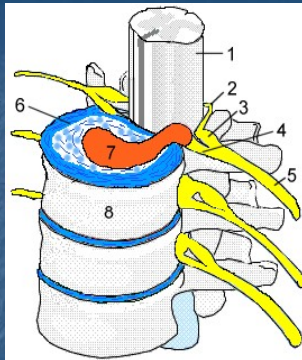


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Spine

Basic Structures:

- Vertebral bodies
- Spinal cord
- Nerve roots
- Vertebral discs



<http://upload.wikimedia.org/wikipedia/commons/1/19/Discusprolaps.jpg>

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Cervical Fracture

50 % of all C-spine injuries are **due to MVA**

S/S: -posterior midline tenderness, focal neurological deficits

Dx: -**lateral x-ray picks up 90%** of fractures
-most injuries occur at C4-6

Tx: -immobilization and surgical fixation

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Ankylosing Spondylitis
Chronic inflammatory disease affecting the spine
Males > Females, usually presents in early adulthood

S/S: -initial c/o diffuse low back pain with morning stiffness
-early exam often negative
-progresses to ↓ spine mobility and limited chest expansion


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Ankylosing Spondylitis cont'd

Dx: -x-ray- early shows sacroiliitis, late shows classic **bamboo spine**
-90% HLA-B27 "+", usually RF "-"

Tx: -PT for flexibility, NSAIDs and posture management

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Ankylosing Spondylitis
Bamboo Spine

http://upload.wikimedia.org/wikipedia/commons/thumb/0/0f/Bamboo_spine_ankylosing_spondylitis.jpg/427px-Bamboo_spine_ankylosing_spondylitis.jpg

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Kyphosis

Progressive increase in dorsal curve of T-spine due to collapse of vertebrae
Causes: osteoporosis, cancer, trauma, fracture

S/S: -present with pain from acute fracture or deconditioning of back muscles
-gradual loss of height
-hunchback deformity w/ ↓ mobility

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Kyphosis cont'd

Dx: -clinical
-x-ray may show narrow disc spaces, osteoporosis and old or new fractures

Tx: -PT for strengthening exercises, analgesics, light support
-Kyphoplasty for new fractures

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Scoliosis

Idiopathic lateral curvature of spine > 10°, often diagnosed in pre-adolescent girls

S/S: -often asymptomatic and discovered on routine exam
-painless spinal asymmetry
-paraspinal hump, uneven shoulders and iliac crests

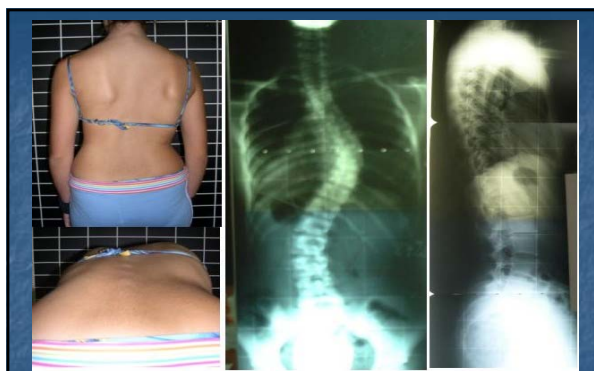
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Scoliosis cont'd

Dx: -clinical and x-ray to measure Cobb angle

Tx: Treatment depends on angle and age
-< 20° observation only
-20°- 40° treated with brace
-> 40° should be evaluated surgically

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http://upload.wikimedia.org/wikipedia/commons/a/3/Initial_diagnosis_of_scoliosis_with_adams_test_and_x-ray.jpg

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Low Back Pain

80% of US population will have episode of back pain, caused by overuse- heavy lifting/twisting

S/S: -low back pain that may radiate to buttock or leg, worse with long periods of standing
-tenderness over paraspinal muscles and ↓ lumbar ROM

-neurologic exam will be normal

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Low Back Pain

Dx: -clinical
-x-ray to r/o other causes, especially if symptoms persist

Tx: -rest, ice/heat, NSAIDs, PT education
-narcotics and muscle relaxants for short period of time (3 days)

