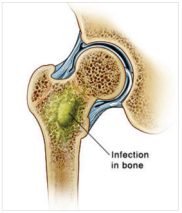
A patient presents with pain in the left knee that started 3 days ago. The patient states that he was involved in a motor vehicle accident three weeks ago which resulted in multiple open fractures and was treated in the emergency department. On physical examination, you note erythema and tenderness over the tibia. Laboratory results reveal WBC of 14,400/uL, ESR 120 mm/hr, and uric acid 4.0 mg/dL and 98.4°F temperature. The most appropriate initial step in this patient's work-up is:



A. bone biopsy and culture
B. CT scan
C. X-ray
D. MRI
E. Rheumatoid factor level

- The most common risk factors for _____ are diabetes, open fractures, and IVDA. Long bones are the most commonly affected. Clinical findings are edema, warmth, tenderness to palpation, reluctance to move the involved extremity, and in late presentations, a sinus tract drainage may be seen. Only 50% of patients present with fever and nearly 90% of patients present with a markedly elevated erythrocyte sedimentation rate.
- The initial test is ALWAYS _____. It typically shows changes about 2-3 weeks after the onset of symptoms, but is still the first test to order. The earliest finding is elevation of the periosteum.

	• The initial study of choice to diagnose osteomyelitis
MRI	• The most sensitive test for osteomyelitis. • It is ordered if an x-ray is negative but a high clinical suspicion exists.
Bone biopsy & culture	• The most accurate test. • It is used to determine sensitivity when choosing an appropriate antibiotic.

The average normal body temperature is generally accepted as _____.

A. 96.8°F (36°C)
B. 98.6°F (37°C)
C. 100.4°F (38°C)
D. 102.2°F (39°C)

- "Normal" body temperature can have a wide range, from 97°F (36.1°C) to 99°F (37.2°C).
- A temperature over 100.4°F (38°C) most often means you have a fever caused by an infection or illness.

_____ is characterized by leukocyte counts that are abnormally low (below 4,000 per cubic millimetre).

A. Leukocytosis
B. Leukopenia

An increase in the number of WBC	An abnormal reduction of WBC

Which of the following is INCORRECT regarding the Erythrocyte Sedimentation Rate (ESR)?

A. Distance at which red blood cells settle per hour (mm/hr)
B. One of the diagnostic test for Temporal Arthritis or Polymyalgia Rheumatica
C. Specific screening test for inflammation
D. ESR normal in early stages of uncomplicated viral disease

A 31-year-old patient presents with a 2-month history of fatigue and joint pain. On physical examination, you note a rash over her cheeks and bridge of the nose. The most sensitive screening test for the suspected condition is:

A. anti-ds DNA
B. anti-Sm Ab
C. anti-histone Abs
D. antinuclear antibody test
E. anti SSB/La

SENSITIVE	SPECIFIC
Screening	Confirmatory

- **Lupus erythematosus** is a collection of autoimmune diseases in which the human immune system becomes hyperactive and attacks healthy tissues.
- Symptoms of these diseases can affect many different body systems, including joints, skin, kidneys, blood cells, heart, and lungs.
- The most common and severe form is **systemic lupus erythematosus (SLE)**.
- Antinuclear antibody (ANA) test is the most sensitive test for Systemic Lupus Erythematosus (SLE). If this is negative, you may rule out SLE with 95% certainty.

Antinuclear antibody (ANA) test	Anti-ds DNA & Anti-Sm Ab	Anti-histone Ab
most _____	most _____	drug-induced lupus

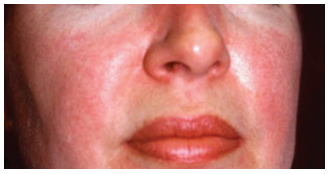
A 31-year-old patient presents with fatigue and joint pain that started 2 months ago. On physical exam, you note a rash over cheeks and bridge of her nose. The most specific test for the suspected condition is:

A. antinuclear antibody test
B. anti-ss DNA
C. anti-histone antibody
D. anti SSB/La
E. anti-Smith antibody

The most specific tests for SLE are _____ and Anti-ds DNA.

