Sports Injuries to the Knee, Hips and Ankle

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Banner Pediatric Subspecialists

William Osler

The very first step towards success in any occupation is to become interested in it

Goals

- Help you feel more comfortable with basic orthopedic problems of the knee, hips, and ankles
- Improve diagnostic skills in identifying problems
- Become more interested in the function and treatment of musculoskeletal problems

Goals: When to refer to ortho

This is a workshop

If there are questions, no need to wait till the end, fire away and we can have a discussion

Please raise your hand or even yell out if I don't see you and we can spend some time on questions

THERE ARE NO DUMB QUESTIONS

Overview of lower extremity injuries, aches and pains

- Knees
- Hips
- Ankles
- History and Physical
- Imaging
- Anatomy/Mechanics
- Injuries/pathology
- Treatment

Why Are Sports Injuries more commonly seen in the pediatric population now???

- Increasing frequency of sport participation
- Younger patients in competitive sports
- Greater Intensity/competition
- Parental Pressure
- Better Physician recognition
- Female athletes participation

"The good physician treats the disease; the great physician treats the patient who has the disease."

-William Osler

- Laugh with your patients

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- Have fun with the people that come through your door

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- Laugh with your patients
- Have fun with the people that come through your door
- Make sure your patients know you sincerely care
- Leave your office each day feeling good about what you have done

History

- What brings you in today?
  - Chief Complaint
  - Open ended questions
- Was there an injury?
  - Mechanism, swelling, pop, weight bearing
- Pain – Location, duration, intensity, frequency
  - Where is the pain,
  - Point with one finger

Seek to Understand, Seek to Comfort

Observation

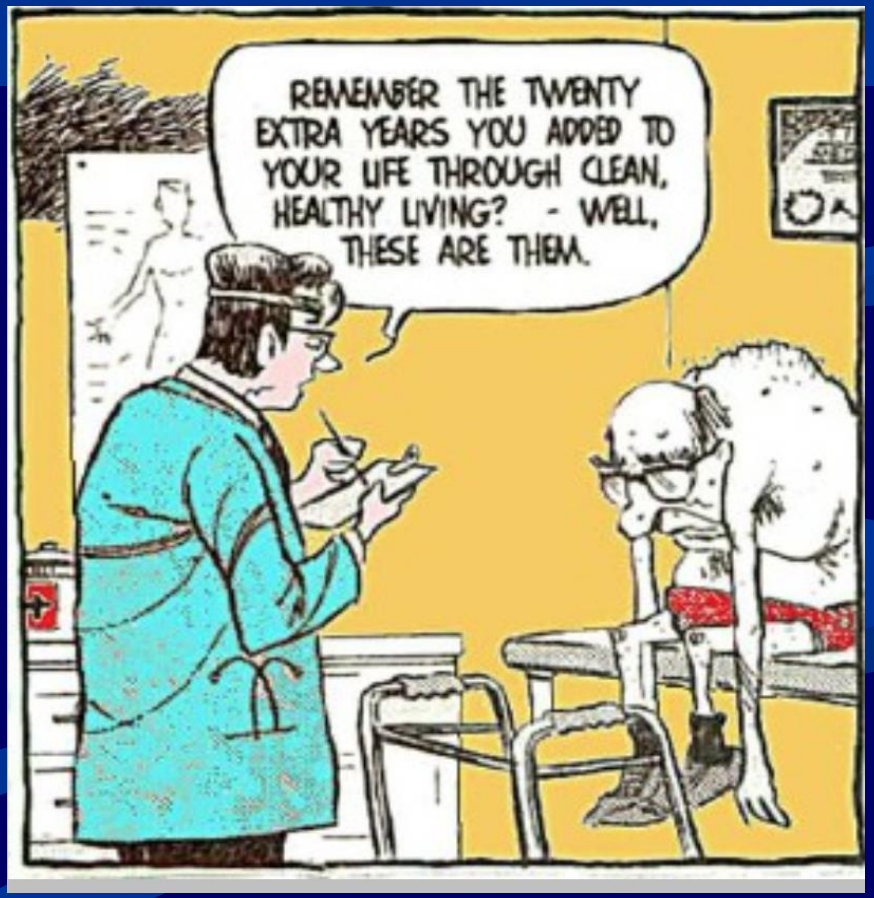
- Is the patient male or female?
- Is the patient obese/sedentary?
- Pain threshold
- "helicopter parent"
- Patient age
- Anxiety level

Battle of the sexes!

- Boys
  - Osgood Schlatter, osteochondritis dissecans, ACL, traumatic injuries
  - Hip labral tears and Femoroacetabular Impingement
- Girls
  - Patellofemoral pain (3 times more common), patellar instability
  - ACL tears 2-4 times more likely
  - Laxity (loose jointed) related pain

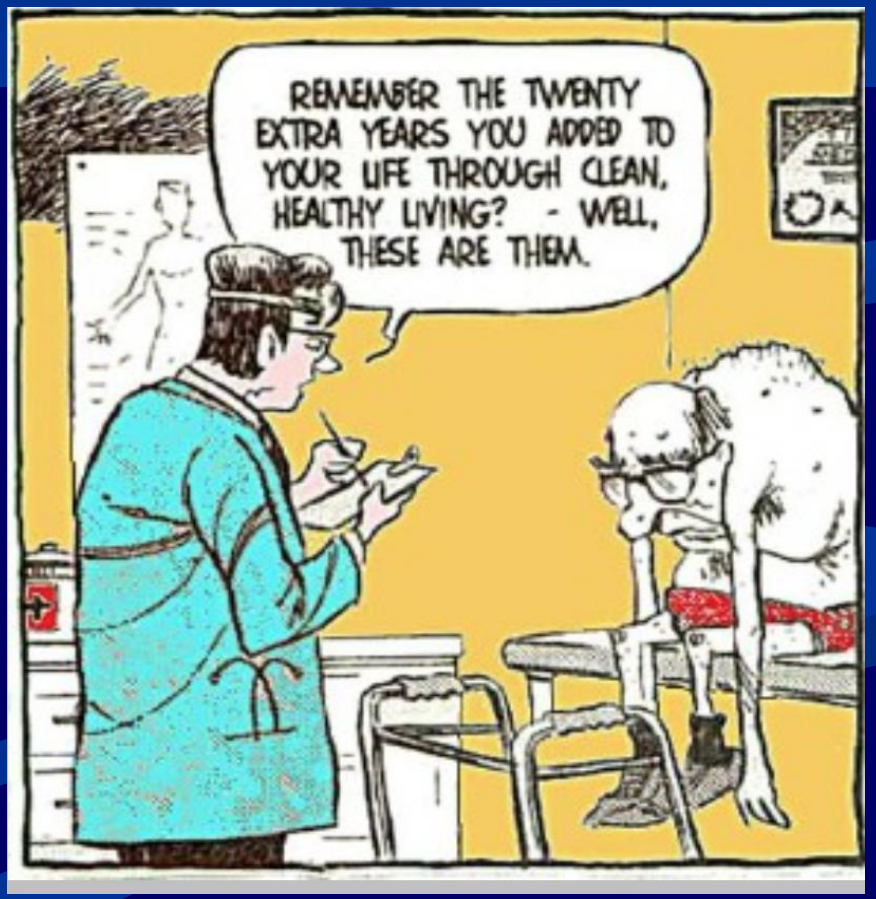
Age of Patient

- Younger patients = less serious problem (usually)
  - Less stress through knee
  - Healthier tissue
- "Growing pains"
- "Alignment issues"
  - <8 years - wait, watch, see,
- Reassure

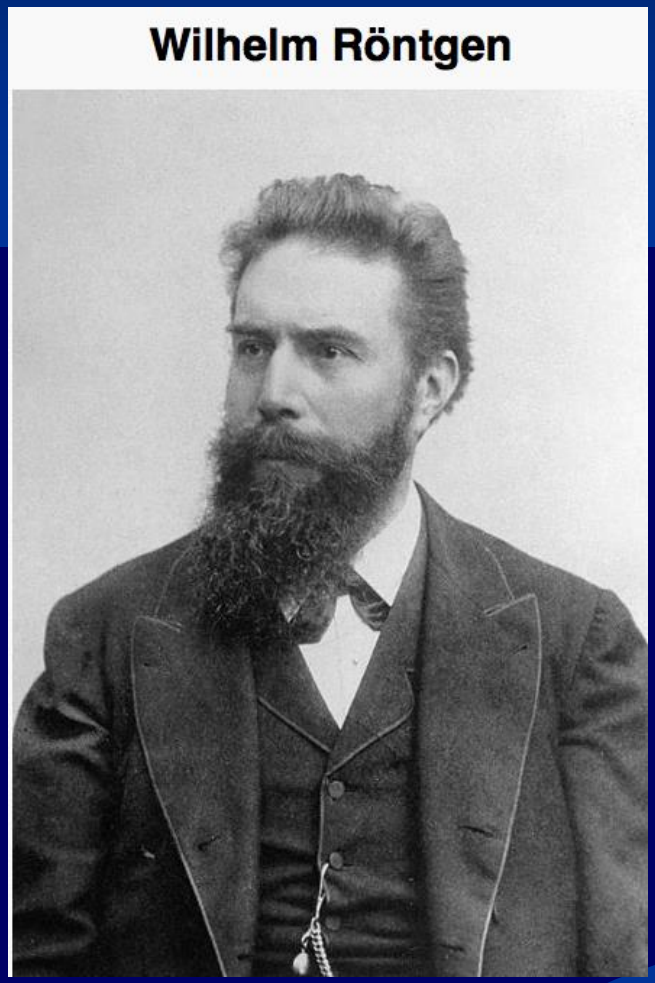


Age of Patient

- Older Patients – increase muscular force/weight lead to more damage
- Injured Tissue
  - not as regenerative



Imaging



When to get x-rays

- Any injuries, especially with swelling
- Long term pain
- Patellar Dislocations
- Patellofemoral pain
- Swelling
- Groin pain
- Ankle injuries/pain

When to get x-rays

- A “negative” x-ray often tells you much more then read

When to get x-rays (in hip)

- Any injuries, especially with swelling
- Long term pain
- “groin pain”

Relative Radiation Exposure

- Chest X-ray = Flight from NYC to LA

  (or 4-10 days of ambient radiation exposure in daily living)

- X-ray of the extremity (hand, foot) = 3 hours ambient exposure
- X-ray of knee = less then 1 day ambient exposure

Relative Radiation Exposure

BONE 	Procedure	Approximate effective radiation dose	Comparable to natural background radiation for:
	Spine X-ray	1.5 mSv	6 months
	Extremity (hand, foot, etc.) X-ray	0.001 mSv	3 hours

CENTRAL NERVOUS SYSTEM 	Procedure	Approximate effective radiation dose	Comparable to natural background radiation for:
	Computed Tomography (CT)–Head	2 mSv	8 months
	Computed Tomography (CT)–Head, repeated with and without contrast material	4 mSv	16 months
	Computed Tomography (CT)–Spine	6 mSv	2 years

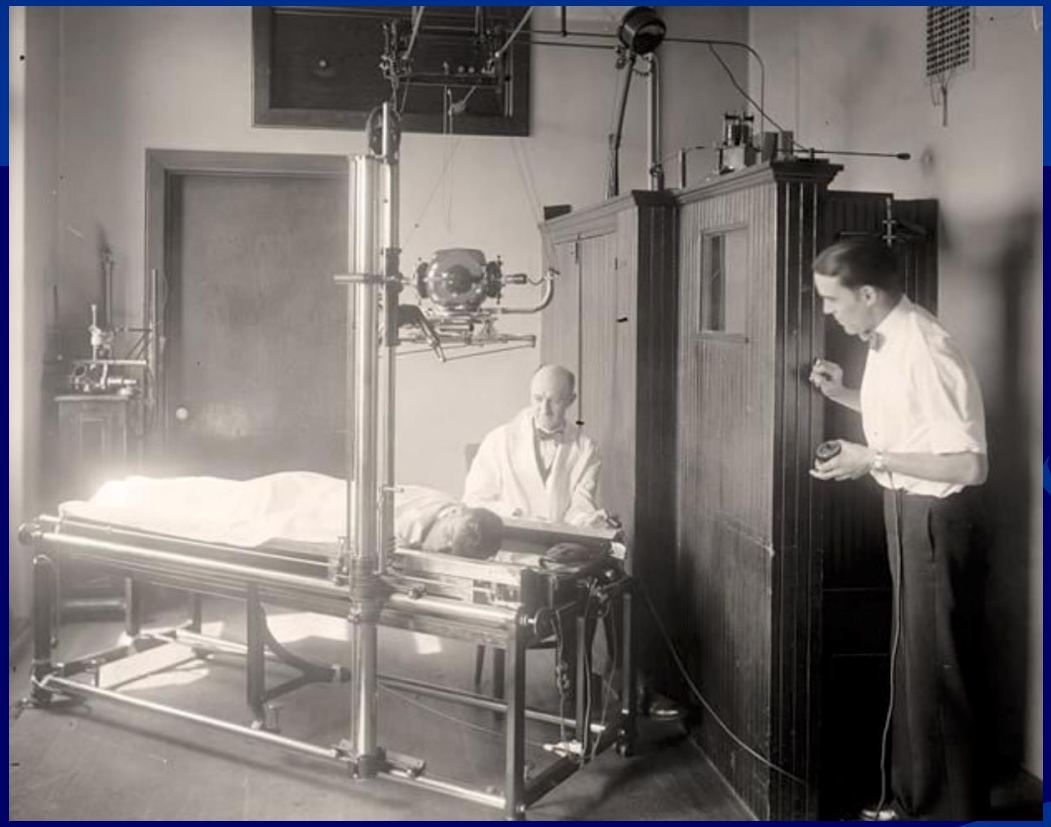
CHEST 	Procedure	Approximate effective radiation dose	Comparable to natural background radiation for:
	Computed Tomography (CT)–Chest	7 mSv	2 years
	Computed Tomography (CT)–Lung Cancer Screening	1.5 mSv	6 months
	Chest X-ray	0.1 mSv	10 days

DENTAL 	Procedure	Approximate effective radiation dose	Comparable to natural background radiation for:
	Dental X-ray	0.005 mSv	1 day

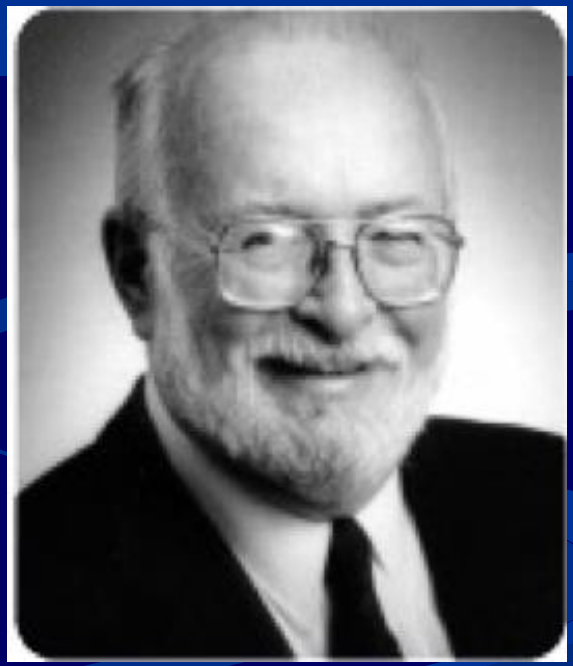
Relative Radiation Exposure

ABDOMINAL REGION	Procedure	Approximate effective radiation dose	Comparable to natural background radiation for:
	Computed Tomography (CT)–Abdomen and Pelvis	10 mSv	3 years
	Computed Tomography (CT)–Abdomen and Pelvis, repeated with and without contrast material	20 mSv	7 years
	Computed Tomography (CT)–Colonography	6 mSv	2 years
	Intravenous Pyelogram (IVP)	3 mSv	1 year
	Barium Enema (Lower GI X-ray)	8 mSv	3 years
	Upper GI Study with Barium	6 mSv	2 years

Relative Radiation Exposure



MRI



When to get an MRI

- Major swelling with injury to rule out fractures/ligament tears
- Anytime when athletic timeline more of an issue
- Persistent pain that hasn't responded to conservative measures

CT Scan

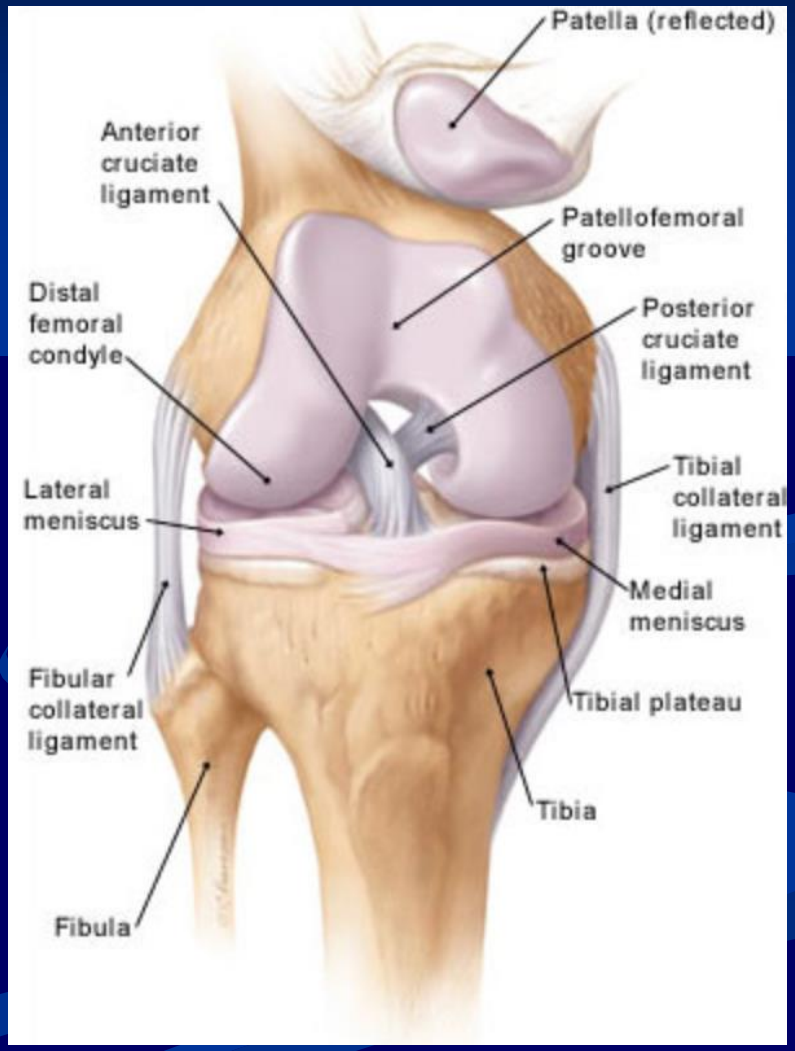
- Complex intraarticular fractures
- Rotational profile
- Pelvic Fractures

CT Scan

- Complex intraarticular fractures
- Rotational profile
- Pelvic Fractures

Knee Anatomy/Mechanics

- Function of the Bones
  - Hinge joint
  - Less bony stability
  - Rely on ligaments/menisci



Relative Bony stability

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Relative Number of Visits to office

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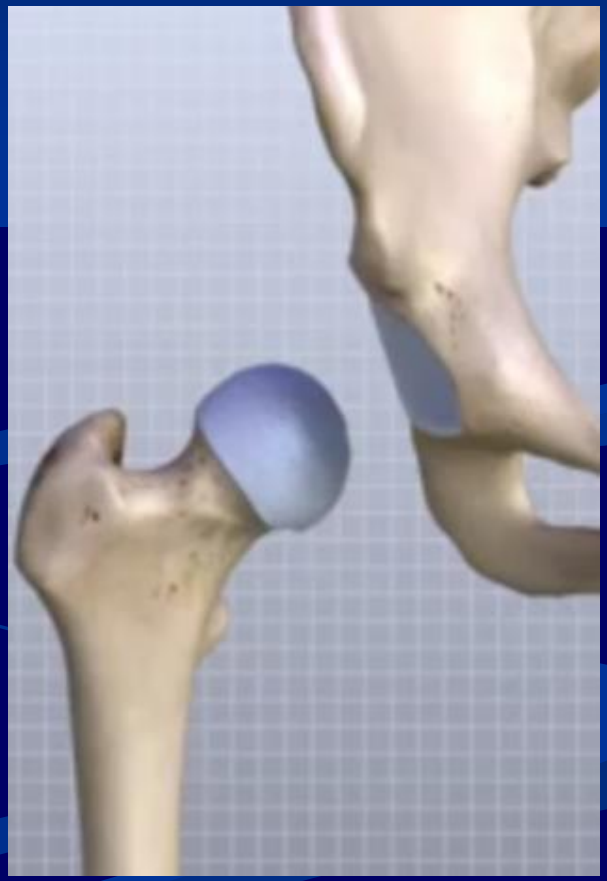
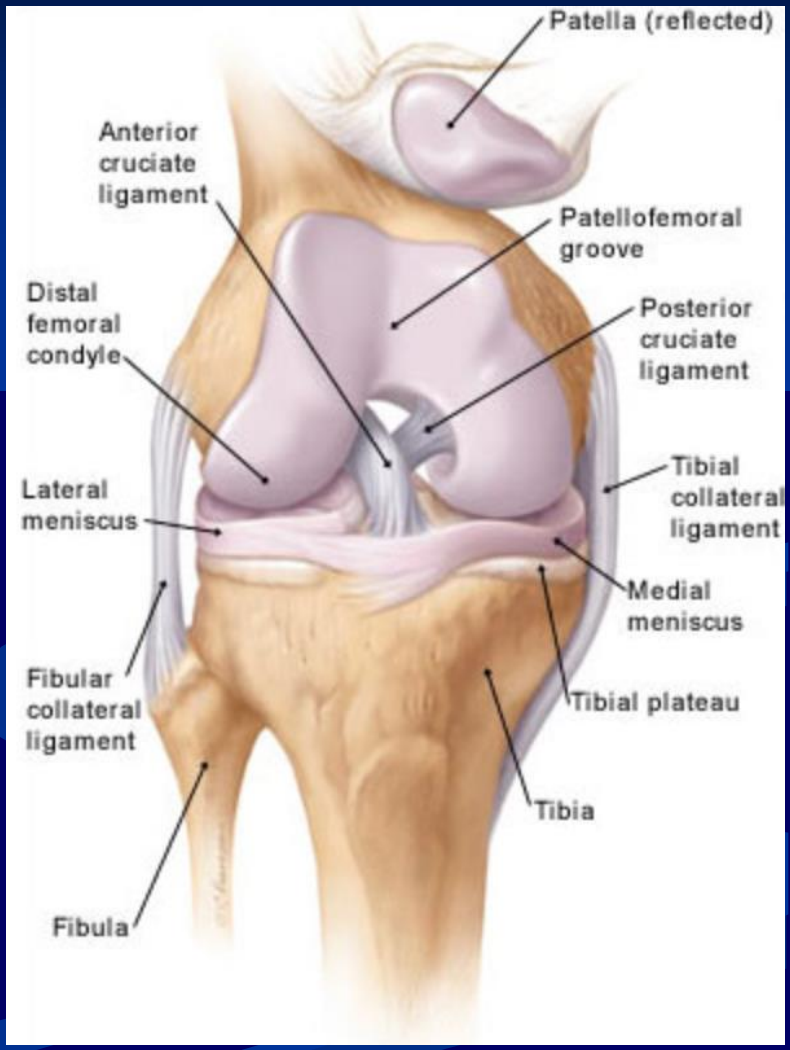
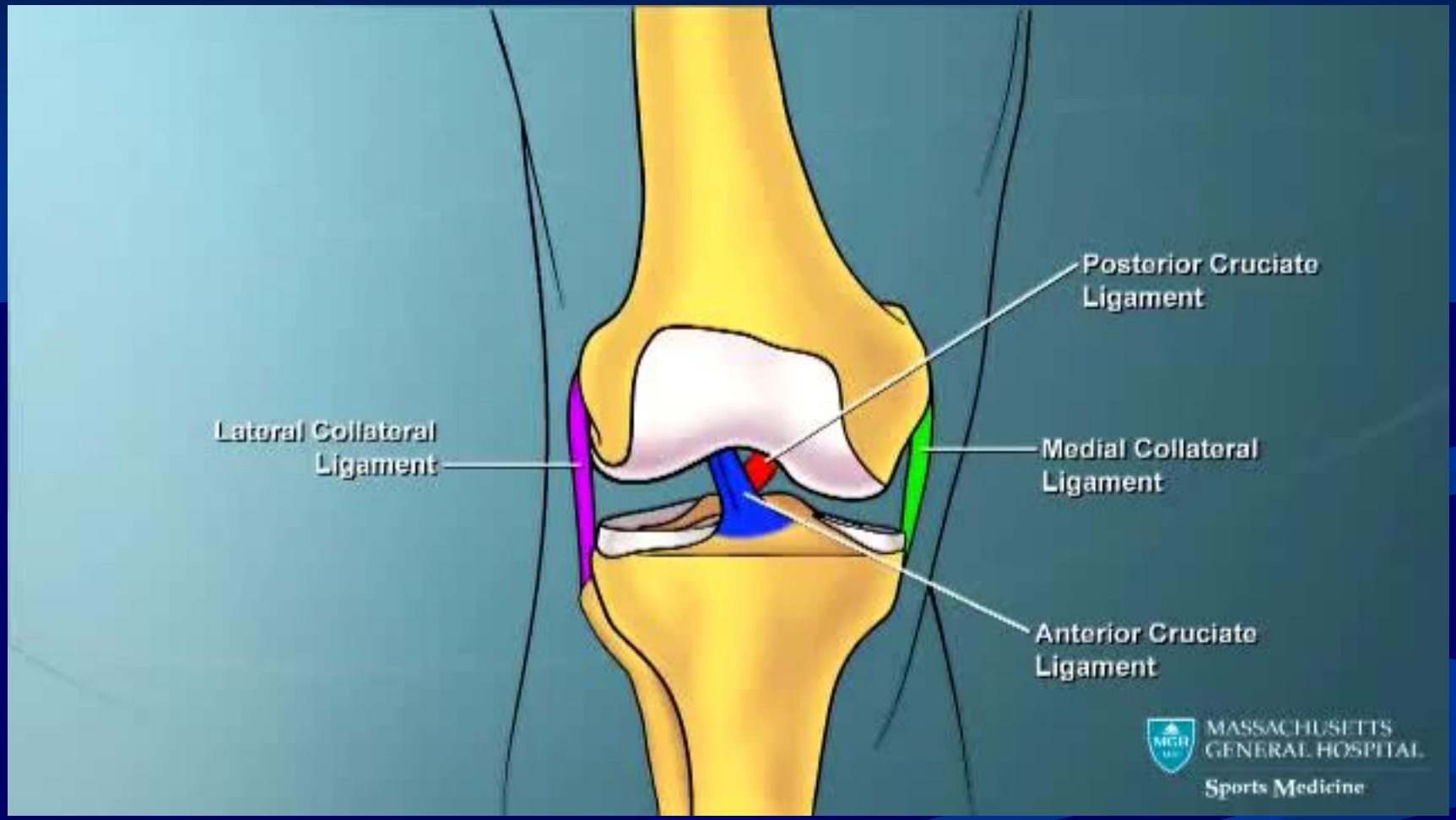


Knee Anatomy/Mechanics

- Function of the ligaments
  - Knee – few bony restraints
  - IMPORTANT stabilizers
  - ACL, MCL, LCL, PCL
    - There are minor ligament stabilizers as well

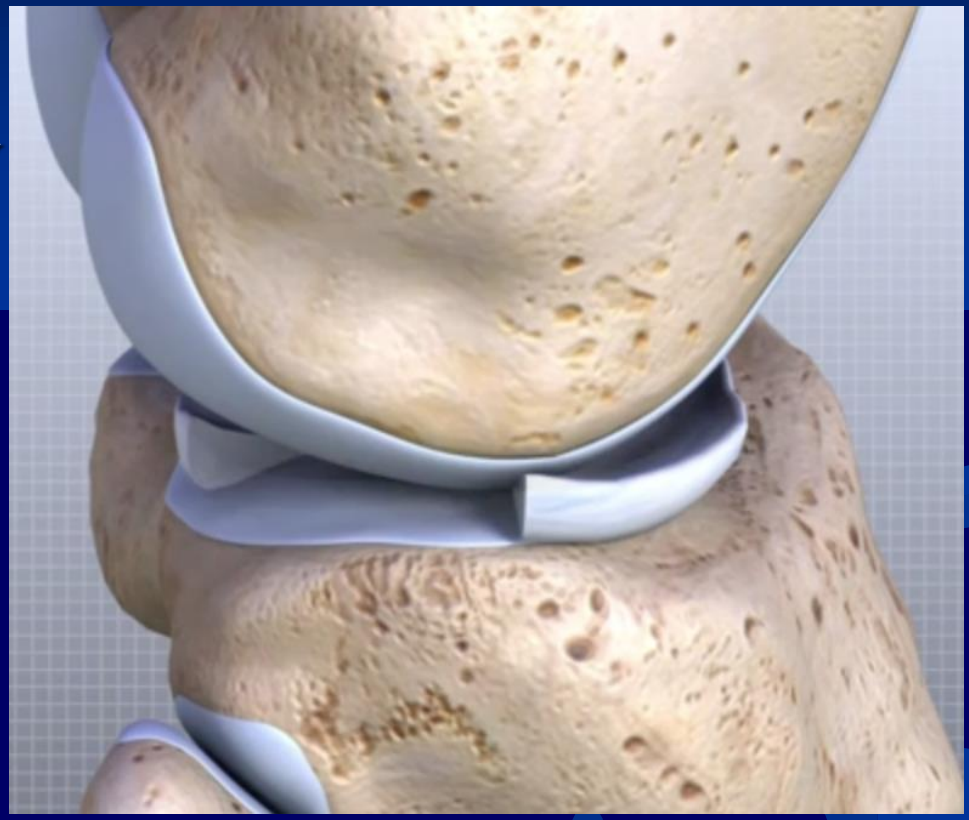


Knee Mechanics

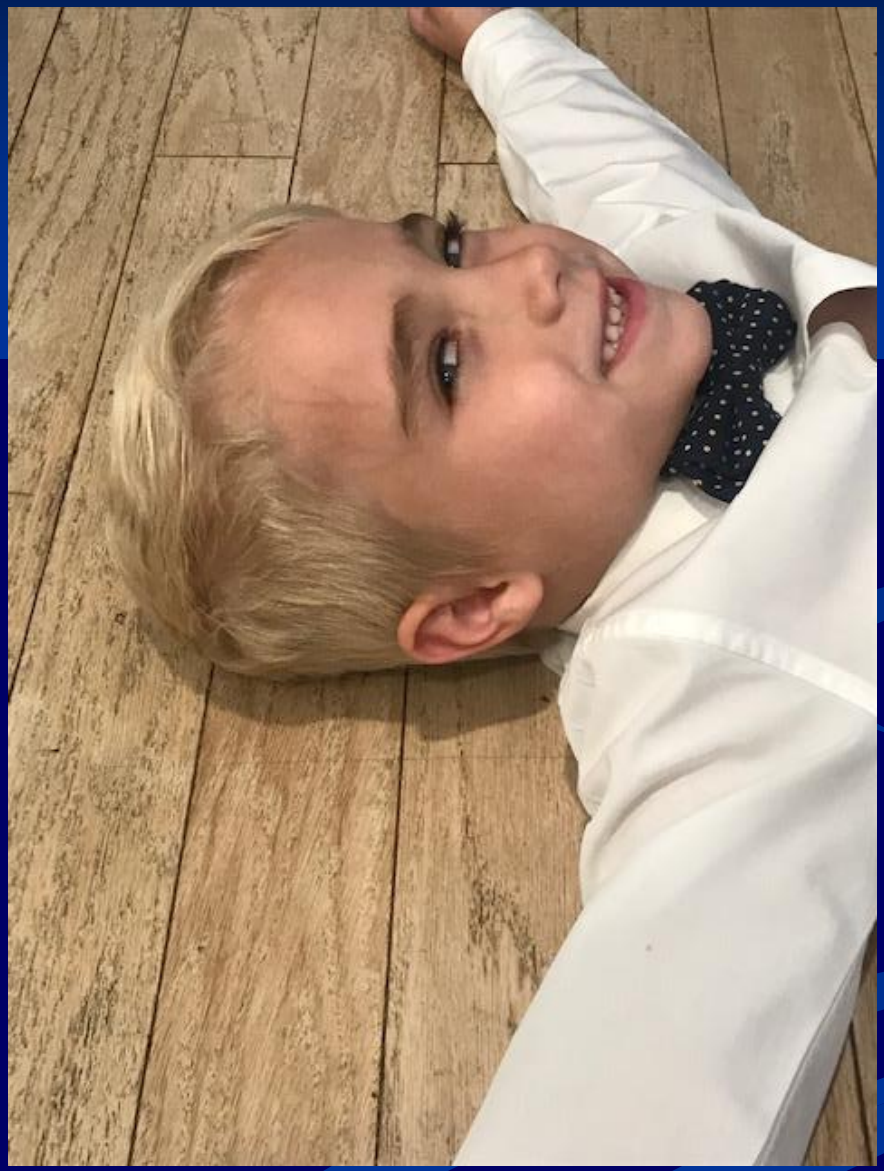


Meniscus Anatomy/Mechanics

- Function of the Menisci
  - Distribute pressure evenly
  - Stabilize the knee
  - Arthritis prevention