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Herniated Disc

Can be cervical or lumbar, usually due to DDD or recurrent trauma

S/S: -**pain in nerve distribution**, worse with flexion or valsalva
-may have motor weakness and diminished reflexes
-Lumbar disc = "**+**" **straight leg raise** and crossed straight leg raise

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Herniated Disc

Dx: -MRI

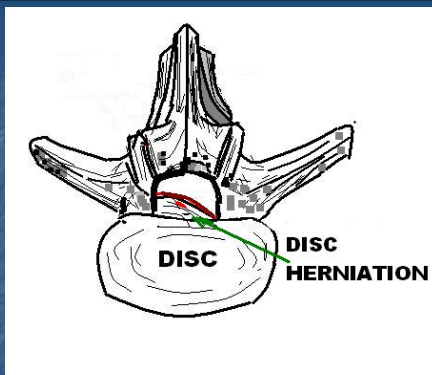
Tx: -rest, ice/heat, NSAIDs, PT education, epidural steroid injections
-consider surgery if symptoms not resolved in 6-12 weeks

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Dermatomes

Nerve Root	Motor exam	Reflex	Sensory Area
L4	Dorsiflexion of foot	Knee jerk	Medial calf & foot
L5	Dorsiflexion of great toe	None	Lat. calf & dorsal foot
S1	Eversion of foot	Ankle jerk	Lat. foot & plantar foot

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http://upload.wikimedia.org/wikipedia/commons/2/22/L5_S1_DISC_HERNIATION.jpg

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Cauda Equina Syndrome

Sudden compression of L2-S4 nerve roots
Causes- central disc herniation, epidural abscess, hematoma, tumor

S/S: -LE radicular pain and numbness
-**saddle anesthesia, bowel and bladder dysfunction**
-LE motor and sensory loss/loss of sphincter tone

Dx: -MRI to **determine cause**

Tx: -emergency treatment, **find cause and fix it**

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Spinal Stenosis

- Narrowing of spinal canal or neural foramina causing compression of thecal sac or nerve root. Patients usually over 60 y/o and males affected more often.
- Causes- hypertrophy of ligamentum flavum, facet capsule hypertrophy, spondylolisthesis, osteophytes or bulging discs

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Spinal Stenosis cont'd

S/S: -insidious onset of buttock and leg pain

- numbness with ambulation or prolonged sitting
- c/o poor balance, unsteady gait or "spaghetti legs"
- relief with sitting or flexion of spine
- few neurologic findings-
 - < 10% have "+" SLR
 - 25% have diminished reflexes
 - 65% have LE weakness

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Spinal Stenosis cont'd

Dx: -MRI best, CT or CT-myelogram if MRI contraindicated
-x-rays show DJD w/ disc degeneration

Tx: -rest, PT, NSAIDs, weight reduction
-epidural steroids, nerve blocks
-surgery when QOL impaired

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**STENOTIC
CANAL**



http://upload.wikimedia.org/wikipedia/commons/4/44/STENOTIC_CANAL.JPG

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A furniture mover c/o low back pain that radiates to his R-buttock, lat leg and foot. PE shows a + SLR at 40 degrees. What is the most likely diagnosis?

1. Cauda equina syndrome
2. Compression fracture L5
3. Herniated L3-4 disc
4. Herniated L5-S1 disc

Diagnosis	Percentage
Cauda equine syndrome	2%
Compression fracture L5	3%
Herniated L3-4 disc	27%
Herniated L5-S1 disc	68%

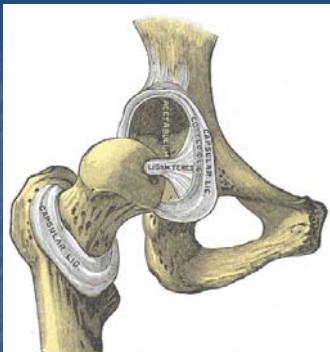
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The highest degree of curvature that is acceptable for conservative treatment of scoliosis with bracing is?

