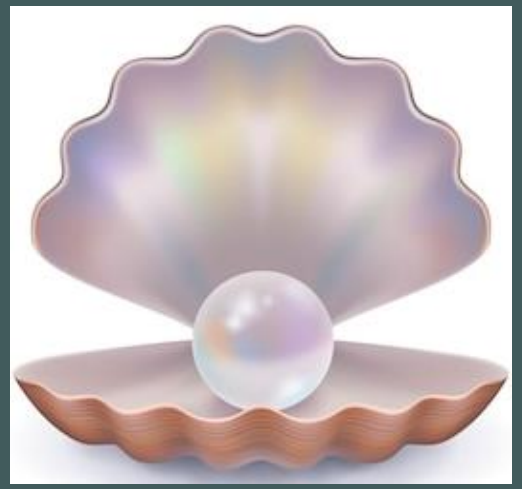
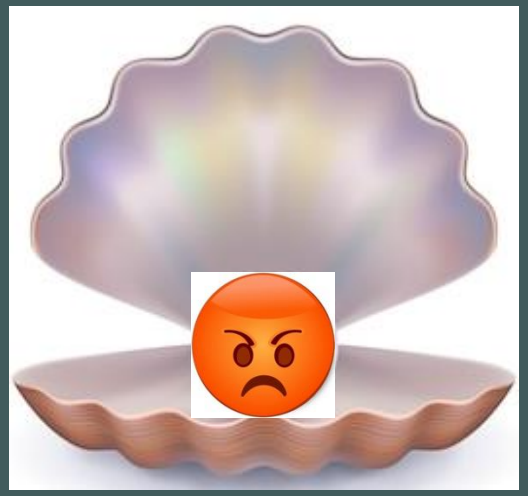
Musculoskeletal Pearls

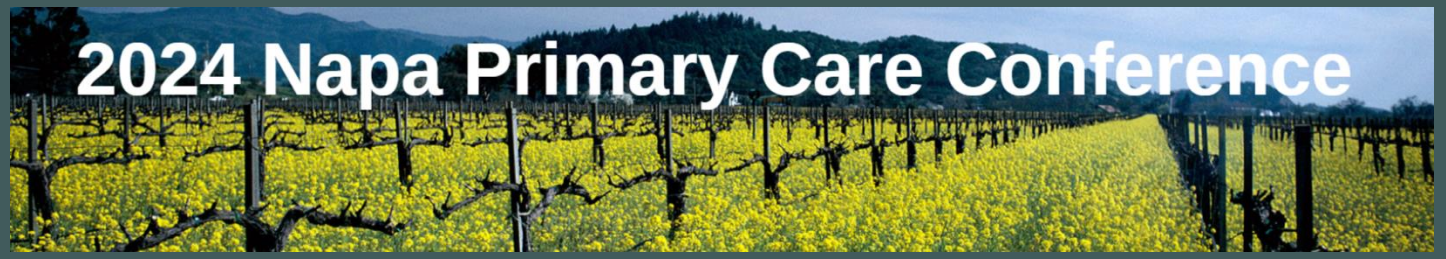


(and Pet Peeves)



Dennis K-Borna, MD, FACSM, FAAFP

No disclosures to report



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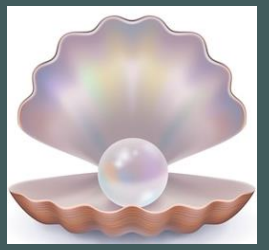

X-ray Basics

- Can’t describe a fracture without at least an AP and lateral
- Consider oblique view if defect can only be seen in one view
- Consider comparison view when dealing with growth plate injuries
- Weightbearing views can be more helpful when evaluating joint spaces

- Order knee x-rays under order (KP Health Connect)

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Sprain vs Strain

Sprain

- Involves injury of a ligament
- Typically a result of a joint being taken beyond its normal range of motion
- Repetitive injuries are uncommon
- Often worse acutely, but improve over time
- Initial treatment with rest/immobilization, followed by range of motion
- Typically graded 1-3

Strain

- Involves injury of a muscle or tendon
- Can arise from overuse*
- May not be as severe initially, but can last multiple months
- Treatment with rest and activity modifications, followed by passive and eccentric stretching, and then strengthening

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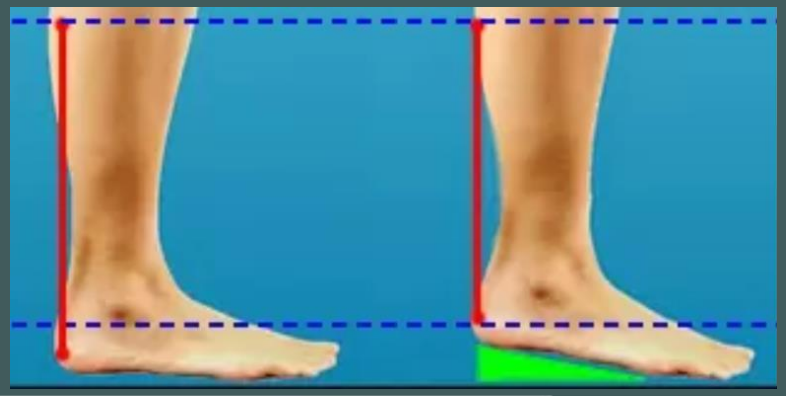
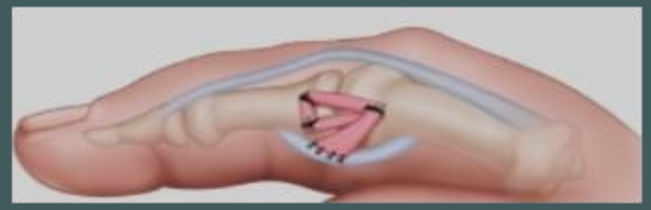
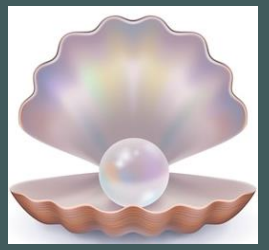
Injury Treatment





- Bring tissues together for healing
  - Achilles/calf strain
    - Shorten the gastroc-Achilles complex
    - Heel lift to the height that resolves pain
  - Finger joint sprains
  - Biceps/triceps
  - Quads/Hamstrings
- Immobilize the joint above and below a fracture
- When in doubt, splint and bring them back in a week

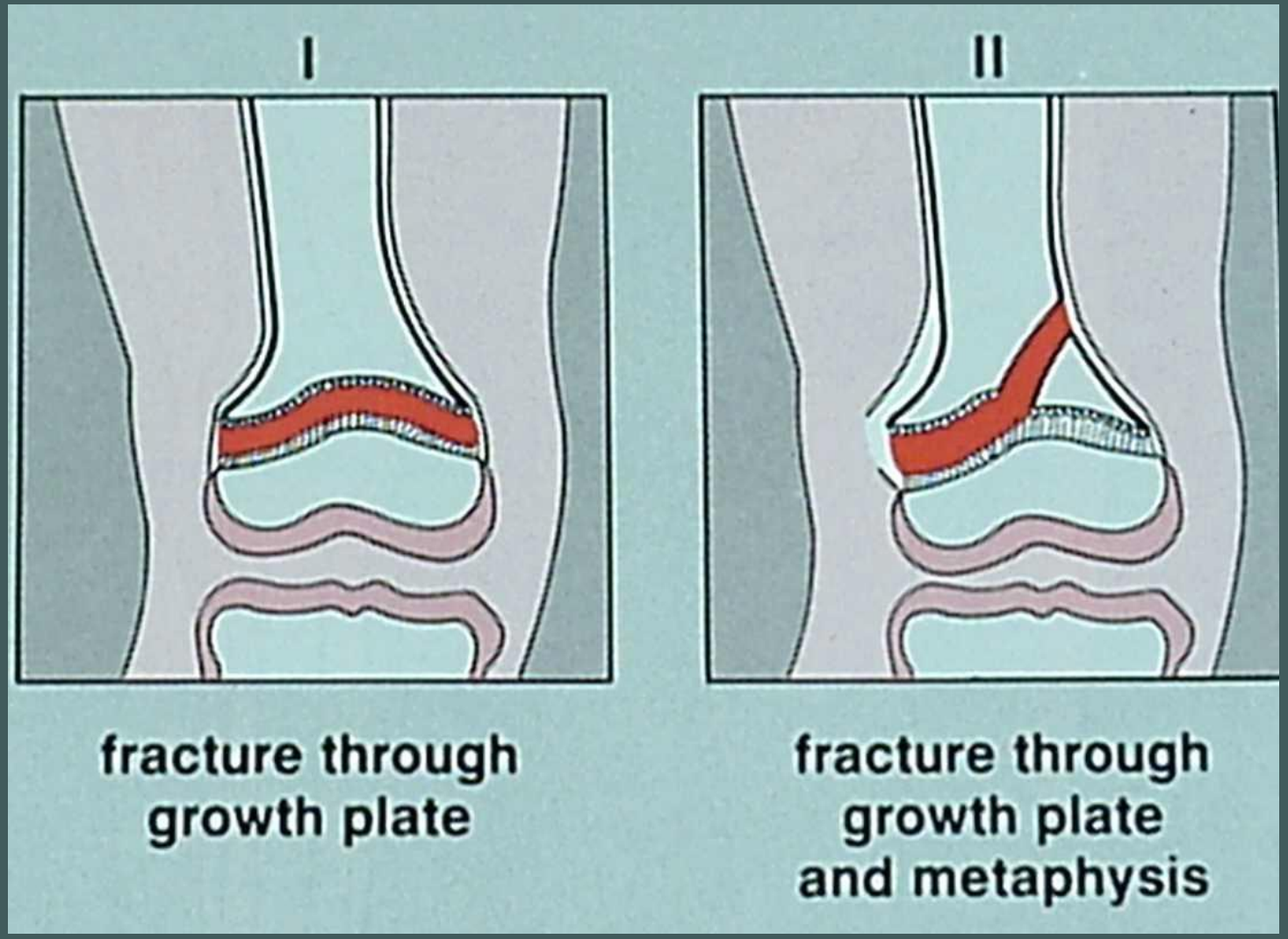
Pediatric Injury Treatment



- Ligamentous injuries are rare in children because the ligaments are stronger than the growth plate
- Be careful about diagnosing a “sprain” in young kids
- Soft tissue injuries heal rapidly in kids
  - If a “sprain” or “strain” is still painful after a week, strongly suspect a fracture
- When in doubt, splint and bring them back in a week