Knee Anatomy/Mechanics

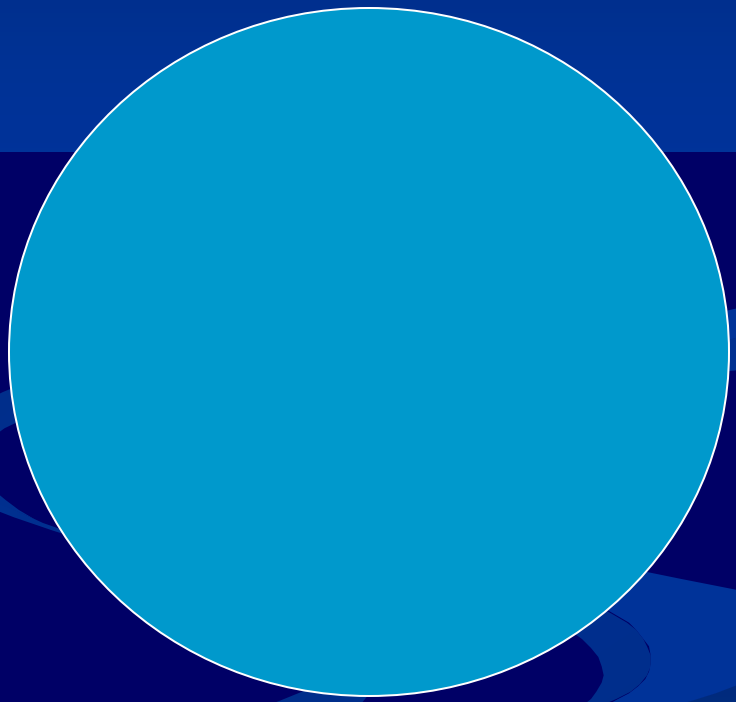


Surface area

Head on floor similar to knee without meniscus

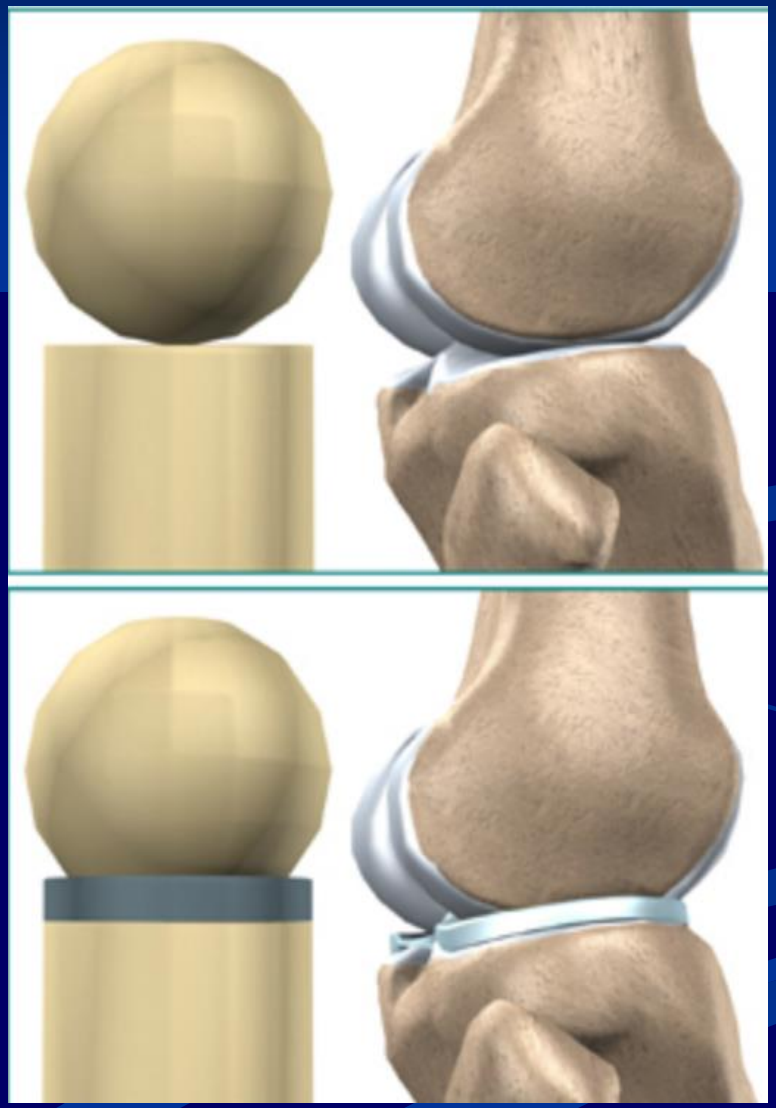
Knee Anatomy/Mechanics

Surface area

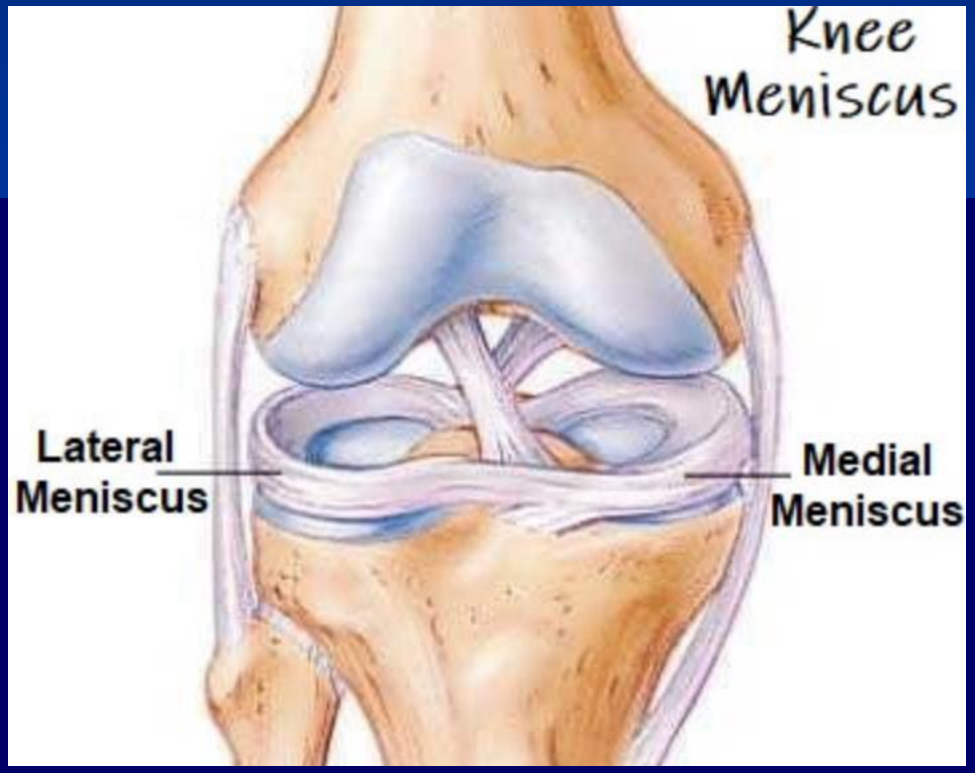


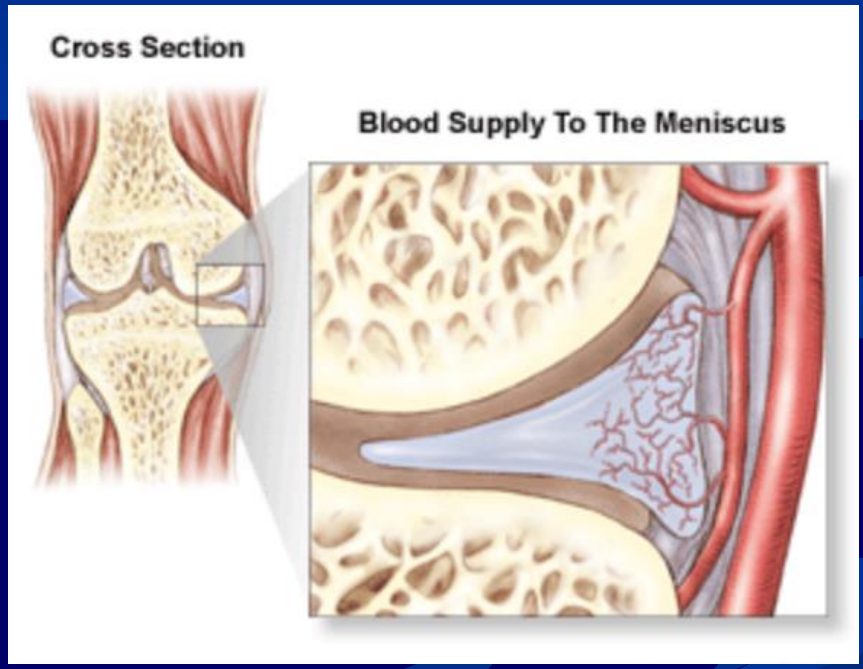
Head with pillow similar to knee with meniscus

Menisci help distribute pressure evenly

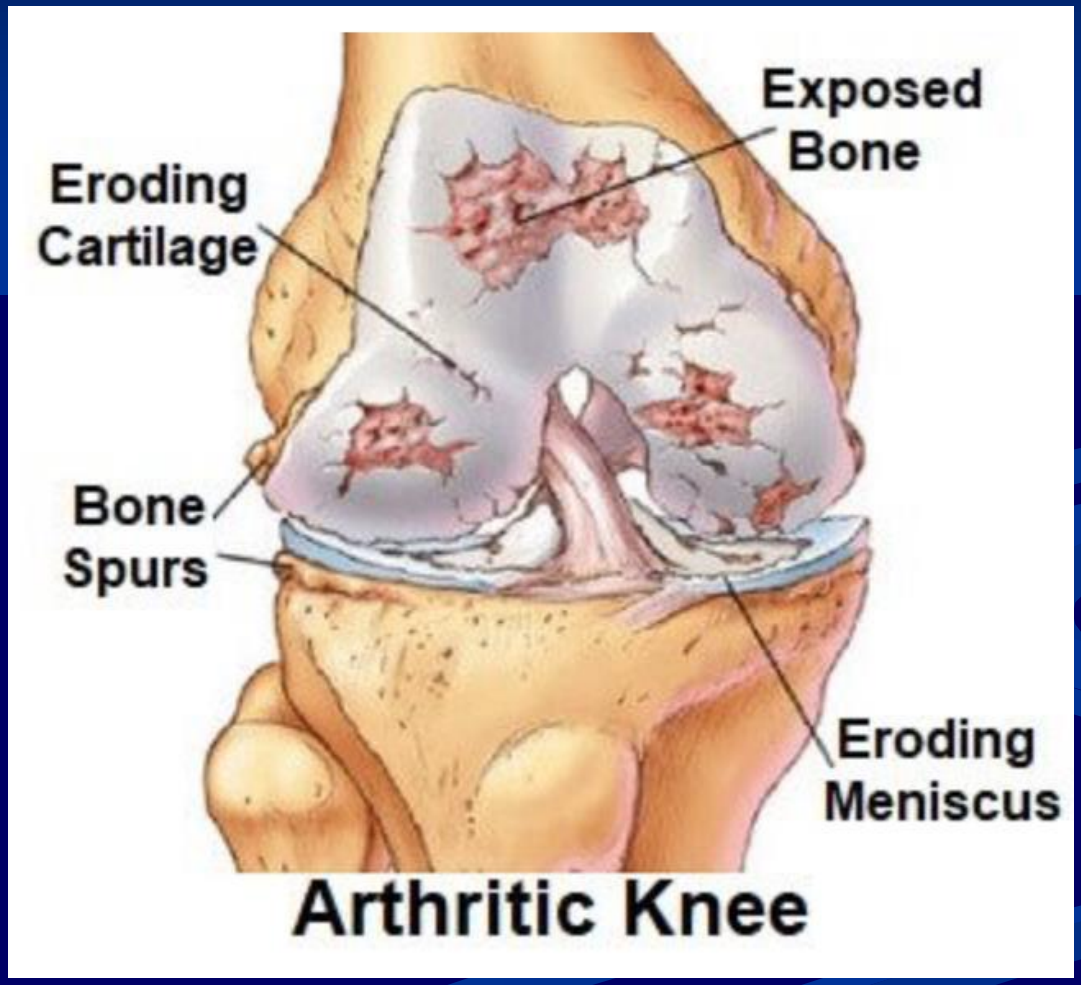


Meniscus Anatomy

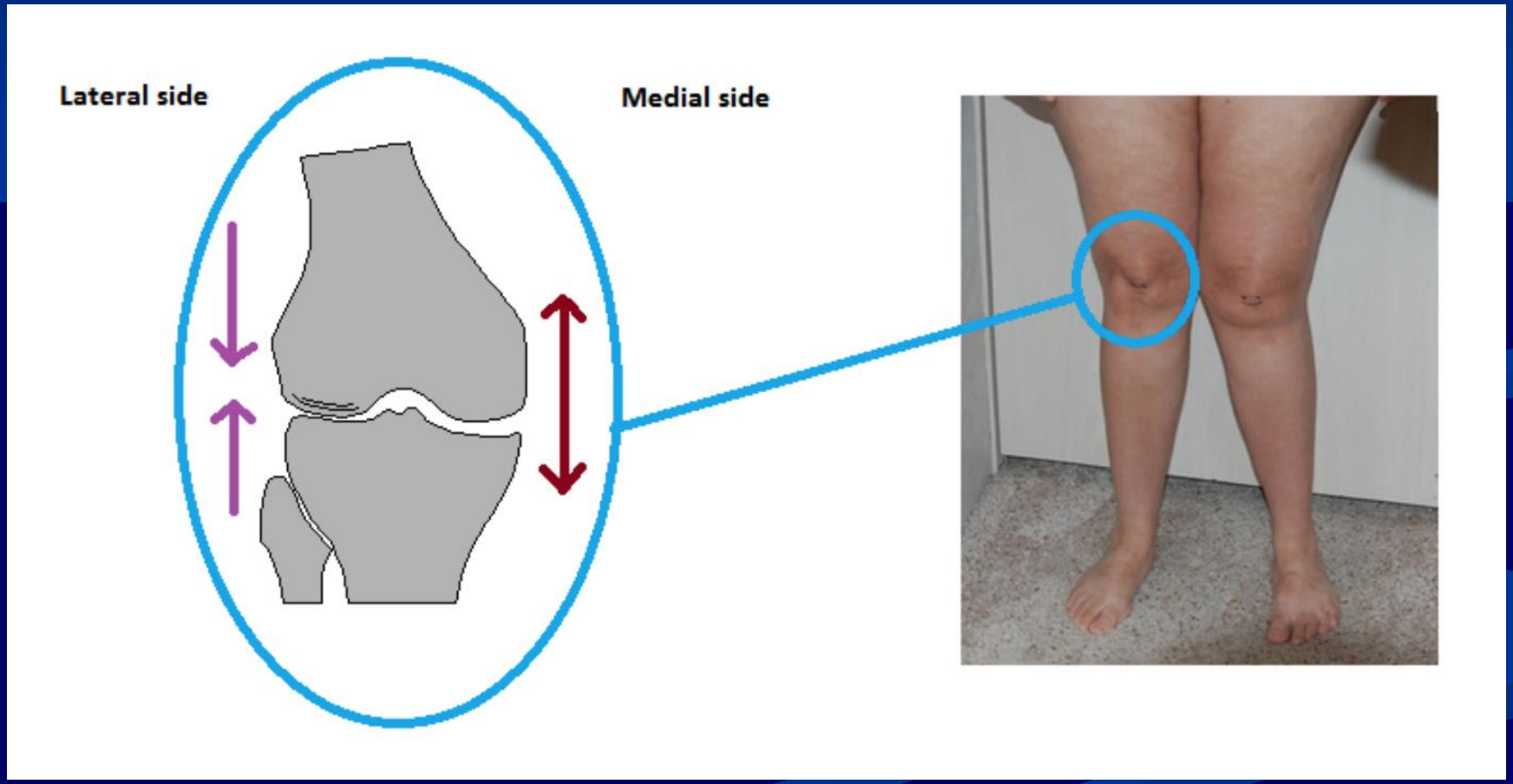




No meniscus = Increase Arthritis

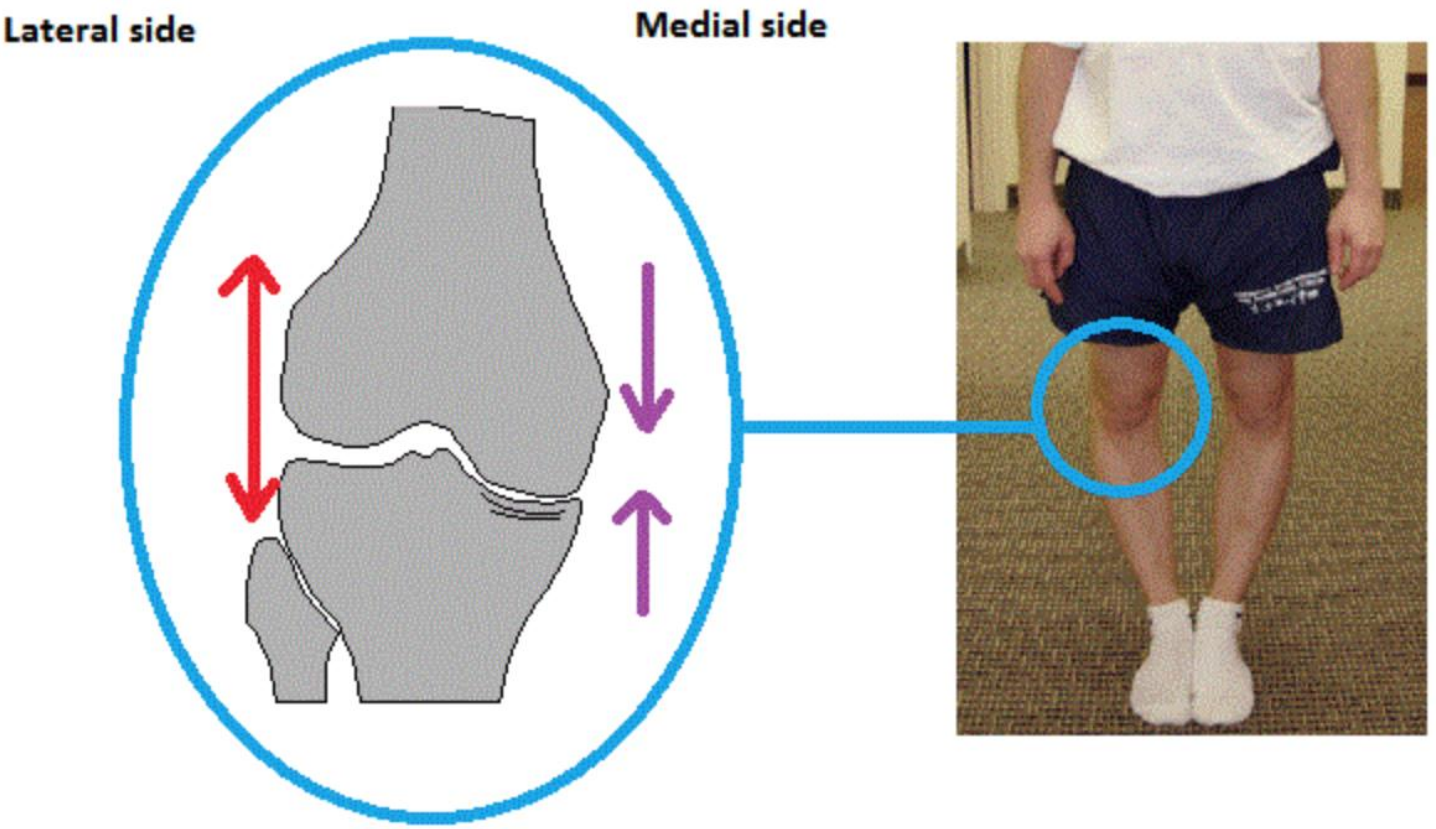


Alignment

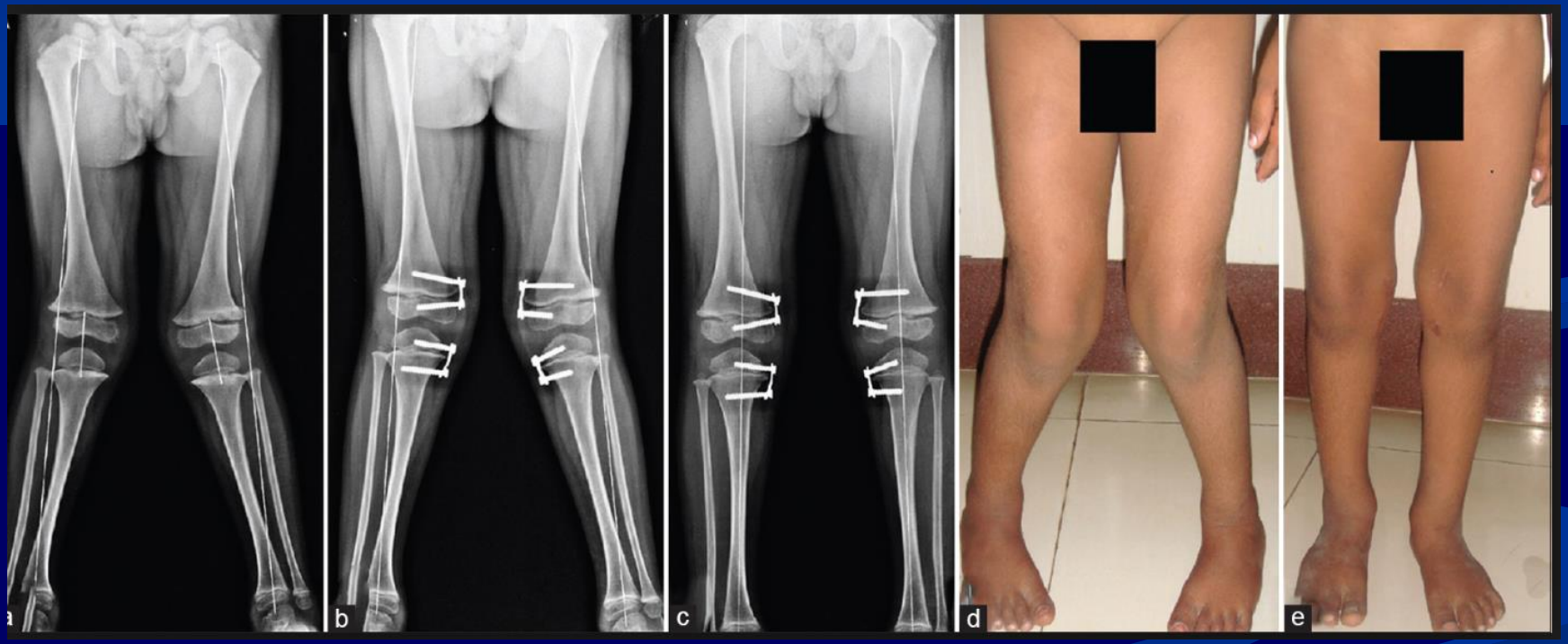


Force= Pressure/Area

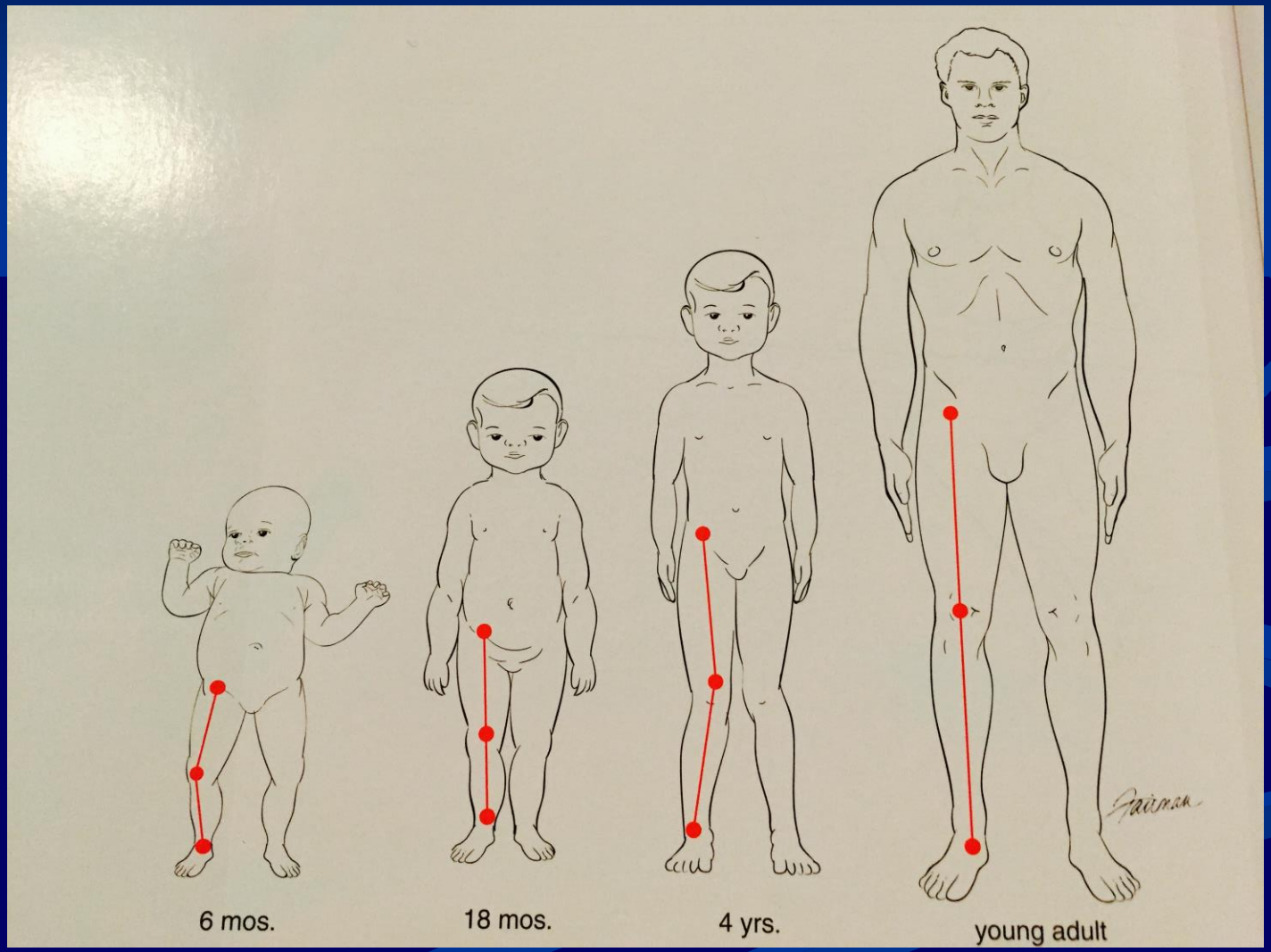
Alignment



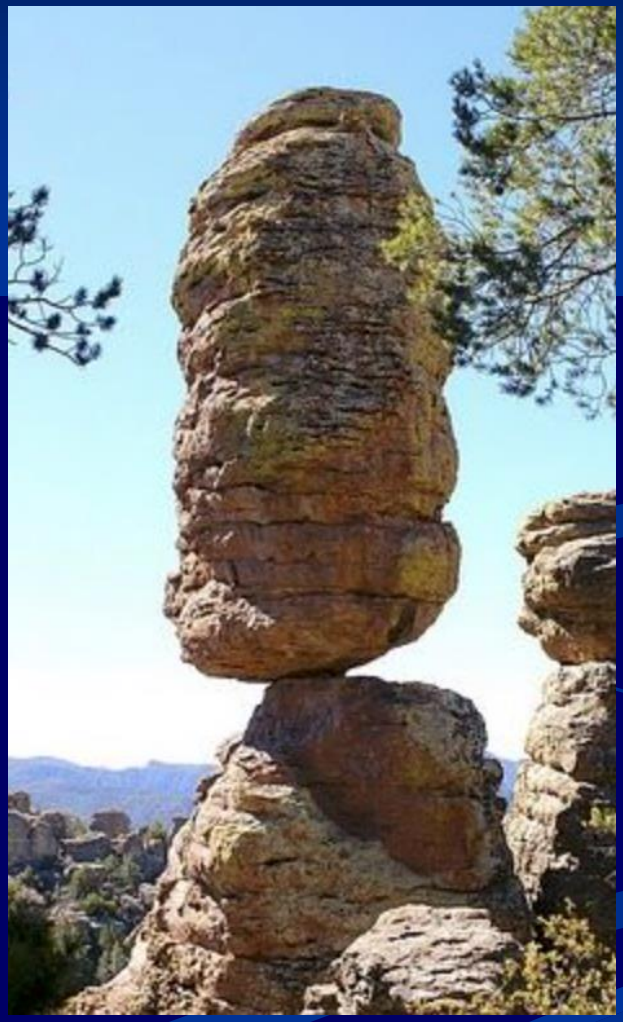
Alignment



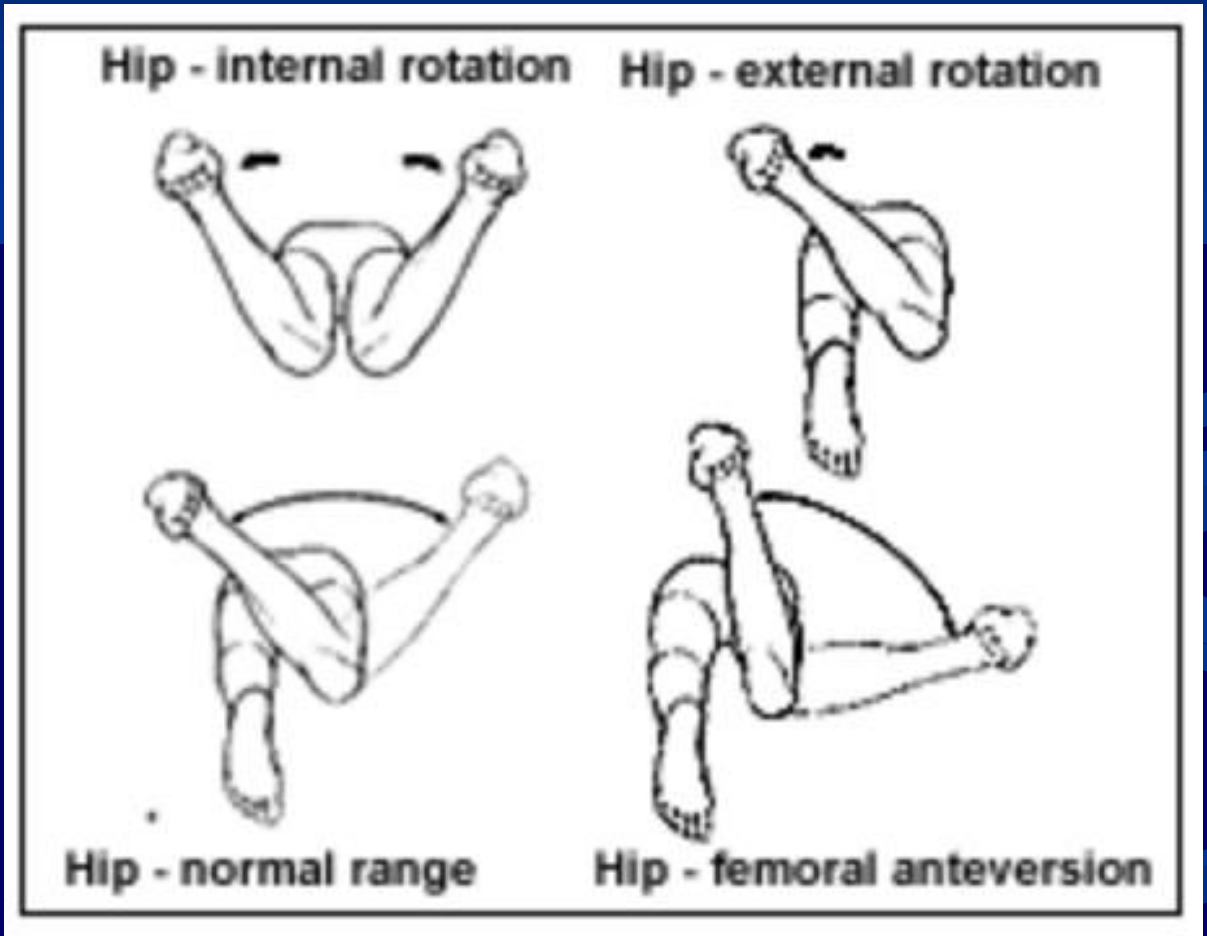
Alignment Changes With Age



Balance is key to happy knee



Rotational Alignment



Rotational Alignment

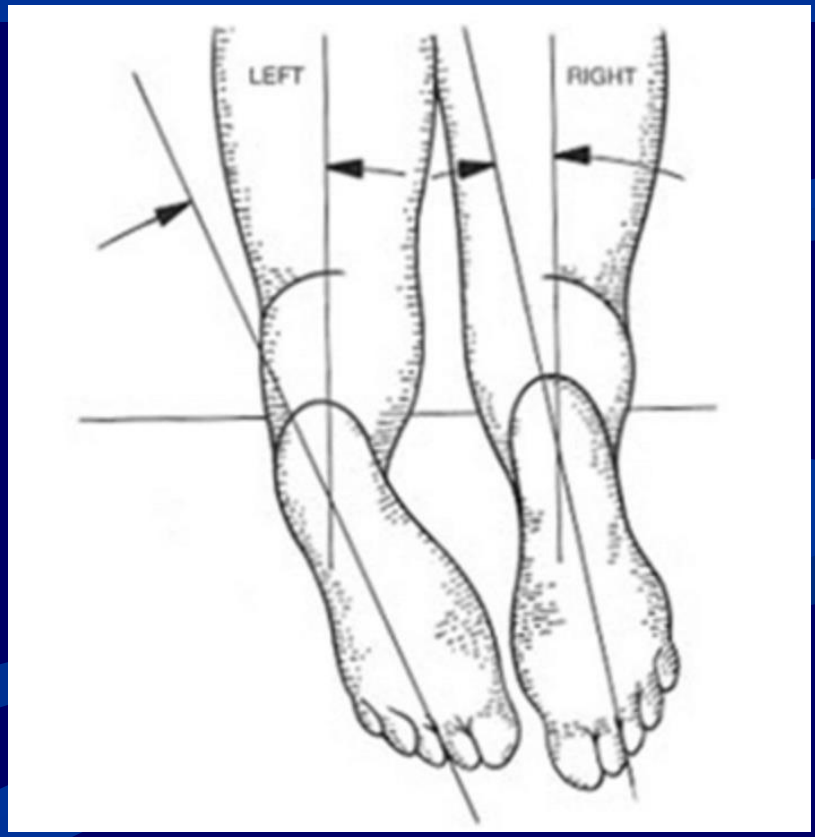
- Video

Rotational Alignment (measure prone)

- Infants
  - 40° internal rotation
  - 70° external rotation
- Age 10
  - 50° internal rotation
  - 45° external rotation
  - Mild, moderate, and severe increases in internal rotation are demonstrated at 70° , 80° , and 90°

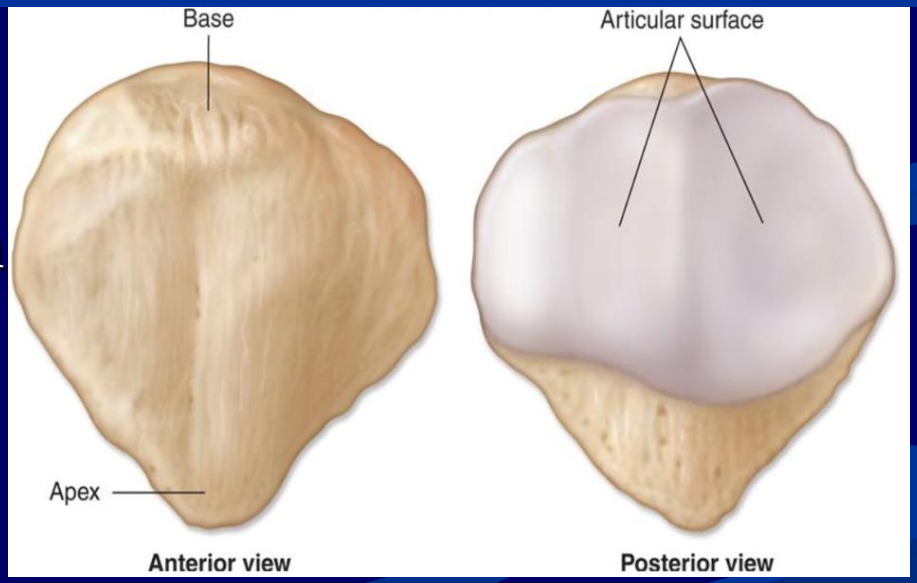
Rotational Alignment (measure prone)

- Thigh Foot Axis
  - Infants - 5° Internal Rotation
  - 8-year olds - 10° of Ext Rot

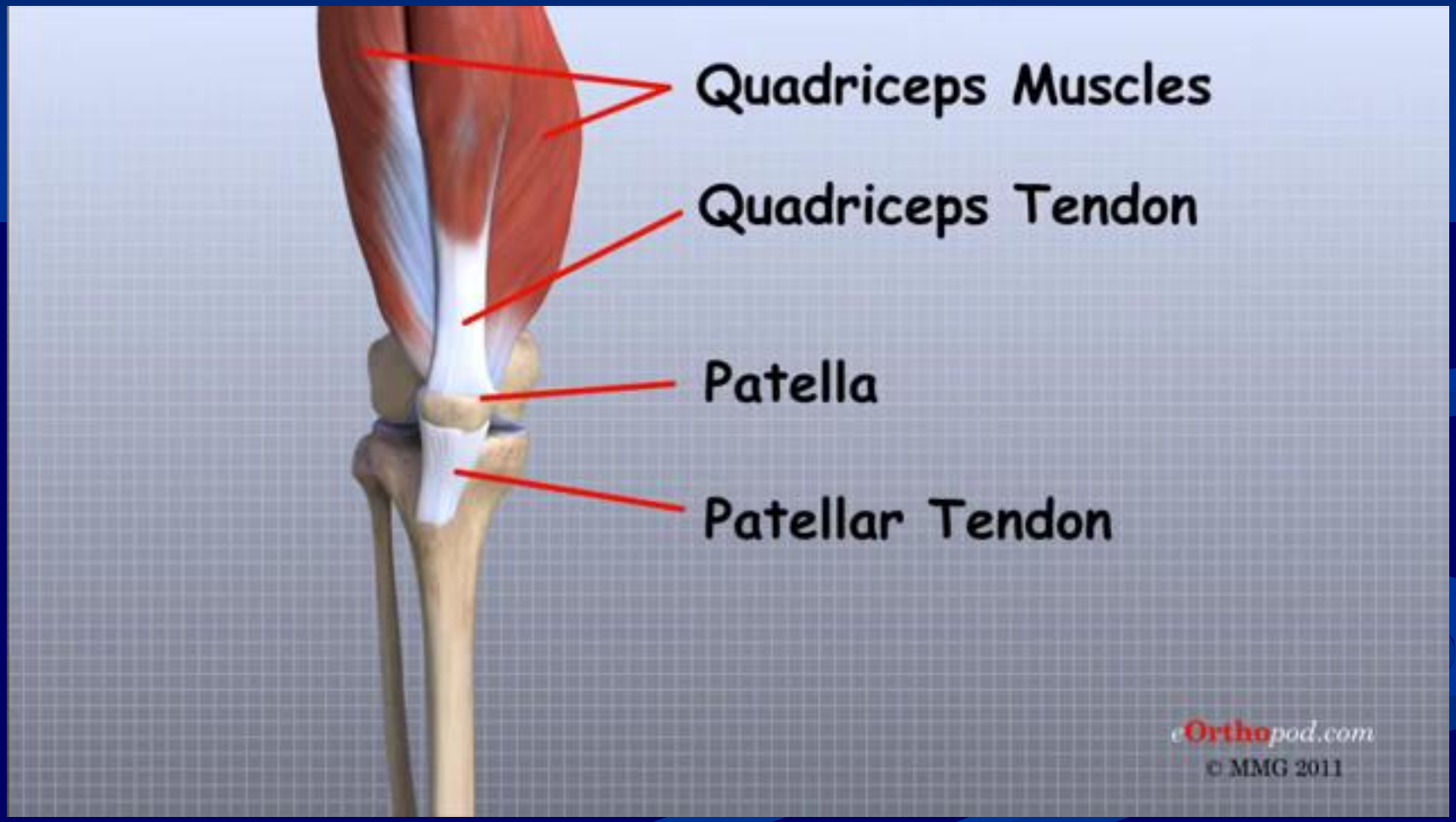


Patella Anatomy/Mechanics

- Largest Sesamoid bone
  - Acts as fulcrum for the quads to increase contractile force
  - Protects the knee
- Poor Tracking-common