Systemic Lupus Erythematosus (SLE) is a chronic autoimmune disease that causes an attack on the cells, tissues and organs of the body. One of its effects in the development of rashes on the epidermis including butterfly or malar rash. In lupus the rash typically _____ the nasolabial folds.

A. spares
B. involves

Lupus	Dermatomyositis
_____ the nasolabial folds	_____ the nasolabial folds
	

A 27-year-old man presents to the clinic with recurrent right knee pain for the last 2 weeks. He was playing basketball 2 weeks ago when he attempted to change directions rapidly. He remembered a popping sensation and pain in his knee that caused him to miss the rest of the game. Afterwards, the knee was swollen and tender to the touch. With the patient lying flat with his knee flexed, a click is felt when the medial knee is extended while externally rotating the knee. What is the appropriate test to confirm the diagnosis?

A. Arthrocentesis
B. Arthroscopy
C. Bone scan
D. MRI of the knee
E. X-ray of the knee

- A meniscal tear is caused by either an acute traumatic injury or by age-related degenerative changes.
- The medial meniscus is the most commonly injured.
- Diagnosis is confirmed by _____.
- First-line treatment is with physical therapy, bracing, and anti-inflammatory drugs.

	synovial fluid from a joint	gout, arthritis, hemarthrosis, synovial infections
	directly visualize the joint	reconstruction of ligament tears
Bone Scan	nuclear scanning test	cancers, metastasis, bone inflammation, infections
	visualize dense objects like bone	osteoarthritis, bony fractures
	soft tissue injuries	torn ligaments and cartilage, herniated discs

Mechanism of meniscal tears is classically a twisting movement at the knee while the leg is bent. A tear of the medial meniscus often occurs together with an _____ cruciate ligament tear and a _____ collateral ligament tear making up the "unhappy triad."

A. anterior, medial
B. posterior, medial
C. anterior, lateral
D. posterior, lateral

Patients with a meniscal tear will typically present with knee pain and swelling that is worse with weight bearing. They may also experience joint locking or clicking when they walk. During the physical examination, the _____ test should be performed.

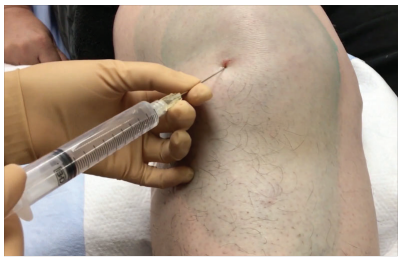
A. McDonald's
B. McBurney's
C. McMurray
D. MacGyver

_____ is the clinical procedure of using a syringe to collect synovial fluid from a joint capsule. It is also known as joint aspiration. _____ is used in the diagnosis of gout, arthritis, and synovial infections such as septic arthritis.

A. Arthroscopy
B. Arthrocentesis
C. Thoracentesis
D. Paracentesis

A 54-year-old male presents to the emergency department complaining of pain and swelling of his right knee since he woke up this morning. He has not measured his temperature but has experienced intermittent chills. Past medical history is significant for gout and diabetes mellitus. Sexual history is unremarkable. Physical examination reveals erythema, warmth, swelling, and exquisite tenderness of the right knee. He is unable to bear weight on the affected leg. The most appropriate next step is

A. RICE (rest, ice, compression, elevation)
B. Arthrocentesis
C. X-ray
D. MRI

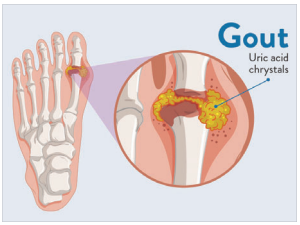


In a patient with acute monoarthritis, arthrocentesis and synovial fluid analysis should be promptly performed in order to provide more information that helps distinguish the different causes. The three main causes are:

Joint space infection (gonococcal or non-gonococcal)	**Crystal induced arthritis** (gout or pseudogout)	**Trauma**

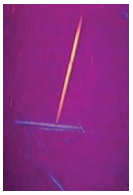
A 47-year-old male patient with history of alcohol abuse and hypertension complains of a two-day history of pain in his first metatarsophalangeal joint. He takes hydrochlorothiazide to control his hypertension. On physical examination he is afebrile, blood pressure is 130/80 mmHg, pulse 85, and respiratory rate 20/min. The affected joint is swollen and warm. The lab results show a normal WBC, ESR of 30 mm/hr, and uric acid level of 10.1 mg/dL. X-ray is unremarkable and arthrocentesis reveals yellow, needle-shaped crystals with negative birefringence. What is the next best step in treatment?