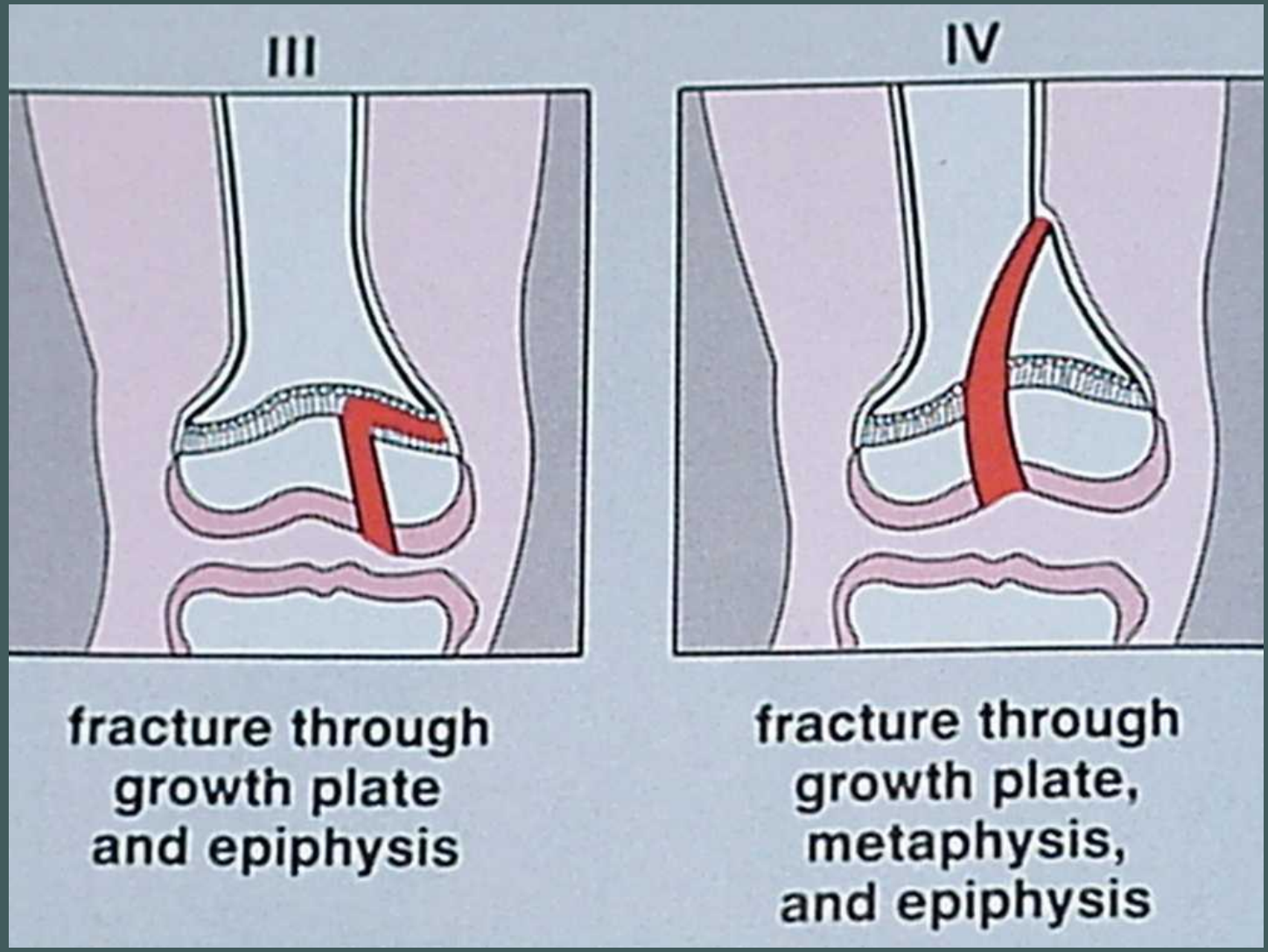
Growth Plate Fractures

Salter-Harris Classification



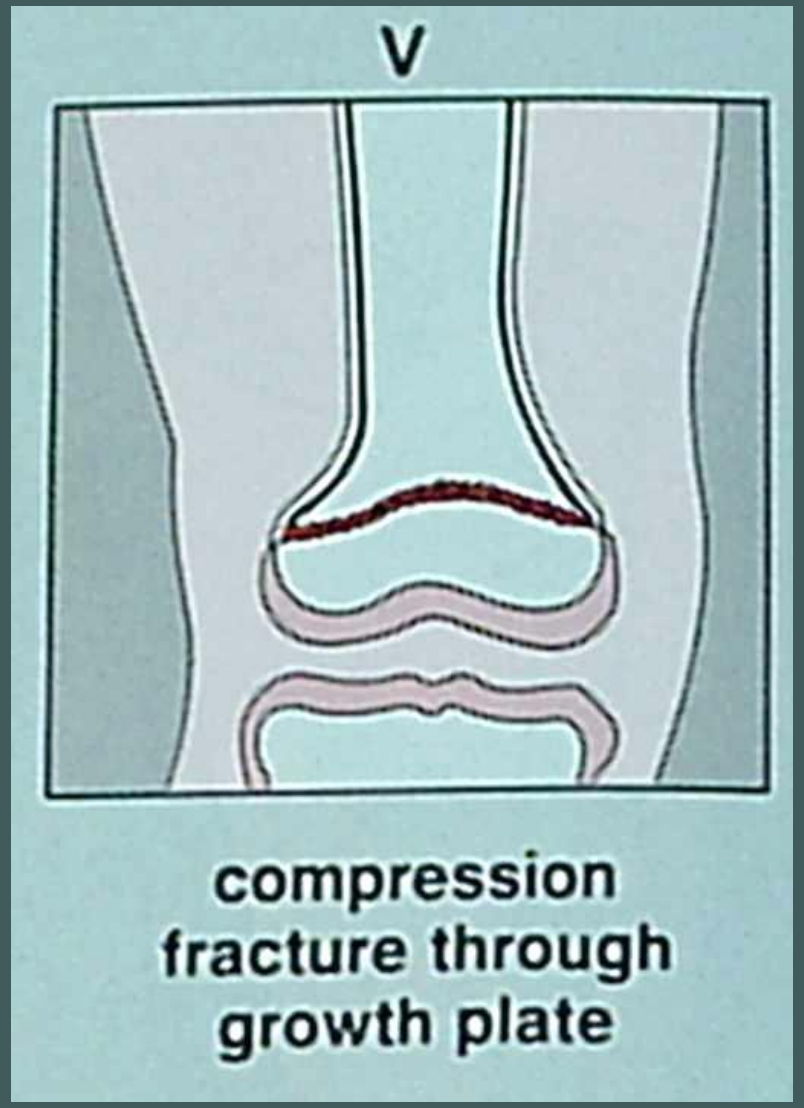
Growth Plate Fractures

Salter-Harris Classification

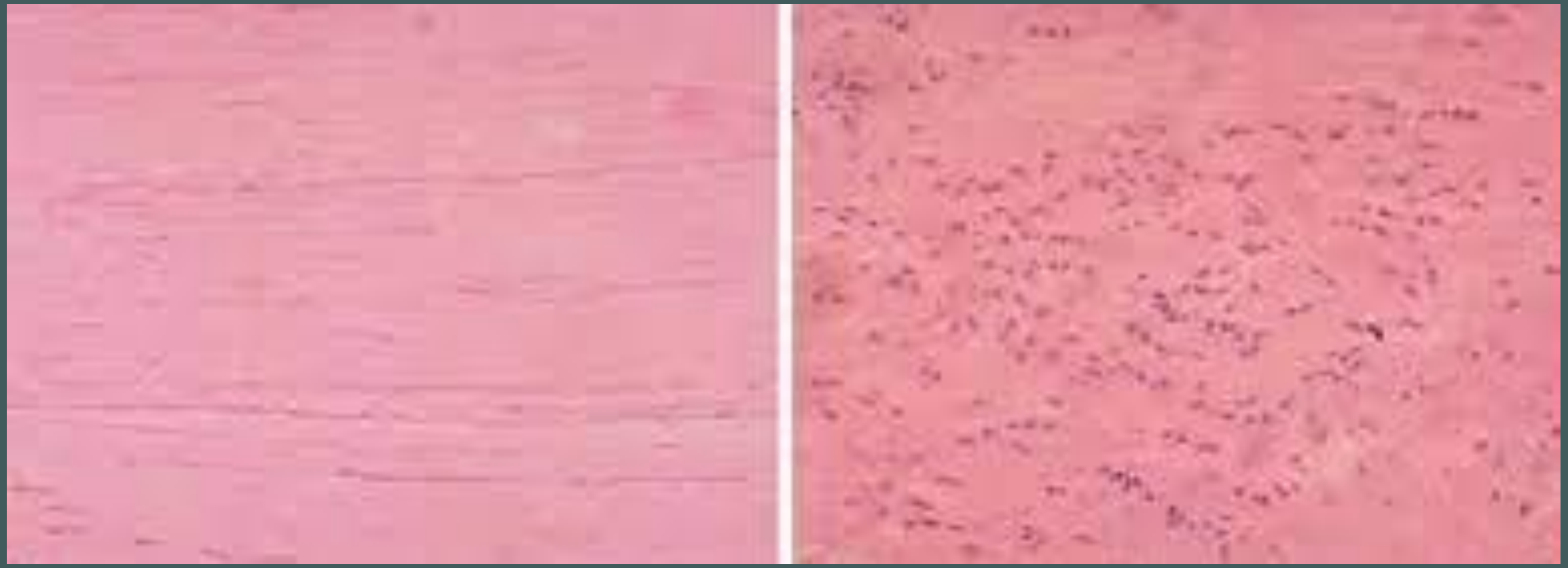


Growth Plate Fractures

Salter-Harris Classification



Tendinosis



normal tendon

tendinopathy

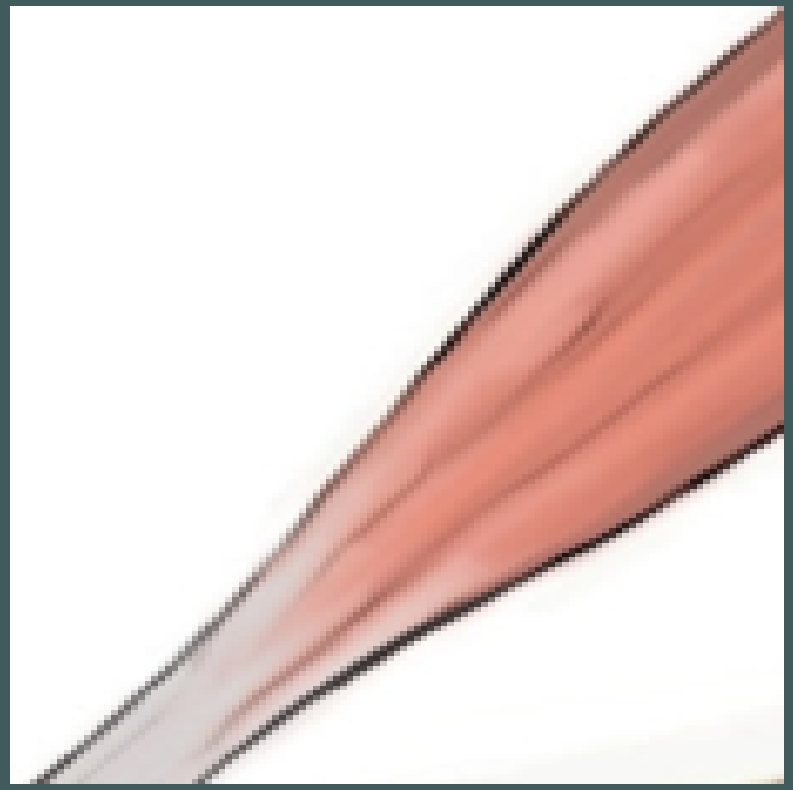
Tendinosis

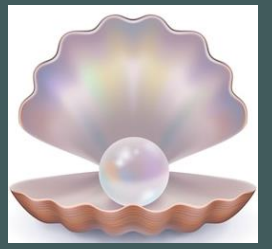
normal tendon

tendinopathy

Eccentric Stretching Exercises

- The hallmark of effective therapy for tendinosis and strains
  - Tension in the musculotendinous unit as it is stretched





NSAIDs

- While many NSAIDs are similar, there are unique differences among them that can be tailored to treating specific issues
- Anti-inflammatory effects at higher doses (prescription)
- Some have stronger anti-inflammatory properties, and some have more analgesic effects
  - GI side effects increased with COX-1 inhibition
- A short burst or a course of an NSAID can be helpful depending on the acuity and severity of the condition
  - “3 ibuprofen 3 times a day for 3 days”
  - Long-acting NSAID x 7-10 days

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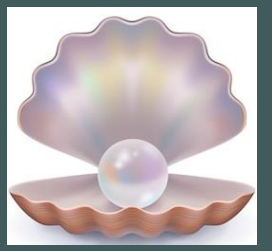
NSAIDs



NSAID	Anti-inflammatory Effects	Analgesic Effects	GI Side Effects
Ibuprofen*	Moderate to High	Moderate to High	Moderate to High
Naproxen*	Moderate to High	Moderate to High	Moderate to High
Diclofenac	High	High	High
Indomethacin	Very High	Moderate to High	High
Ketorolac	High	High	High
Celecoxib	Moderate to High	Moderate to High	Lower
Meloxicam	Moderate to High	Moderate to High	Lower