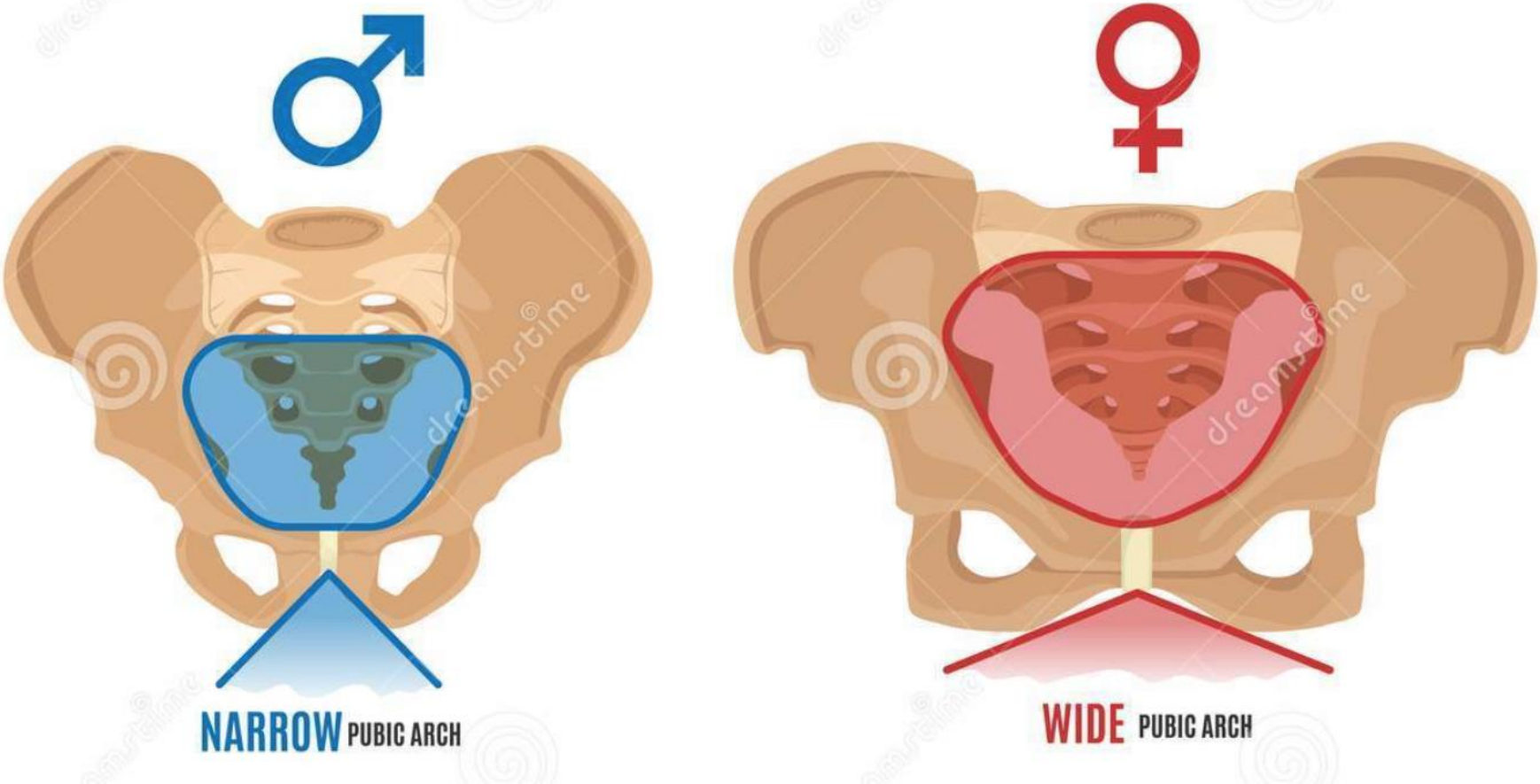


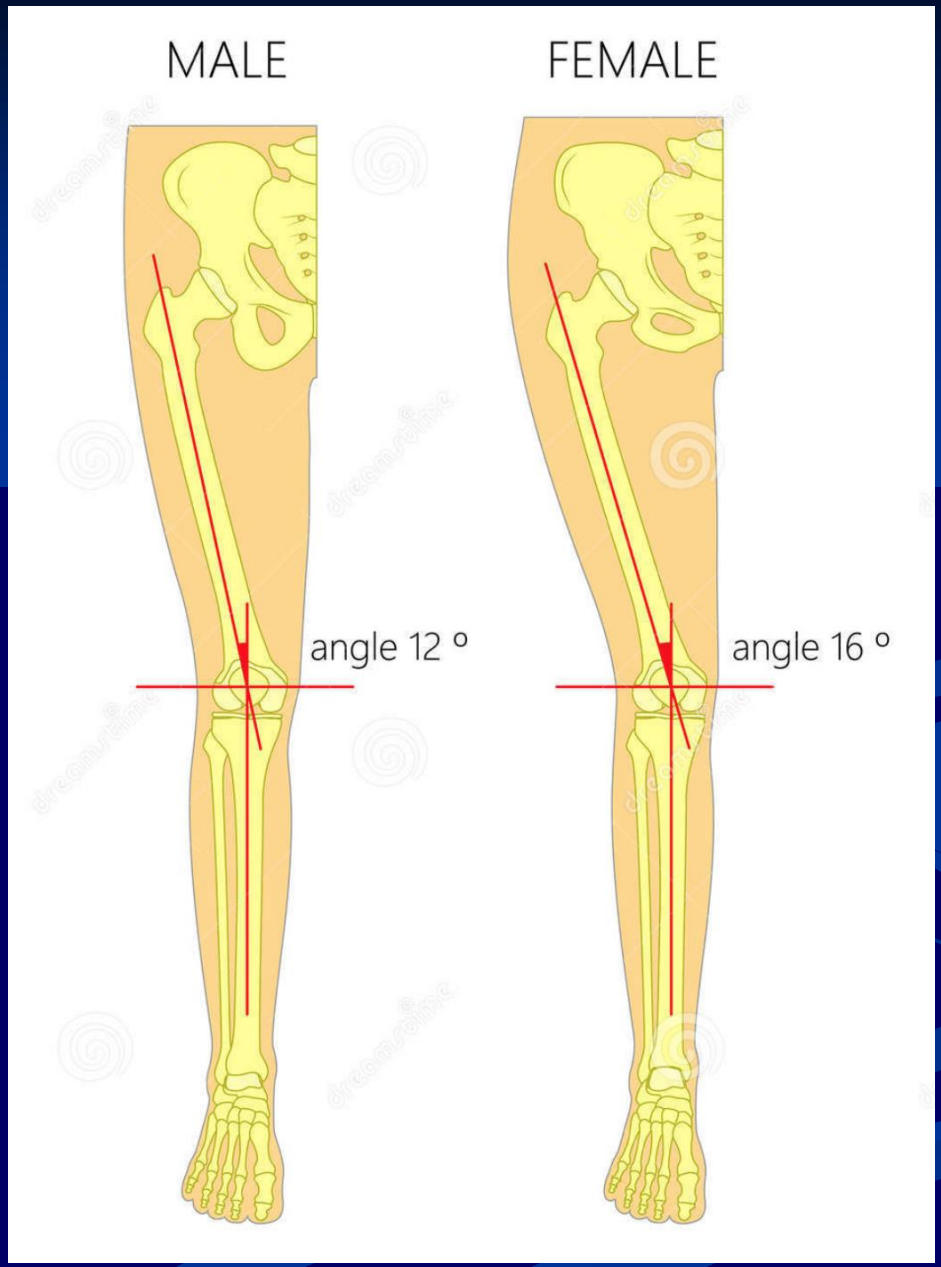
Patella Anatomy/Mechanics

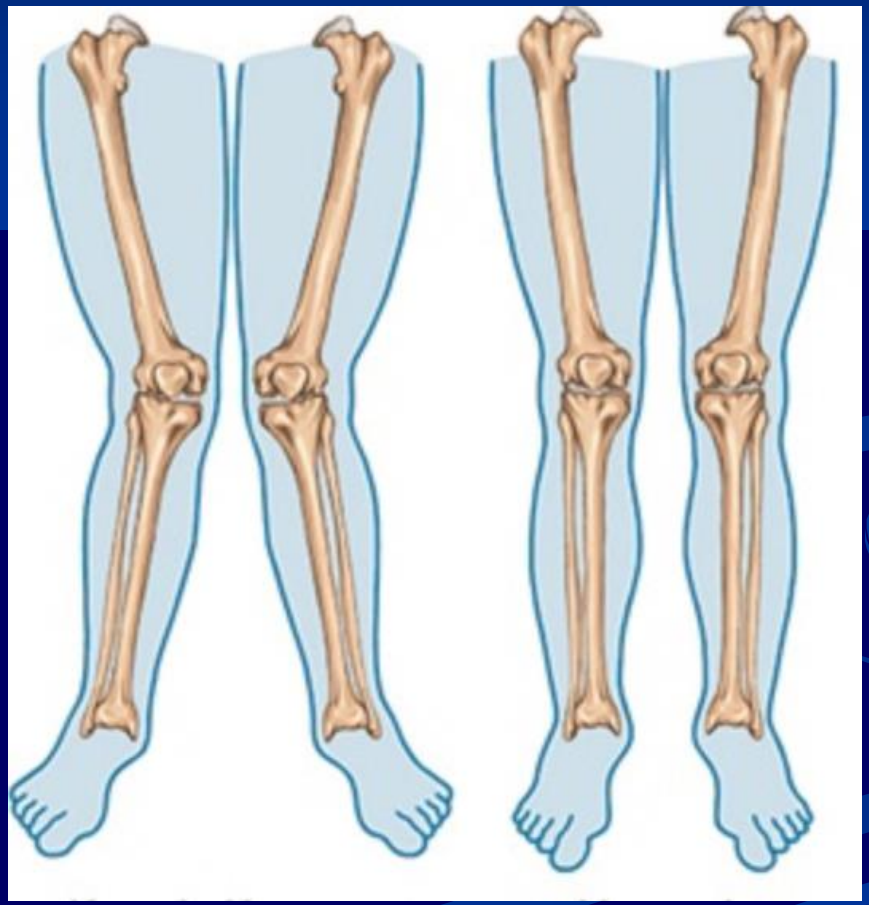


- Knee anatomy and patellofemoral pain – YouTube (3 minutes)

Male Vs Female Pelvis




MALE
FEMALE
angle 12 °
angle 16 °

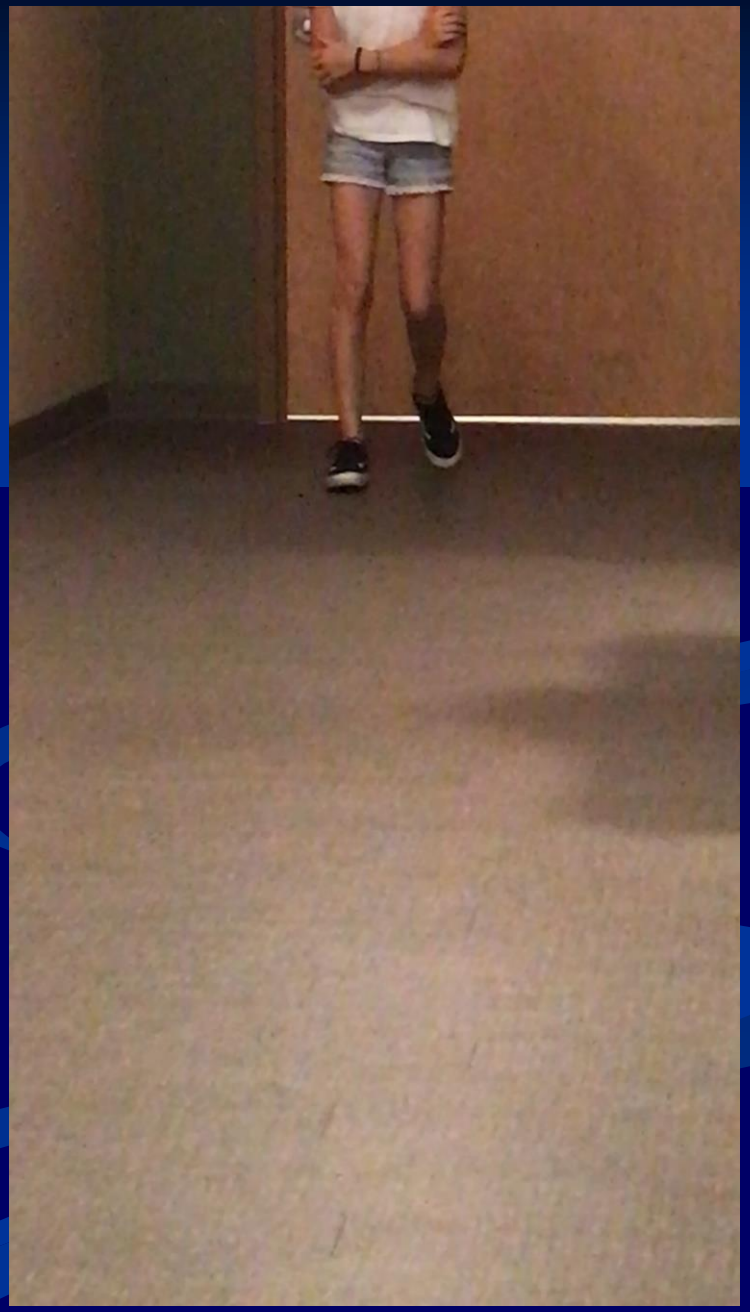


Patella Mechanics/Anatomy

- Mechanics and anatomy determine pathology
- Rotation
- Coronal alignment
- Muscular imbalance leads to issues

Patella Exam

- Exam and observation
  - Look for internal rotation
  - Evaluate Single leg squat
  - Check Rotational profile



Patella Mechanics

- Exam and observation
- Kissing Patella
  - Patella facing each other
  - Internal Rotation of femur
  - Alignment leads to pain

Patella Mechanics

- Single leg squat Exam
- Look for patella turning in
- Look at weakness with squat

Patella Mechanics

- Single leg squat Exam
- Look for patella turning in

Physical Exam Cont.

- Does the patient have loose joints

Any patients with a atraumatic history….

Any patients with a atraumatic history….

- Check joint laxity

Beighton Score

Beighton Hypermobility Score

The Beighton score is a simple system to quantify joint laxity and hypermobility.

It uses a simple 9 point system, where the higher the score the higher the laxity.

The threshold for joint laxity in a young adult is ranges from 4-6. Thus a score above 6 indicates hypermobility, but not necessarily true BHJS (see below)

Joint	Finding	Points
left little (fifth) finger	passive dorsiflexion beyond 90°	1
	passive dorsiflexion <= 90°	0
right little (fifth) finger	passive dorsiflexion beyond 90°	1
	passive dorsiflexion <= 90°	0
left thumb	passive dorsiflexion to the flexor aspect of the forearm	1
	cannot passively dorsiflex thumb to flexor aspect of the forearm	0
right thumb	passive dorsiflexion to the flexor aspect of the forearm	1
	cannot passively dorsiflex thumb to flexor aspect of the forearm	0
left elbow	hyperextends beyonds 10°	1
	extends <= 10	0
right elbow	hyperextends beyonds 10°	1
	extends <= 10	0
left knee	hyperextends beyonds 10°	1
	extends <= 10	0
right knee	hyperextends beyonds 10°	1
	extends <= 10	0
forward flexion of trunk with knees full extended	palms and hands can rest flat on the floor	1
	palms and hands cannot rest flat on the floor	0

Beighton Testing

- >10 degrees hyperextension at elbow

Mother's elbow

Beighton Testing

- 90 or > at Metacarp-phal joint

Beighton Testing

- Thumb to forearm

Beighton Testing

- 10 deg or more knee hyperextension at knee

Beighton Testing

- Palms to ground

Beighton Testing

- Score of 4-6 is threshold for laxity
- Greater then 6 = hypermobility

Why do we care about loose joints?

- Can be a very disabling problem that can last into adulthood
- Help patients to understand where their pain is coming from
- Can affect almost any joint and lead to painful hypermobility
- Helps guide treatment options

What can we do for our loose jointed patients???

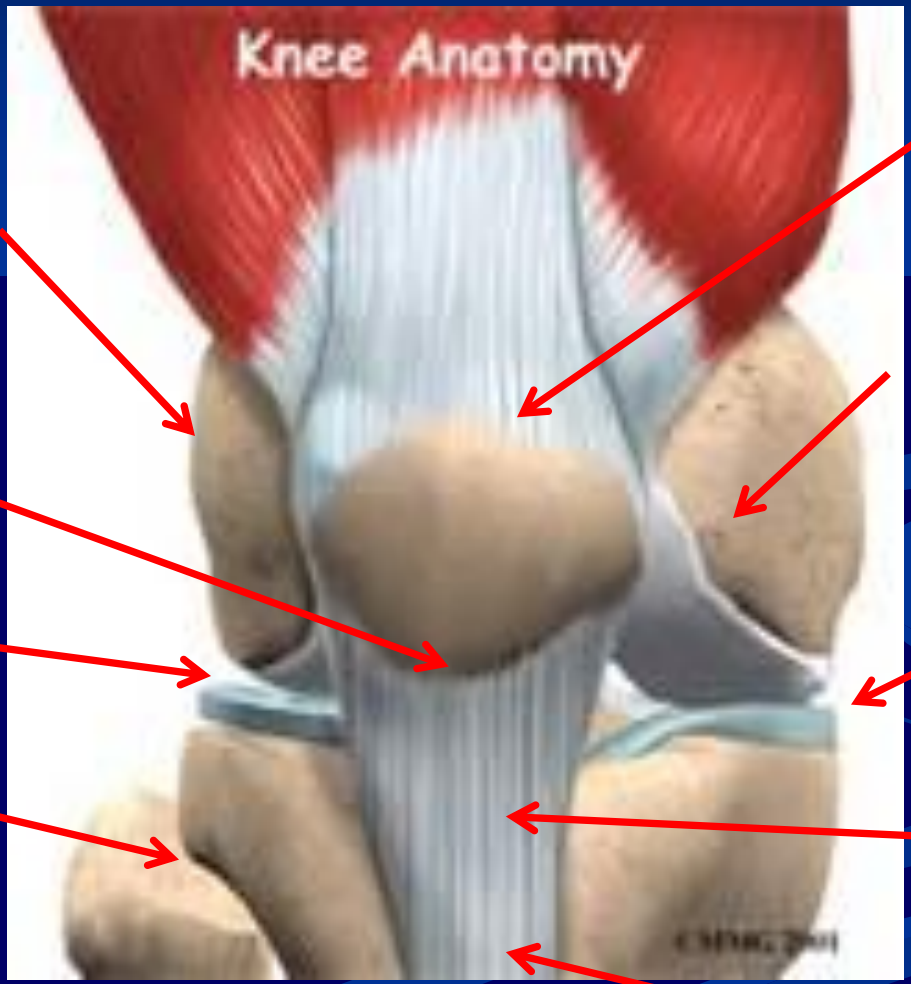
- Physical Therapy to increase stability about joints
- Encourage not to stretch or show friends "Cool Tricks"
- Bracing
- Help choose appropriate activities

Physical exam cont.

- Swelling
  - fracture
  - ligament
  - meniscus tear
  - ACL tear
  - Rheumatological problems

Physical Exam

Location of pain



Lateral condyle- ITB

Sinding Larsen Johansson

Lateral joint line- discoid meniscus

Tib-fib joint instability

Patellofemoral pain

Medial Condyle-plica Patellofemoral pain

Joint Line-meniscus

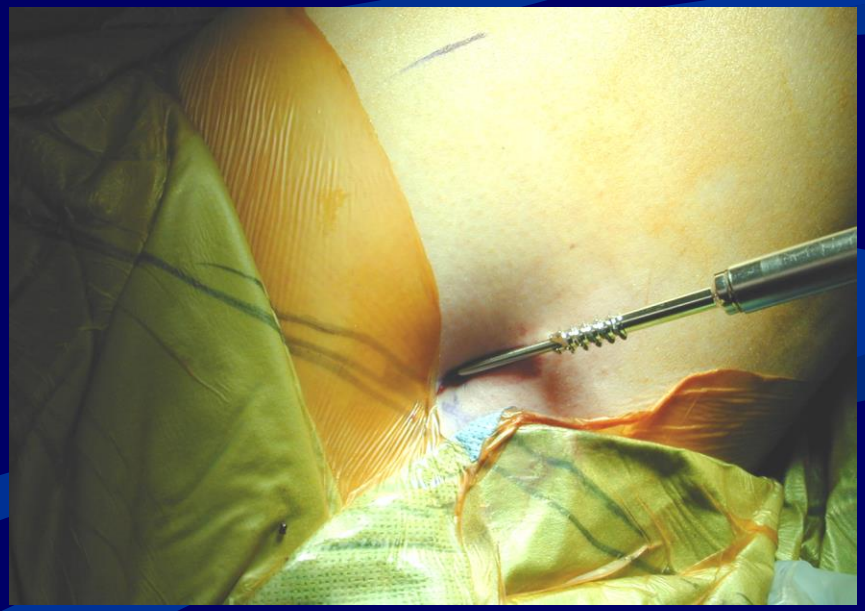
Patellar tendinitis

Tuburcle- Osgood Sclatter

With knee pain, remember to examine the hip!

Avoiding the Pitfalls: Referred Knee Pain in Children

- Hip pain can often be referred to the knee in children
- Sensory distribution of obturator nerve to medial knee
- ALWAYS Examine hip in any child with knee pain
- Misdiagnosis common: LCPD [Perthes], SCFE [slipped capital femoral epiphysis]



Anterior Knee Pain: "The Headache of the Knee"

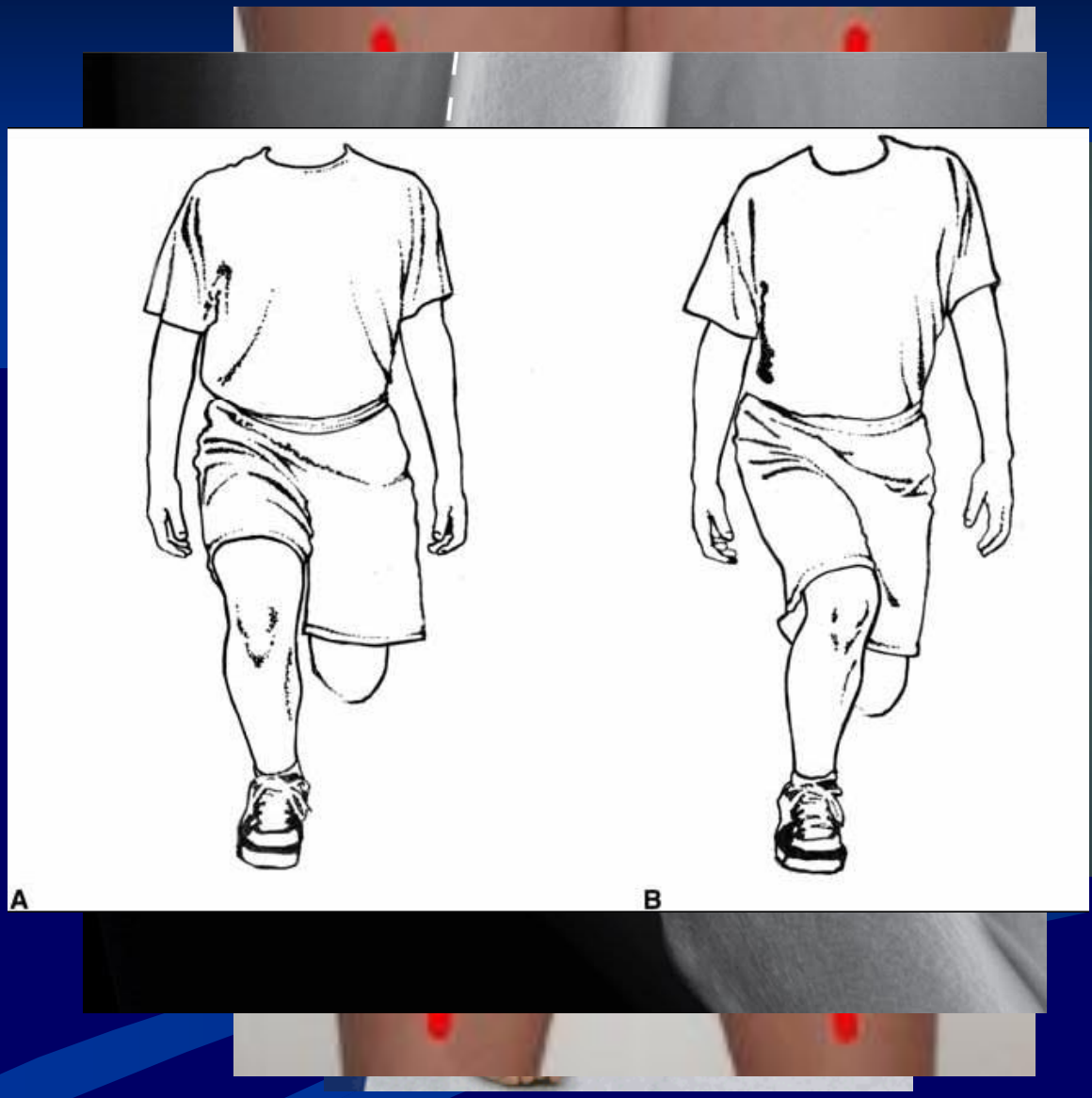
- Chronic knee pain in any part of extensor mechanism of knee
- Spectrum includes patellofemoral pain syndrome, Osgood Schlatter disease, Sinding-Larsen-Johansson syndrome, plica
- Peri-patellar, insidious pain
  - no known trauma or injury
- Occasional complaints of knee locking, acute swelling, or giving way/buckling

Patellofemoral Pain

- Definition – Pain originating from maltracking or anatomical problems (cartilage damage) to the patella

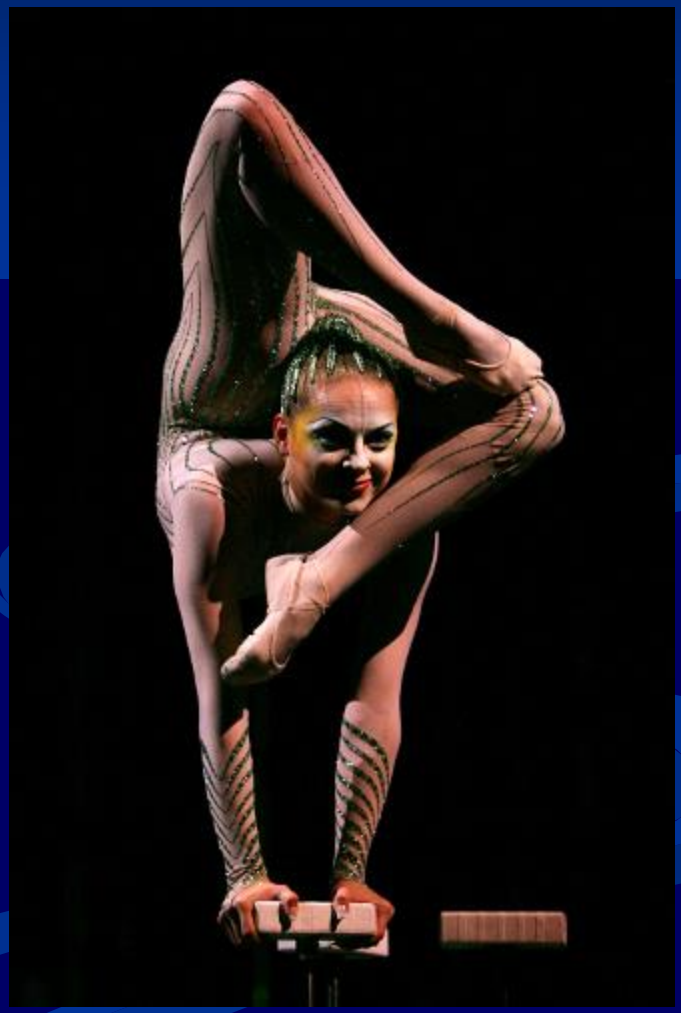
Causes Patellofemoral Knee Pain

- Femoral anteversion
- Genu valgum
- Patella alta
- Shallow patellar groove
- Ligament laxity
- Weak hip
  & knee muscles



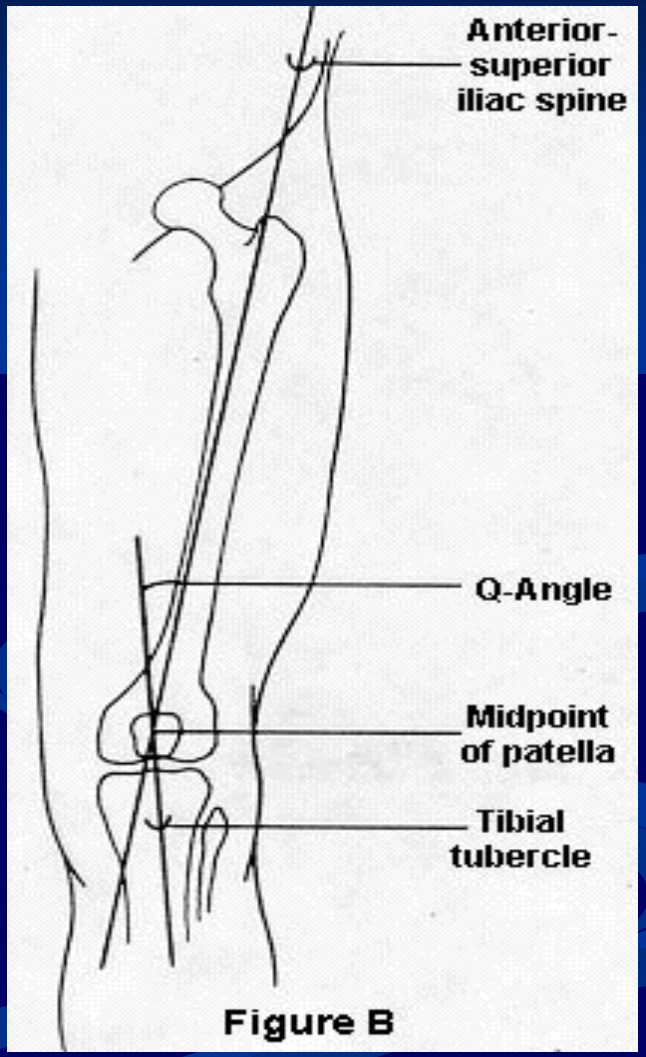
INSERT EXAM ON KIDS

The Suspects



Patellofemoral Knee Pain

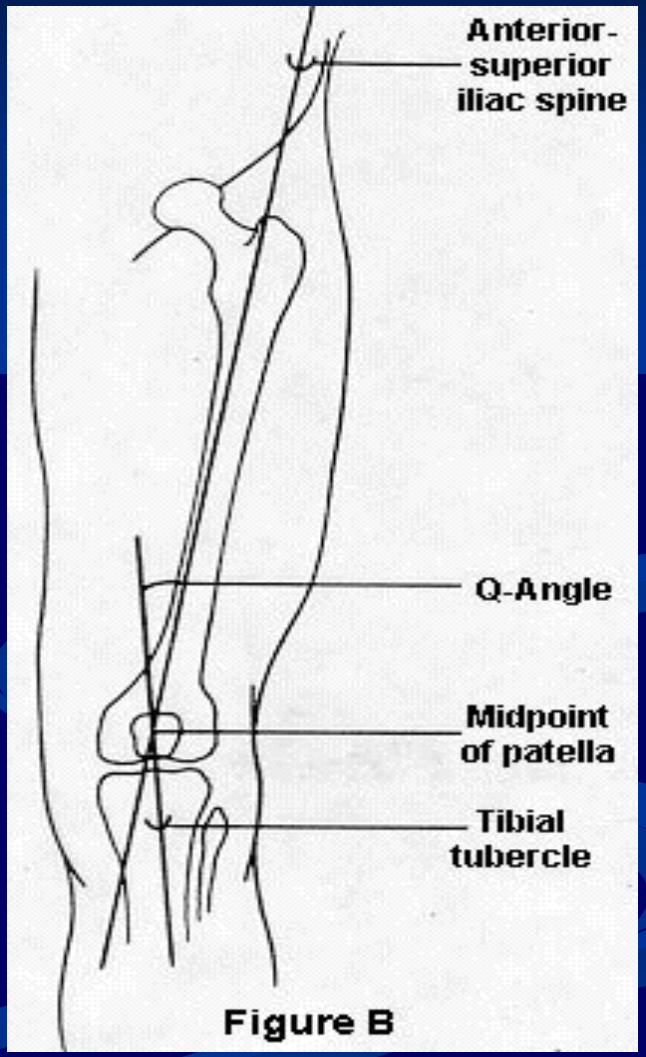
- Very common—most common in adolescent females



Greater Q angle in Females

Patellofemoral Knee Pain

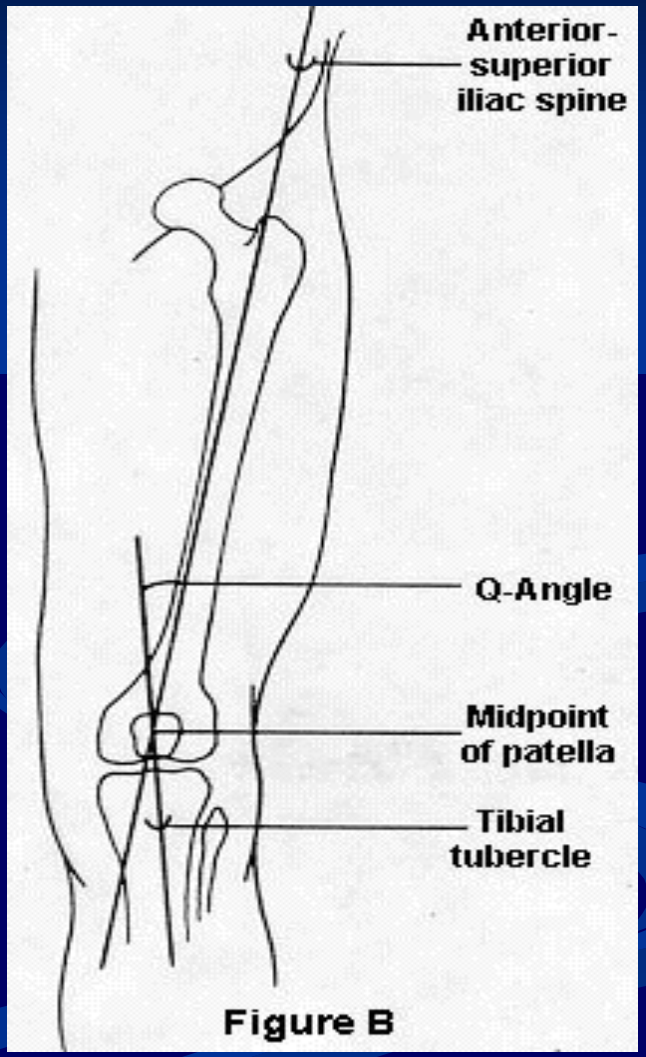
- Very common—most common in adolescent females
- Dull anterior poorly localized knee pain: often worse with stairs, squatting, jumping



Greater Q angle in Females

Patellofemoral Knee Pain

- Very common—most common in adolescent females
- Dull anterior poorly localized knee pain: often worse with stairs, squatting, jumping
- Poor Patellar tracking
  - Contributing factors: biomechanical (larger Q angle, weaker quadriceps/ VMO/hip abductors, tight hamstrings/ITB, rotational problems)



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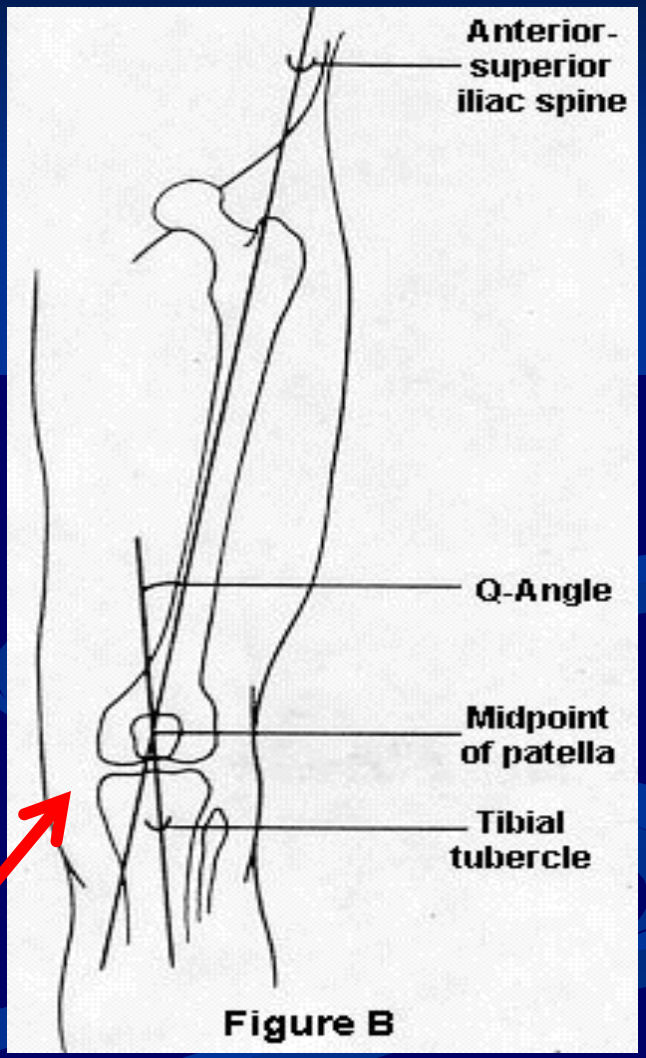
Pain often medial to patella

- Plica



Greater Q angle in Females

Patellofemoral Maltracking

Anterior Knee Pain: Management

- Manage conservatively with NSAIDS, physical therapy, isometic exercises, activity modification, bracing, orthotics
- Often frustrating problem to treat in the adolescent: activity modification hard for athlete
- Physical therapy: Emphasis of strengthening VMO, hip abductors, improving patella tracking, correcting biomechanical faults, etc.
- Generally responds well to conserv.