A. colchicine
B. allopurinol
C. prednisone
D. indomethacin



NSAIDs	The treatment of choice for acute gout
Colchicine	NOT first choice in acute treatment due to it is slower to work than NSAIDs
Allopurinol	Used for maintenance therapy. NOT for acute attack
Prednisone	Recommended only for patients who have contraindications to NSAIDs.

A 41-year-old male patient complains of pain in his right knee that started 9 hours ago. He denies trauma and admits to daily alcohol use. On physical examination, he is afebrile, blood pressure is 125/80 mmHg, pulse 85, and respirations 20/min. The affected knee is swollen and warm. Lab results reveal a normal WBC and ESR of 30 mm/hr. X-ray does not reveal bony changes and arthrocentesis is ordered and microscopic examination is shown in the exhibit. What is the most likely diagnosis?



A. gout
B. pseudogout
C. rheumatoid arthritis
D. septic arthritis
E. osteoarthritis

Pseudogout	• May be clinically indistinguishable from gout. However, joint aspiration would show calcium pyrophosphate crystals with weak positive bifringence (blue when parallel to the slow axis of the polarizer and yellow when perpendicular) and rhomboid shaped. <table><tr><th>Gout</th><th>Pseudogout</th></tr><tr><td>needle shape</td><td>rhomboid shape</td></tr></table>
Rheumatoid arthritis	• Usually involves symmetrical joints especially after inactivity.
Septic arthritis	• Presents clinically similar but with high white count, fever (both may also be present in gout) and lack of crystals on arthrocentesis. • A gram stain and culture would be diagnostic.
Osteoarthritis	• A degenerative joint disease that presents classically with pain in weight bearing joints especially at the end of the day. • The pain improves with rest. • The presentation is chronic and there are no systemic symptoms.

Which of the following is true of gouty arthritis?

A. Calcium pyrophosphate dihydrate crystals are found in joint fluid
B. Female predominance
C. Allopurinol can be used during an acute attack
D. Tophi (deposits of uric acid crystals) may be present

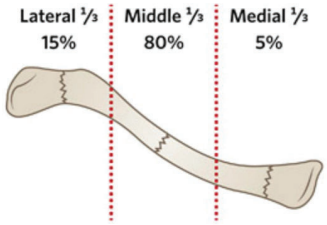
- Tophi can be seen in gout.
- Calcium pyrophosphate dihydrate crystals are seen in pseudogout.
- Gout has a male predominance.
- Allopurinol is used to ↓serum uric acid and prevent or decrease attacks, but is not used for an acute attack.

GOUT

- The synovial fluid reveals monosodium urate crystals which have strong negative birefringence (yellow when parallel to the slow axis of the polarizer and blue when perpendicular) and are needle-shaped. The condition manifests with a sudden, nocturnal onset of pain. About 90% of patients with gout are men. Alcohol contributes to retention of urate.
- The pain is most commonly monoarticular or asymmetric. While the most susceptible joint is the MTP (metatarsophalangeal) joint of the great toe (podagra), the ankles and knees are commonly affected as well.
- The involved joints are swollen, tender and warm. ESR is also commonly elevated caused by the inflammatory process. X-rays during initial attacks are usually normal. With chronic gout, x-ray may show tophi and erosions with overhanging cortical bone referred to as "rat-bite erosions".

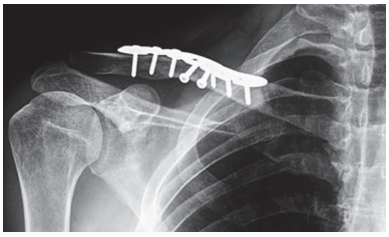
What portion of the clavicle is most commonly fractured?