Piroxicam	High	High	High
Etodolac	Moderate to High	Moderate to High	Moderate
Sulindac	Moderate to High	Moderate to High	Moderate
Nabumetone	Moderate	Moderate	Lower
Oxaprozin	Moderate	Moderate	Moderate
Salsalate	Moderate	Moderate	Lower

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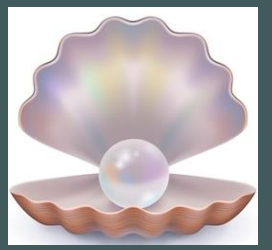
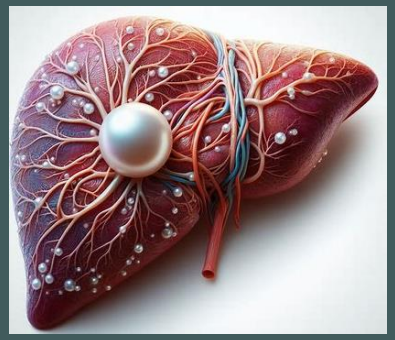
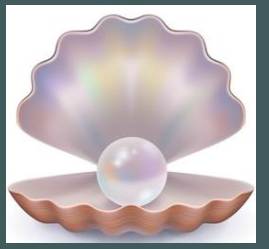
Acetaminophen vs NSAIDs



- Although not for inflammation, acetaminophen can improve pain symptoms “close to” NSAIDs
  - NNT **4.6** (acetaminophen) vs **3** (ibuprofen)
- For milder chronic pain, regular use of acetaminophen with NSAIDs for flare-ups may be appropriate
  - NNT for acetaminophen + ibuprofen **1.6**
- While rare, hepatotoxicity with regular daily use is lower for acetaminophen than for NSAIDs
  - Diclofenac and sulindac can carry relatively increased hepatic risks
  - For pain control in cirrhotic patients, a lower daily dose of acetaminophen (2g) is regarded as safer than NSAIDs





Ketorolac (Toradol)

- Can be a very useful medication for acute pain/inflammation
- Can be especially effective for renal colic
- Recent studies have shown minimal differences between 15mg, 30mg, and 60mg IM doses

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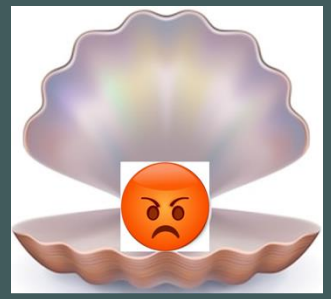

Skeletal Muscle Relaxants

- Widely prescribed, but with limited evidence on efficacy
- Can have high adverse effect profile (CNS effects)
- Often used along with NSAIDS for many musculoskeletal issues
  - Acute back pain
  - Neck pain
  - Myofascial pain conditions
  - Strains
  - Tendinitis
  - Insomnia