Patellofemoral Pain

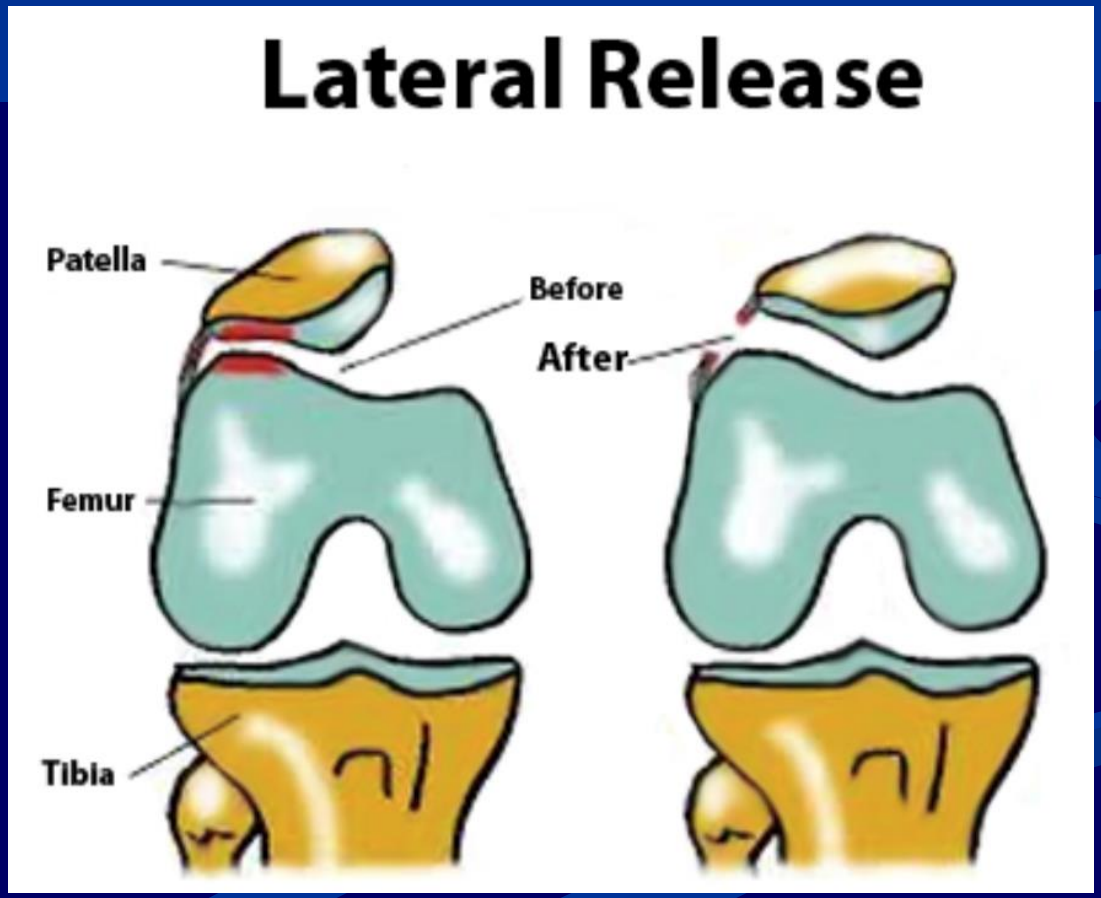
- When to Operate?

Patellofemoral Pain

- When to Operate?
  - **At least 6** months failed nonoperative treatment
  - Anatomical problems that can be addressed
- Educating parents key
  - Discussion about causes
  - Discussion about success rate

Patellofemoral Pain Operations

- Lateral releases- less popular now

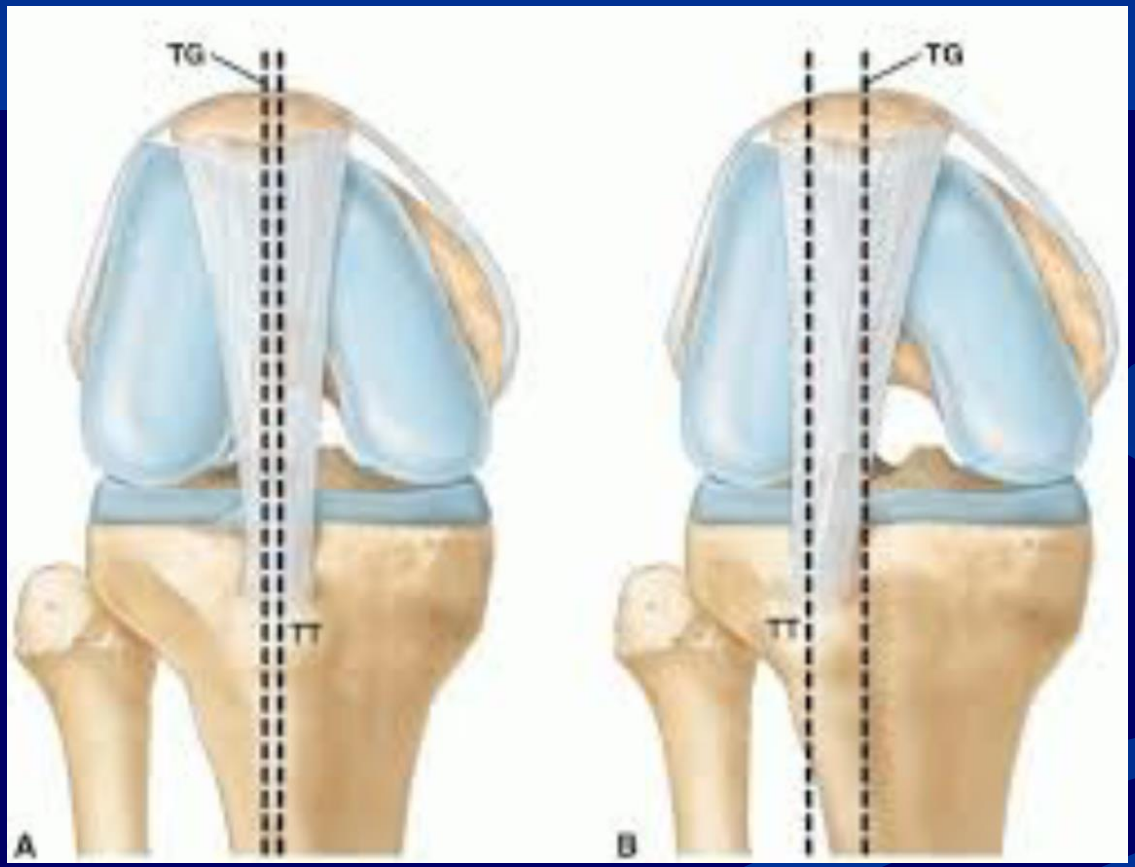


Patellofemoral Pain Operations

Lateral lengthening

Patellofemoral Pain Operations

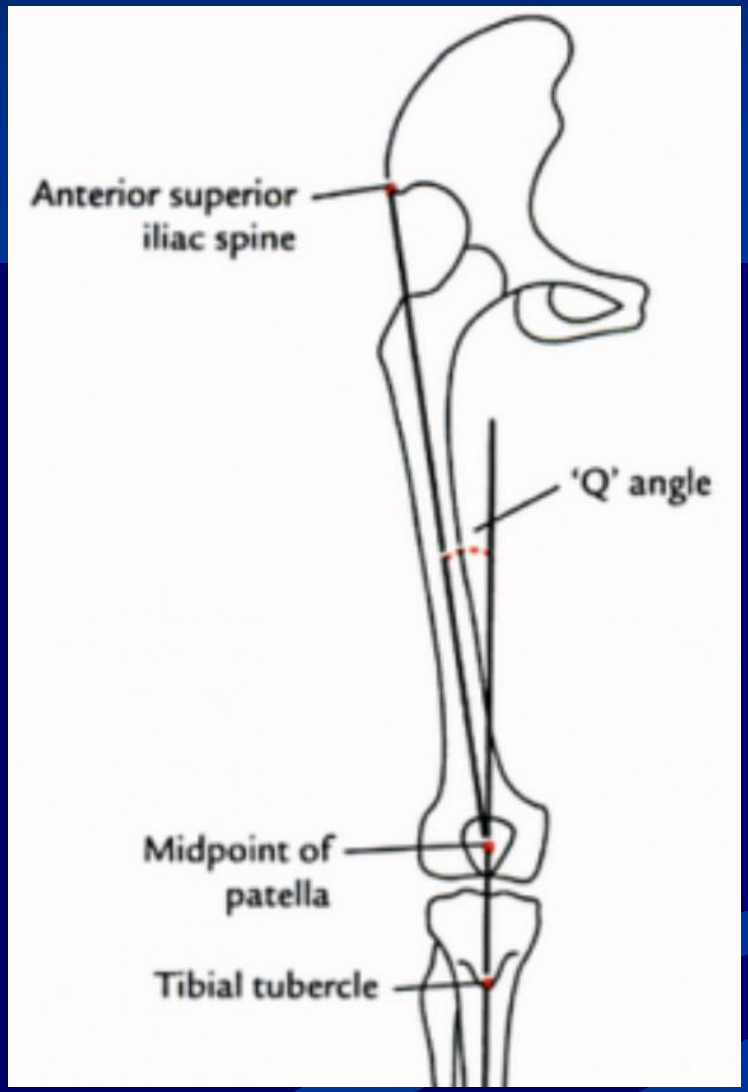
Tibia tubercle transfers



Patellofemoral Pain Operations

Tibia tubercle transfers

Tibia tubercle transfers

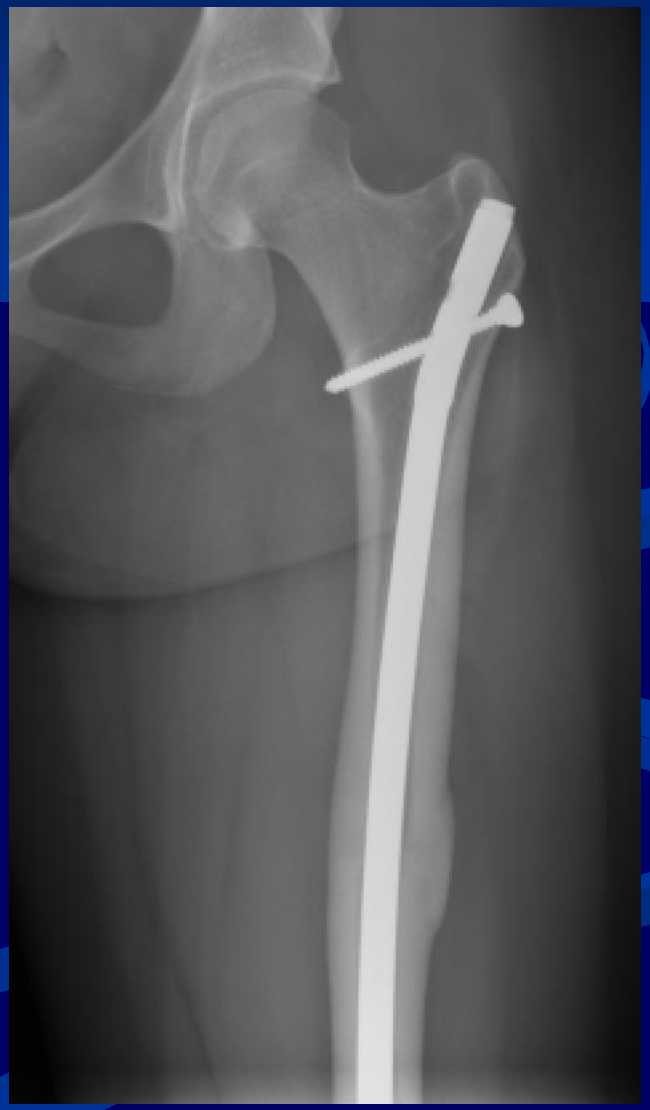


Patellofemoral Pain Operations

Derotational osteotomies

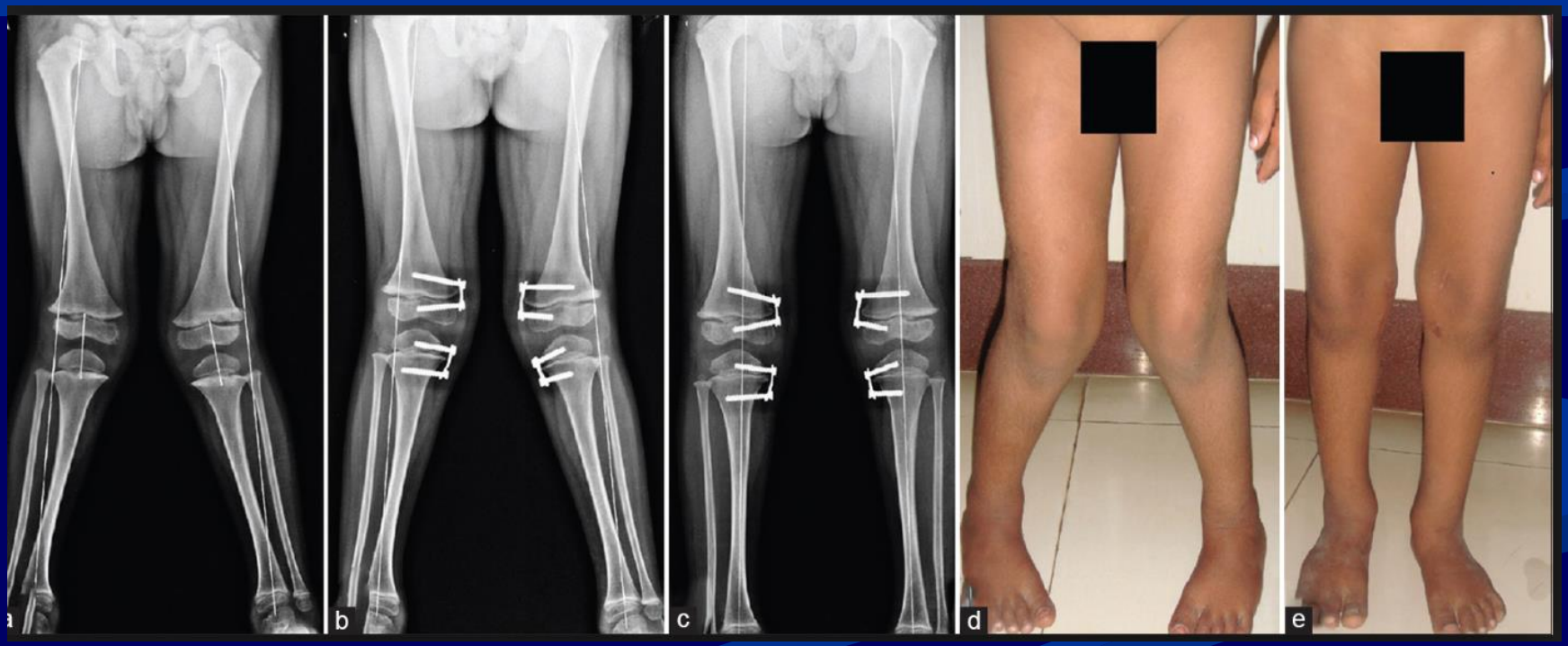
Patellofemoral Pain Operations

Derotational osteotomies



Patellofemoral Pain Operations

- Coronal alignment procedures



Patella Dislocation (Instability)

- Anatomical (non-traumatic) Factors
  - Femoral anteversion (internal rotation)
  - Genu valgum (knock knee)
  - Patella alta (high riding patella)
  - Ligament laxity
  - Shallow Trochlear (patellar) groove

Patella Dislocation (Instability)

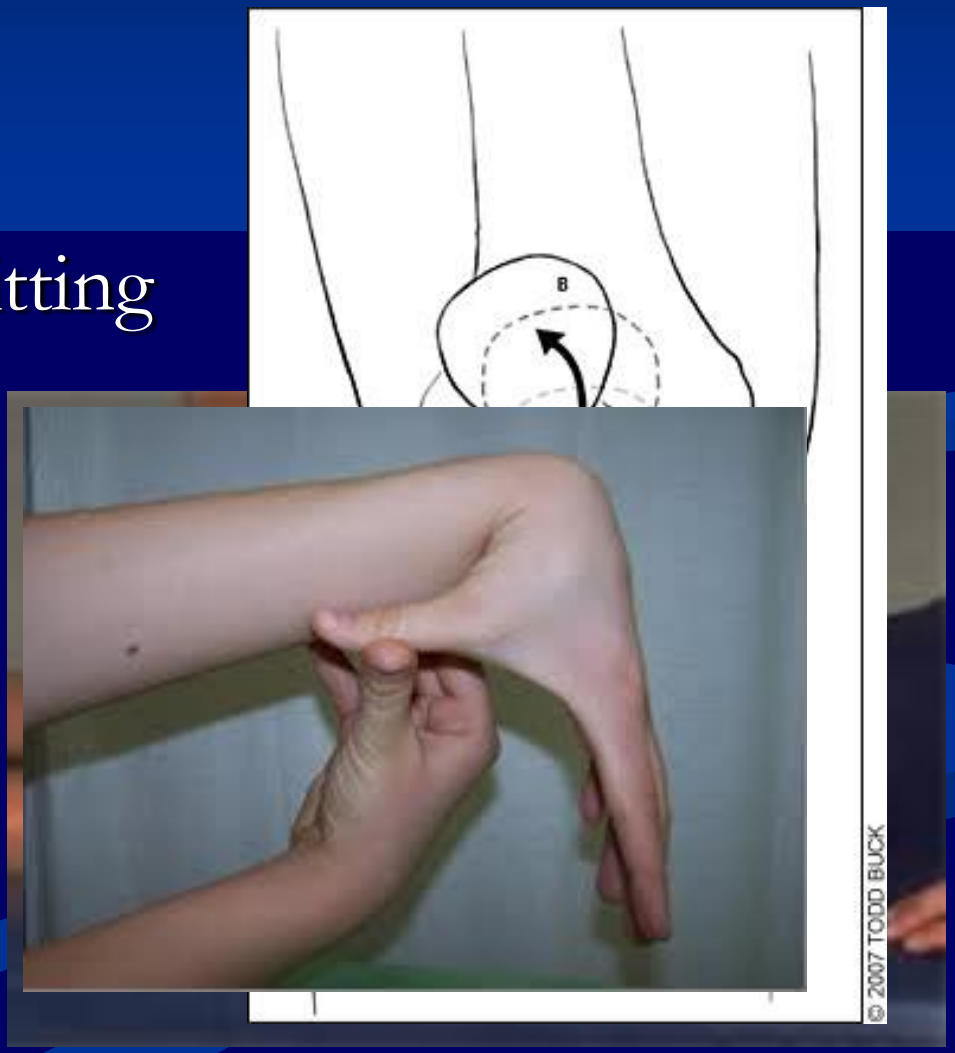
- Traumatic Dislocation
  - Tearing Medial Patellofemoral Ligament
  - Anatomical risk factors

Patella Dislocation (Instability)

- Up to 50% redislocation rate
- Cartilage Damage
  - Worse with tight jointed patients
  - Loose= elastic system

Patellar Instability Testing

- Apprehension Test
- J-Sign- extend while sitting
- Overall joint laxity
- Single leg squat
- Femoral Anteversion

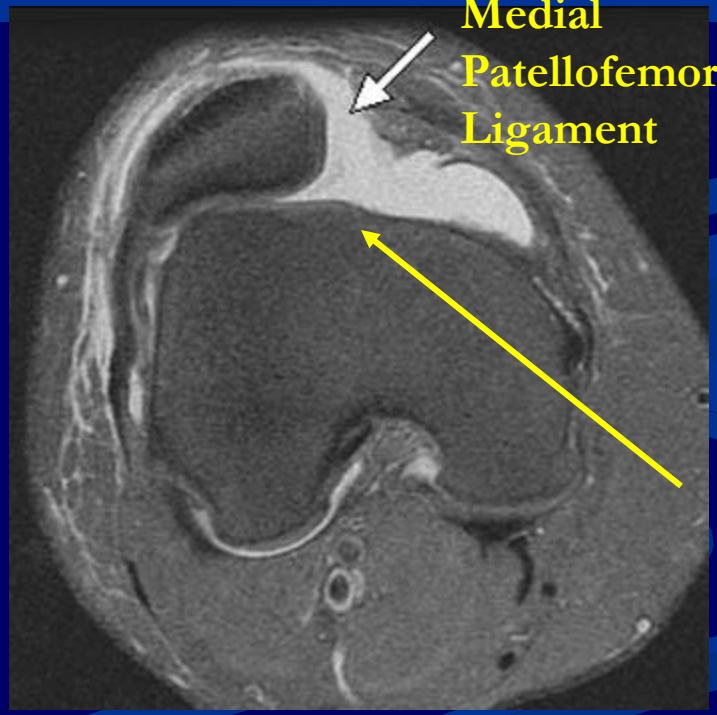


J Sign – trochlea dysplasia

X-Rays Cross Over Sign

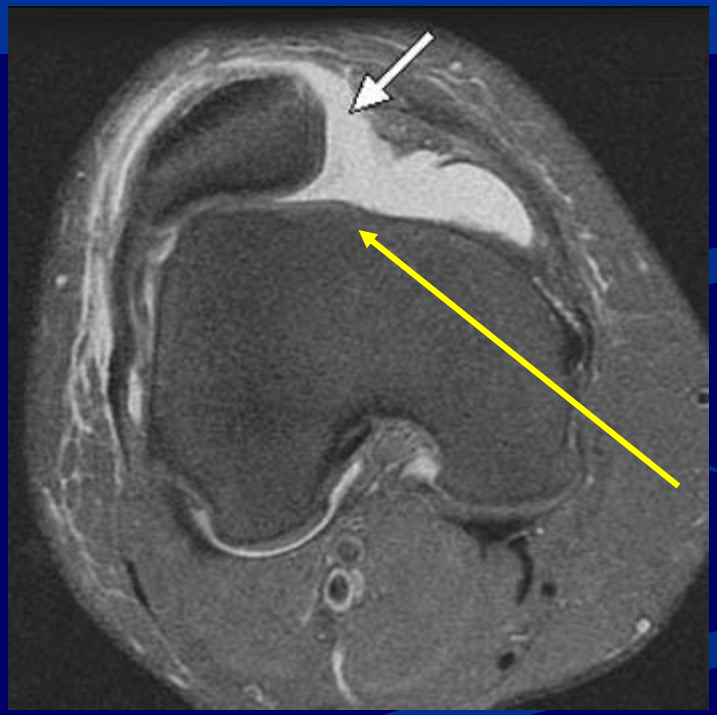
Knee Dislocations

- Tearing of Medial ligaments
- Convex patellar groove
- Increased Q angle
  - TTTG



Trochlea dysplasia

- Convex trochlea groove (groove that patella sits in)



Convexity of Patellar Groove

Imaging for first dislocation

- Xrays for all patients (AP, lateral, sunrise)
  - Good lateral most important view

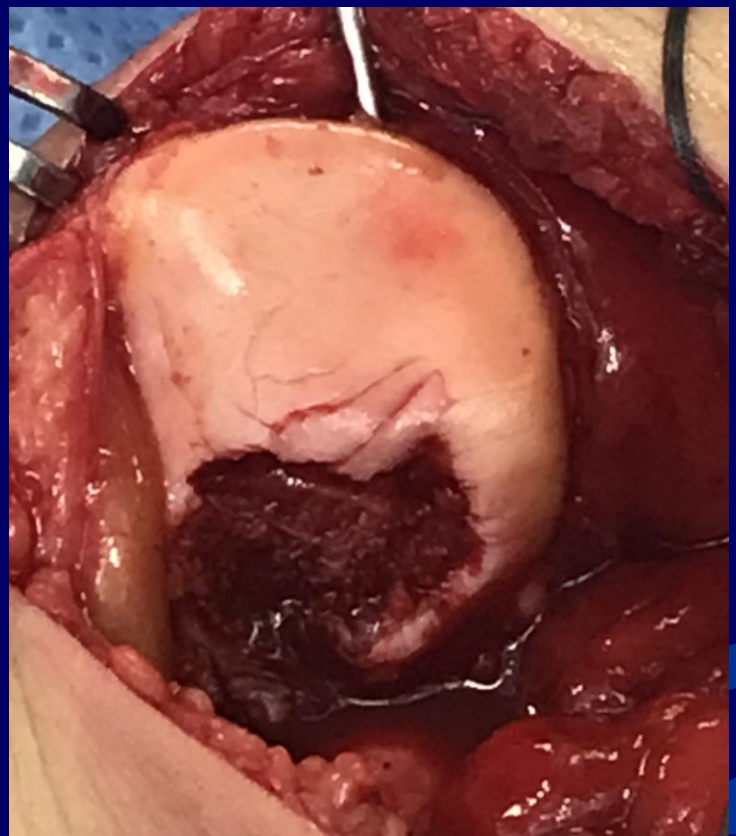
Imaging for first dislocation

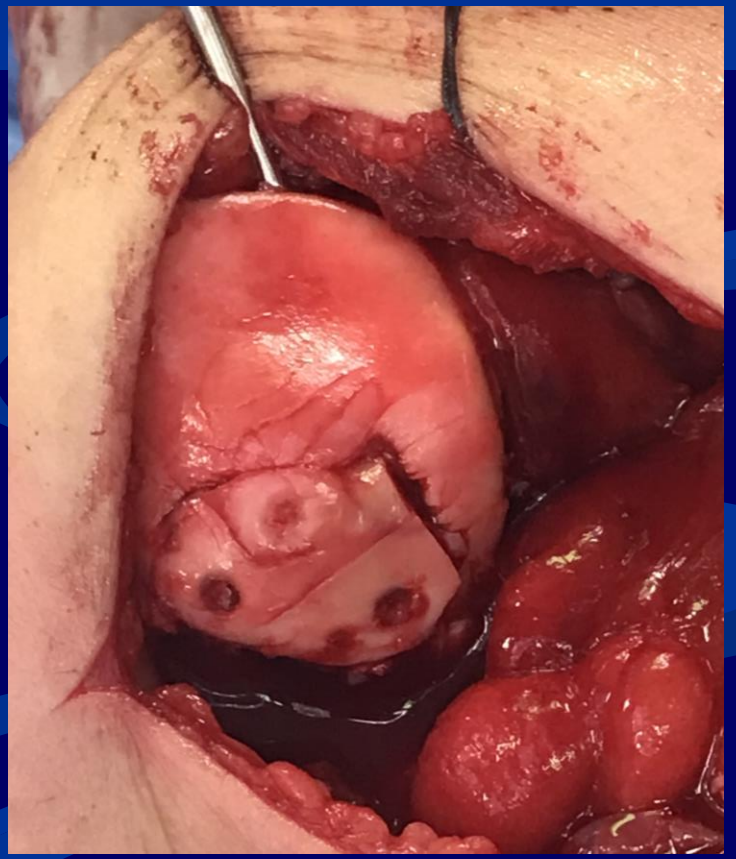
- MRI – for massive swelling
  - Often have a cartilage lesion

MPFL - ligament

Imaging for first dislocation

- MRI – for massive swelling
  - Often have a cartilage lesion





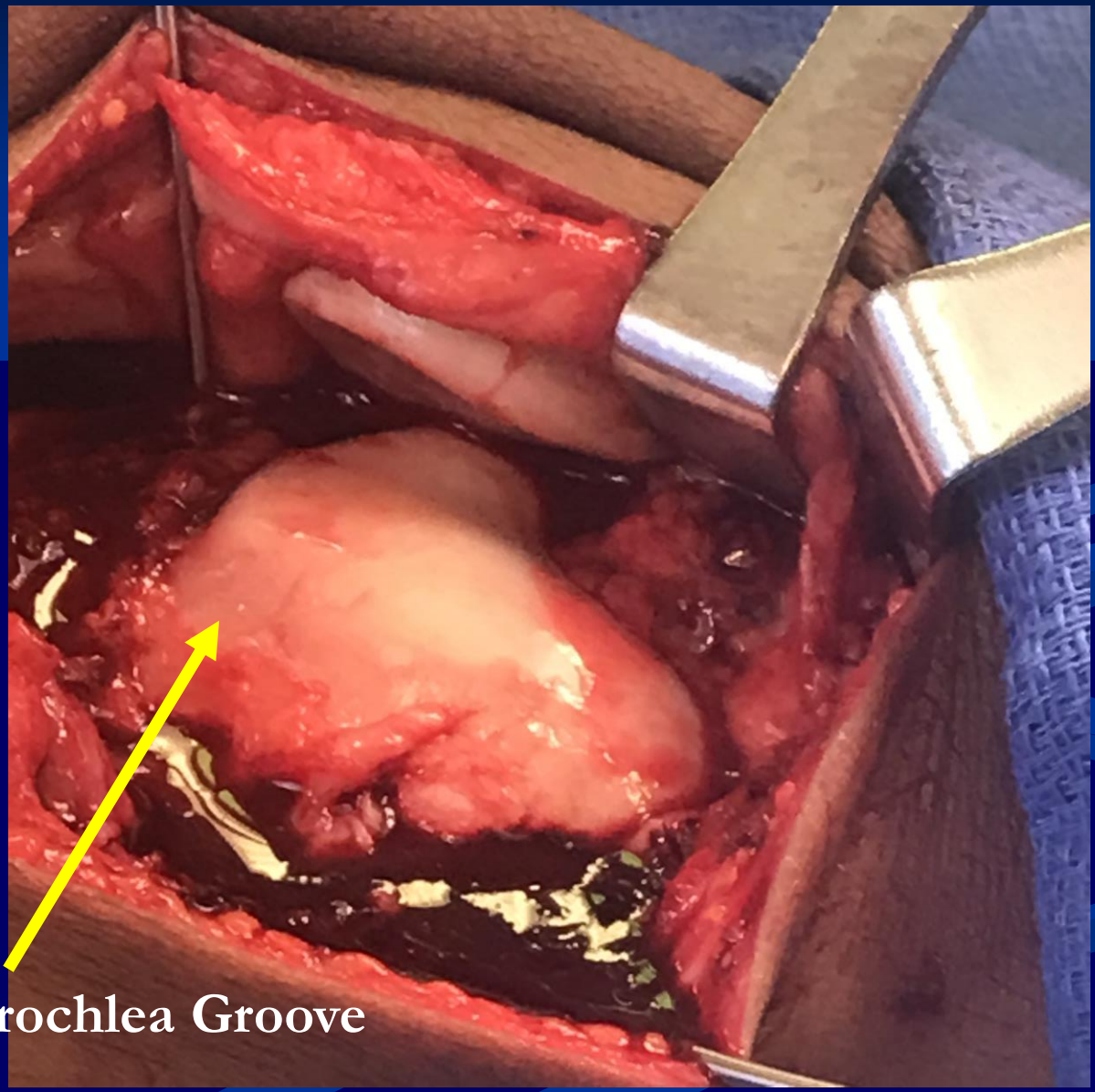
Patellar Dislocations Treatment

- First time dislocators – Non-operative
  - If there is bony fragment in joint-surgery
  - Physical Therapy, immobilizer 1-2 weeks, brace
  - Operative for loose fragments or poor anatomy
- 2+ dislocations – Discuss surgery
- How debilitating is the problem?