A. Distal 1/3
B. Middle 1/3
C. Proximal 1/3
D. Distal 1/3 and proximal 1/3 fractures are equally most common



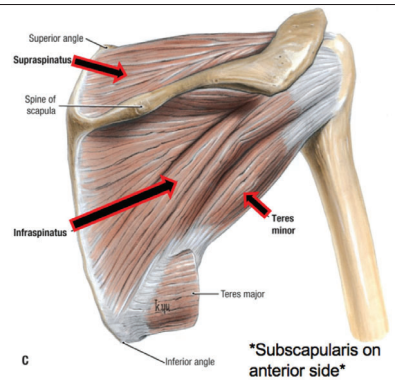
- Clavicle fractures are one of the most common bony injuries.
- The most common location is the middle third (80%).
- 15% occur in the distal third and 5% occur in the proximal third.

Lateral	Middle	Medial
15%	80%	5%



The rotator cuff muscles include all of the following except:

A. Teres minor
B. Supraspinatus
C. Rhomboids
D. Infraspinatus

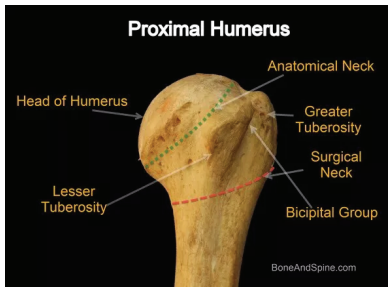


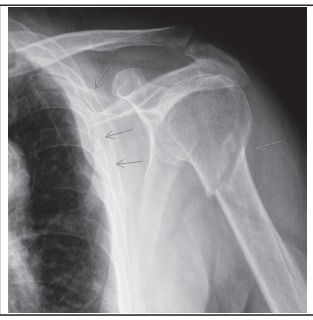
- The rotator cuff muscles include:
  1. supraspinatus
  2. infraspinatus
  3. teres minor
  4. subscapularis
- These muscles are dynamic stabilizers of the shoulder.

S I t S

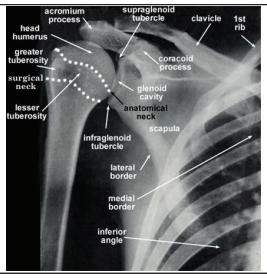
What is the most common site for humeral fractures?

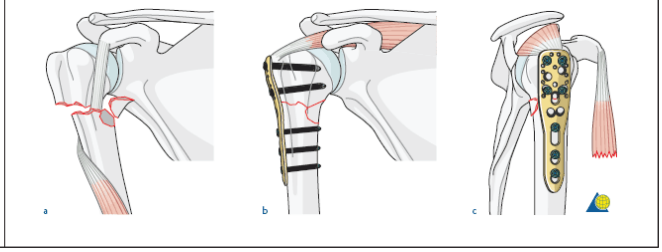
A. Surgical neck
B. Anatomical neck
C. Mid-shaft
D. Humeral head





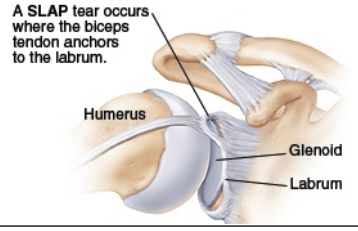
- The _____ is called so because of frequent fractures which occur here. This area lies below the head and tubercle and is narrow.
- The **anatomical neck** is located at the junction point of the head with the shaft, and is between the head and tubercles.



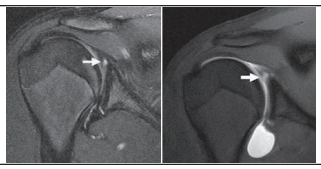


Mechanisms proposed for superior labrum anterior to posterior (SLAP) lesions include:

A. Falling on an outstretched arm
B. Overhead throwing motion
C. Pulled elbow
D. Answers A and B



- SLAP lesions occur as a result of falling on an outstretched hand (**FOOSH**) causing a traction and compression injury related to the fall.
- **Overhead throwing motion** in the deceleration phase causes traction on the superior labrum by the biceps muscle.
- The cocking phase of the overhead throw causes a torsional peeling-back stress to the glenoid labrum leading to a SLAP lesion.