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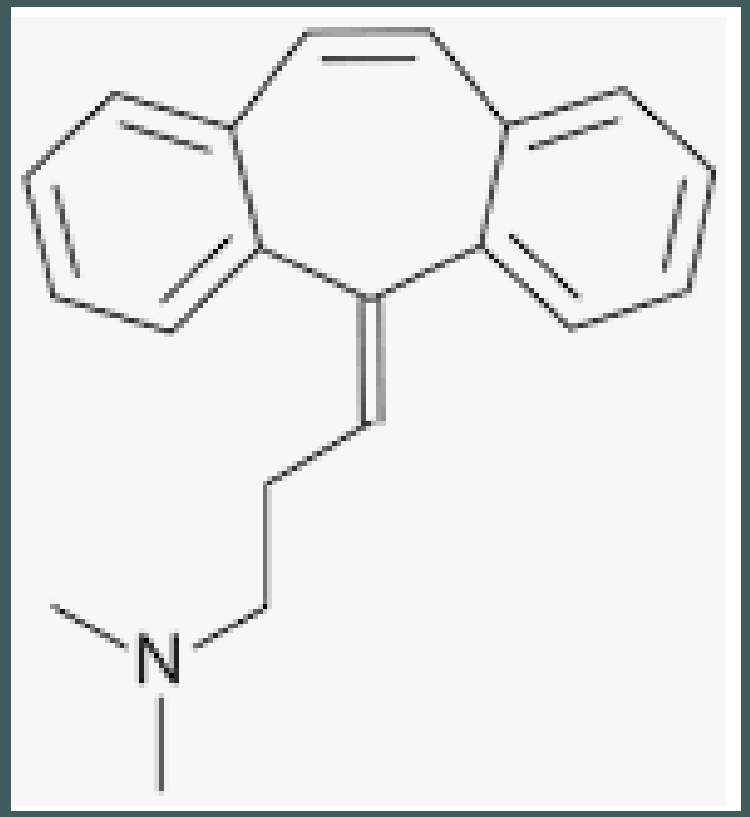
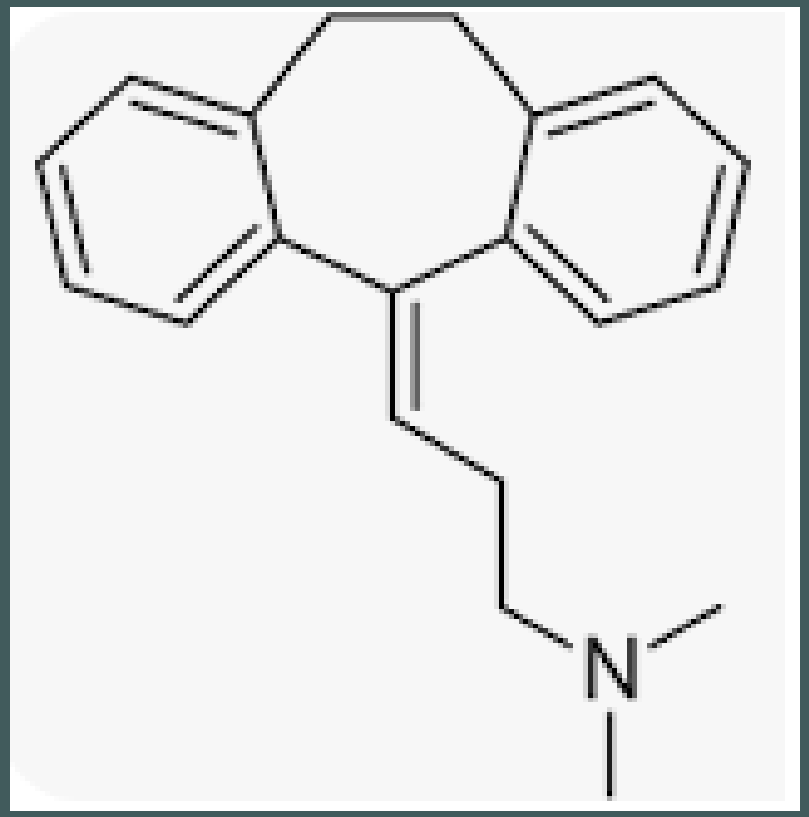
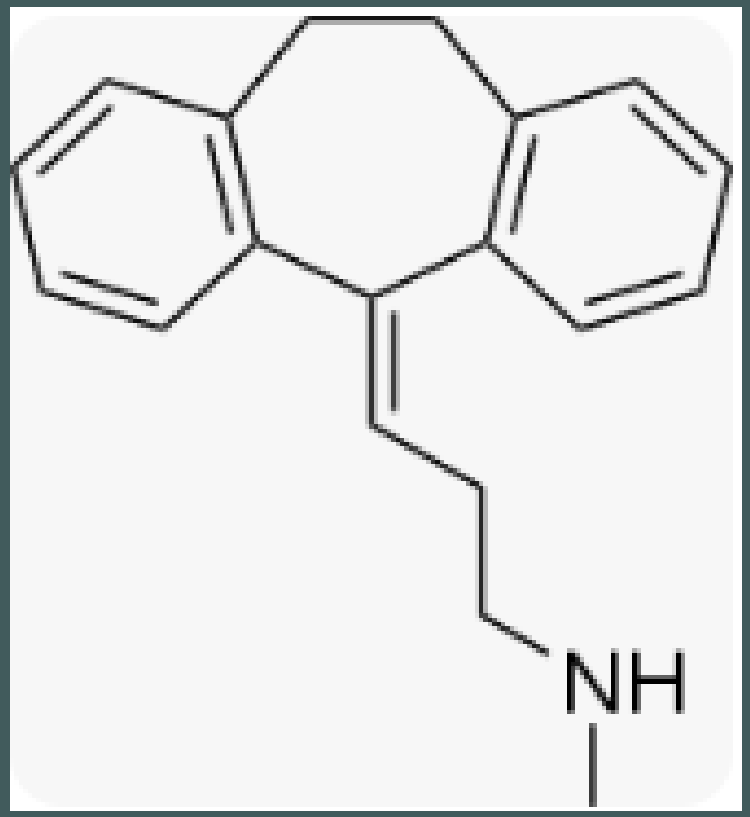
Skeletal “Muscle Relaxants”



Cyclobenzaprine



Amitriptyline



Nortriptyline

“Flexeril 10mg tid”

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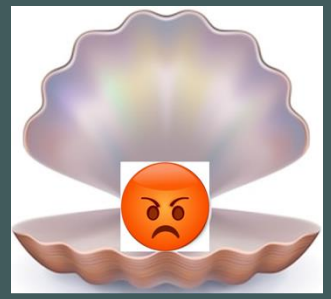


Skeletal Muscle Relaxants

- **Antispasticity agents:** work on the spinal cord or directly on the skeletal muscles to improve muscle hypertonicity and involuntary spasms
- **Antispasmodic agents:** decrease muscle spasms through changes in CNS conduction

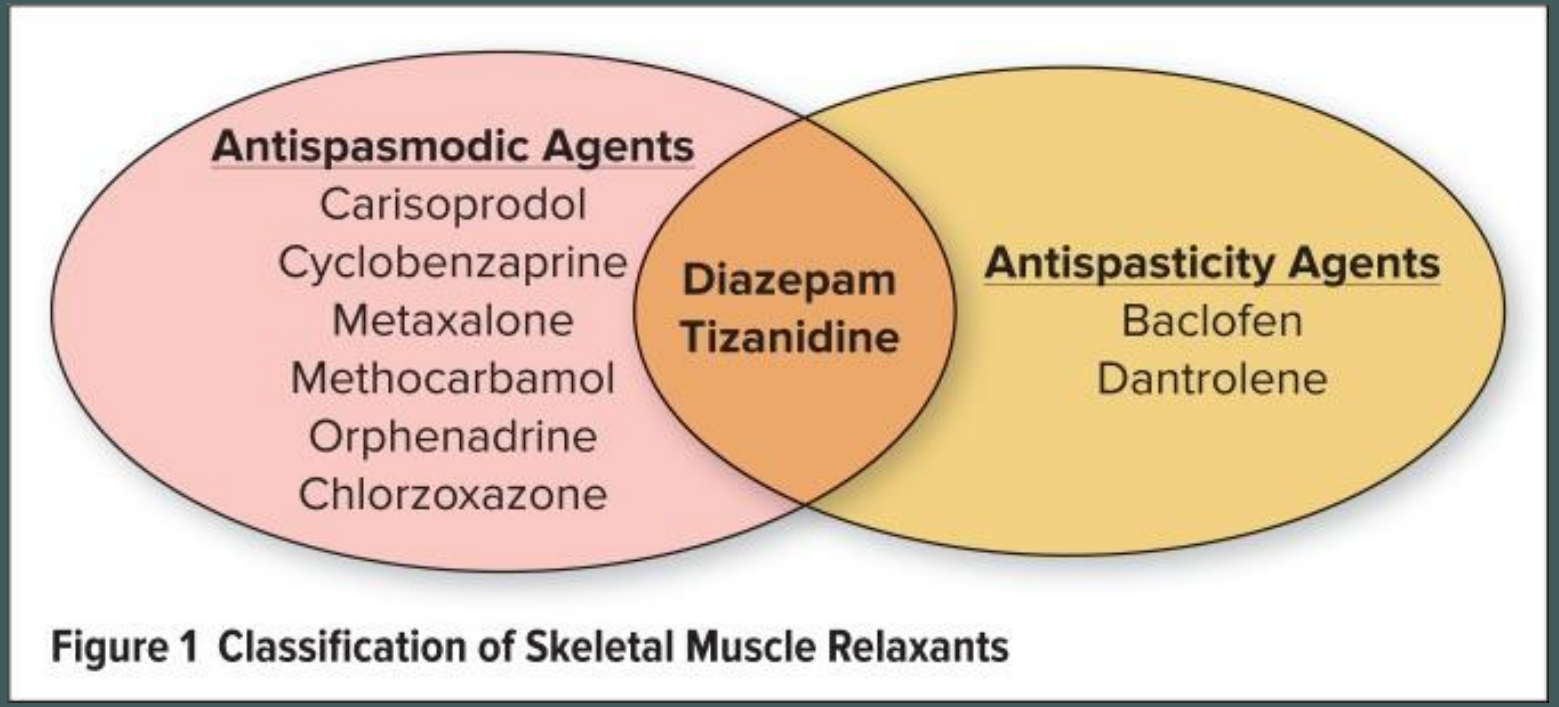
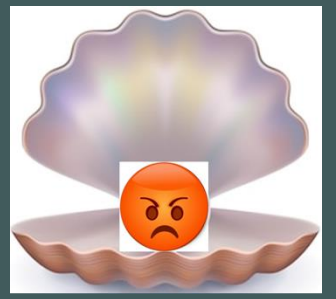


Figure 1 Classification of Skeletal Muscle Relaxants

Witenko C, et al.Considerations for the appropriate use of skeletal muscle relaxants for the management of acute low back pain. P T. 2014 Jun;39(6):427-35.