Treatment

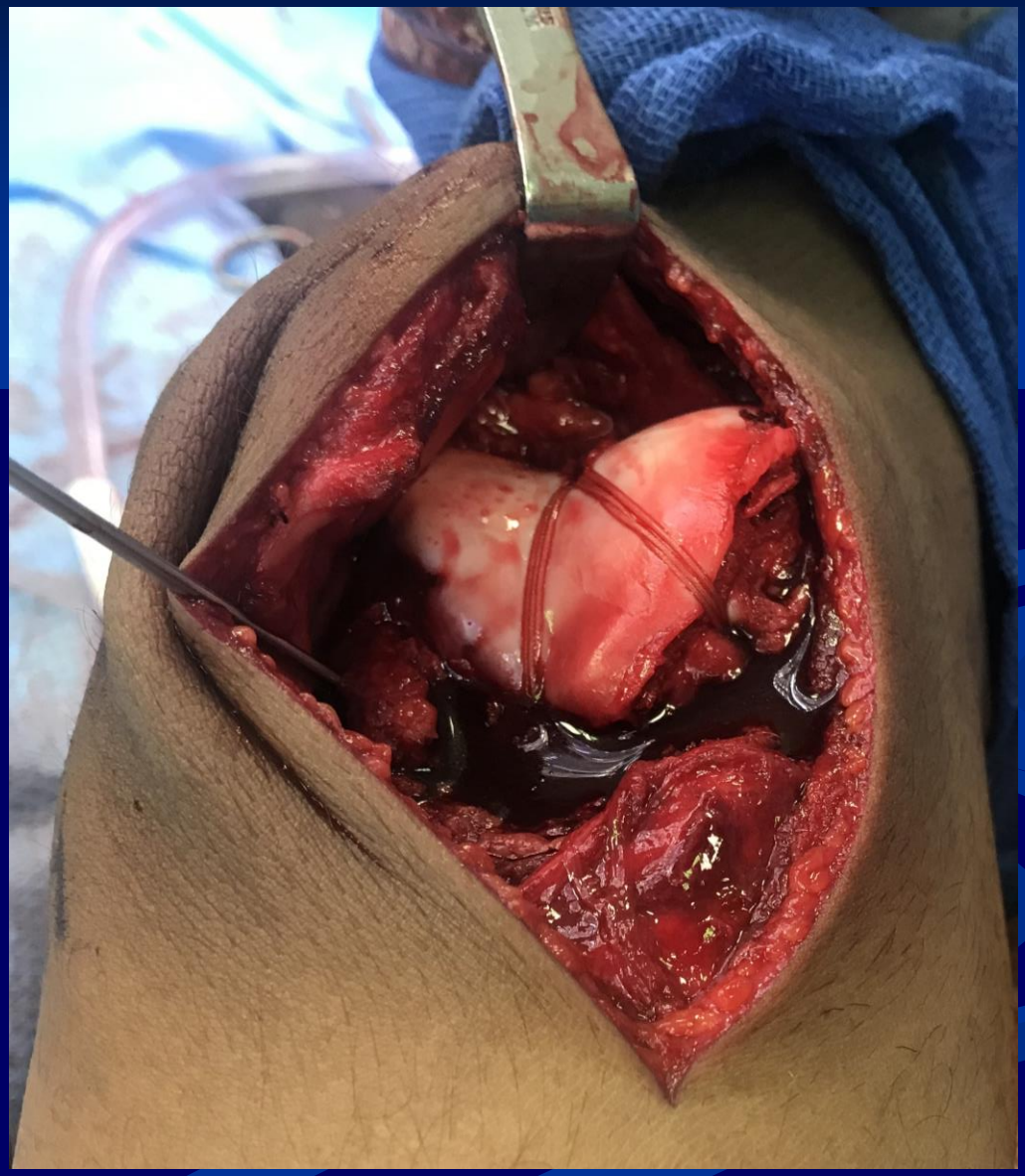
- Medial patellofemoral ligament reconstruction
  - Reconstruct medial restraint

Surgery for trochlea dysplasia



Convexity of trochlea Groove

Surgery for trochlea dysplasia



Osgood Schlatter

Apophysitis of the tibial tuburcle

Problem of the active child

Usually a problem of 10-16 year olds

Pain is self limiting

Bracing sometimes helps, sometimes doesn't

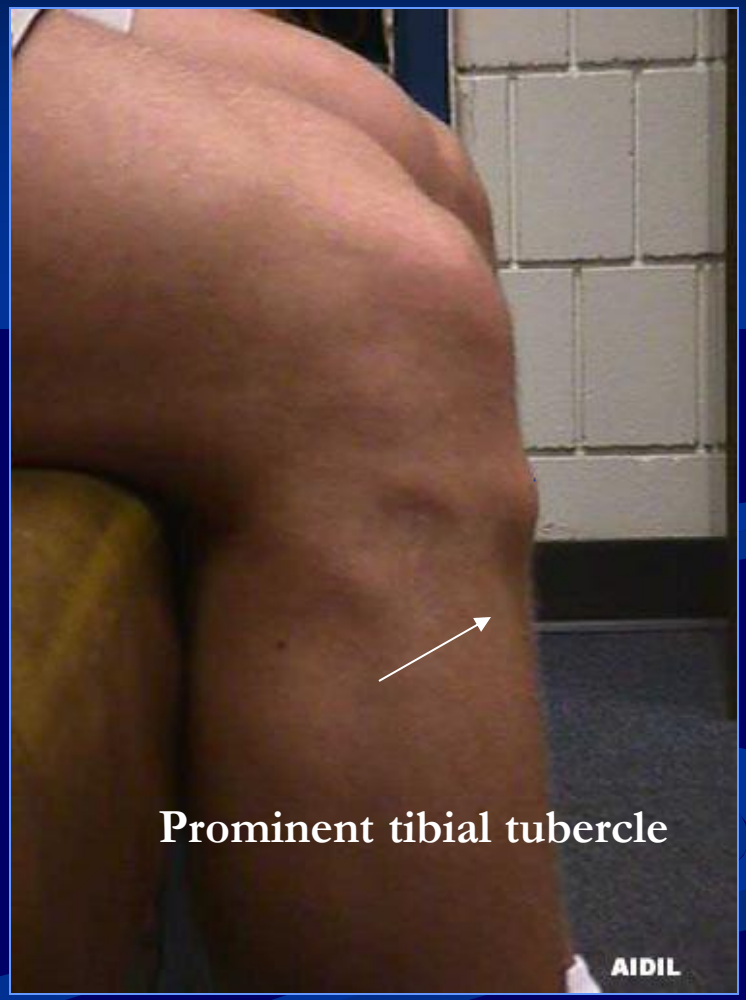
Patient with this xray doesn't need to be referred

Treatment –Reassurance, education, Brace, activity modification

Osgood Schlatter

- It's Not Osgood Schlatter if the growth plates are closed
- Insertional patellar tendinitis

Osgood Schlatter's Disease of the Knee



Osgood schlatter

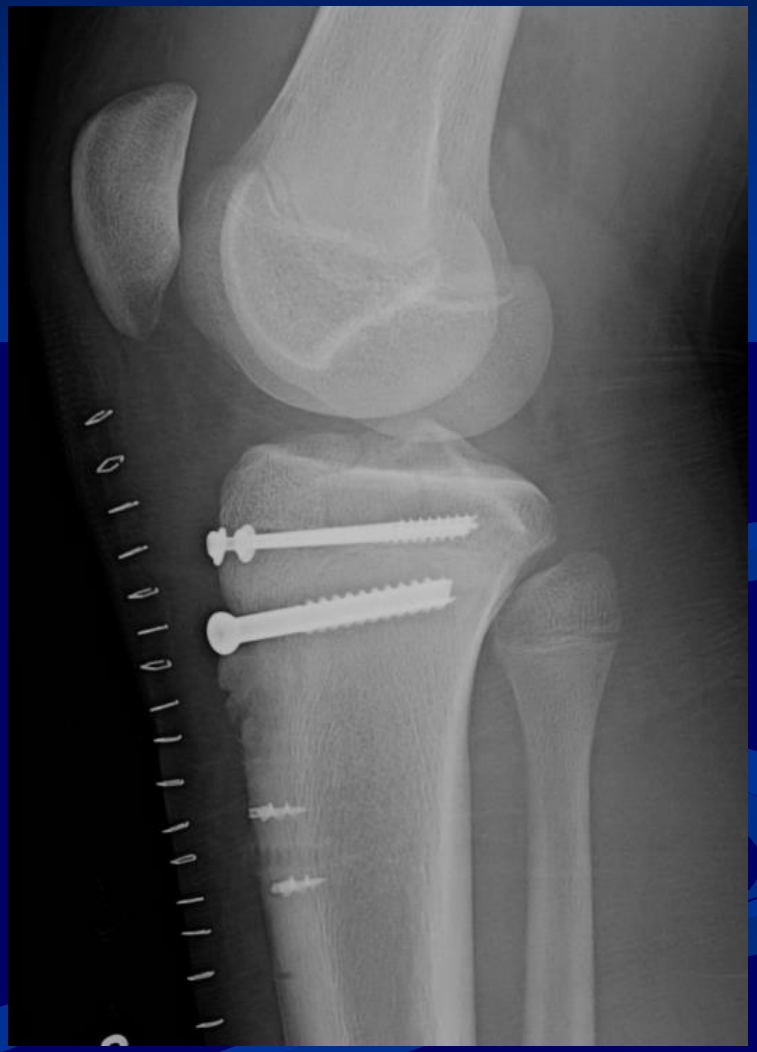
- This won't heal
- Needs surgery

The bigger the bump, the more likely a loose fragment is present

Osgood Treatment

- Activity Modification
- Knee bracing
- Education of parents
- Physical therapy (stretching and strengthening)
  - Usually only moderately beneficial

Tibial Tuburcle Fracture



Sinding-Larsen-Johansson Syndrome

- The "Osgood Schlatter" of the patella
- Traction apophysis of the distal pole of patella: repetitive microtrauma
- Self-limiting: Resolves in approx 6-12 months, responds to activity modification, NSAIDS, occasional PT

Ossification/fragmentation seen at distal pole of patella

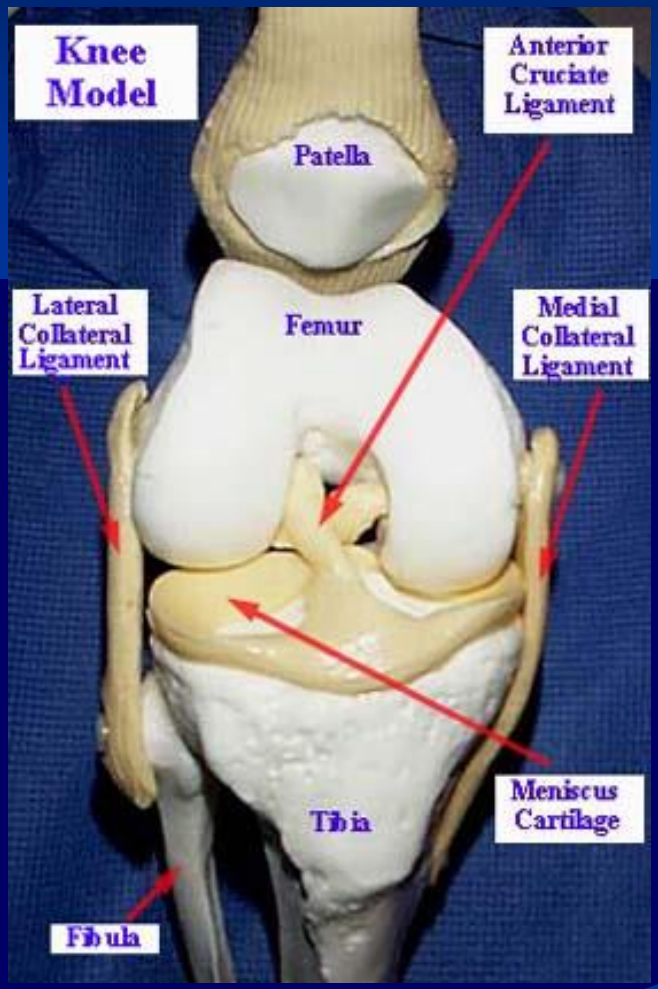
Traumatic Knee injuries

Can you name this players injury?

Can you name this Players Injury

Can you name this players injury?

ACL Injuries



ACL Mechanics

ACL Mechanism of Injury

- 70% Noncontact
- 30% Contact (player is hit by opposing player)
- Hyperextension or valgus load to knee


TOR 80
GS 83
3rd 2:22 24
ESPN
TO: 4 BONUS
TO: 4 BONUS
NBA FINALS - TOR LEADS 3-2

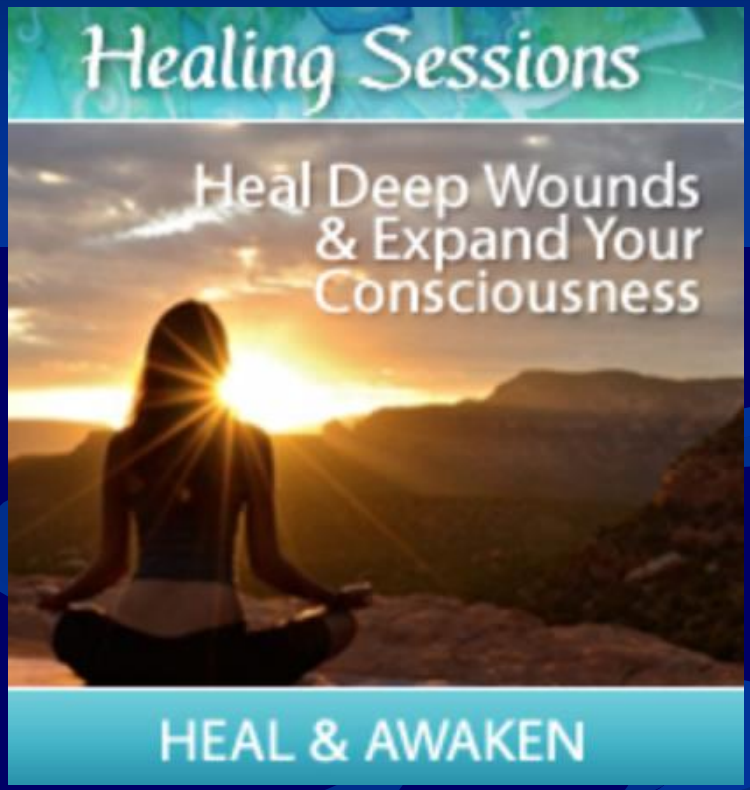
Function of ACL

- Prevent anterior translation
- Prevent Rotation of the knee
- Necessary for cutting sports
- Protect menisci
- Efficient transfer of force

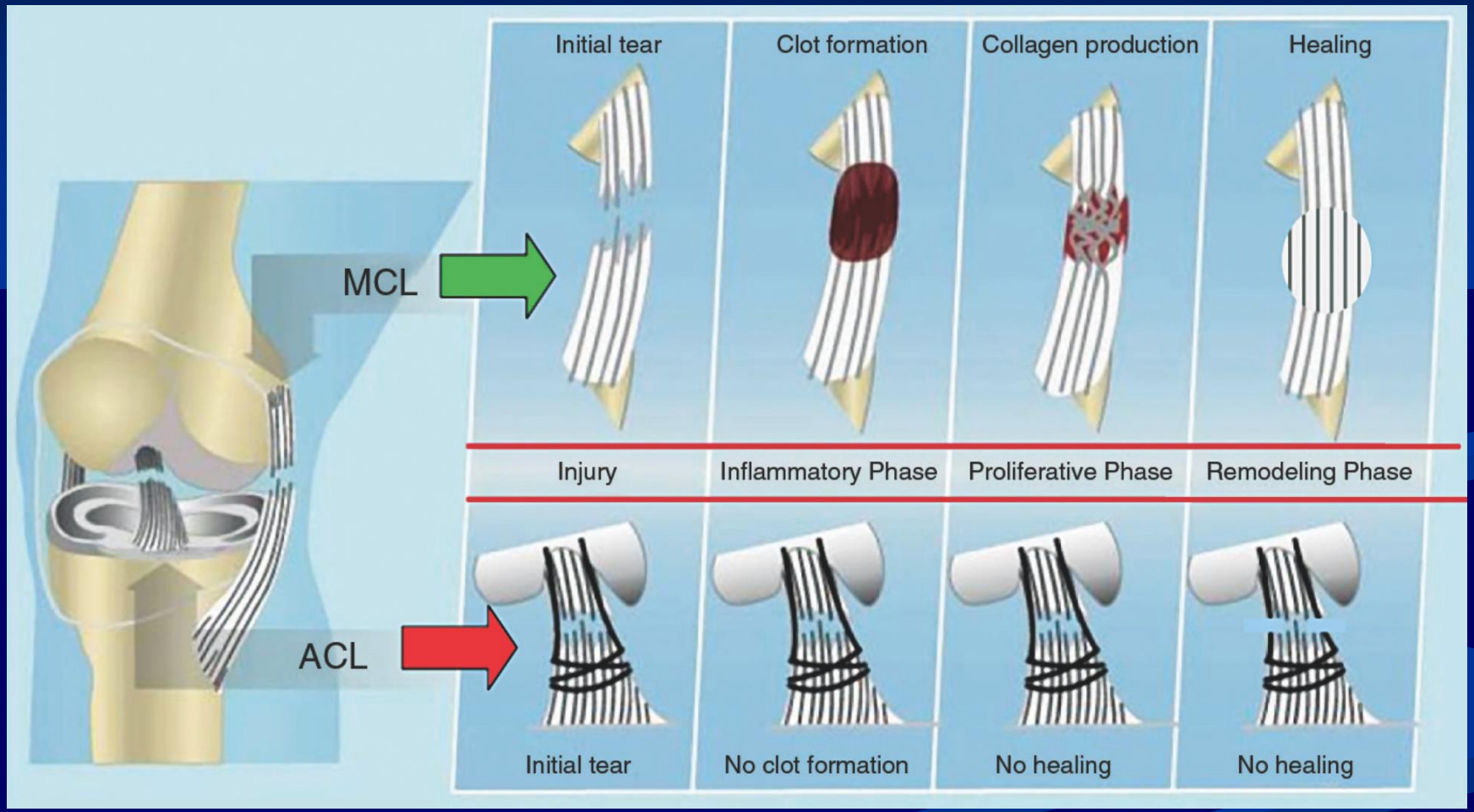
Knee Anatomy/Mechanics

- Ligaments
  - Extra-articular heal well
    - MCL/LCL
  - Intra-articular heal poorly
    - ACL
    - PCL better healing then ACL
    - Synovial fluid

Sedona Vortex don't heal ACLs



ACL vs MCL healing



ACL Injuries in Female Adolescents

- Female athletes 2-4 times more susceptible to ACL injuries
- Theories…anatomic differences: smaller intercondylar notch, smaller size of ACL, landing mechanics, larger Q-angle, ligamentous laxity, imbalance between hamstring and quad strength, hormonal differences (estrogen/menstrual cycle) improper training/conditioning program

Non Sex-Dependent Risk Factors

- Artificial surfaces
- Increase friction at shoe-playing surface interface
  - More cleats
  - Bigger cleats
  - Drier climates
- Sport
  - Soccer, football, basketball
  - Hockey – rare

How do you know when the ACL is torn??

- Very Painful
- Often a pop is heard
- Immediate swelling common
- Pop + Swelling- 70%

Concommitant Injuries

- Meniscus – 50%
- Collaterals

Testing

Lachman Exam

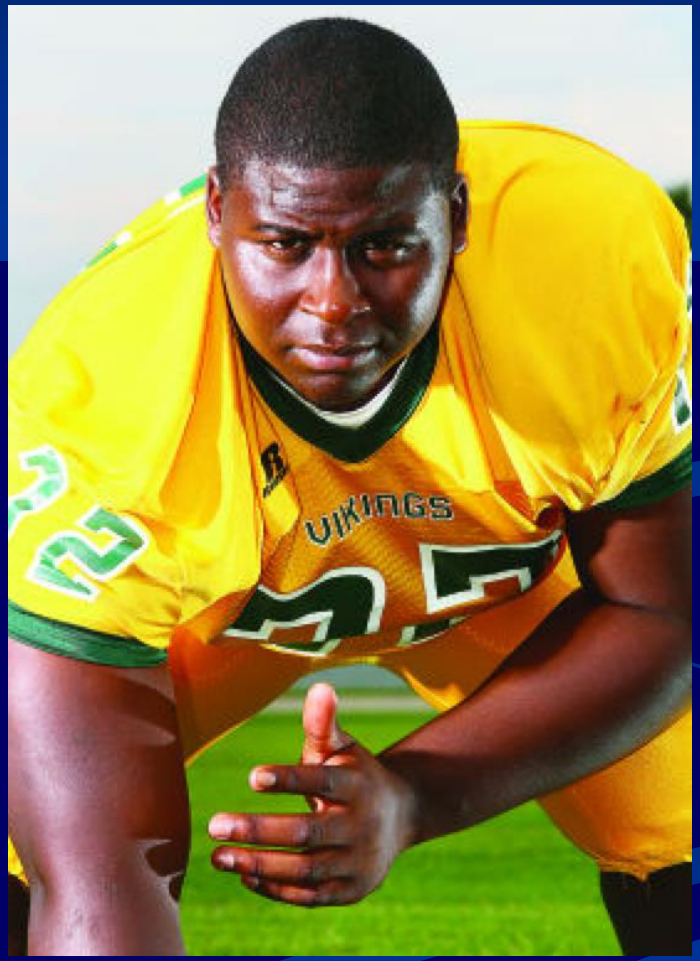
- Need a relaxed patient!
- Compare sides
- Do on every patient (regardless of suspicion) to increase skills

Lachman Exam

- 20 deg. Flexion of knee, stabilize femur with one hand, use other to anteriorly translate tibia
- Test PCL first with posterior drawer
- Multiple times bilaterally to get sense of stability
- Sensitivity 85% specificity 94%

Lachman Test

Tough Exam

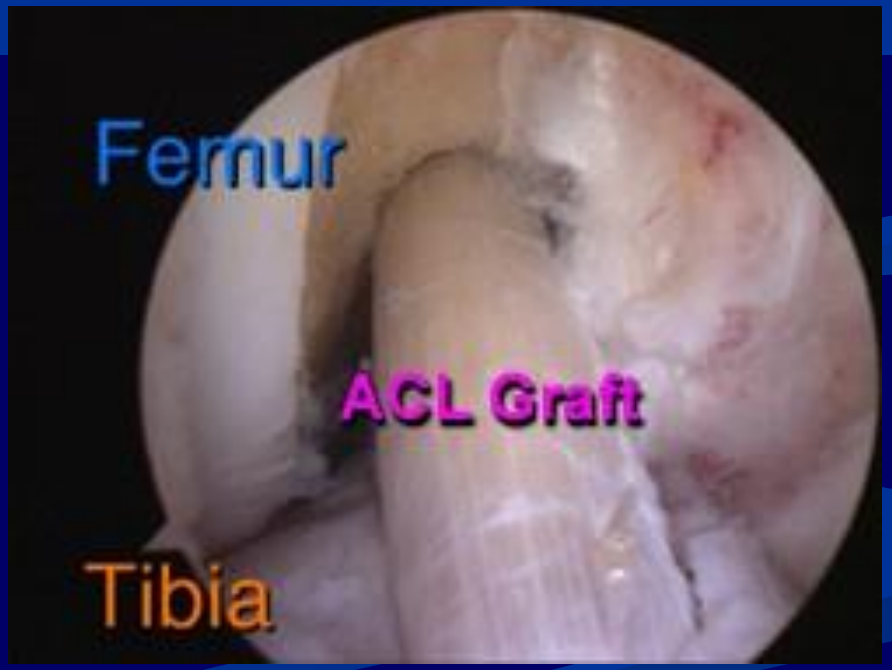


When do we operate on these?

ALWAYS

ACL Reconstruction

Does surgery prevent Arthritis??

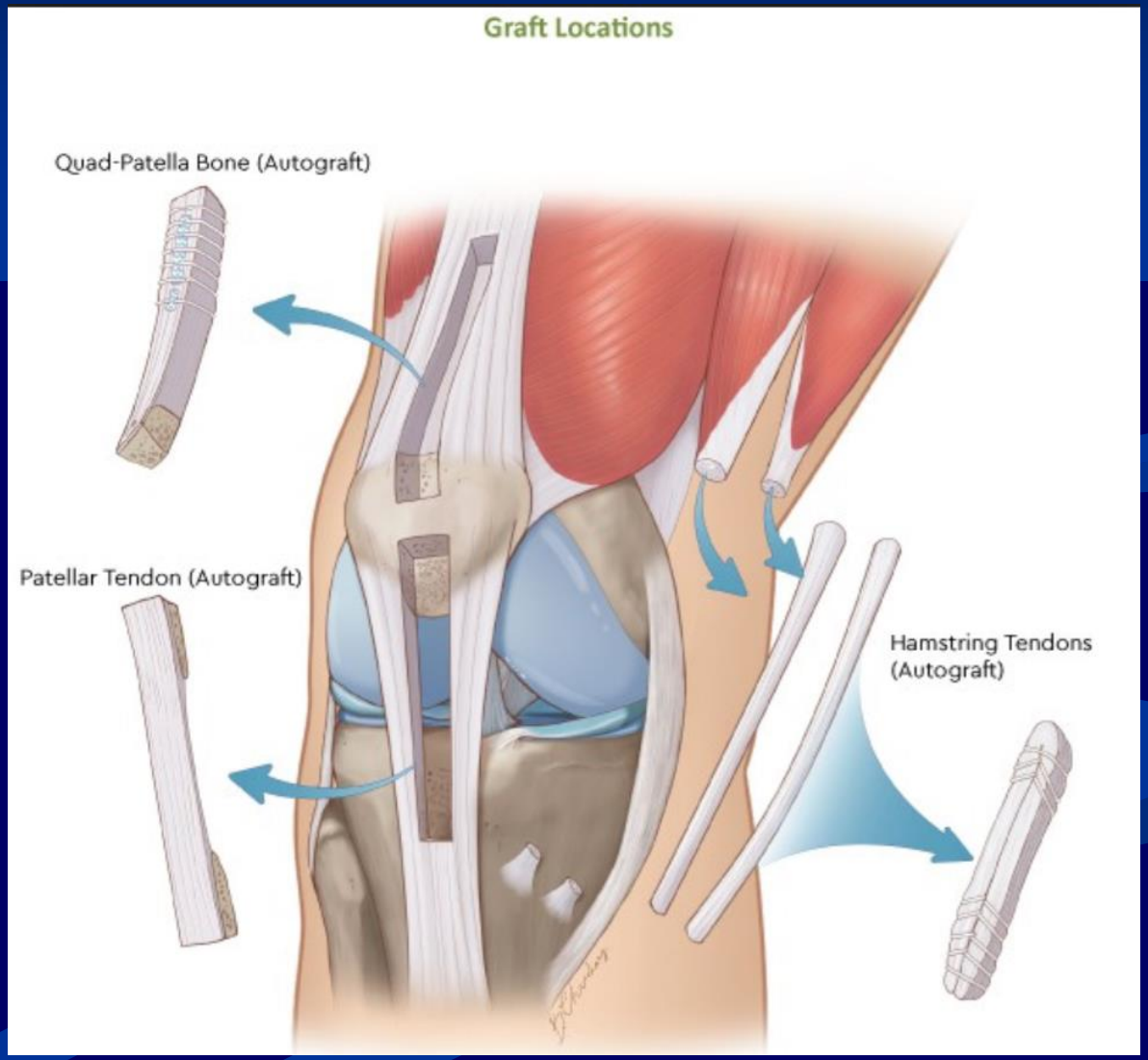


Pediatric ACL Reconstruction

- In open growth plates, always soft tissue graft
- Always use autologous tissue
  - 10-15% re-tear rate with autologous tissue
  - 30% with allograft tissue

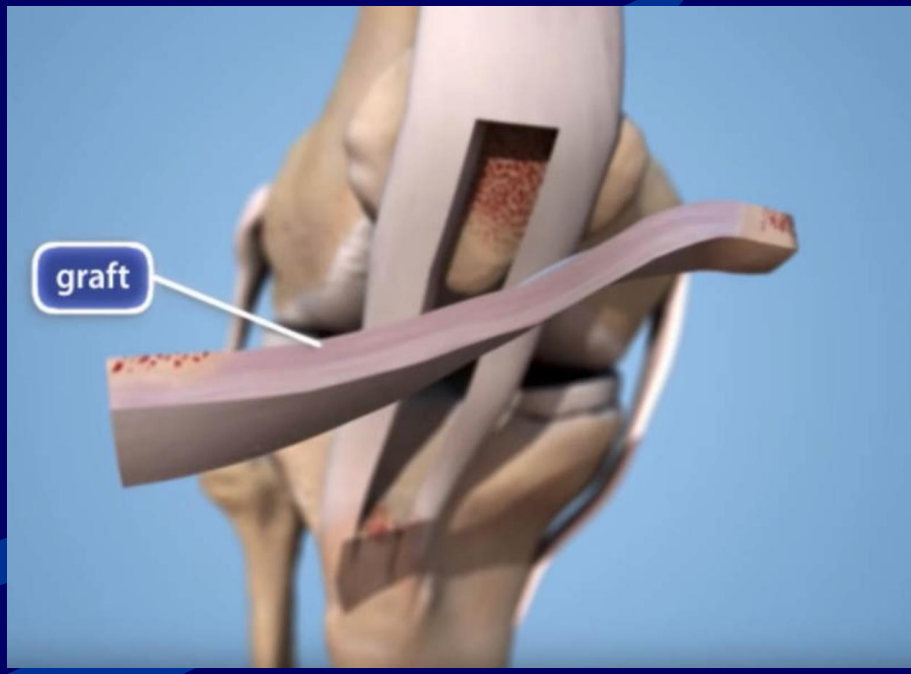
Graft Sources

- Hamstring
- Patellar Tendon
- Quadriceps
- Iliotibial Band



Pediatric ACL Reconstruction

- Closed growth plates can get patellar tendon grafts
  - Better in soccer players
  - Better in loose jointed girls
  - Large Football players



Retear rates

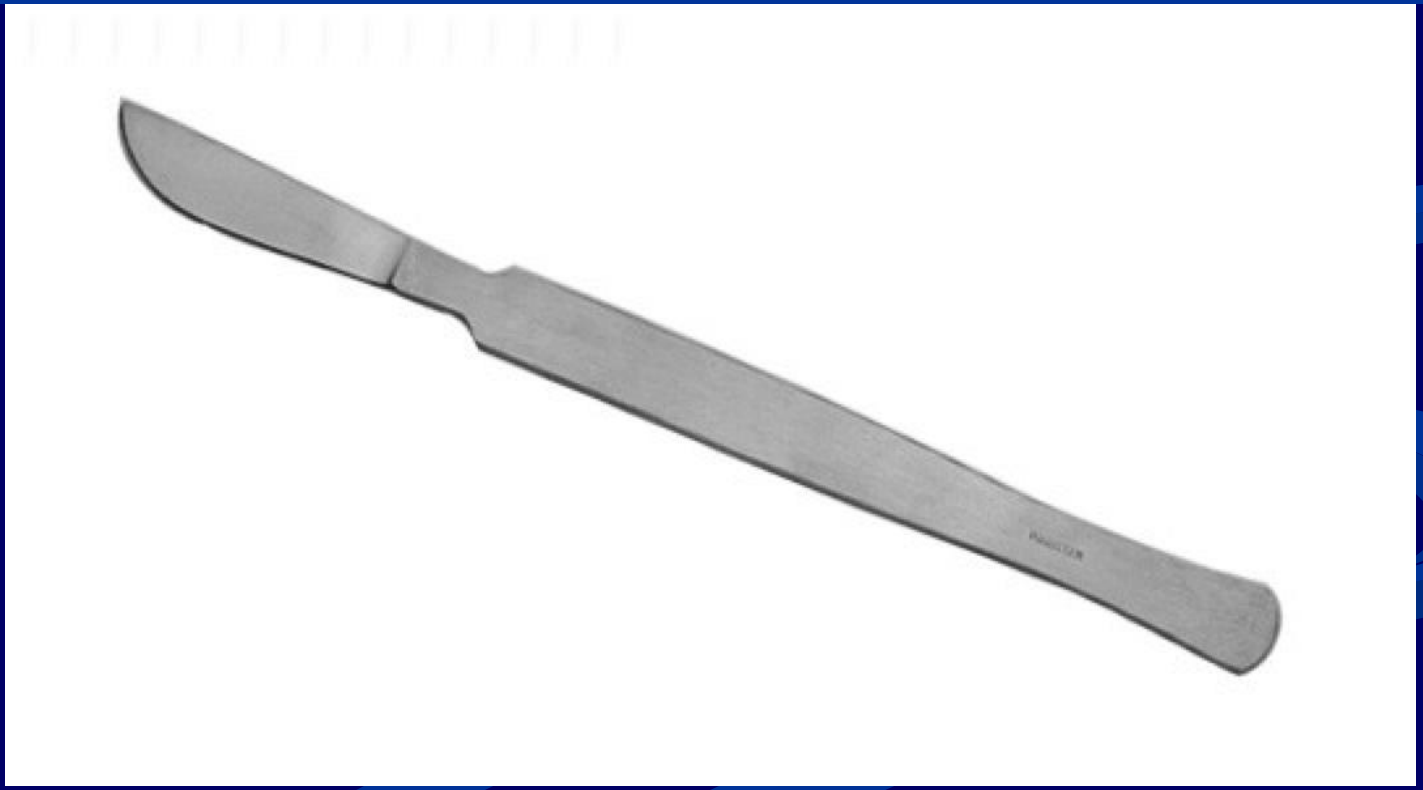
- 17% - Hamstring reconstruction
  - Only option in skeletally immature
- 8% - BTB recon
- 33% -allograft

How do patients do post surgery?

- 9-12 month minimum to get back to sports
- 5,770 patient meta-analysis Arden, et al (2011 Br J sports med)
- 82% returned to sports
- 63% returned to preinjury sport
- 44% returned to competitive sport

How about the patient under 10 with ACL Injures?

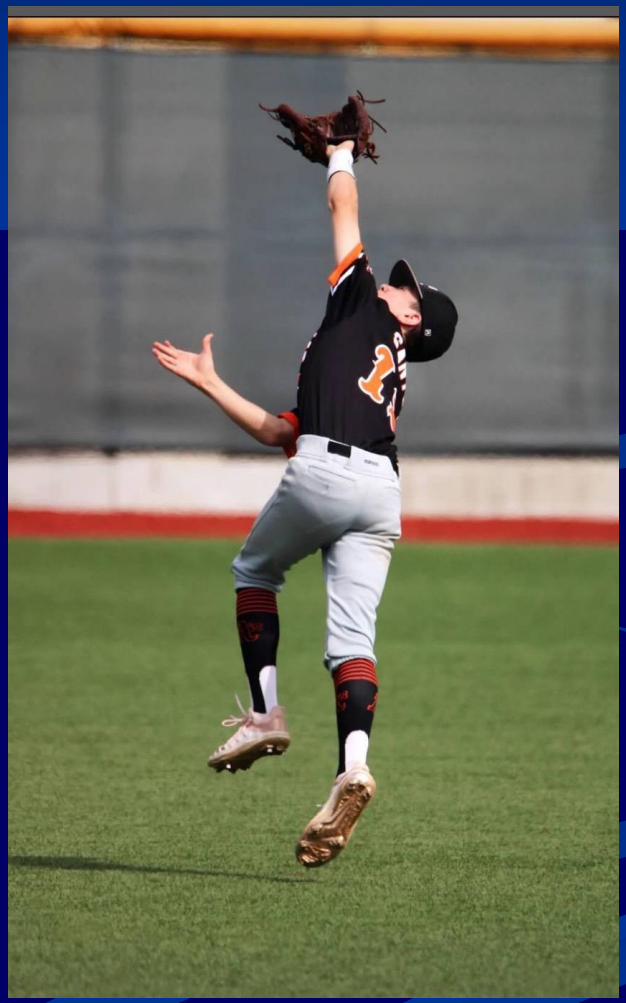
- Fix or watch?
- Ortho Mantra - Heal With Steel!



ACL Tears in Skeletally Immature

- Recommendations: FIX!
- Surgical limitations
  - Timing
  - Modified procedure

14 year old male 8 years post ACL reconstruction



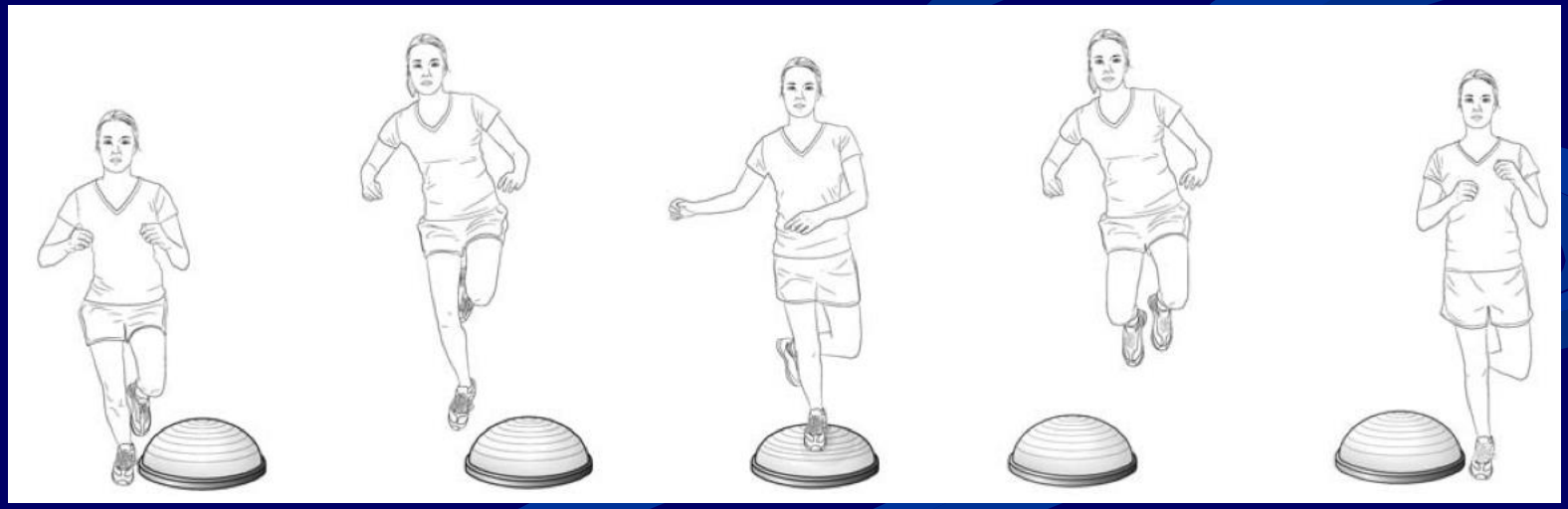
Can we prevent ACL tears??