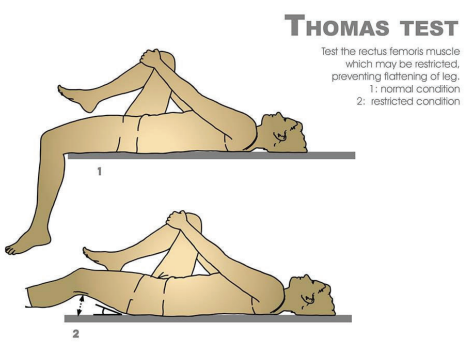
- **MR arthrogram** is the test of choice when evaluating for labral pathology. This exam has 2 parts. One would first have an arthrogram and then an MRI. This 2-part exam shows more details of the joint than an MRI by itself.

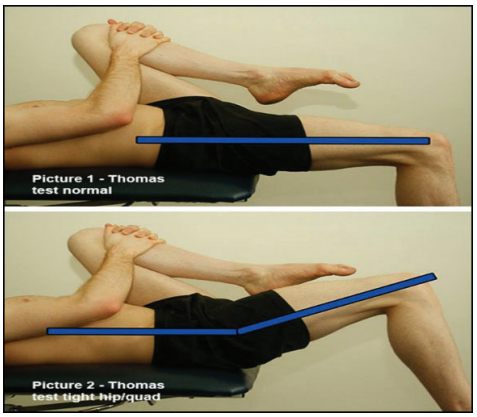
Nursemaid elbow

- a.k.a. "_____ head subluxation" or simply "pulled elbow", is the most common upper-limb injury in children under the age of 6. It is typically an easily treatable condition.
- The etiology is movement of the head of the radius under the annular ligament. The distal attachment of the annular ligament covering the radial head is weaker in children than in adults, allowing it to be more easily torn

Thomas' test is used to assess:

A. Lumbar lordosis
B. Hip flexion contracture
C. Sacroiliac joint dysfunction
D. Iliotibial band contracture





- Thomas' test is used to assess for a hip flexion contracture.
- With the patient supine, flex one hip to obliterate the lumbar lordosis. The angle between the affected thigh and the table reveals the fixed flexion contracture of the hip.

Which finger is commonly affected in Dupuytren's contracture?

A. The index finger
B. The middle finger
C. The ring finger
D. The pinky finger

Dupuytren's contracture

- Most commonly involves the _____ finger.
- **Risk factors:** This condition appears in the fourth to sixth decade of life and is more severe in males of northern European descent.
- **Pathophysiology:** collagen type III hyperproliferation affecting the palmar fascia.
- **Treatment:** serial triamcinolone injections in early stages, collagenase injections, and surgery.

- Dupuytren's contracture is a condition in which one or more fingers become permanently bent in a flexed position.
- It usually begins as **small hard nodules just under the skin of the palm**. It then worsens over time until the fingers can no longer be straightened. While typically not painful some aching or itching may be present.
- The ring finger followed by the little and middle fingers are most commonly affected. It can interfere with preparing food, writing, and other activities.

Which activity will most likely aggravate patellofemoral pain syndrome?

A. Ambulation
B. Climbing stairs
C. Stationary cycling
D. Swimming

Patellofemoral pain syndrome (PFPS)

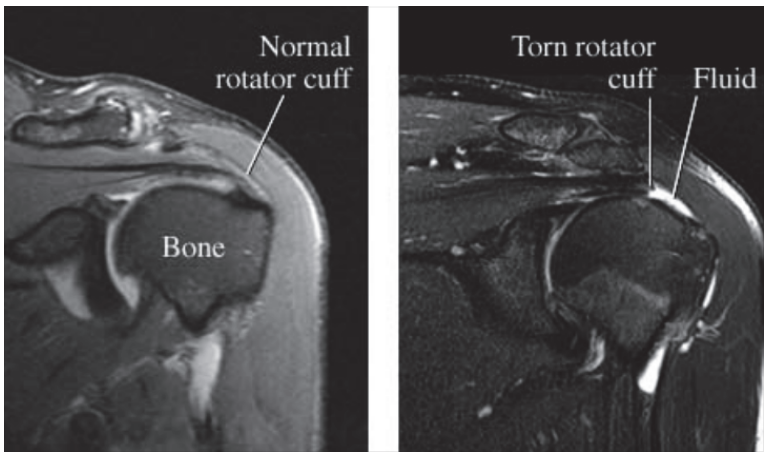
- A.k.a. **runner's knee**, is a condition characterized by knee pain ranging from severe to mild discomfort seemingly originating from the contact of the posterior surface of the patella (back of the kneecap) with the femur (thigh bone).
- It is anterior knee pain involving the patella and retinaculum that excludes other intra-articular and peri-patellar pathology.
- The patellofemoral joint is under high levels of compression during **stair climbing** due to significantly ↑quadriceps activity.