Skeletal Muscle Relaxants



Medication	Spasticity	Pain	Sedation	Duration
Cyclobenzaprine	Moderate	High	High	4-6 hours
Baclofen	High	Moderate	Moderate to high	4-8 hours
Tizanidine	Moderate to High	Moderate	Moderate to high	4-6 hours
Methocarbamol	Low to moderate	Low to moderate	Low to moderate	3-6 hours
Diazepam	Moderate to High	Low to moderate	High	6-12 hours
Metaxalone	Low to moderate	Low to moderate	Low to moderate	4-6 hours
Carisoprodol	Low to moderate	Low to moderate	High	4-6 hours

Back

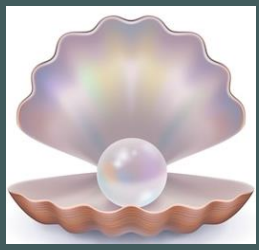
Anterior Back

- Discs
- Vertebral bodies

Posterior Back

- Central canal
- Facet joints
- Pars interarticularis
- Paraspinous muscles*
- Sacroiliac joints

Back

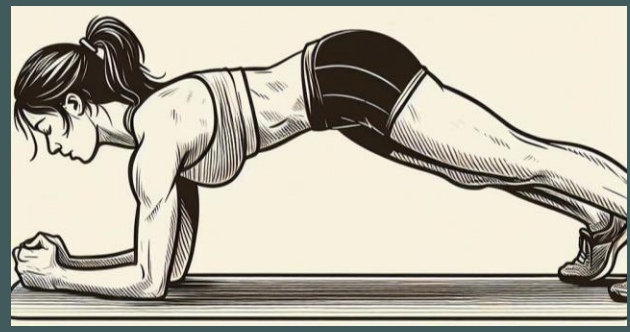


Anterior Back

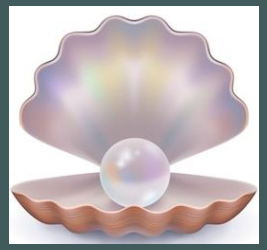
- Worse with sitting/leaning forward
  - Work on anterior stretching and posterior strengthening

Posterior Back

- Worse with standing/leaning backward
  - Work on anterior strengthening and posterior stretching



.pispasm



For muscle spasms of the neck and back, there are several things that are important to help relieve your symptoms sooner rather than later:

1. Medications -- this includes anti-inflammatory pain medications with or without muscle relaxers
2. Heat to the affected area -- usually for about 30 minutes or so
3. Stretching exercises -- these should be done slowly, and should involve stretching AWAY from the area that hurts
4. Massage -- start gently, and then gradually increase the pressure and the size of the massage circles.
5. Drink plenty of fluids -- dehydrated muscles tend to be more spastic than well-hydrated muscles.

The best way to approach these treatments is in the following order:

Take the medication(s) and wait an hour.
Then apply the heat for 30 minutes.
Then do the stretching exercises and the massaging. This gives you a better chance to stretch out and relax the affected muscles.

Avoid excessive bedrest and sedentary positions, as well as highly exertional activities, heavy lifting, or frequent bending or other exacerbating activities.

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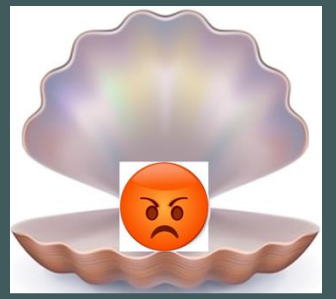
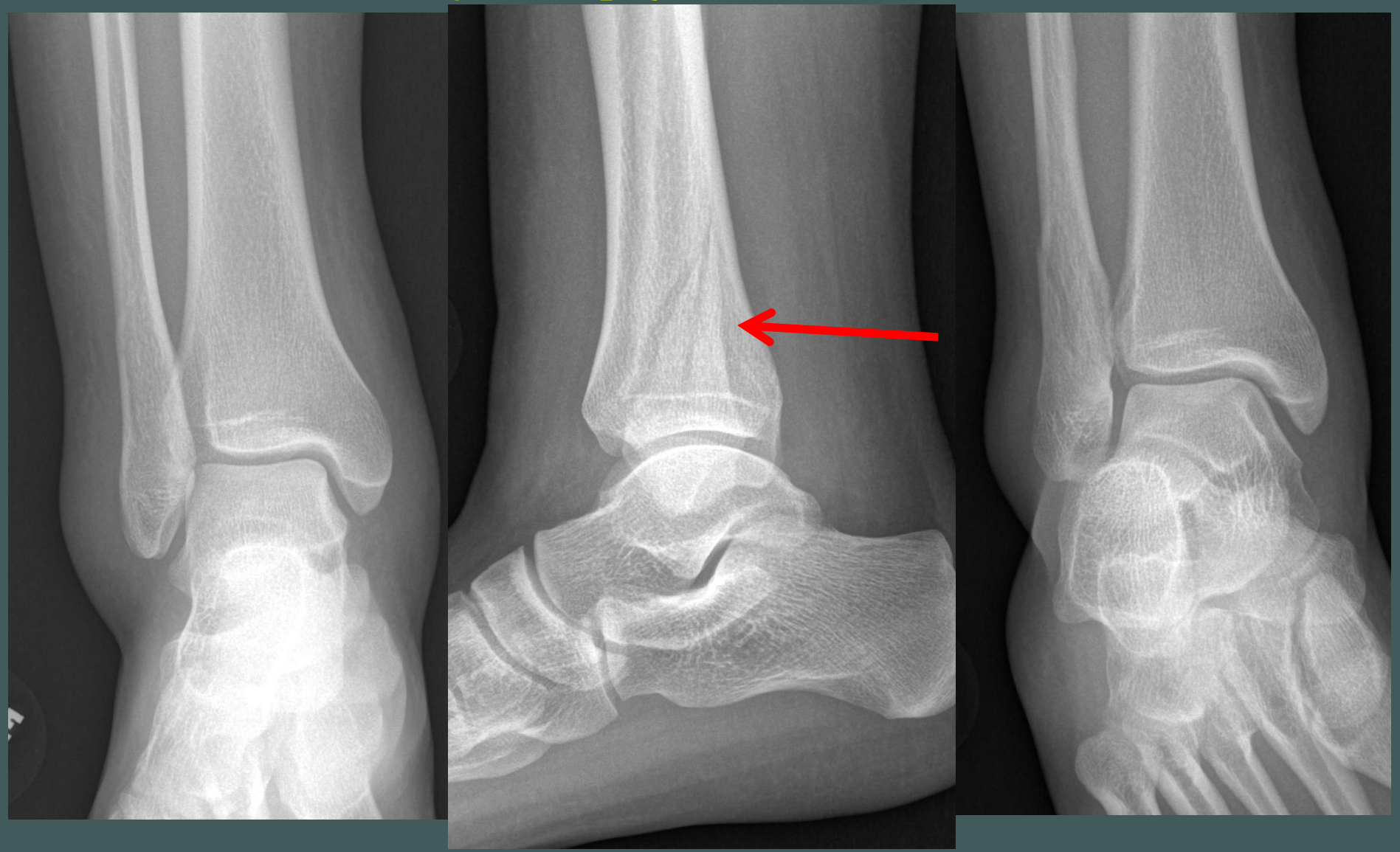
Prednisone



- Corticosteroids for acute injuries can inhibit the healing process and are usually **not** recommended
- Systemic corticosteroids for acute back pain
  - No clear benefit for non-radicular low back pain or spinal stenosis
  - May be helpful for acute radiculopathy only
  - Do not reduce likelihood of surgery for slipped/bulging disc
- Systemic corticosteroids for carpal tunnel syndrome
  - Not recommended
- Systemic corticosteroids can be helpful for acute gout and Bell's palsy
- Multiple joint pains; diagnostic for presumed rheumatologic issue

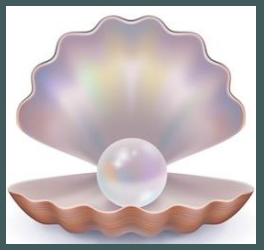
Ankle Injuries

- For acute ankle injuries, pay close attention to the lateral view



Ankle -- Mortise View

Ankle Sprains



- Don’t forget to check the Achilles
- Most causes of recurrent ankle issues are related to instability
- Stable ankle sprains:
  1. RICE
  2. ROM exercises
     - “the alphabet”
  3. Strengthening exercises
     - towel or theraband exercises

  *4. Weightbearing strengthening/proprioceptive exercises
     - “tiptoes of one foot for 15 seconds”

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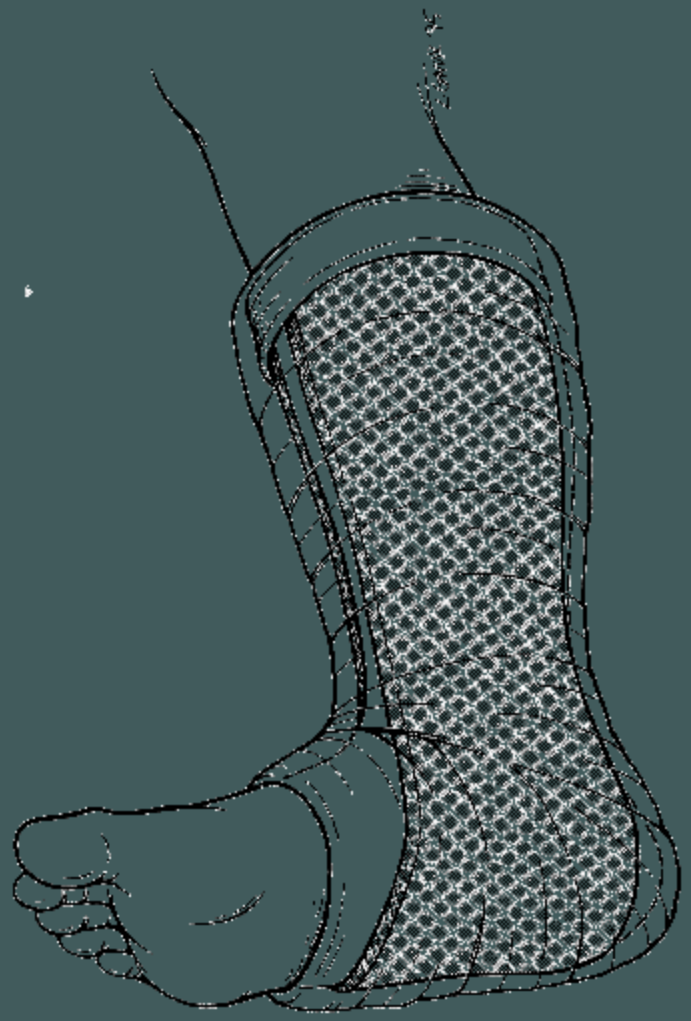
Ankle Stirrup Splint