ACL prevention

- 62% reduction rate of ACL injuries with prevention program employed

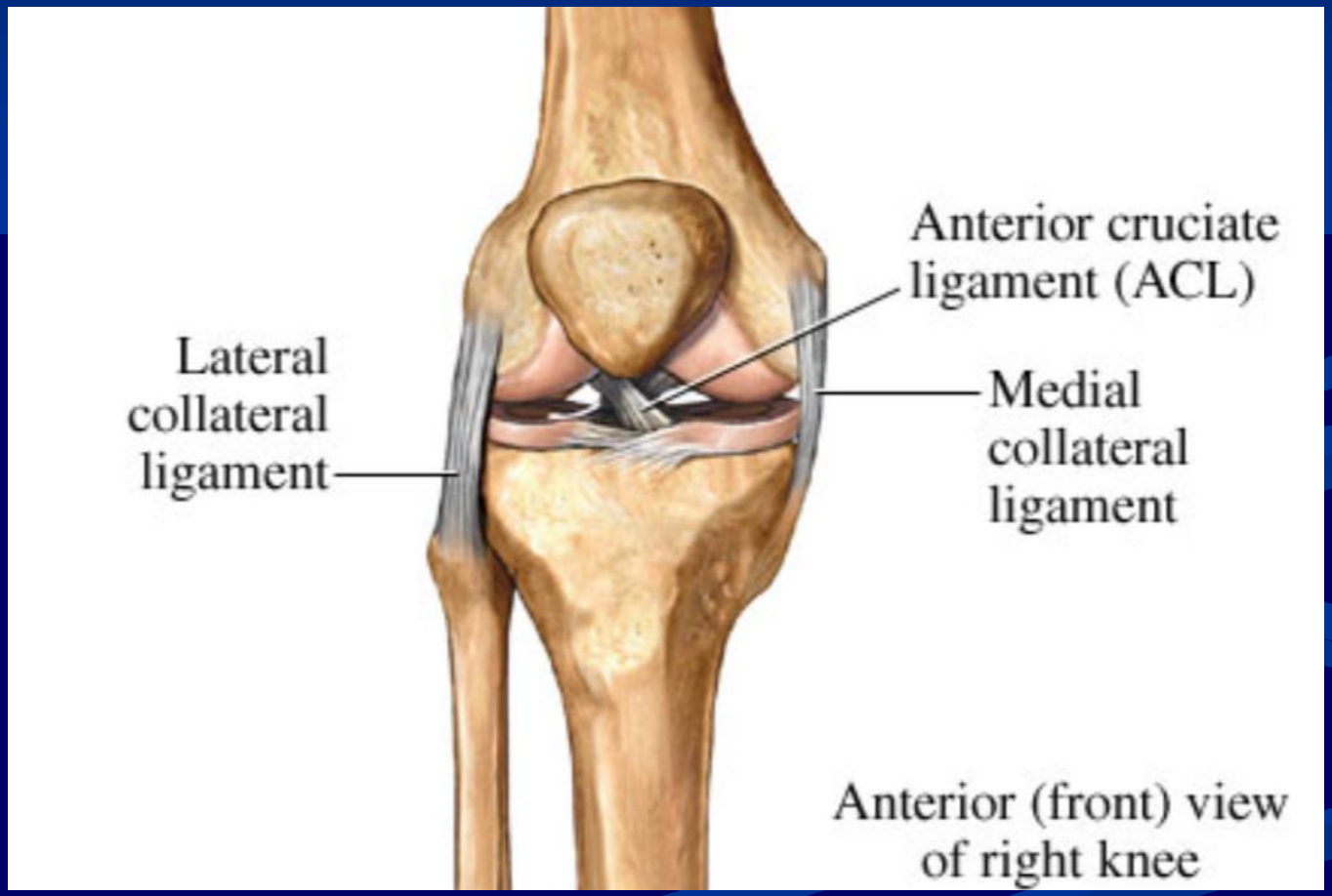
  (Sadoghi JBJS 2012)

- Focus on "knee over foot landing"



ACL prevention

Collateral ligament injuries



Collateral ligament injuries

- MCL most common ligament injury in knee
- Grade 1-3
  - Grade 1-2 Nonoperative
  - Grade 1 – Back to sports 10.6 days
  - Grade 2 – Back to sports 19.4
  - Grade 3 – possible surgery
- Bracing may help

Collateral ligament injuries

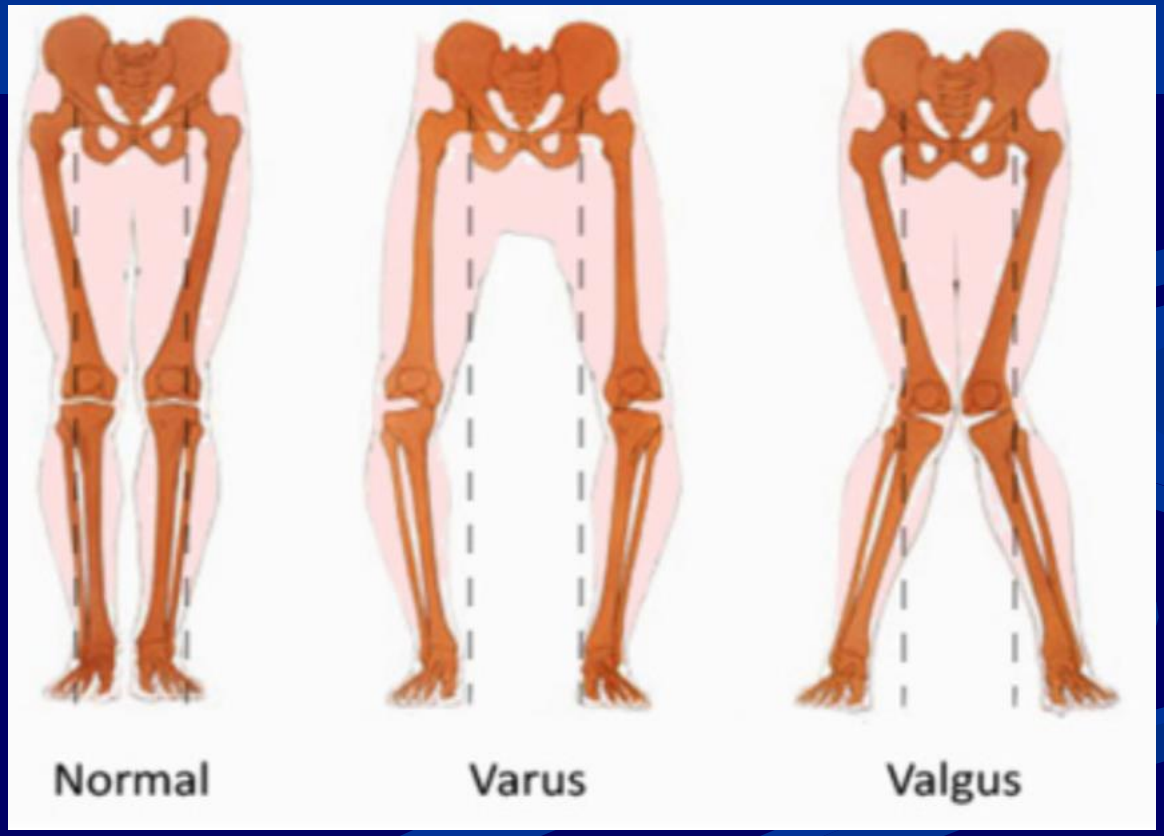
- Lateral collateral ligament – Usually heal with nonoperative treatment
- TX: Brace, PT, activity restriction (6 weeks)
- In chronic setting surgery may be needed

LCL ligament injuries

Post LCL reconstruction

Collateral ligament injuries

- Always check alignment



Collateral Ligament Tests

- Varus and Valgus loads at 20 degrees
- It's not a collateral tear without matching history

Osteochondritis Dissecans (OCD)

Osteochondritis Dissecans of the Knee

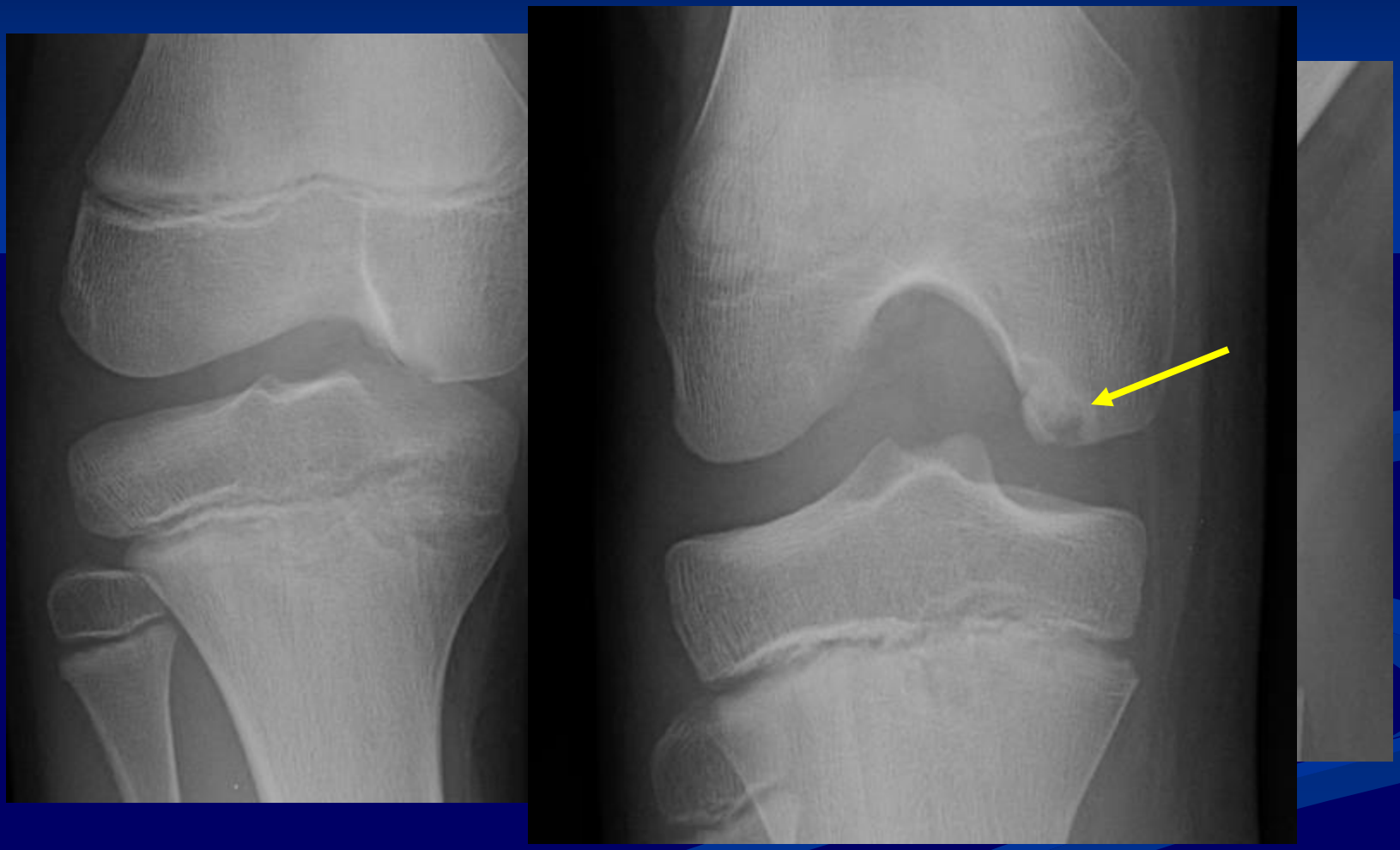
- Fragmentation of cartilage and avascular necrosis of subchondral bone
  Unknown Etiology: repetitive microtrauma, ischemia, genetic component
- **Medial femoral condyle,** occasionally lateral condyle or patella, bilateral in approx 30%
- **Symptoms:** pain, locking, recurrent mild effusion

OCD- Whose at risk?

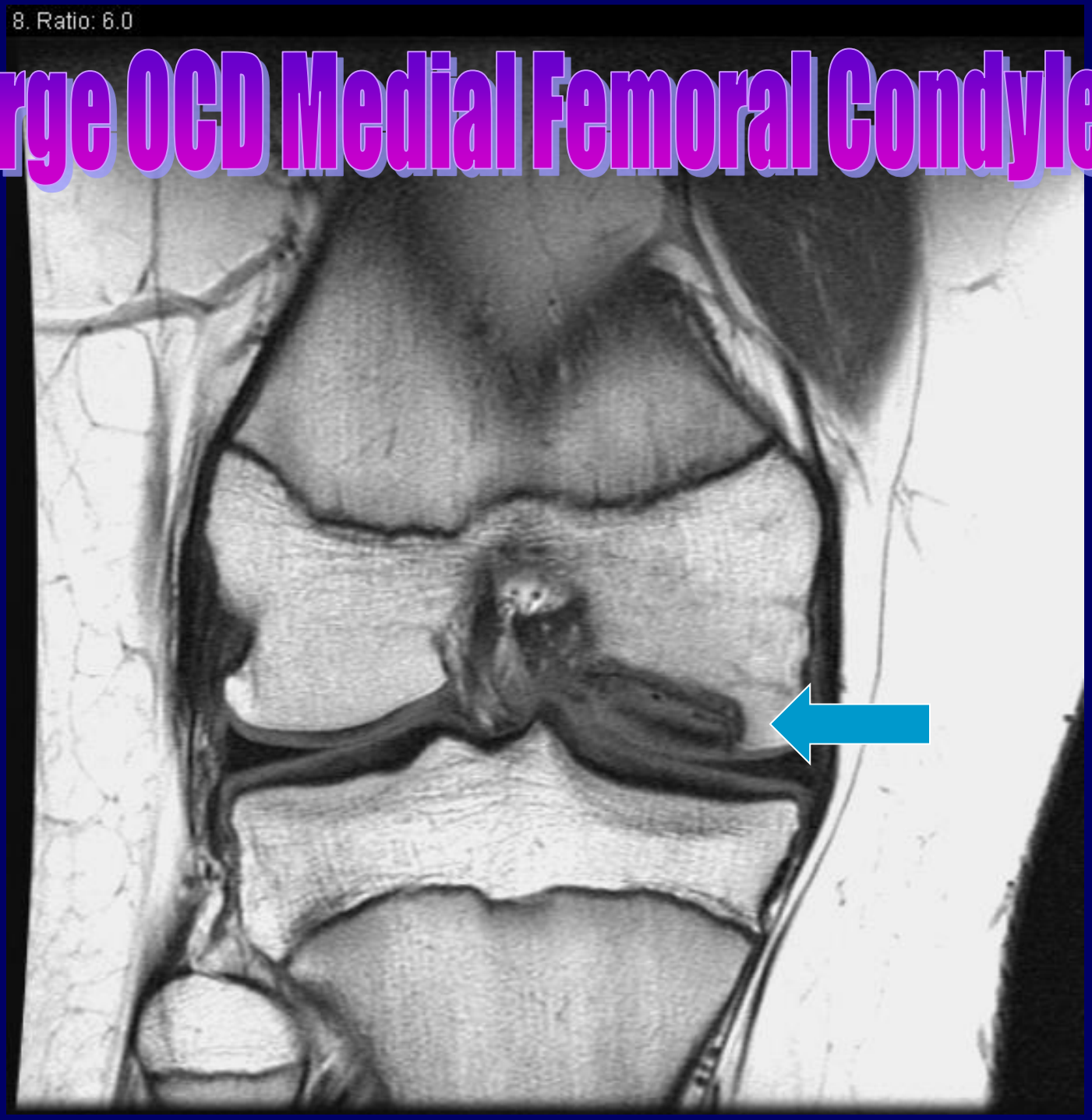
OCD – Who's at risk

- The very active tween or teen

Tunnel X-Rays Critical

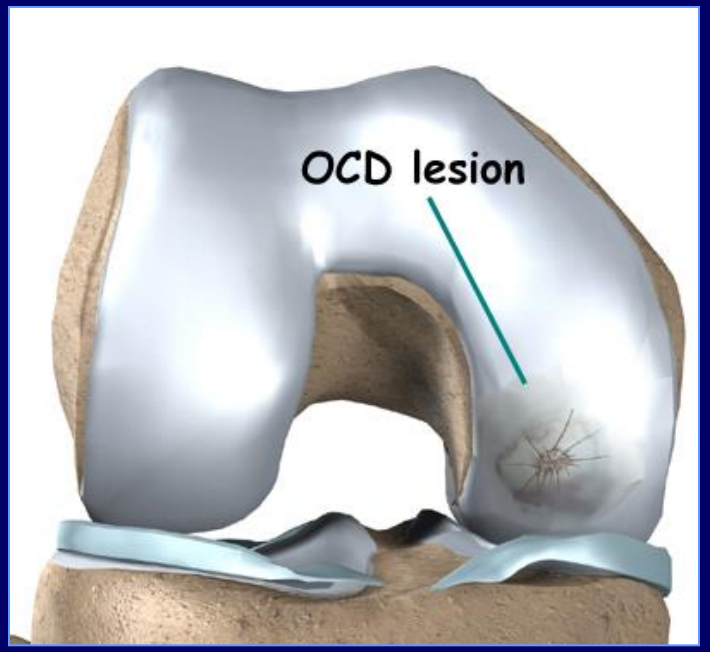


Large OCD Medial Femoral Condyle



Osteochondritis Dissecans: Management

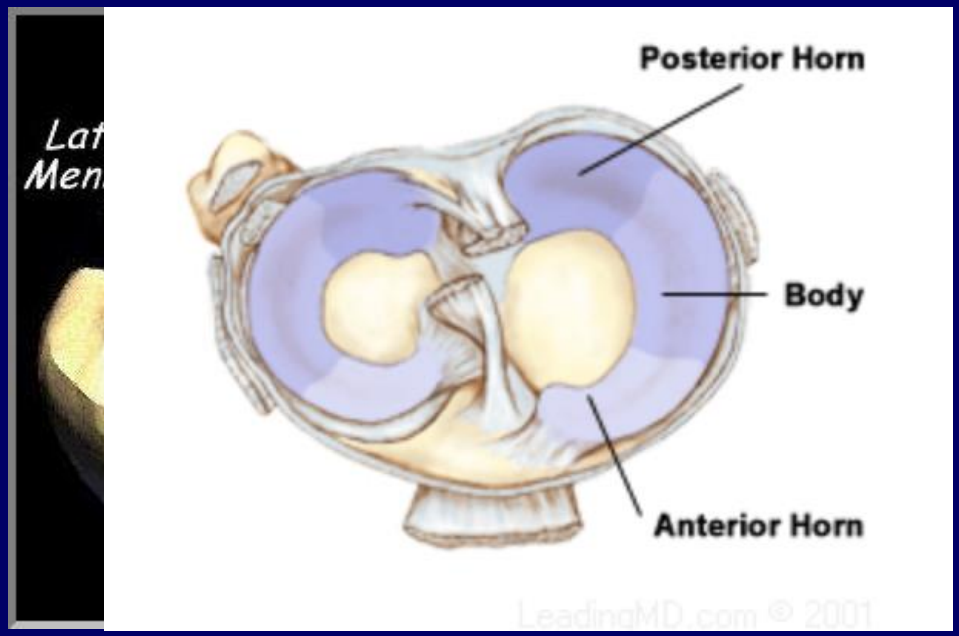
- Best treatment???
  - REST, REST, REST!!!
  - unloader brace, activity modification, surgery



The Meniscus

Meniscus Function

- Stability & shock absorption
- If ACL torn… meniscus takes more stress
- Torn/compromised meniscus ---- Future Arthritis



Meniscus function

Meniscal tears
How do they present?

- Adults
  - often no known injury (degenerative)
- Pediatric population
  - Usually a traumatic injury (not always)
  - Lateral sided pain be ware of discoid meniscus

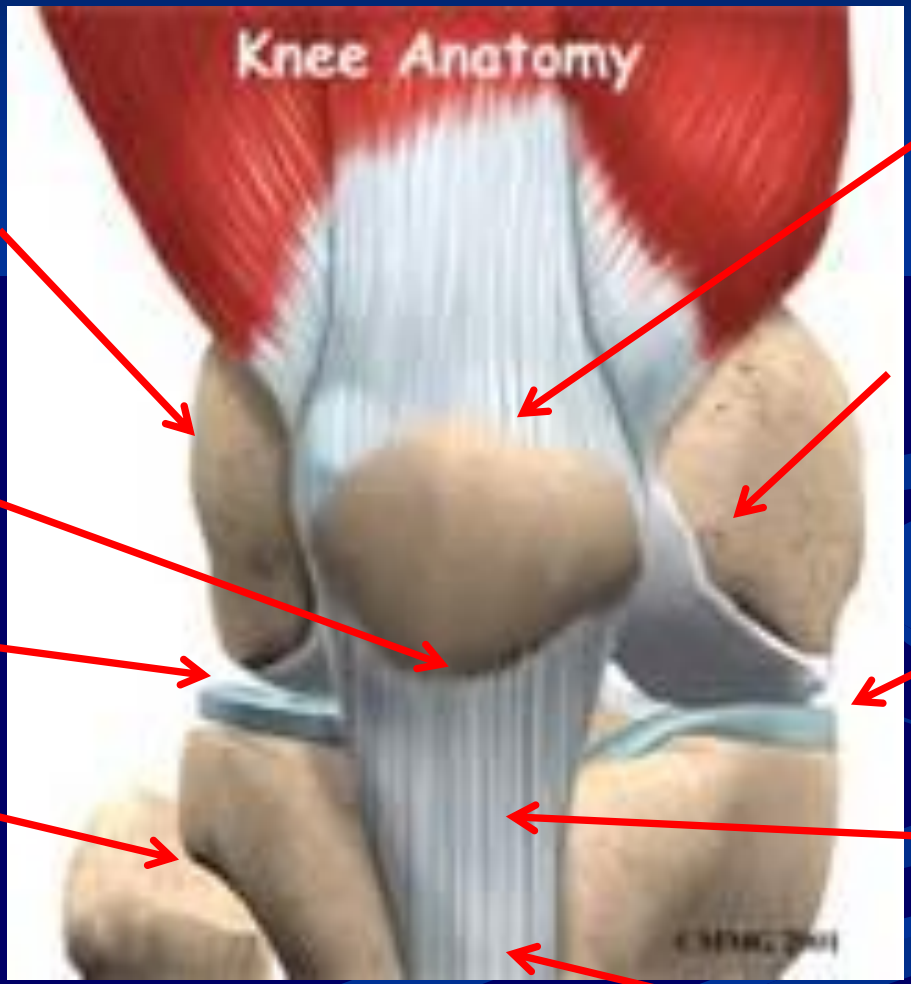
What age do Meniscal tears occur?

- Usually teenage patients
- If under 10 and point tenderness at lateral joint line, think discoid meniscus

Location of pain

- Joint Line pain
- Posterior pain
- If pain at the medial joint line, often patellofemoral pain

Location of pain



Lateral condyle- ITB

Sinding Larsen Johansson

Lateral joint line- discoid meniscus

Tib-fib joint instability

Patellofemoral pain

Medial Condyle-plica Patellofemoral pain

Joint Line-meniscus

Patellar tendinitis

Tuburcle- Osgood Sclatter

Meniscal Testing

- McMurray
- Thessaly
- Duck walkin

Meniscal Testing

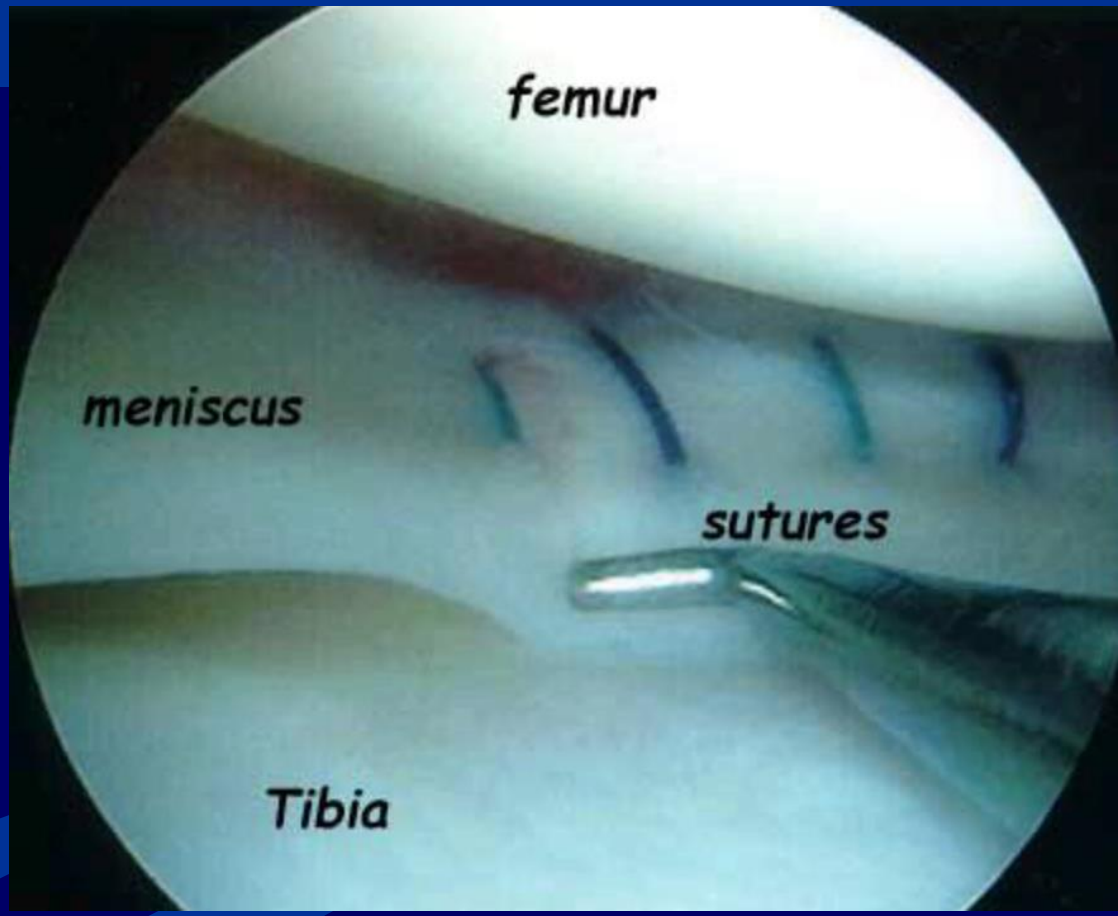
- McMurray an Thessaly – Both have sensitivity and specificity of mid 60s

McMurray Testing

Thessaly Test

Meniscal Treatment?

- Usually surgery
- Repair preferable
- Recovery 6 month



Lateral sided Knee Pain

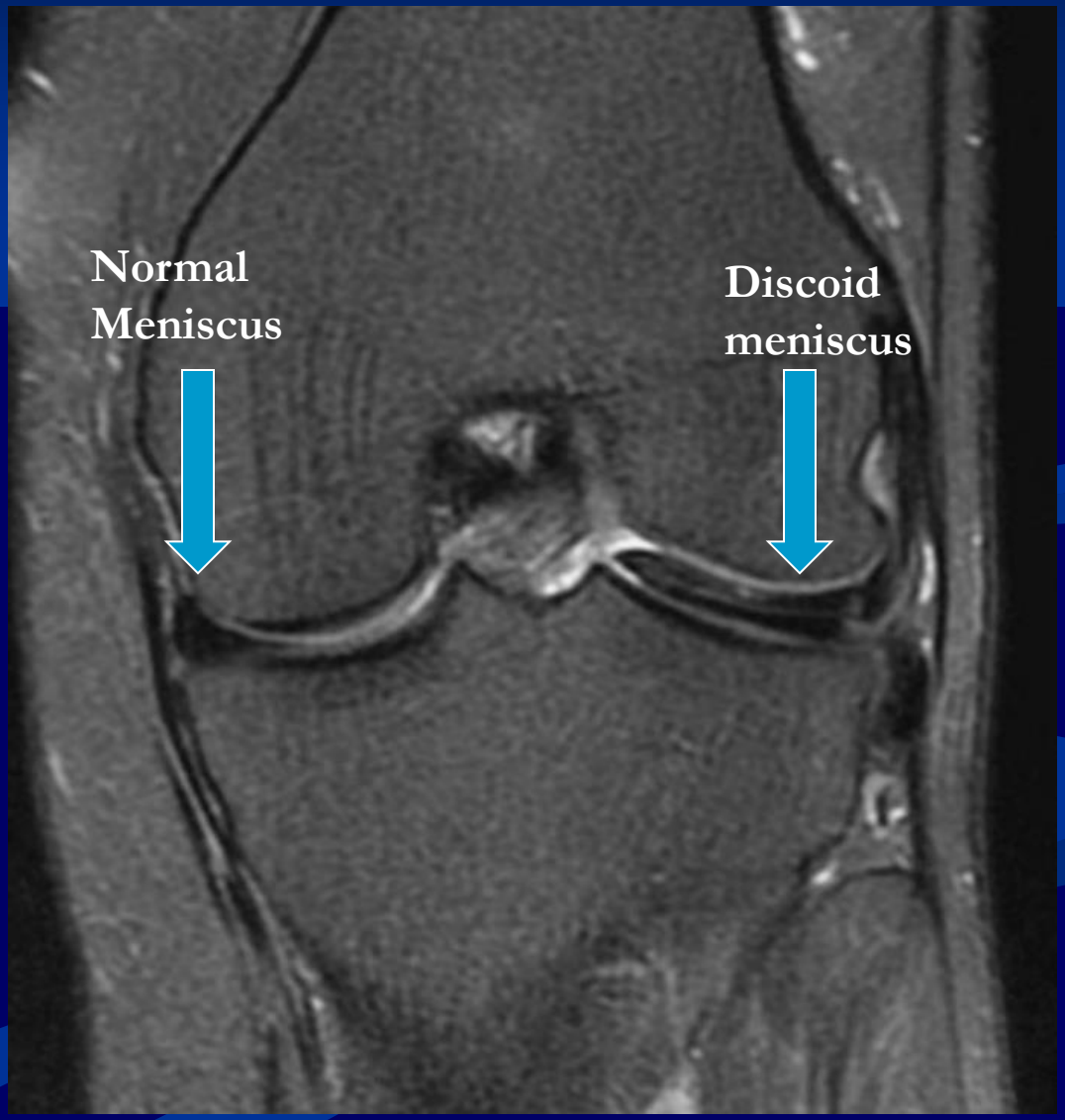
- Discoid Lateral Meniscus
- Iliotibial band syndrome
- Proximal tibia-fibula joint instability
- Torn lateral meniscus
- LCL tear/laxity

Discoid Meniscus

- Congenitally enlarged meniscus
  - (almost always lateral)

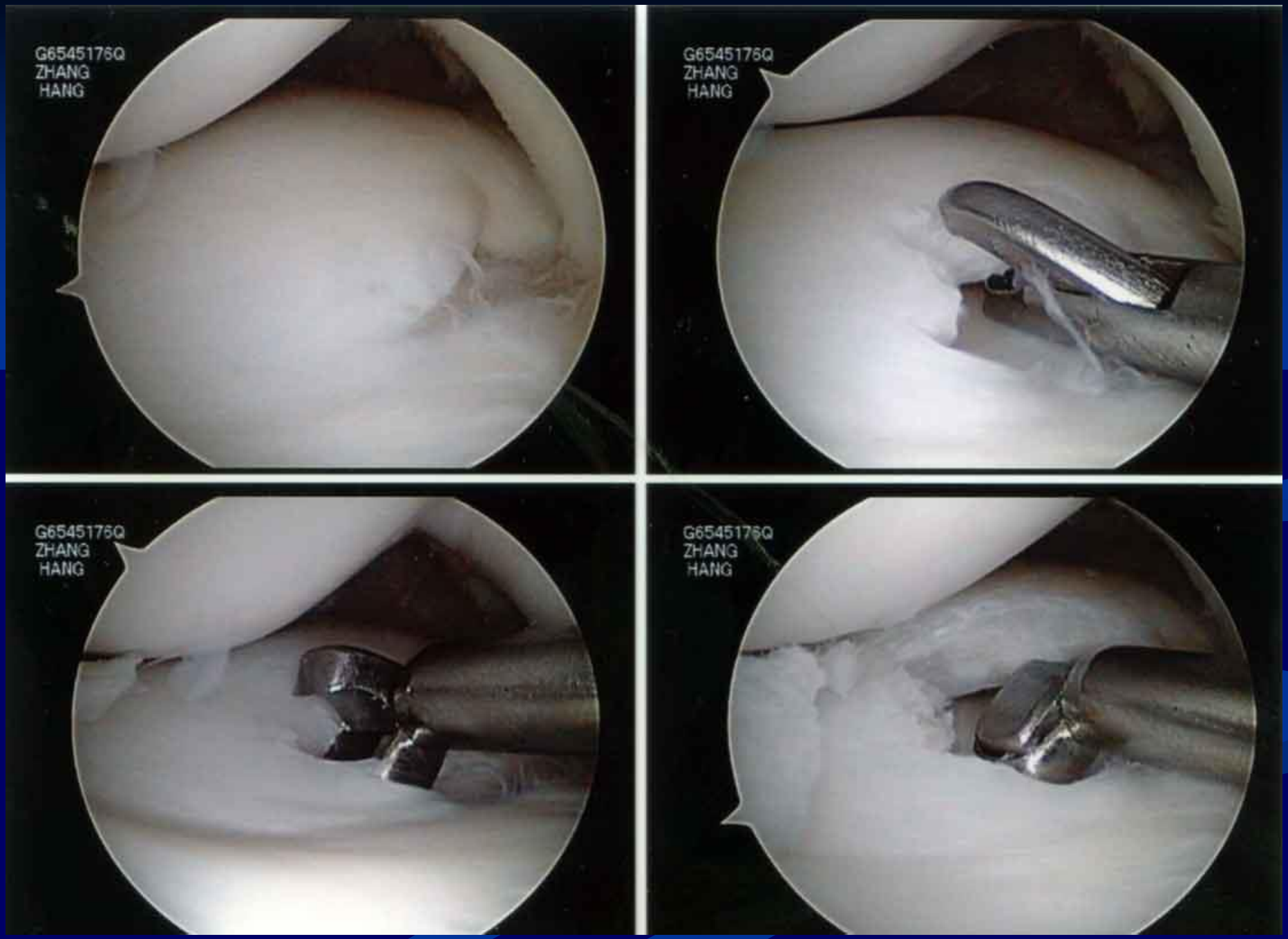
Discoid Meniscus

- Age at Presentation
  - Varies
  - If <10-12 years w/meniscal tear, likely discoid
- Symptoms
  - Lateral pain, locking, swelling



Discoid Meniscus Treatment

- Non-operative if incidental finding and symptom free
- If symptomatic, operative intervention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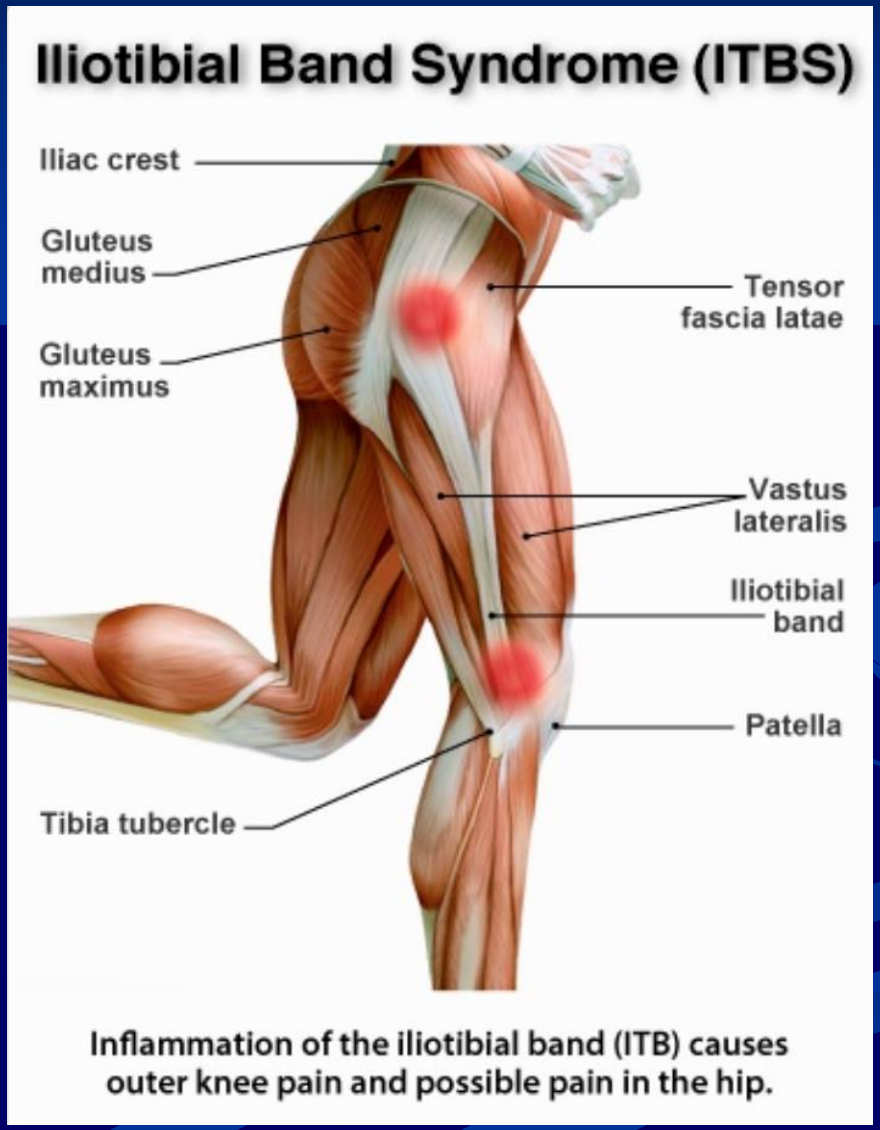
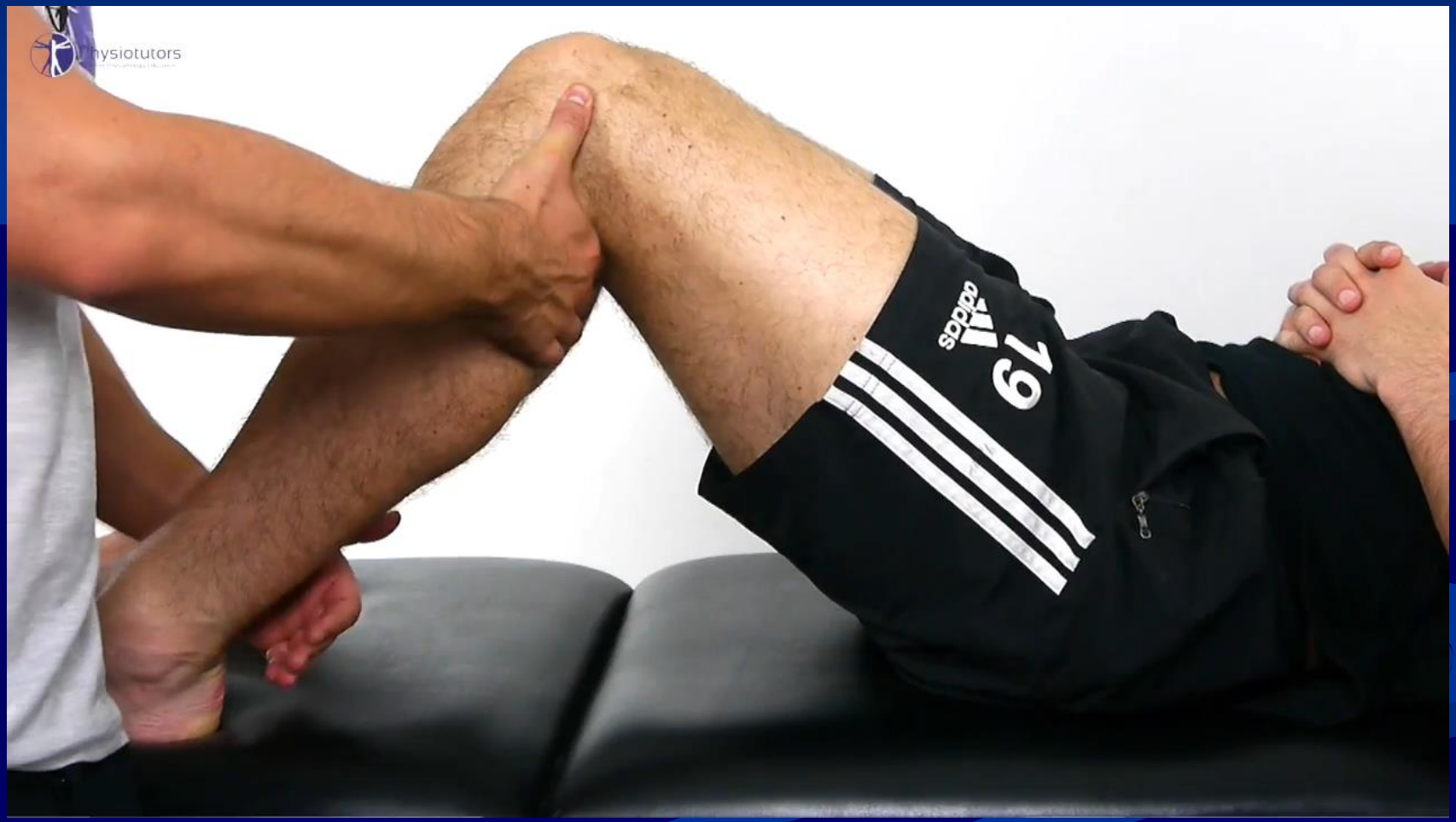
Iliotibial Band Friction Syndrome