1. 20 degrees
2. 30 degrees
3. 40 degrees
4. 70 degrees

Curvature Degree	Percentage
20 degrees	15%
30 degrees	6%
40 degrees	74%
70 degrees	5%

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Hip Joint

Basic Structures:

- Pelvis
- Acetabulum
- Proximal femur
- Femoral head
- Greater trochanter

<http://upload.wikimedia.org/wikipedia/commons/0/04/Gray342.png>

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Avascular Necrosis (Aseptic Necrosis)

Loss of blood supply to the femoral head


Causes- trauma, alcoholism, steroid and anti-retroviral use

S/S: -dull, **aching groin pain**, & antalgic gait
-pain on IR and ER, ↓ hip ROM

Dx: -MRI

Tx: -refer for orthopedic evaluation

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<http://upload.wikimedia.org/wikipedia/commons/thumb/1/1a/LeggCalvePerthes1.jpg/800px-LeggCalvePerthes1.jpg>

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Hip Fracture

Usually due to fall in elderly women
Femoral neck or IT fracture most common

S/S: -leg will be shortened and ER or IR
-pain on ROM of hip

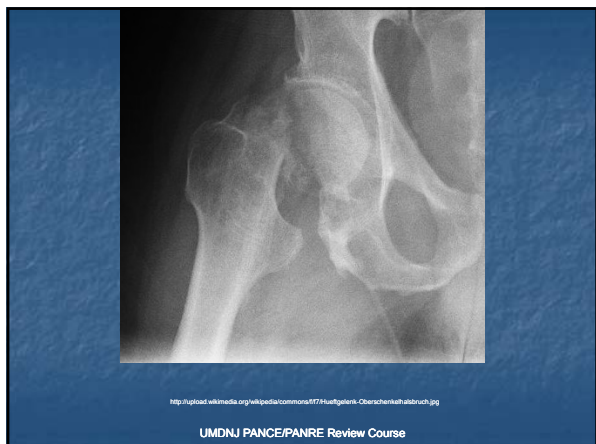
Dx: -x-ray, MRI for occult fractures

Tx: -ORIF

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Hip Dislocation

High impact trauma, 90% MVAs

S/S: -limb shortened and internally rotated, severe pain (most posterior)
-25% sustain related knee injury
-15% sustain sciatic nerve injury

Dx: -x-ray, CT to r/o fracture of acetabulum

Tx: -**immediate** reduction with post-reduction film

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A patient c/o aching pain in his R-groin. His ROM is decreased but his x-ray is neg. What study would confirm your suspected diagnosis?

1. Arthrogram
2. Bone scan
- ✓ 3. MRI
4. Repeat x-ray



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Knee Joint

Basic Structures:

- Distal femur
- Proximal tibia
- Proximal fibula
- ACL/PCL
- MCL/LCL
- Menisci

<http://www.healthcentral.org/content/collections/RCS3loww955.JPG>

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Tibial Plateau Fracture

Occurs in patients who have had an **axial load injury**, i.e. fall from a high place

S/S: -present with knee pain & swelling
 -may be unable to bear weight

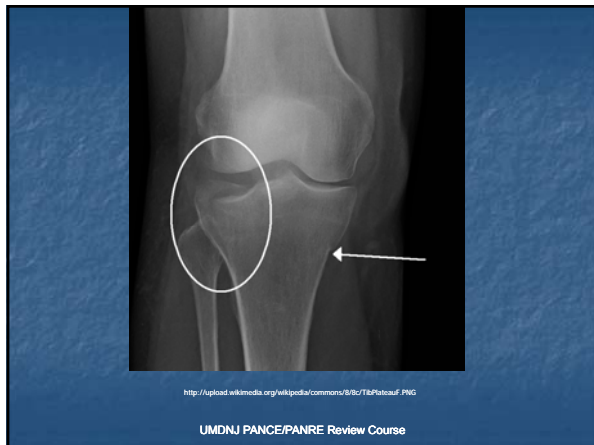
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Tibial Plateau Fracture

Dx: -x-ray; use CT or MRI if unsure
-look for **tibial depression**

Tx: -initial treatment; immobilization and non-weight bearing
-depends on type of fracture, cast immobilization or if tibial defect surgery

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Patellar Fracture

Usually caused by a **direct blow or forced flexion** of the quadriceps muscle

S/S: -pain and swelling of the soft tissues of anterior knee, may feel defect in bone
-**inability to actively extend knee**