Bad Sprain or Ankle Fracture

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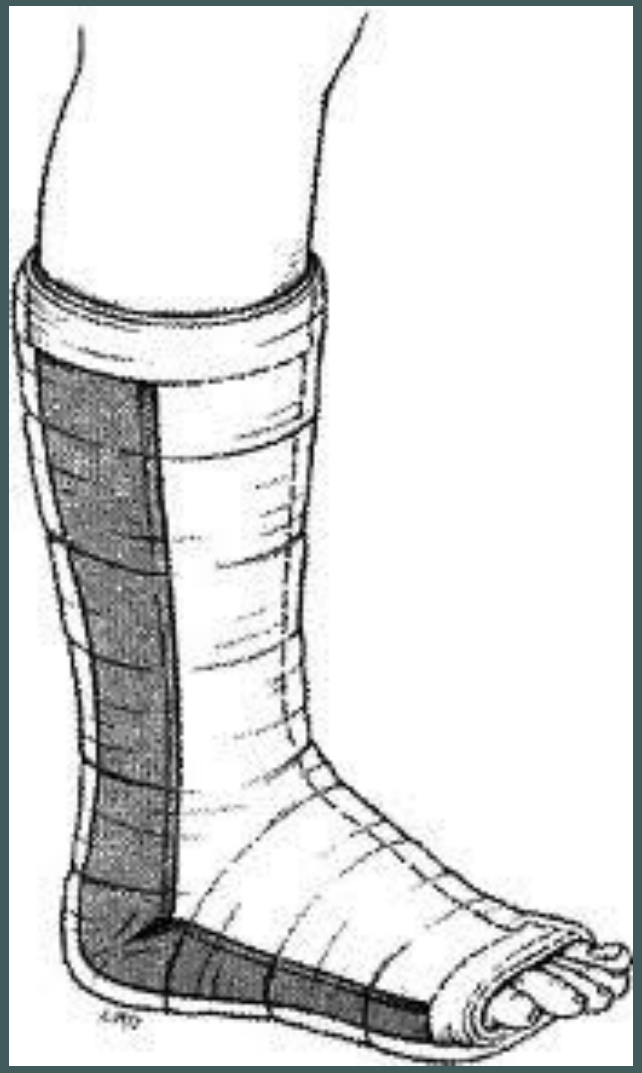
Posterior Splint



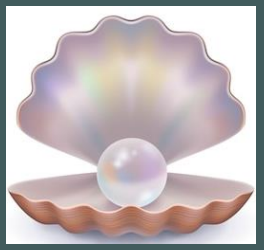
Nondisplaced stable foot fractures or foot sprains

Cam Walker (Cam Boot)

Stable foot or ankle injury

Braces

- Ankle sleeve
  - Mild support, compression for swelling
- Lace-up ankle brace
  - Provides additional support to an unstable ankle upon return to activities
  - Similar support to ankle taping
  - Can result in chronic instability/weakness if worn excessively, especially without appropriate rehab
- Heel lifts
  - Achilles tendinitis or calf strains



Shoulder

- Many diagnoses strongly correlate with certain ages
  - Under 18: growth plate (epiphysitis)
  - 18-25: shoulder instability
  - 20-30: AC joint pain* (if pain is superior)
  - 35-50: shoulder impingement, rotator cuff syndrome
  - 40-60: small to moderate rotator cuff tears
  - 60+: large rotator cuff tears
  - 45-65: frozen shoulder

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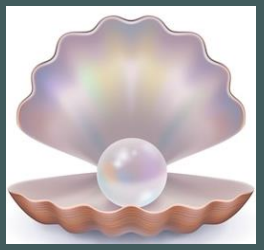
Shoulder -- Epiphysitis



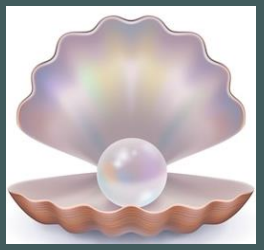
- Proximal humeral epiphysitis very common in young throwers
- Pain in the proximal shoulder, especially with throwing or resisted activities
- Exam can be similar to rotator cuff injury
- X-rays helpful to confirm open growth plate
  - Often normal, but may show growth plate widening (epiphysiolysis)

Shoulder -- Epiphysitis

Normal shoulder

Abnormal shoulder
widening of the growth plate

Shoulder -- Epiphysitis



- Treatment is rest from throwing activities and from exacerbating activities for 1-3 months
- Encourage pain-free activities
- Be careful about ordering physical therapy!
- Counsel about “random sharp pains”
- Re-check at 4-6 week intervals
- Gradual return to throwing once exam is completely pain-free

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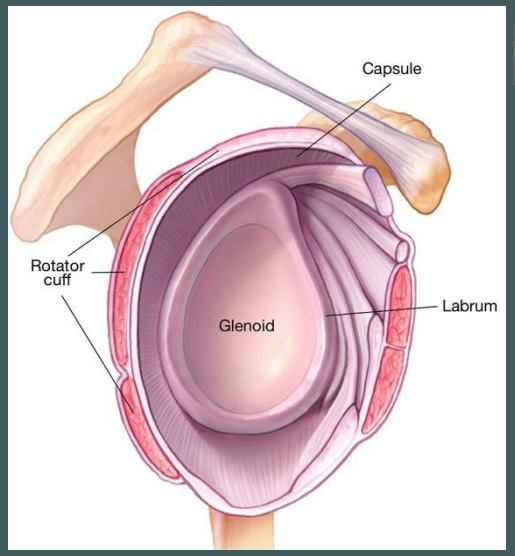
Shoulder -- Instability

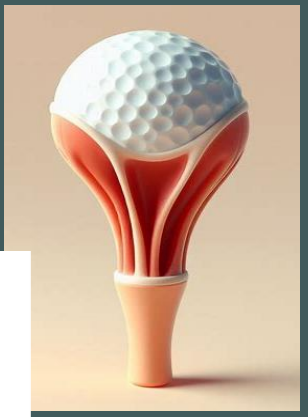


https://www.dubaisportsorthopaedics.com

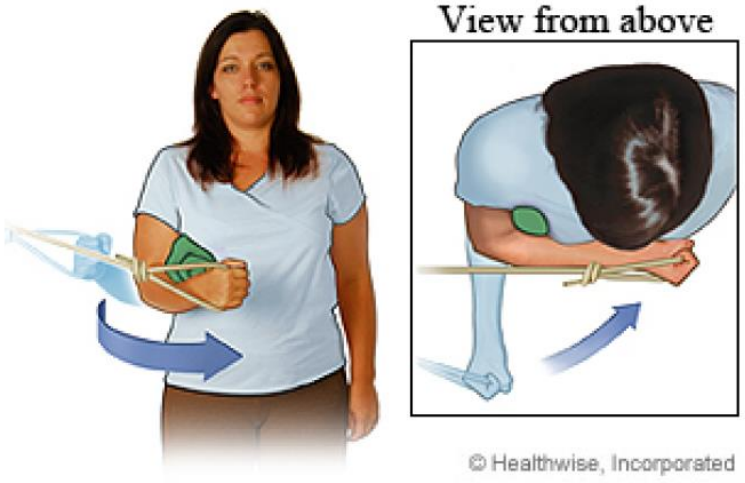
- The glenohumeral joint is inherently unstable
  - Stabilizers:
    - Ligamentous capsule
    - Labrum
    - Rotator cuff

- The rotator cuff acts like a suction cup to help stabilize the joint
  - Weak cuff means more shifting movement in the joint