Noble Test

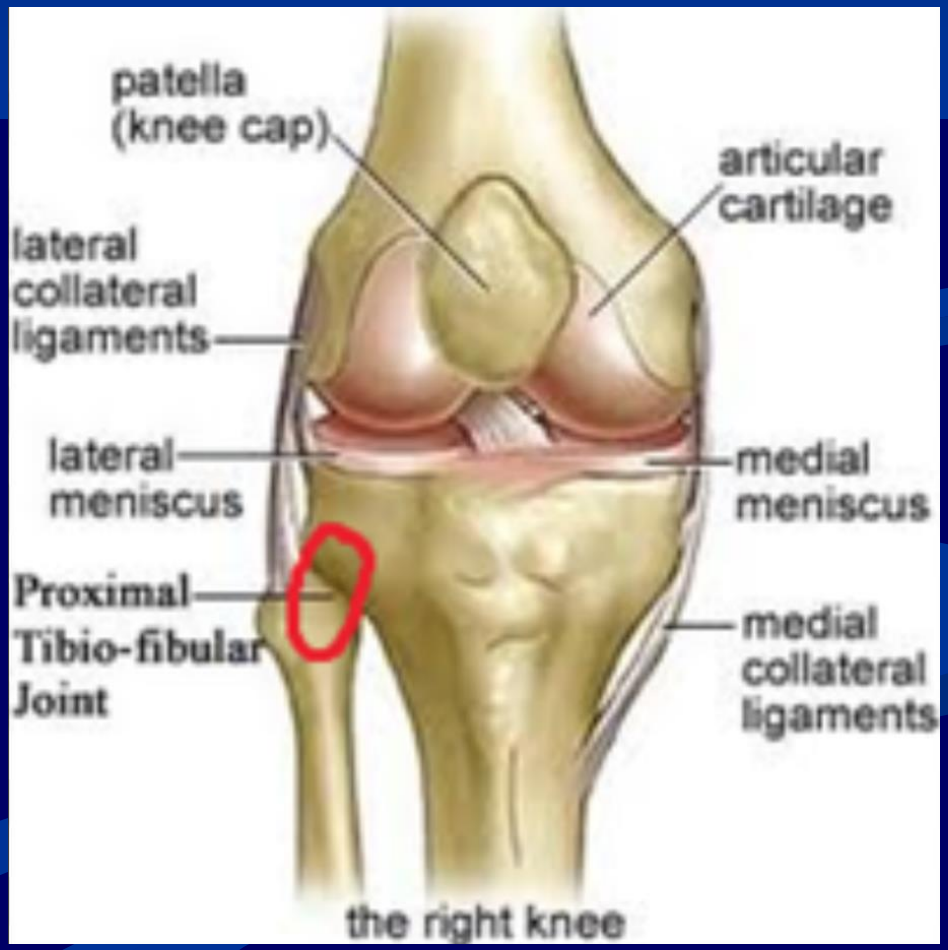


Noble Test

Ober Test

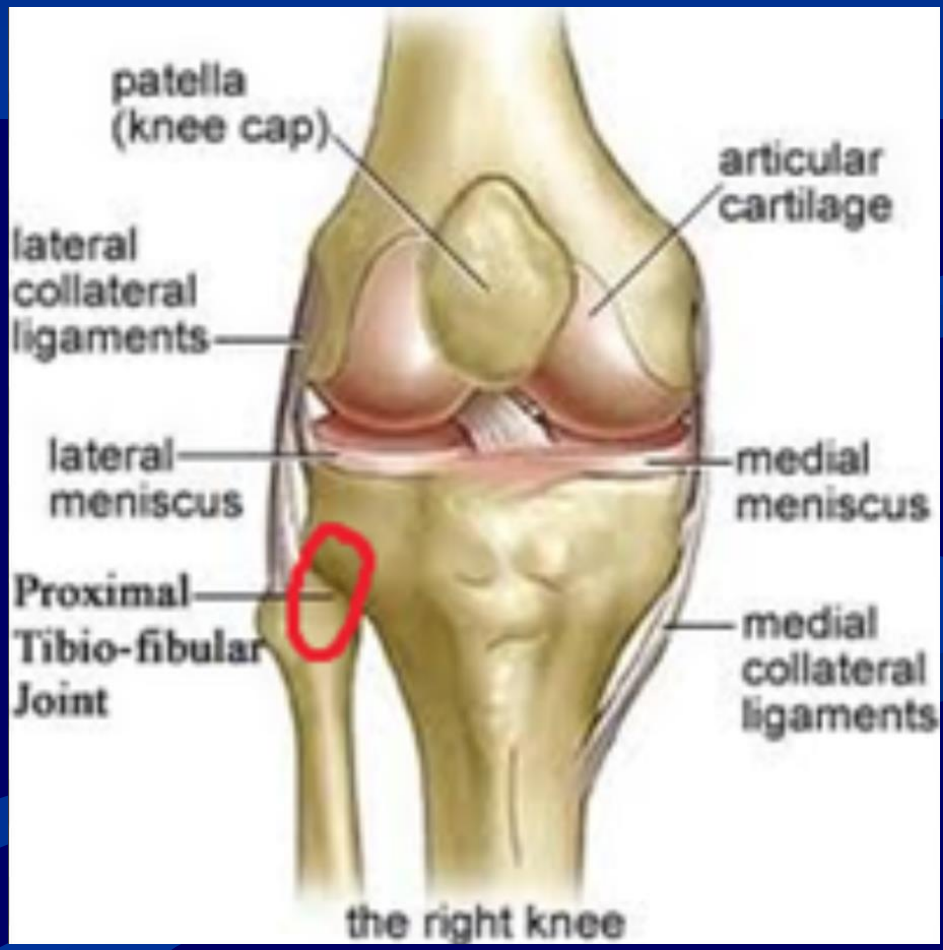
Proximal Tibia-Fibula Joint Pain

- Lateral sided pain just distal to joint line at tib-fib joint
- Frustrated patients
- Negative studies
- Failed PT



Proximal Tibia-Fibula Joint Pain

- Test- grab fibula head and shift ant-post to illicit pain
- Injection can help dx
- Imaging negative
- Surgery if pain bad



Hip Problems

Hip Problems

- Slipped Capital Femoral Epiphysis
- Transient Synovitis
- Septic Arthritis
- Femoroacetabular Impingement
- Snapping Hip
- Avulsion Injuries

Slipped Capital Femoral Epiphysis

- 2-3 times more common in boys then girls
- Often overweight patients
- 80% occur during adolescent growth spurt
  - ~12 y/o girls
  - ~13.5 y/o boys
- 25% bilateral (some think 60-80%)

Slipped Capital Femoral Epiphysis

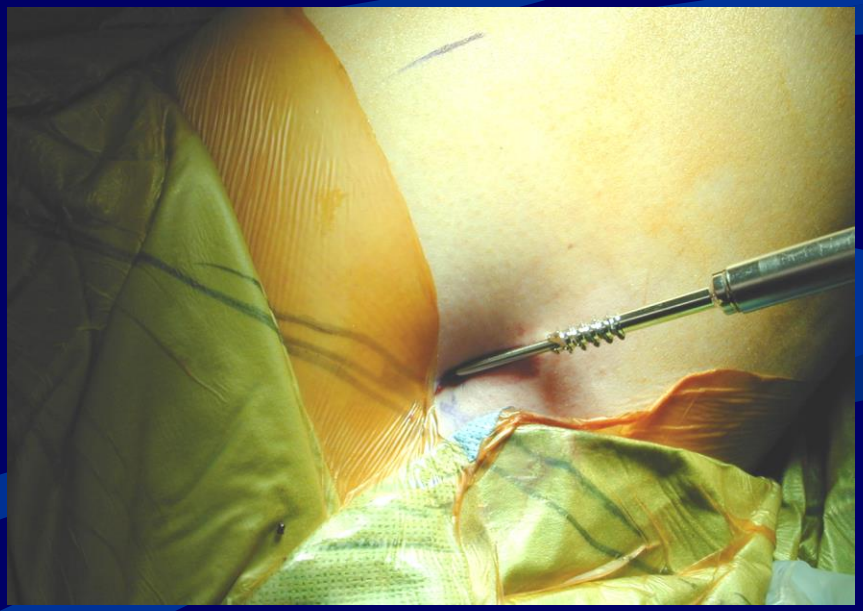
- If patient doesn't look like….
- Look for other problems
  - Renal osteodystrophy
  - Hypothyroidism
  - Panhypopituitarism
  - Hypogonal syndrome

Slipped Capital Femoral Epiphysis

- Up to 4 months from first physician visit to diagnosis
- Presentation
  - Hip, Groin, Thigh, or knee pain for long time
  - Abductor Lurch
  - Foot externally rotated
  - Poor internal rotation with hip flexed

Avoiding the Pitfalls: Referred Knee Pain in Children

- Hip pain can often be referred to the knee in children
- Sensory distribution of obturator nerve to medial knee
- ALWAYS Examine hip in any child with knee pain
- Misdiagnosis common: LCPD [Perthes], SCFE [slipped capital femoral epiphysis]



10 year old female presents to ER 8/1/09 with months of hip pain secondary to a groin pull

10 year old female presents to ER 9 days later with severe pain now

Slipped Capital Femoral Epiphysis Treatment

- Heal with Steel…

Legg Calves Perthes

Legg Calves Perthes

- Idiopathic avascuar necrosis of the femoral head
- 10% Bilateral
- Most common between 4-8 years of age
  - Can be seen in kids less then 2
- Diagnosis can be difficult/subtle
  - Can be mistaken for synovitis
  - “I notice a slight limp at the end of the day, but he doesn’t complain of pain”

Legg Calves Perthes

- Exam
  - Slight assymetry with loss of abduction/internal rotation
- Diagnosis – Xrays (occasioanally MRI)
  - Sometimes can be missed initially

Legg Calves Perthes Treatment

- Casting
- Rest
- NSAIDs
- Surgery

Transient Synovitis

- Most common cause of pain in school age kids
- May have elevated labs, fever, inability to walk
- More common in boys then girls (2-4xs)
- May have viral etiology or trauma (30% & 5%)
- Treatment – NSAIDs
- Lasts7-10 days – up to 17% recur

Septic Arthritis

Septic Arthritis

- Bacterial Infection
- Patient looks sick, getting worse
- Nonweightbearing
- Pain with even log role of hip

Septic Arthritis Diagnosis

- Kocher Criterium- Non-weight bearing, ESR>40, fever, WBC>12,000
  - 4/4 of the above (+) - 99% chance septic
  - 3/4 above positivie - 93% chance
  - 2/4 above positive - 40% Chance
  - 1/4 above positive - 3% chance

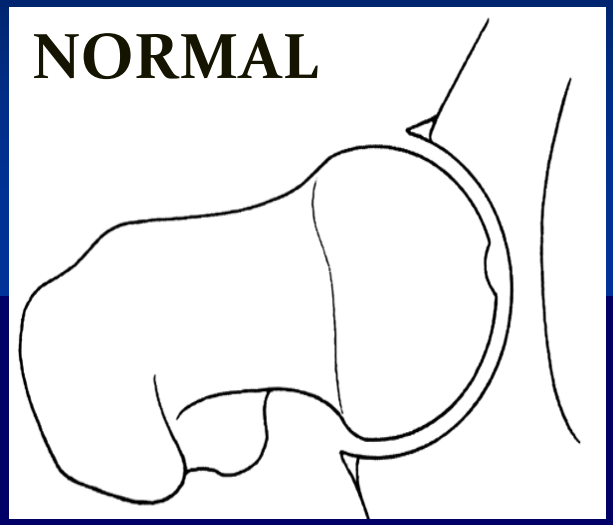
Septic Arthritis

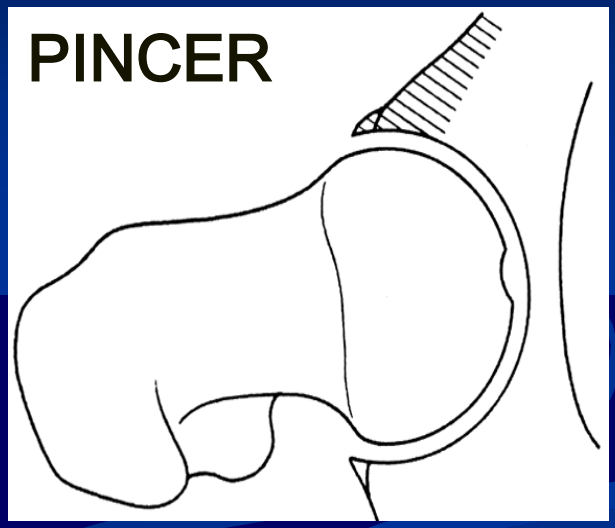
- Suspicious???
- Bypass the ortho doc and send to the ER

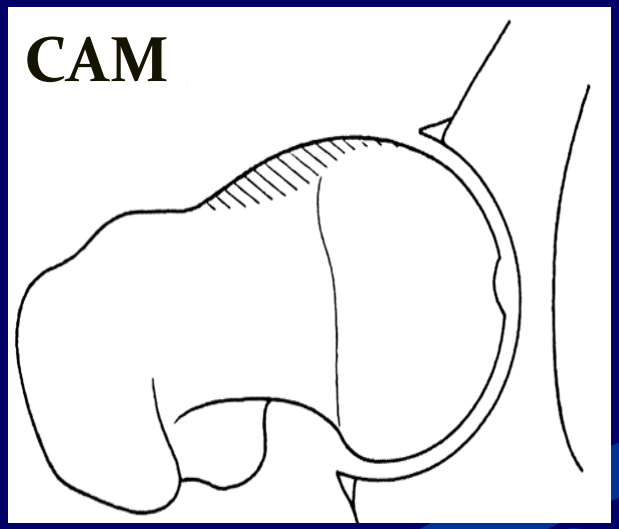
Femoroacetabular Impingement

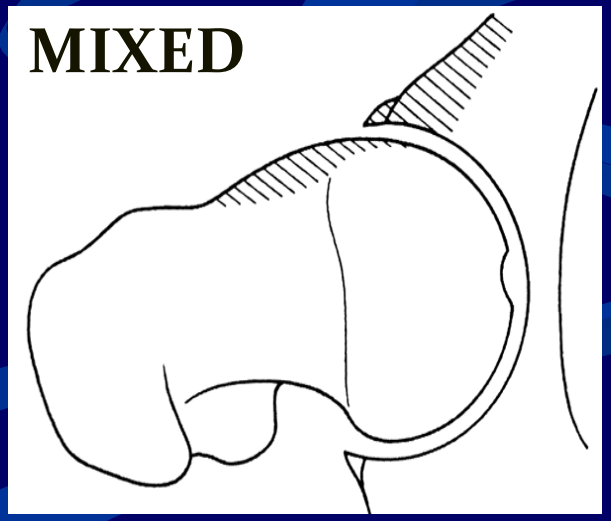
- New "Hot Topic" in Orthopaedics
- Impingement is the next frontier for sports medicine
- High profile athletes with FAI have raised awareness
- Process can start early in adolesc. and progress with age (McCarthy

Femoroacetabular Impingement
What is it?









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Femoroacetabular Impingement

- Ball and Socket configuration
- When the ball or socket has an abnormal shape, bone on bone/cartilage contact occurs leading to damage of the labrum or cartilage

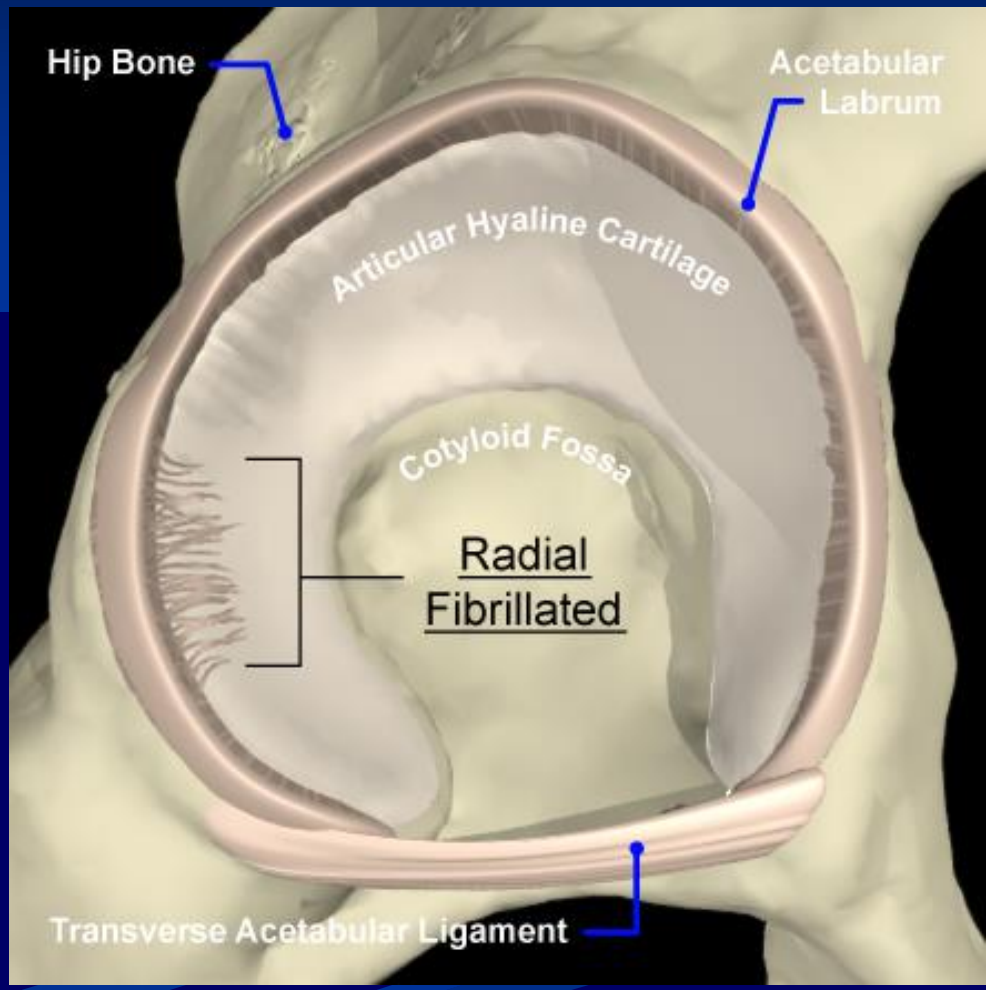
Femoral Acetabular Impingement

Labral Function

Role of the labrum

1. Increases joint stability, improves hydrostatic fluid pressure in the intraarticular space
2. Increased joint stability, deepens socket
3. Load transmission

Isolated labral tears are uncommon

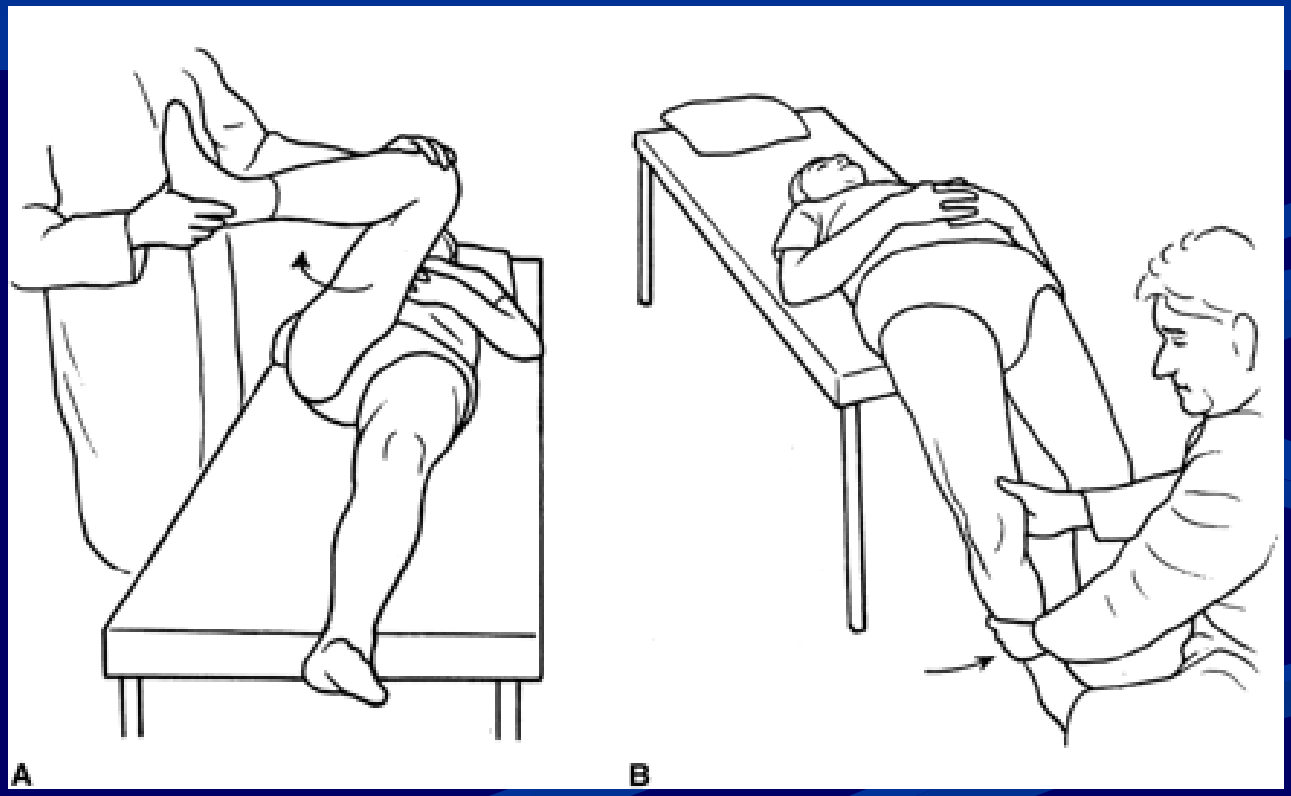


Labral Tear Presentation

- Pain is classically in the anterior groin
- "C"-sign
- Less commonly in posterior hip

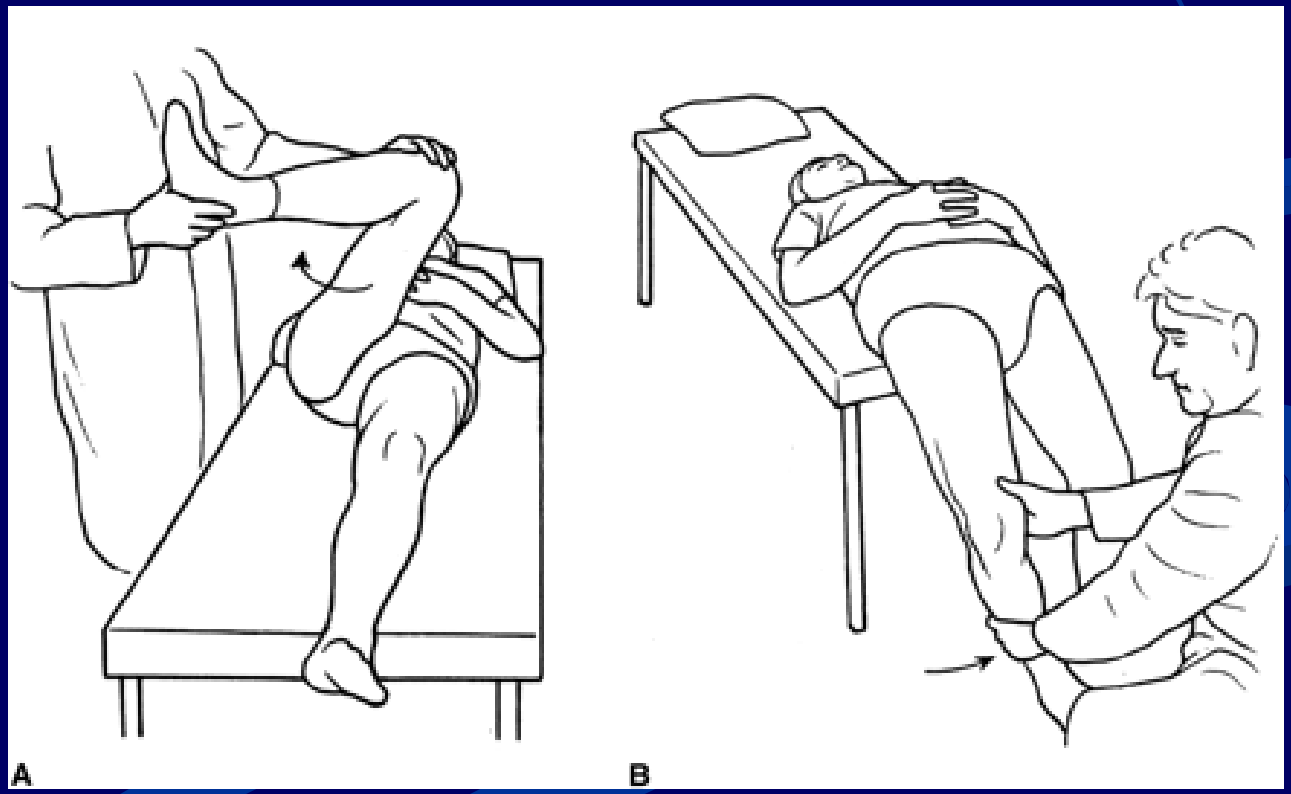
How do we diagnose?

- Clinical exam is very sensitive
  - "Impingement test"



How do we diagnose?

- Clinical exam is very sensitive and specific
  - Impingement test
    - Flexion Adduction Internal Rotation

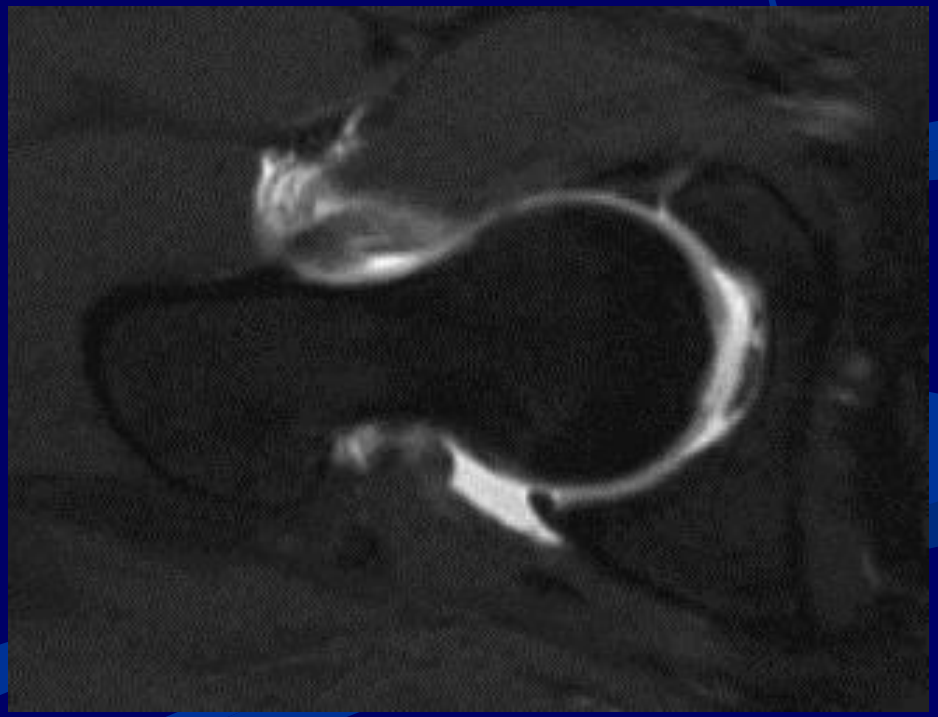


How do we diagnose?

- Clinical exam is very sensitive and specific

MRI Sensitivity for labral tears

- Pelvis MRI with Large Field of View 8% ssensitivity
- Hip MRI noncontrast 25%
- MRI Hip Arthrogram 92%
  - Toomayan et al, AJR, 2006