- As patellofemoral pain syndrome is the **most common cause of anterior knee pain** in the outpatient, a variety of treatments for patellofemoral pain syndrome are implemented.
- Most patients with patellofemoral pain syndrome respond well to conservative therapy.

What diagnostic test is the "gold standard" for evaluation of the rotator cuff?

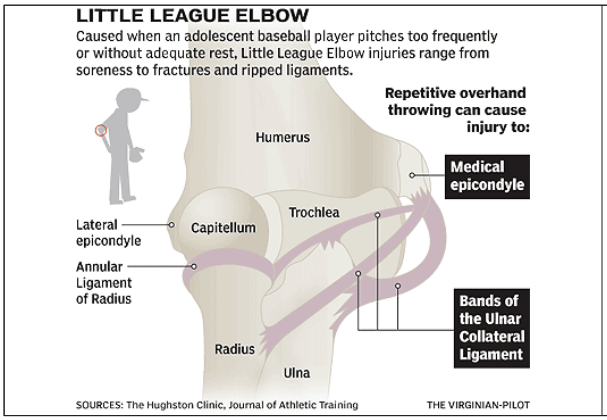
A. Plain x-ray
B. Physical exam of the shoulder
C. MRI
D. Ultrasound

- MRI has replaced arthrography as the gold standard test for rotator cuff injuries.
- MRI offers high sensitivity and specificity that can be used to identify size, location, and quality of injury.
- MRI is relatively expensive and requires lack of motion by the patient in order to avoid artifact.



Little League elbow:

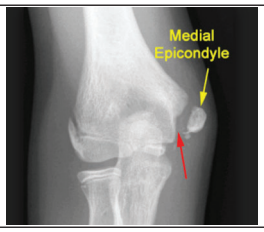
A. Involves the lateral elbow region
B. Is an acute dislocation of the elbow
C. Occurs most commonly between the ages of 18-20
D. Occurs in athletes complaining of medial elbow pain



- **Little League elbow:** Little League elbow is suspected in a throwing athlete between the ages of 9 and 12 with **medial elbow pain** and a recent history of throwing.
- **S/Sx:** There is tenderness over the medial epicondyle and pain with resisted flexion of the wrist and valgus stress testing of the elbow. There may also be a slight elbow flexion contracture.
- **Pathology:** irritation and inflammation of the _____ on the medial epicondyle.

Growth Plate

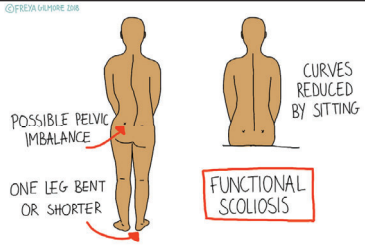
- A.k.a. the epiphyseal plate or physis, is the area of growing tissue near the end of the long bones in children and adolescents.
- Each long bone has at least two growth plates: one at each end. The growth plate determines the future length and shape of the mature bone.



Scoliosis can be classified as structural or functional. Which one of the following is NOT characteristic of structural scoliosis?

A. Most cases are idiopathic
B. It is reversible
C. Subtype of structural scoliosis includes idiopathic
D. Subtypes of structural scoliosis include congenital or acquired

Scoliosis	
Structural scoliosis	**Functional scoliosis**
• Structural scoliosis is not reversible. Subtypes include idiopathic, congenital, or acquired. Idiopathic scoliosis accounts for 80% of structural scoliosis.	• It is a curvature due to a problem that does not involve the spine, such as having legs that are different lengths or muscle spasms caused by pain.
• The spine curvature is **not flexible** and does **not go away** with a change in position.	• The curvature is **flexible** and will **go away** if the problem that causes to lean to the side goes away.



Functional scoliosis

- Nonstructural scoliosis involves a temporary change of spinal curvature. This is caused by an underlying condition such as a difference in leg length, muscle spasms, or inflammatory conditions, (e.g. appendicitis), which may produce muscle spasm.
- Functional scoliosis is treated by correcting the underlying problem.