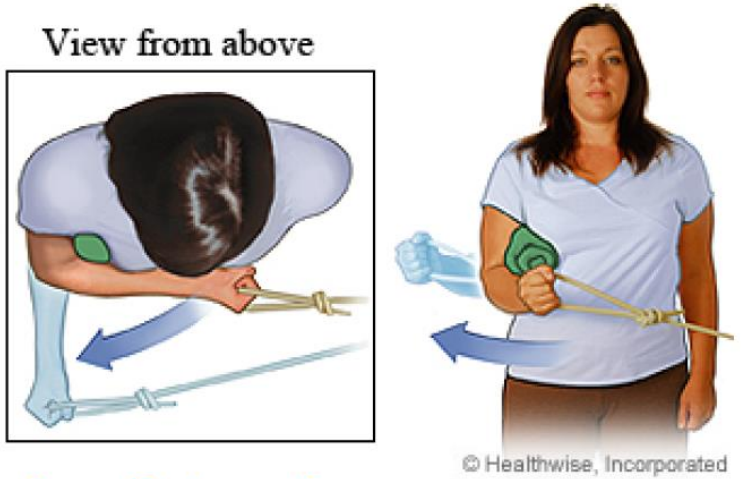
Shoulder -- Instability



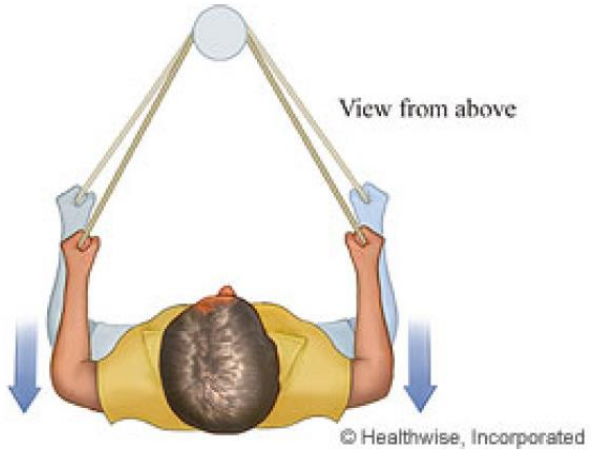
Internal rotator strengthening exercise



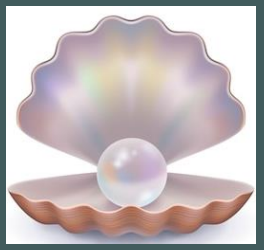
External rotator strengthening exercise



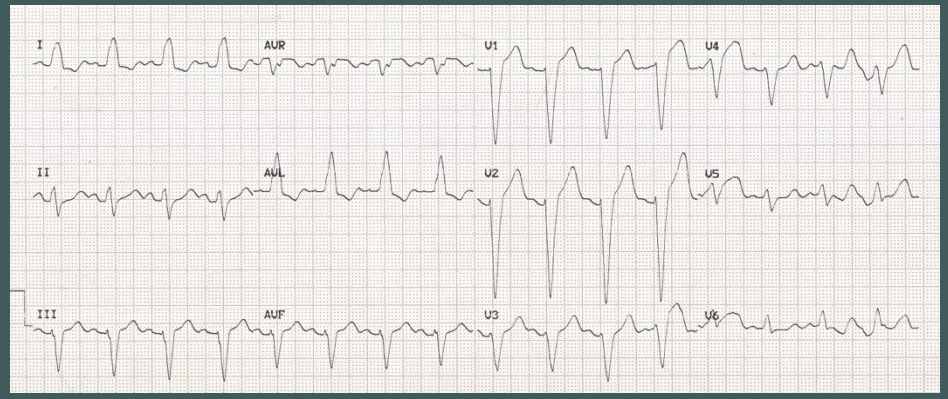
Scapular exercise: Retraction



Shoulder – AC Joint



- Involved in many shoulder movements, so AC injury or pain will yield multiple “positive” exam findings
  - Check for AC tenderness
  - Cross-body extension
  - Scarf test
  - Pain at the ends of abduction
  - Pain with shoulder compression



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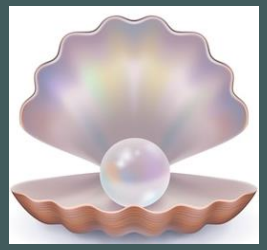
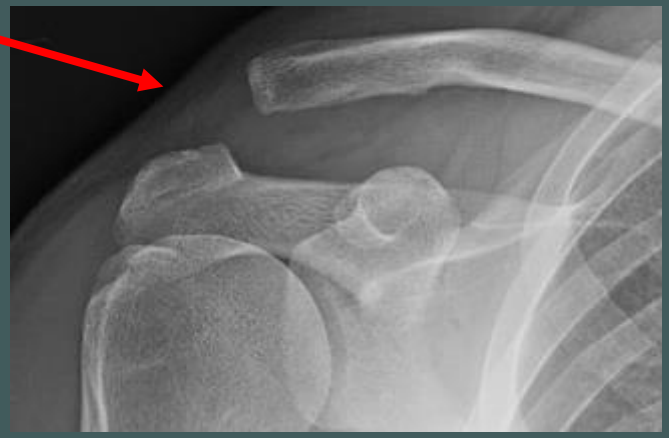
Shoulder – AC Joint

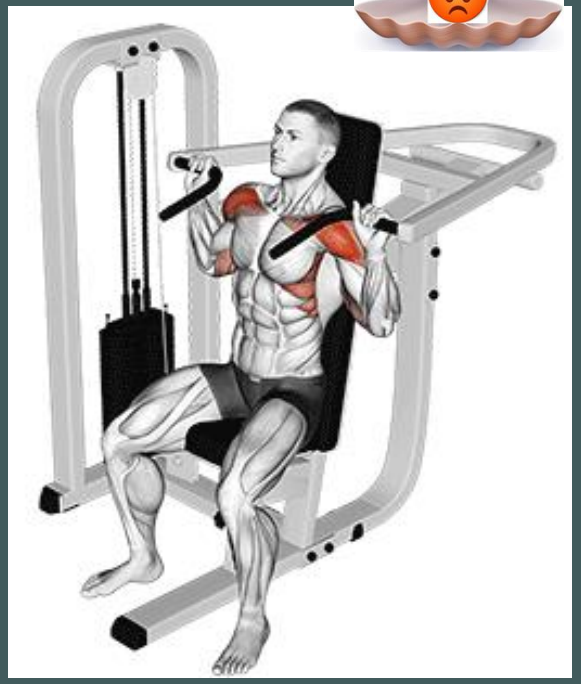


- AC injury (“separated shoulder”)



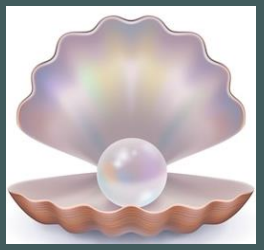
- AC arthritis

- AC pain is common in young people who do a lot of bench press and shoulder press (military press)

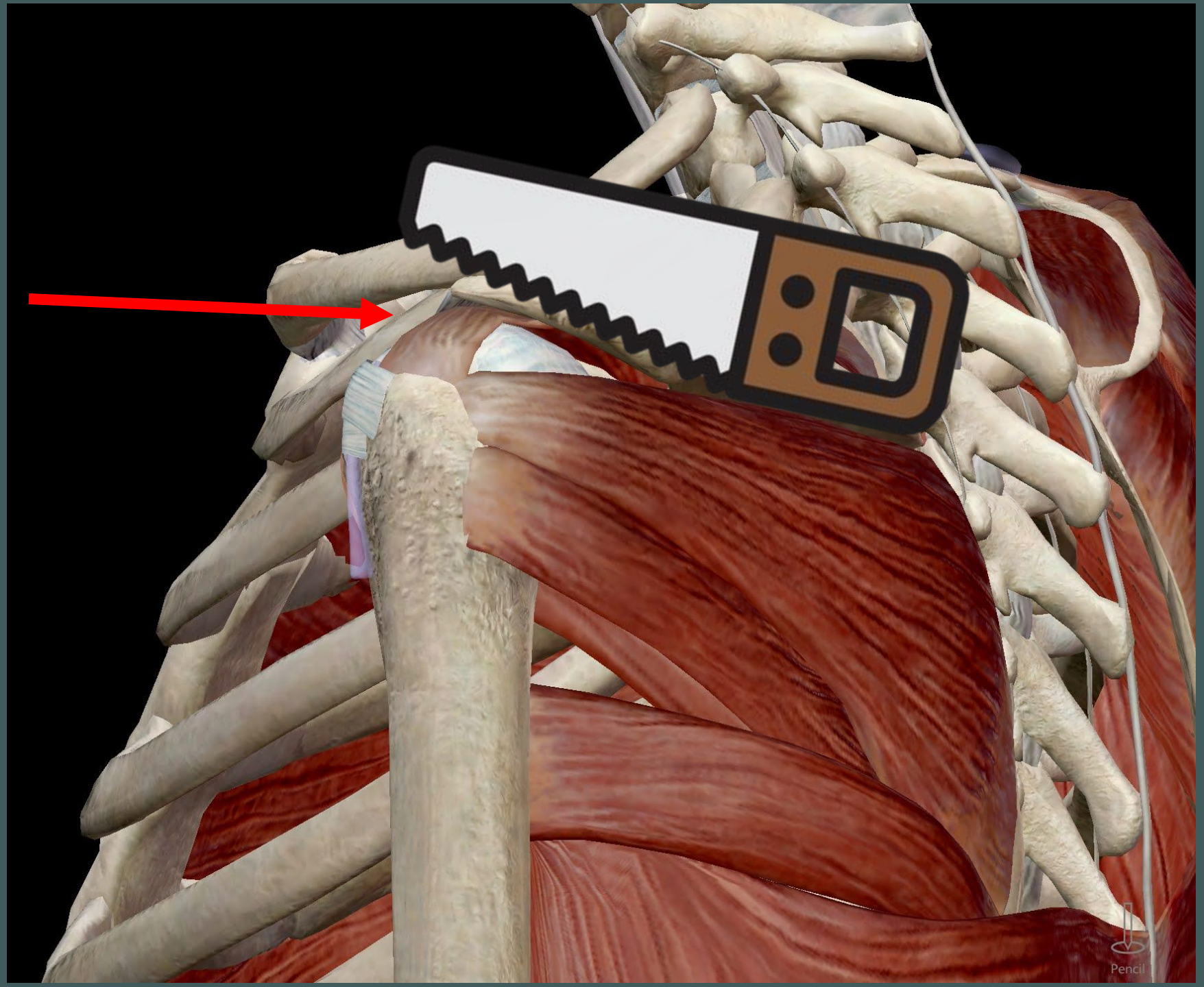


https://fitnessprogramer.com/exercise/lever-shoulder-press/

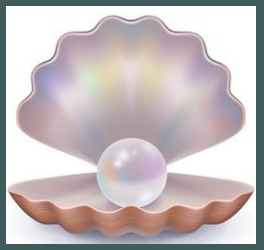
Shoulder – Rotator Cuff Syndrome/Impingement



- The rotator cuff undergoes age-related degeneration
- Pain is often proximal lateral
  - "It's never the deltoid"
  - Can radiate to the elbow, but not past it
- Similar to instability, RC strengthening is needed
  - Other consideratons:
    - Degree of cuff pathology
    - Pain limitations
- Scapula mechanics are important

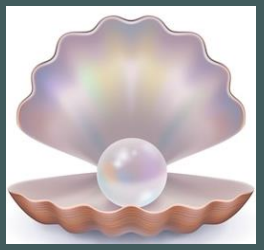

Pencil

Shoulder – Rotator Cuff Tears



- Large rotator cuff tears compromise the ability of the glenohumeral joint to articulate properly
- Deltoid pulls the humeral head superiorly
  - "high-riding humerus"

Shoulder – Adhesive Capsulitis



- Early frozen shoulder can mimic a bad impingement syndrome
- Time course is 1-3 years (average 18 months)
  - Freezing stage
  - Frozen stage
  - Thawing stage
- More common in females, diabetics, and thyroid patients
  - Peak age: mid-50s
- Look at restricted passive external rotation for diagnosis
- Aggressive ROM therapy early on is important to help shorten the course