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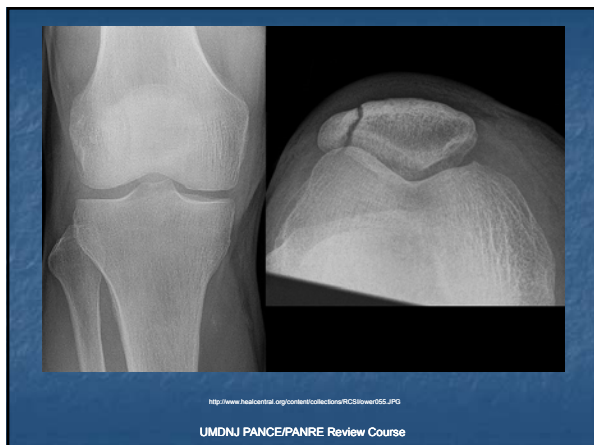
Patellar Fracture

Dx: -physical exam and x-ray

Tx: -8 weeks immobilization if **displaced**
 < 3mm

- ORIF if displaced > 3mm or step-off
- patella excision in extreme cases

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ACL Injury

Forceful internal rotation of knee w/ planted foot
Common causes-skiing, basketball, soccer

- S/S: -**patient hears "pop"**, sudden swelling,
 instability
- acute** hemarthrosis
 - "+" Lachman test** & anterior drawer sign

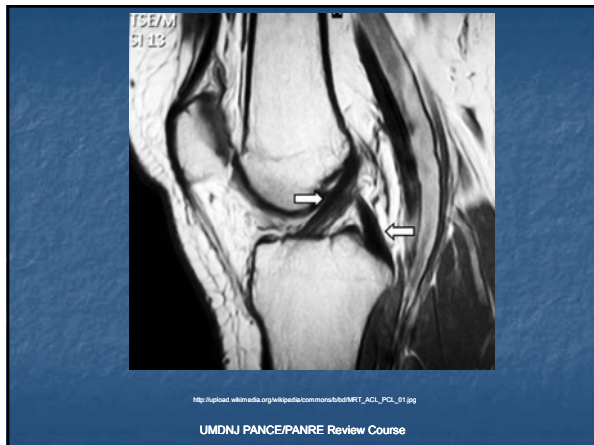
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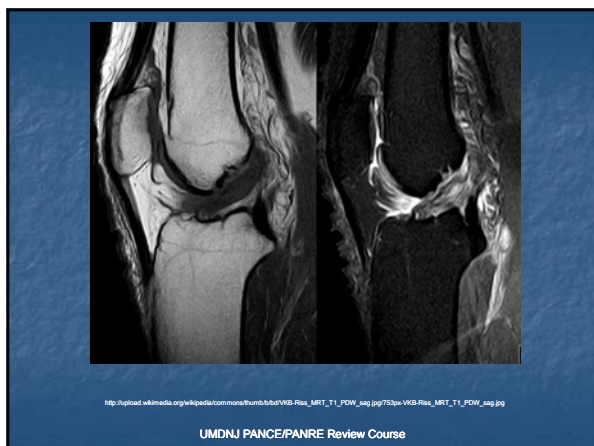
ACL Injury cont'd

Dx: -clinical, confirm with MRI

Tx: -rest/ice, NSAIDs, bracing, PT with activity changes
-young athletes=arthroscopic ACL reconstruction

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Meniscal Injuries

Most common knee injury (medial most often), history of knee trauma, usually twisting or slipping

S/S: -triad of joint line pain, effusion (develops overnight) and locking or clicking
-positive McMurray & Apley test

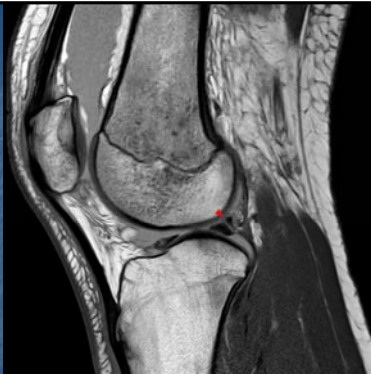
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Meniscal Injuries cont'd

Dx: -clinical, confirm with MRI

Tx: -RICE, NSAIDs and PT
-arthroscopy for persistent symptoms

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http://upload.wikimedia.org/wikipedia/commons/thumb/0/02/Meniscotornale_Besonder_MRT_Kneearthros_Pseudotumor.png/602px-Meniscotornale_Besonder_MRT_Kneearthros_Pseudotumor.png

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Prepatellar Bursitis
(Housemaid's Knee)

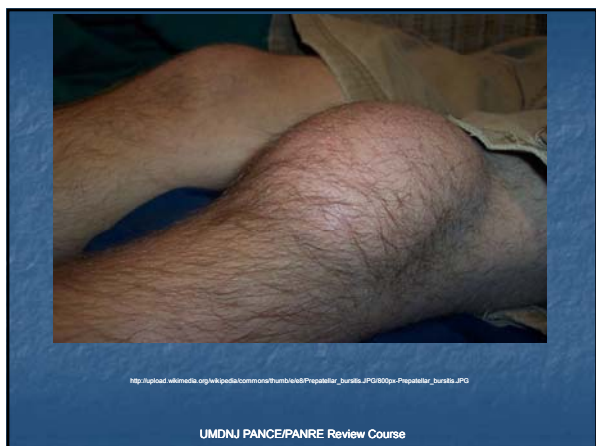
Caused by excessive kneeling or trauma to knee

S/S: -palpable boggy swelling over patella
-if red/painful, worry about infection

Dx: -clinical

Tx: -RICE, NSAIDs, usually self-limiting

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Which is the most accurate PE procedure for evaluation of ACL integrity?

1. Anterior drawer sign
- ✓ 2. Lachman test
3. McMurray test
4. Varus/valgus stress

Procedure	Accuracy (%)
Anterior drawer sign	15%
Lachman test	83%
McMurray test	1%
Varus/valgus stress	1%

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Which of the following is often caused by a direct fall onto the knee?

1. ACL rupture
2. Meniscal injury
- ✓ 3. Patellar fracture
4. Tibial plateau fracture

Injury	Frequency (%)
ACL rupture	1%
Meniscal injury	2%
Patellar fracture	89%
Tibial plateau fracture	9%

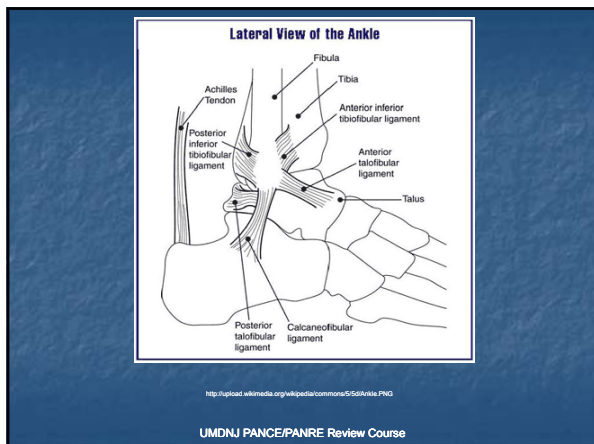
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Ankle and Foot

Basic Structures:

- Distal tibia
- Distal fibula
- Talus
- Calcaneus
- Tarsal & metatarsal bones
- Phalanges
- Lateral and medial ligaments

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Ankle Sprain

Represents most common musculoskeletal injury, 85% of injuries are **inversion with plantar flexion**. **ATF most commonly injured**.

S/S: -Pt. may hear "pop" followed by swelling and contusion
-pain mostly over ligaments vs. bone
-palpate all 4 ligaments (ATF, CF, PTF, DL) and medial/lateral malleoli