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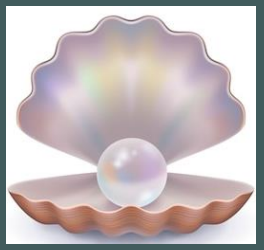
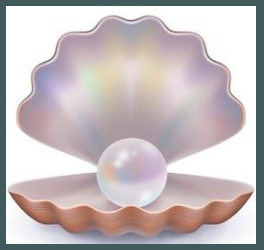


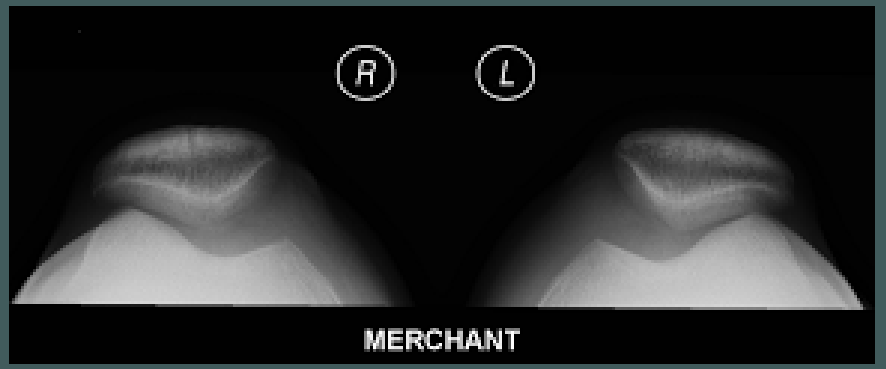
Knee

- Acute knee injury with pop, immediate swelling, and an inability to finish playing is ACL tear 80% of the time
- For acute knee injuries, limit to weightbearing as tolerated only
- Check ability to do a straight leg raise to ensure that extensor mechanism is intact
- Knee immobilizer
  - Keeps the knee in extension
  - OK for extensor mechanism injury
  - For other injuries, ace wrap or compression brace with crutches may be better
  - Can promote weakness, quad atrophy within a few days

Knee – Patellofemoral Syndrome



- "Runner's knee"
- Most common cause of anterior knee pain
- Caused by irritation of the patellofemoral compartment
  - Dysfunctional patellar tracking
  - Malalignment
  - Trauma



- Chondromalacia patella is often used interchangeably, but it technically also involves a wearing down of the cartilaginous surfaces

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Patellofemoral Pain Syndrome Treatment

- Strengthening the anteromedial knee
- Strengthening the hip
- Stretching of the IT band
- Arch supports to help with malalignment
- Patella stabilizing brace
- Surgery (rare)

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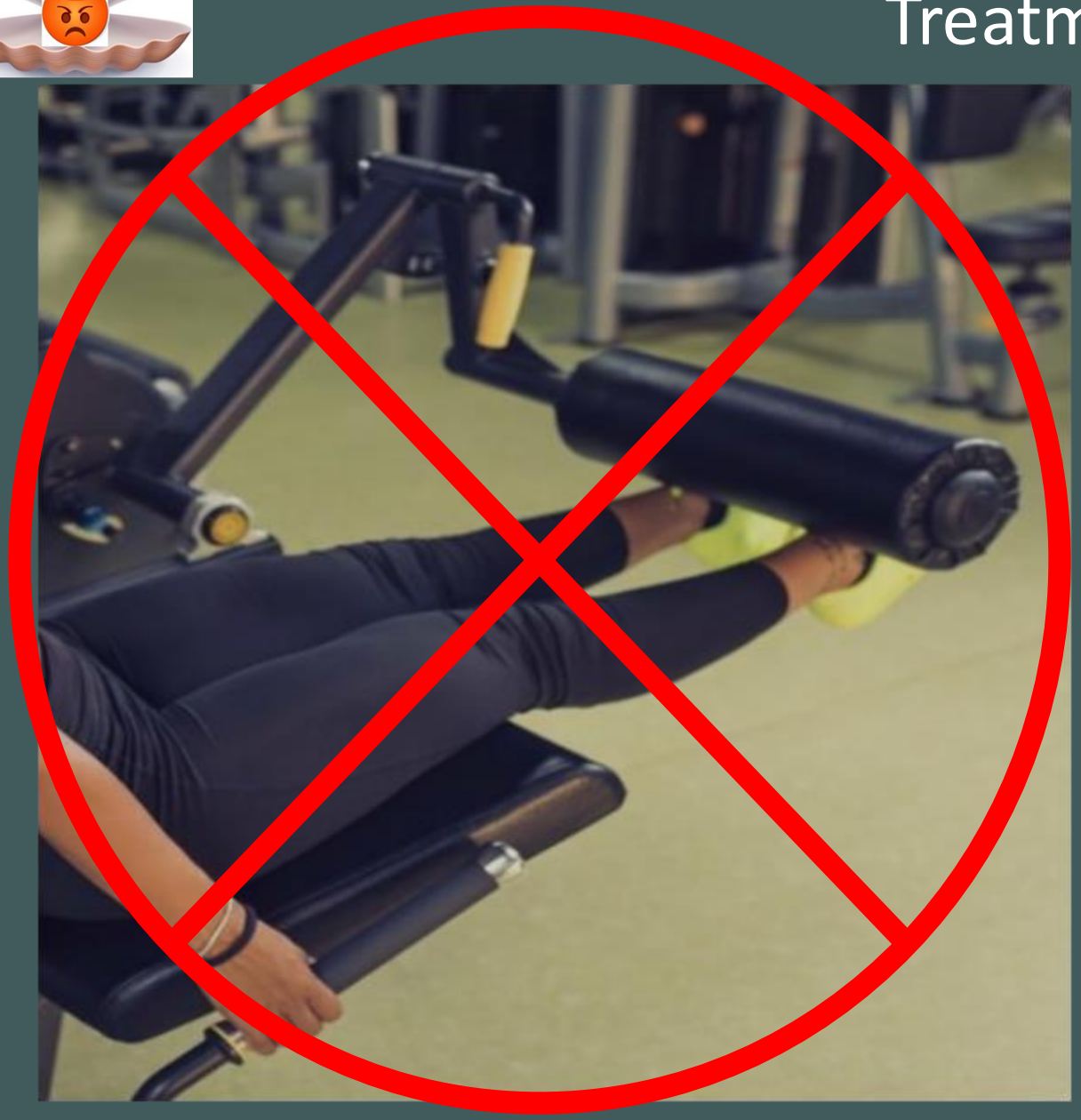
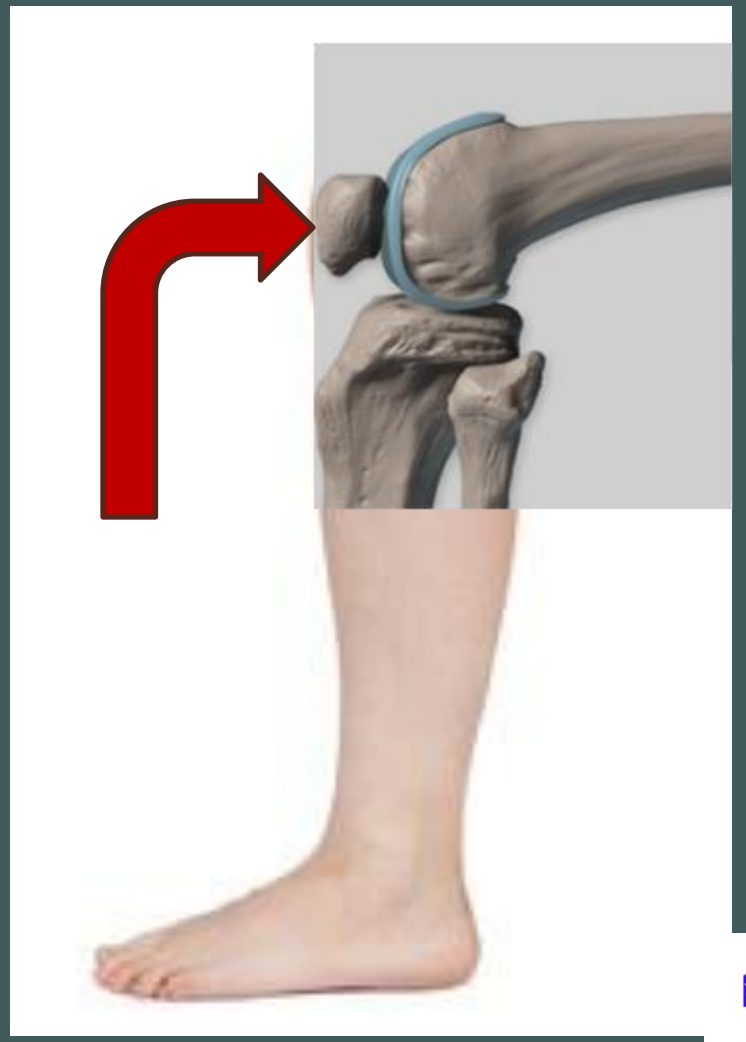
Patellofemoral Pain Syndrome Treatment





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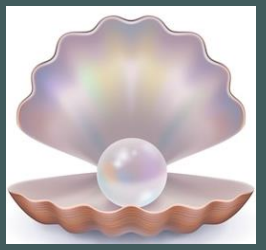
Patellofemoral Pain Syndrome Treatment

Pain Threshold vs Pain Tolerance



- Pain **threshold**:
  - The minimum level at which a stimulus is considered painful
  - Some psychologic components, but more **physiologically** influenced
    - Genetics
    - Age
    - Exercise
    - Opiates
- Pain **tolerance**:
  - The maximum level of pain that can be endured
  - **Psychologic** factors can have a greater influence
    - Attitudes
    - Depression/anxiety

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Thank you!

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