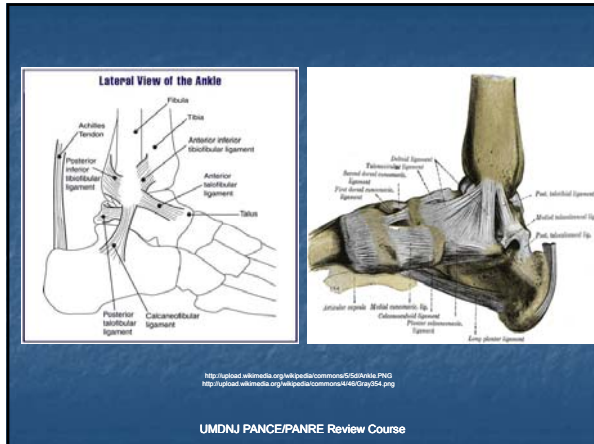
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Ankle Sprain cont'd

Dx: -clinical, **x-ray if bony tenderness or patient unable to weight bear**

Tx: -RICE, NSAIDs, supportive brace with WBAT for 4-6 wks

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Ankle Fracture

Caused by eversion, inversion or lateral rotation of ankle, more likely to injure deltoid ligament

S/S: -pain, swelling, ecchymosis, instability
 -pain will be over bone vs. ligaments
 -check proximal fibula for tenderness
 -check peroneal nerve (foot drop)

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Ankle Fracture cont'd

Dx: -AP/lateral and mortise view of ankle

Tx: -stable fracture 4-6 wks immobilization and WBAT
 -unstable fractures require ORIF

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Achilles Tendon Rupture
 Caused by pushing off or forcible plantar flexion
 -common 30-50 y/o and weekend warrior

S/S: -"I was jumping and it felt like someone kicked me in the calf"
 -report a "pop" and feel weakness when walking
 -deformity noted proximal to attachment
 -**positive Thompson test**

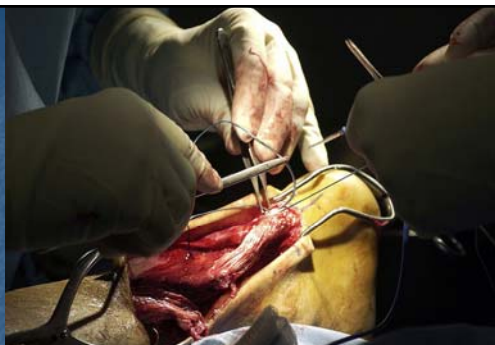
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Achilles Tendon Rupture cont'd

Dx: -clinical, MRI used for surgical planning

Tx: -plantar flexion cast 8-12 weeks
-acute surgical repair = less re-rupture

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http://upload.wikimedia.org/wikipedia/commons/thumb/c/cb/Ruptured_achilles_tendon.jpg/800px-Ruptured_achilles_tendon.jpg

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Avulsion Fracture

Avulsion fracture of 5th metatarsal, **inversion of foot** causes a chip fracture off bone

S/S: -pain/ecchymosis at base of 5th MT

Dx: -x-rays

Tx: -hard shoe or cast with **rapid return to wt. bearing**
-good healing rate

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Stress Fractures

Repetitive stress leads to bony resorption before new bone can be placed, continued stress leads to fracture. Young, active, starting new activity.

S/S: -pain over bone with **no history of trauma**
-fractures usually occur at tibia, metatarsals, calcaneus, or sacrum

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Stress Fractures cont'd

Dx: -clinical, x-ray not "+" for 3-4 wks
-bone scan will confirm early suspicion

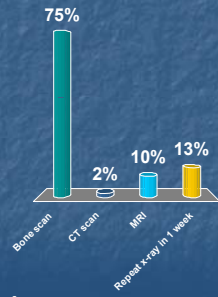
Tx: -rest, activity modification or non wt-bearing for 4-8 wks
-may need cast

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A new military recruit presents with "shin splints". X-rays are negative, what test would you order next?

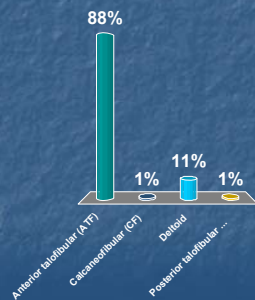
- ✓ 1. Bone scan
- 2. CT scan
- 3. MRI
- 4. Repeat x-ray in 1 week



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What is the most commonly injured ligament in an inversion ankle sprain?

- ✓ 1. Anterior talofibular (ATF)
- 2. Calcaneofibular (CF)
- 3. Deltoid
- 4. Posterior talofibular (PTF)



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