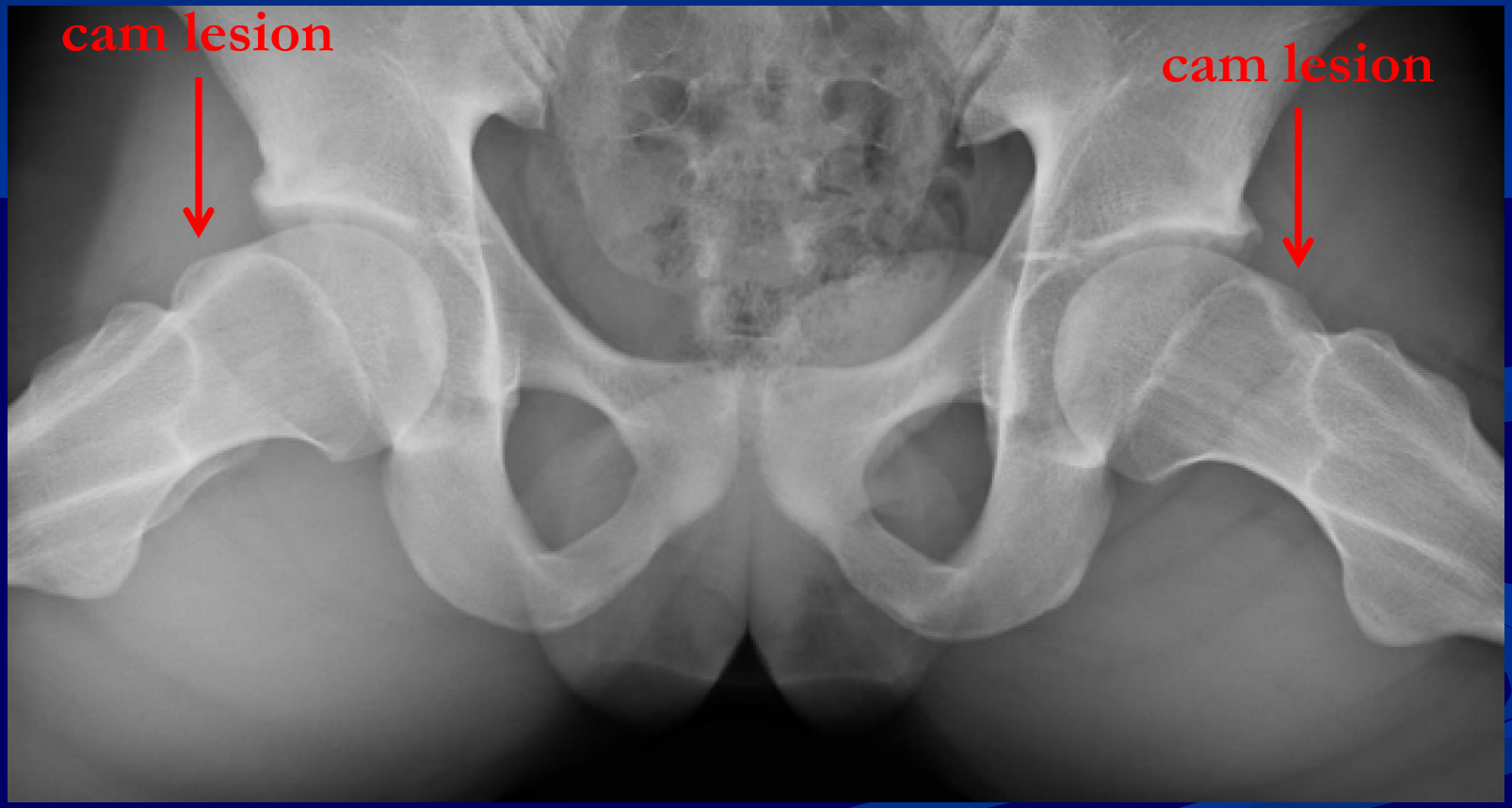


Treatment

- Therapy will be less effective
- Surgery is the best option

Surgery

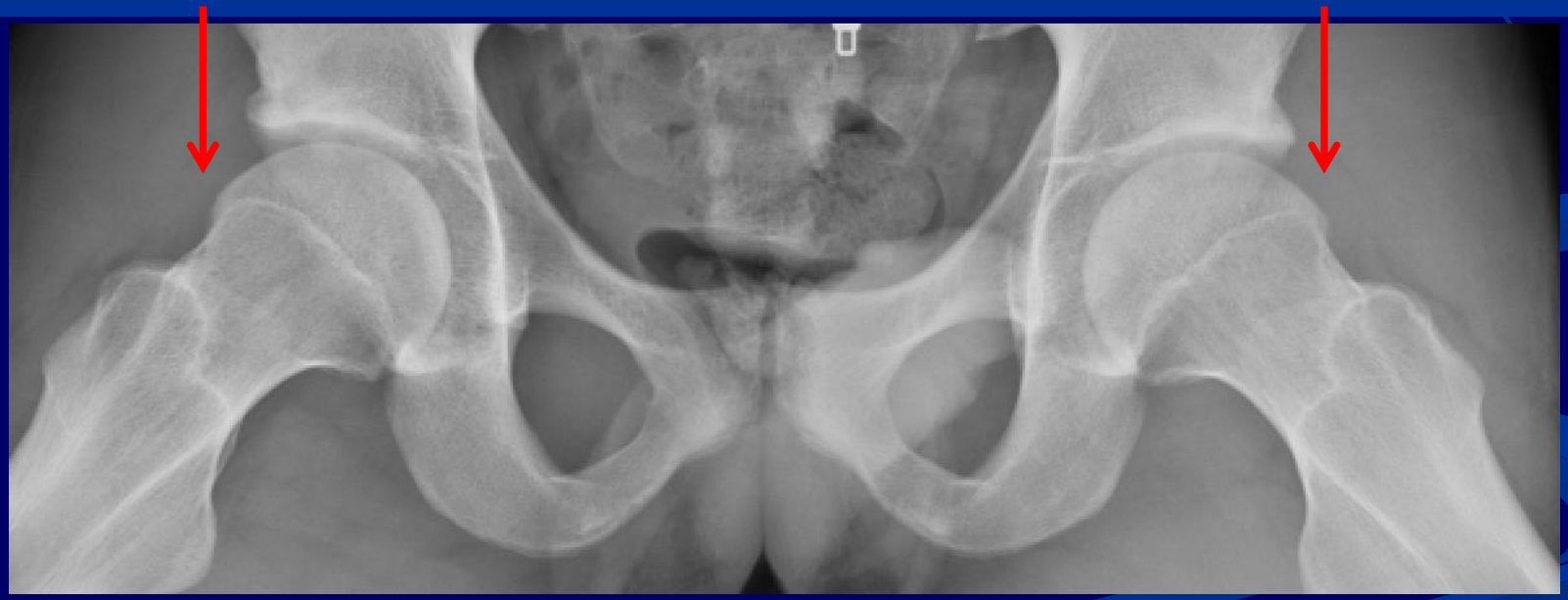
Surgery



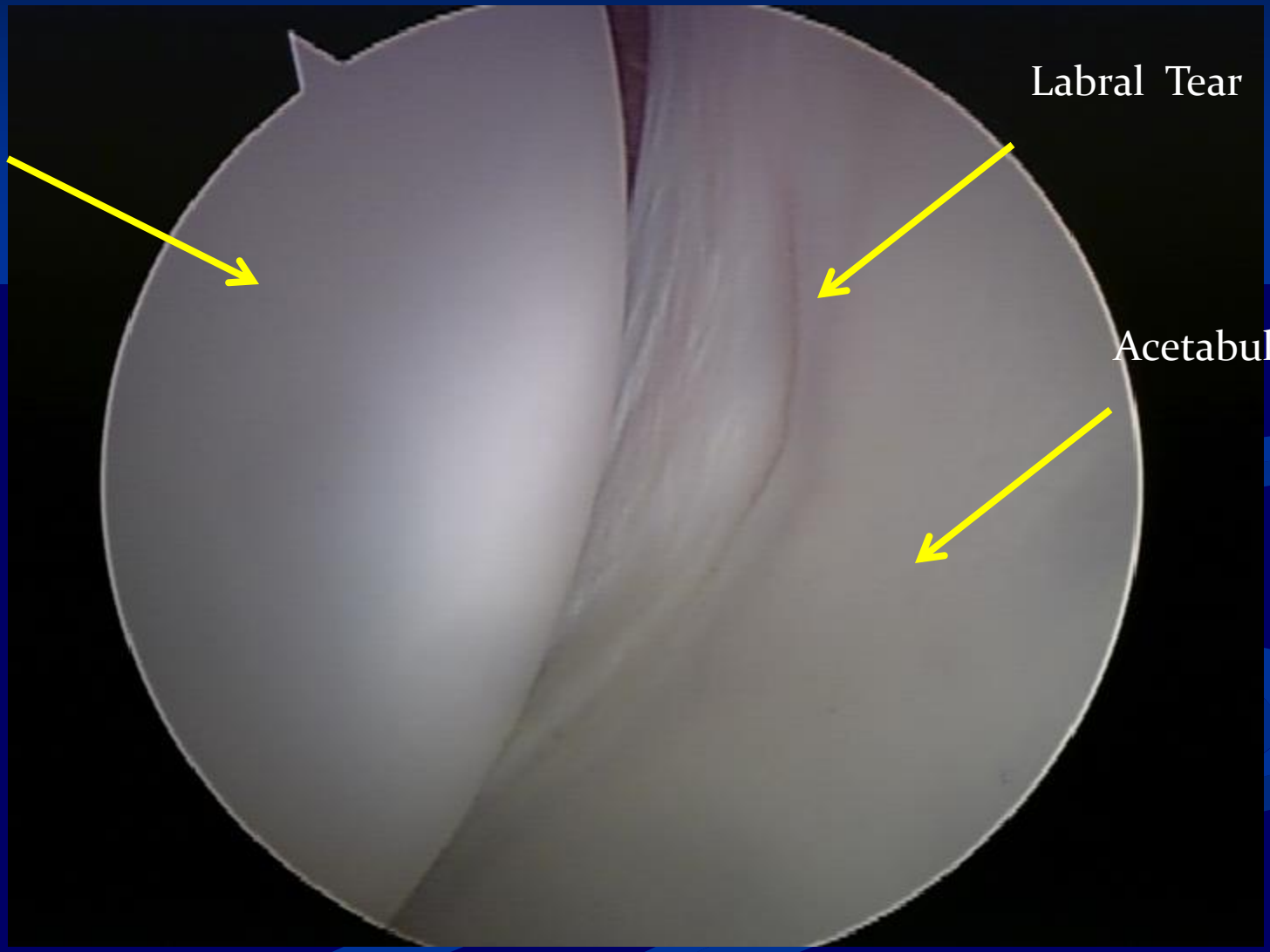
Surgery

Restored femoral neck

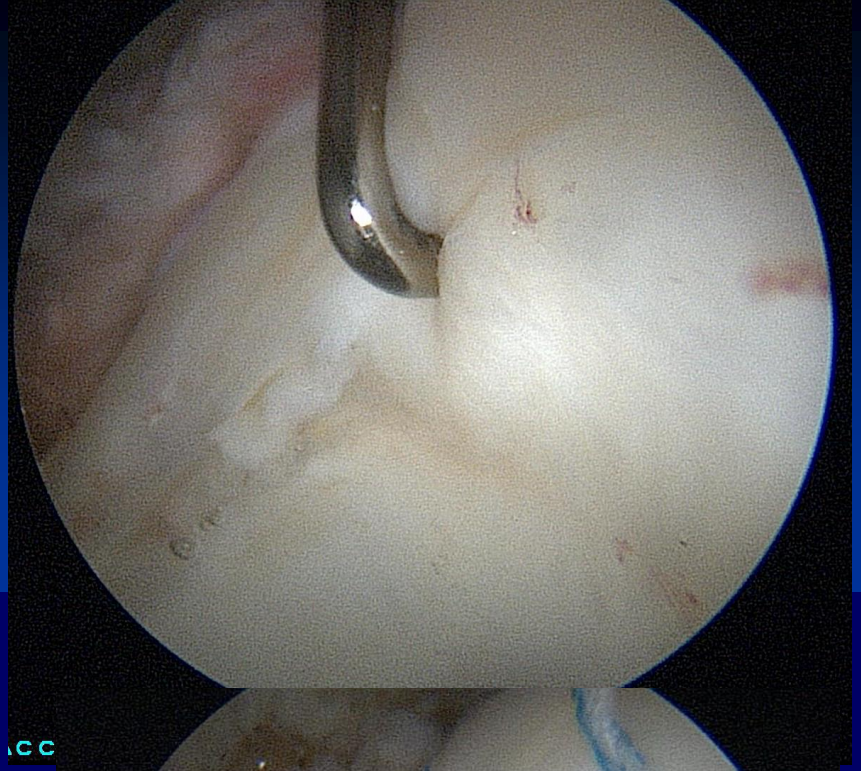
Restored femoral neck

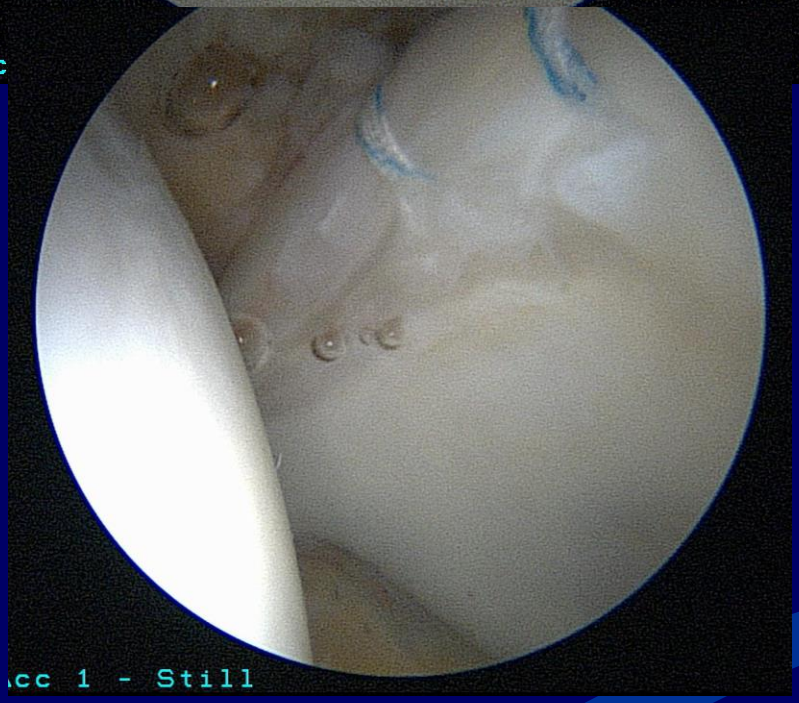


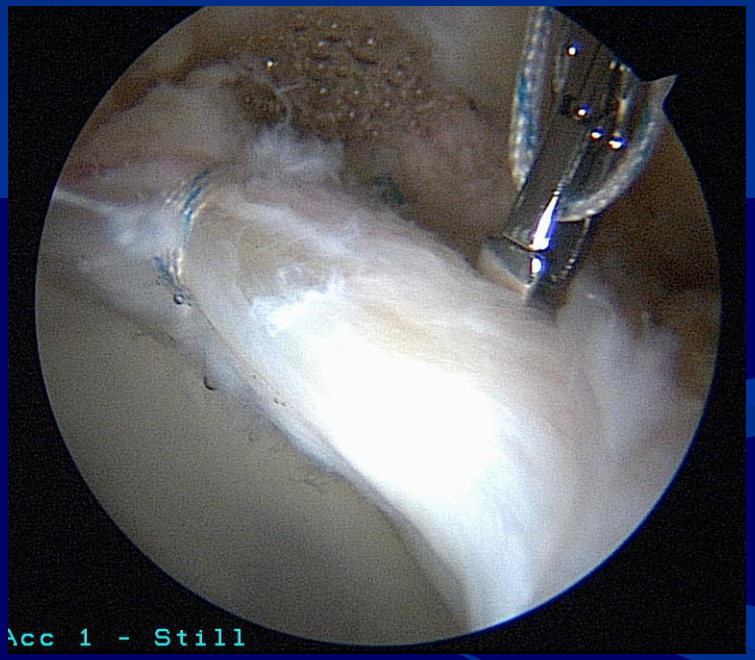
16 year Old Boston Hockey PLayer



Labral Debridement


Acc


Acc 1 - Still

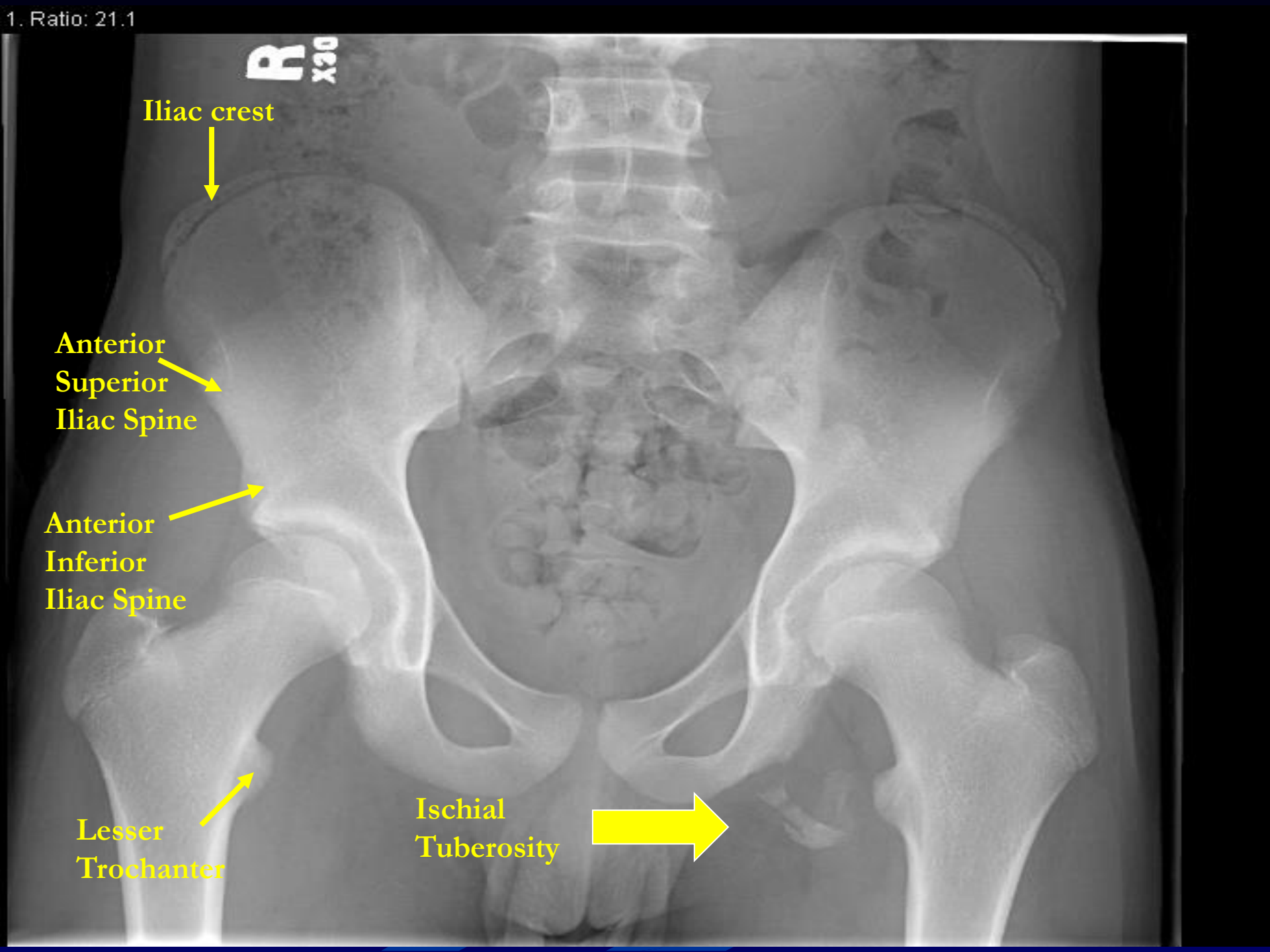

Acc 1 - Still

Pelvic Avulsion Fractures

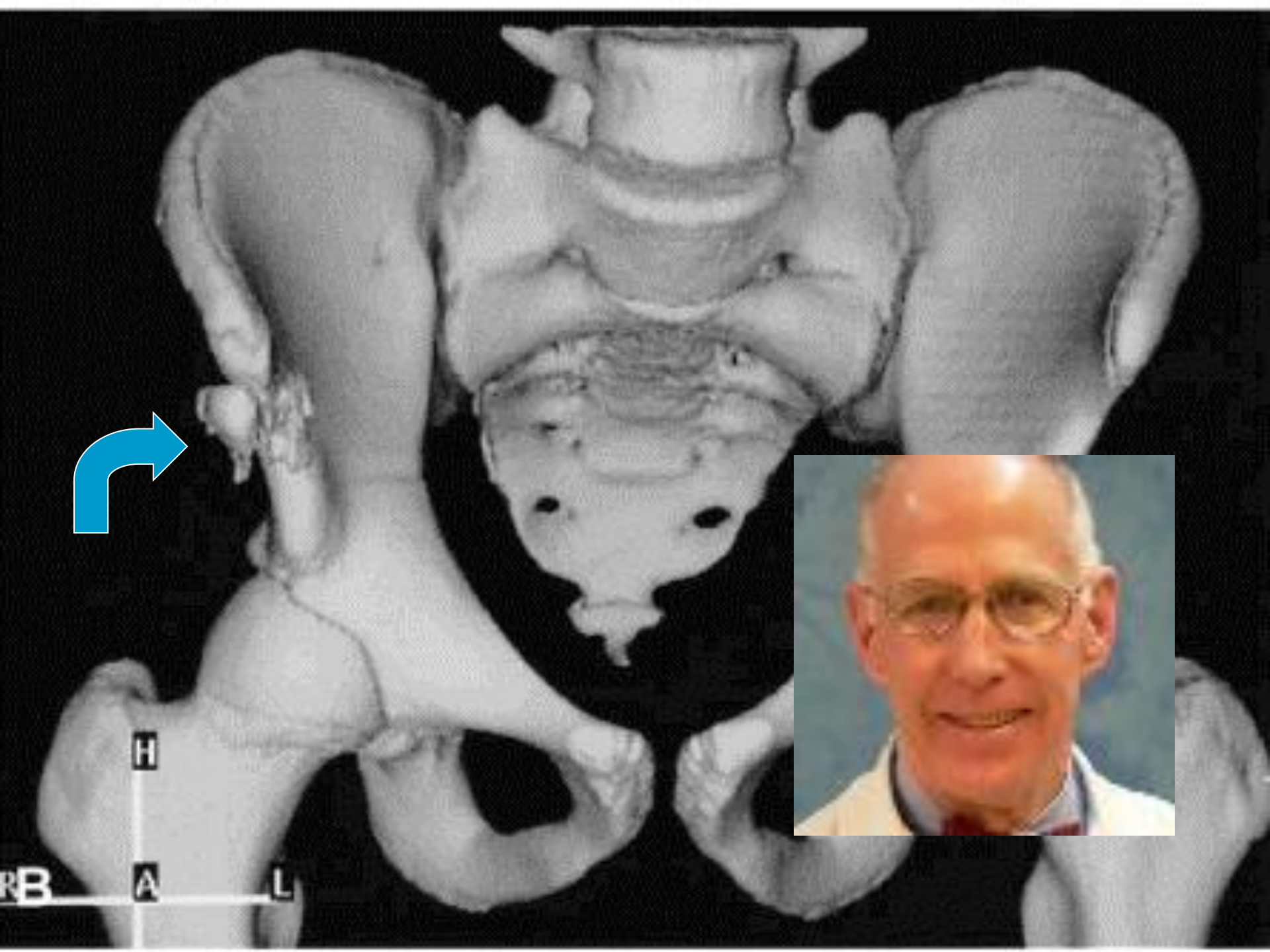
- Most common in boys between age 12-14 years
- Mechanism : forceful contraction (sprinting, kicking, jumping)
  - Often an eccentric load (landing)

Pelvic Avulsion Fractures

- Localized tenderness on physical exam
- Pain with stretch of affected muscle
- Antalgic Gait, Limping, Pain worse with activity
- Radiographs are diagnostic

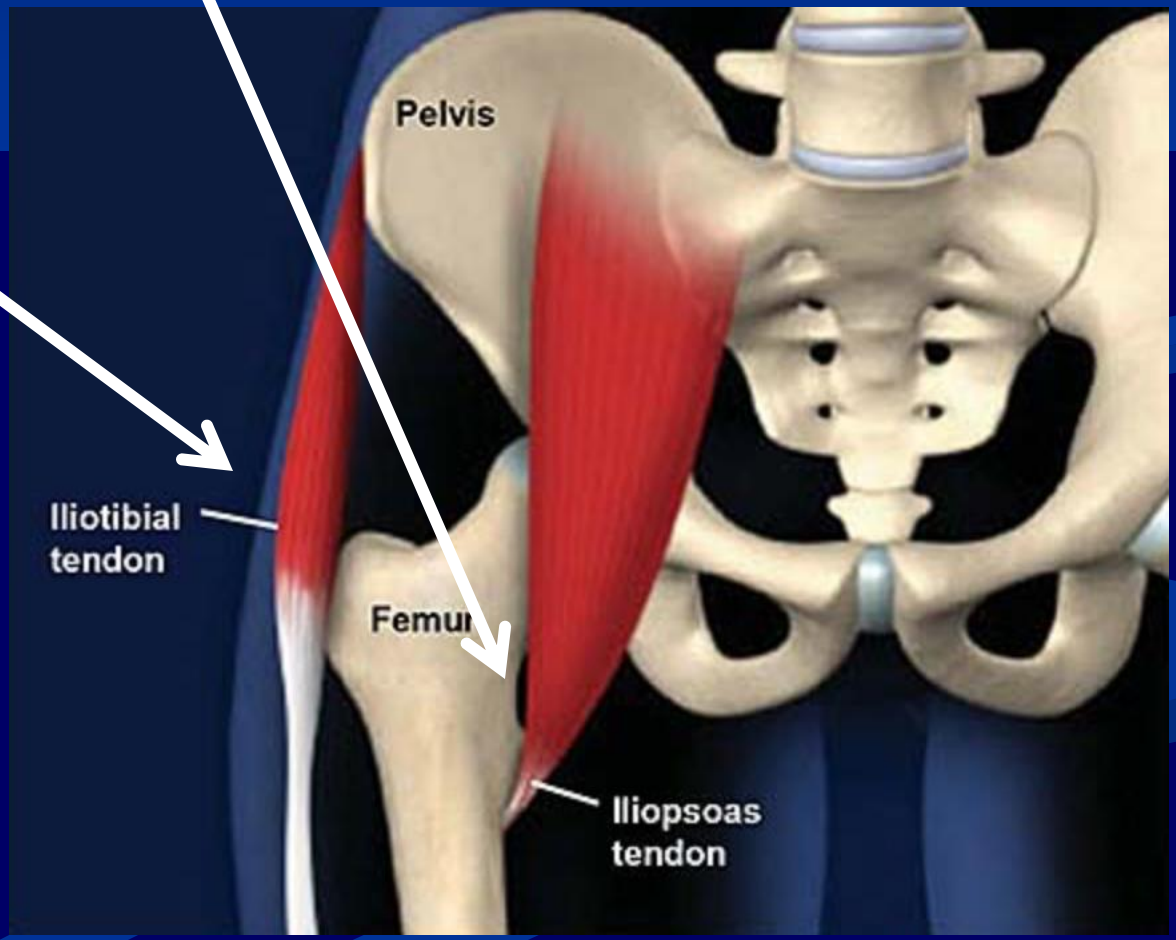

1. Ratio: 21.1
R
X30
Iliac crest
Anterior
Superior
Iliac Spine
Anterior
Inferior
Iliac Spine
Lesser
Trochanter
Ischial
Tuberosity

Iliopsoas Avulsion Fracture


H
RB
A
L

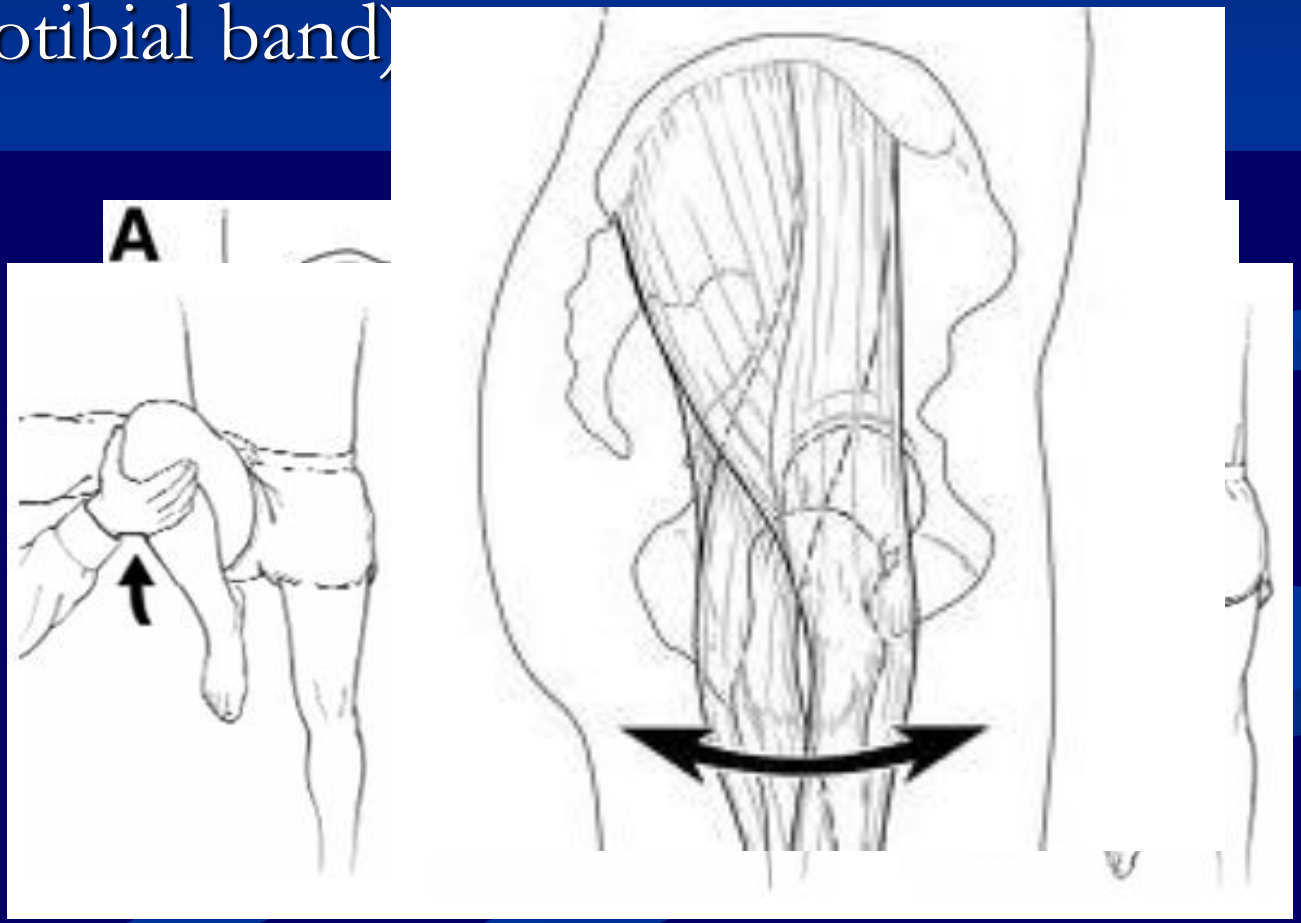
Snapping Hip

- Internal (iliopsoas)
- External (ITB)



Snapping Hip

- Internal (iliopsoas)
- External (iliotibial band)
- Palpate



Trochanteric Bursitis and Iliopsoas Band tendinitis

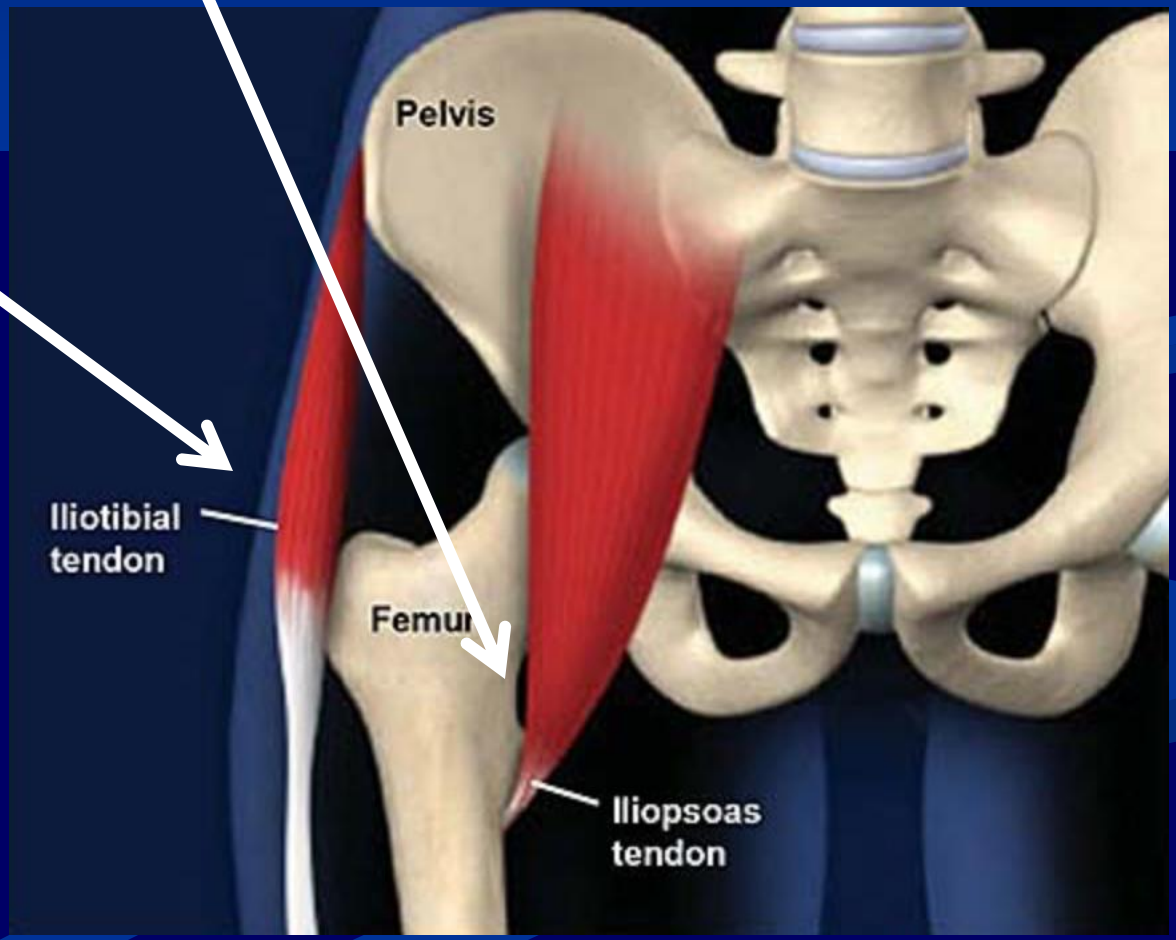
- Even if it doesn't snap, these areas can be pain generators

Trochanteric Bursitis and Iliopsoas tendinitis Treatment

- Even if it doesn't snap, these areas can be pain generators

Trochanteric Bursitis and Iliotibial Band tendinitis

- Flexor Tendinitis
- Trochanteric Bursitis



OBER TESTING- Iliotibial Band Problem

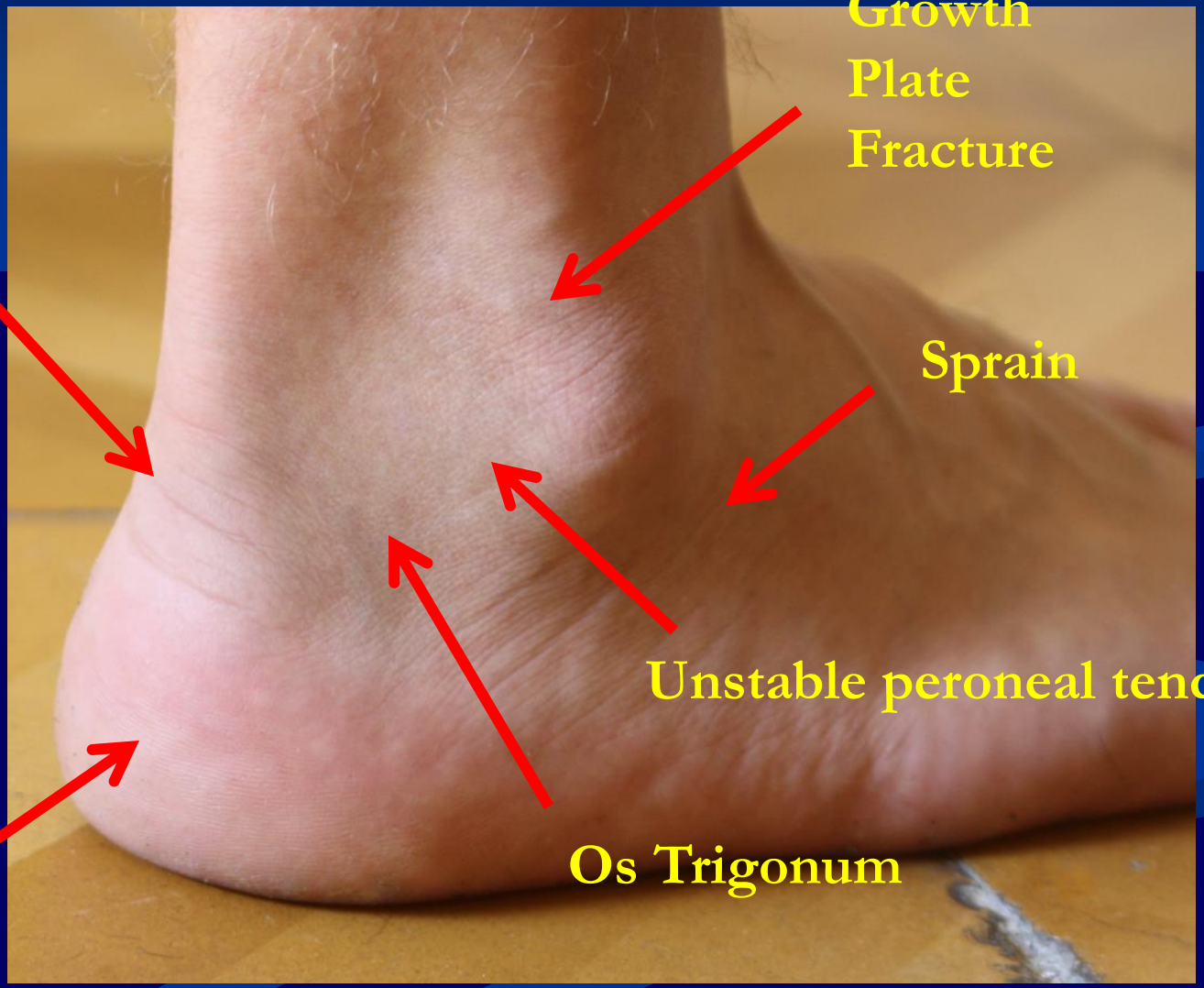
Iliopsoas Tendinitis Testing
Thomas Test (Tight Iliopsoas)

Trochanteric Bursitis and Iliopsoas tendinitis Treatment

- Physical Therapy
- Injections
- Surgical lengthening of respective tendon

Foot and Ankle Problems

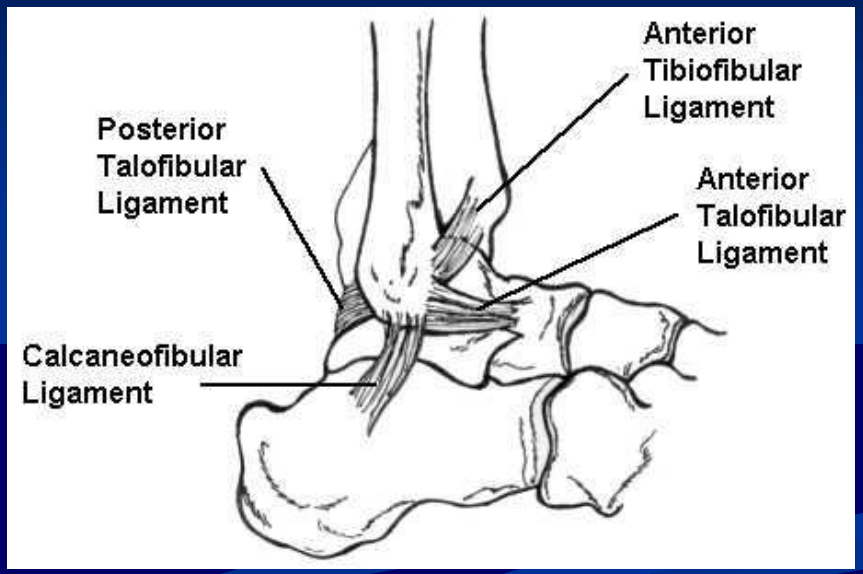
Location of Pain- Lateral Ankle



Location of Pain Ankle/Foot

Common Ankle Injuries in Children

- Common in young athletes
- Sprains are difficult to distinguish from growth plate injuries in children
- Primary ligamentous support for ankle includes 3-part lateral ligament complex and 5-part medial (deltoid) ligament complex
- Lateral ankle sprains by far more common



Physical Examination of the Ankle

- May be very limited exam due to swelling and pain
- Inspect, palpate ligaments sequentially
- Push on growth plate to see if most tender over bone

Anterior Drawer & Talar Tilt Tests of the Ankle

Anterior Drawer Test: Assesses stability of anterior talofibular ligament
[Often very difficult to assess secondary to significant swelling and pain]

Differential Diagnosis: Ankle Sprain

- Proximal fibula fracture
- Syndesmotic disruption (High Ankle Sprain)
- Base of 5th metatarsal avulsion fracture
- Physeal (Growth plate) fracture

Ankle Rehabilitation

- R-Rest
- I-Ice
- C-Compression
- E-Elevation

- Splints, Casts, Crutches: Depend on severity of injury
- Early weight bearing as tolerated, AVOID prolonged immob.
- Home or formal PT

Ankle Rehabilitation: Phase III

- Functional conditioning with proprioception, agility, and endurance training
- Gradual return to play
- Maintenance exercises and protection

High Ankle Sprain

- Rotational injury
- Pain more proximal
- Recovery twice as long
- Treatment
  - Cam Boot
  - Therapy


Take very seriously

Heel Pain: Sever's Disease

- Traction Apophysitis of the calcaneous: Activity related/Overuse
- Most common cause of heel pain in adolescents
- Most common in active males 10-13 years of age
- Heel tenderness at calcaneal apophysis

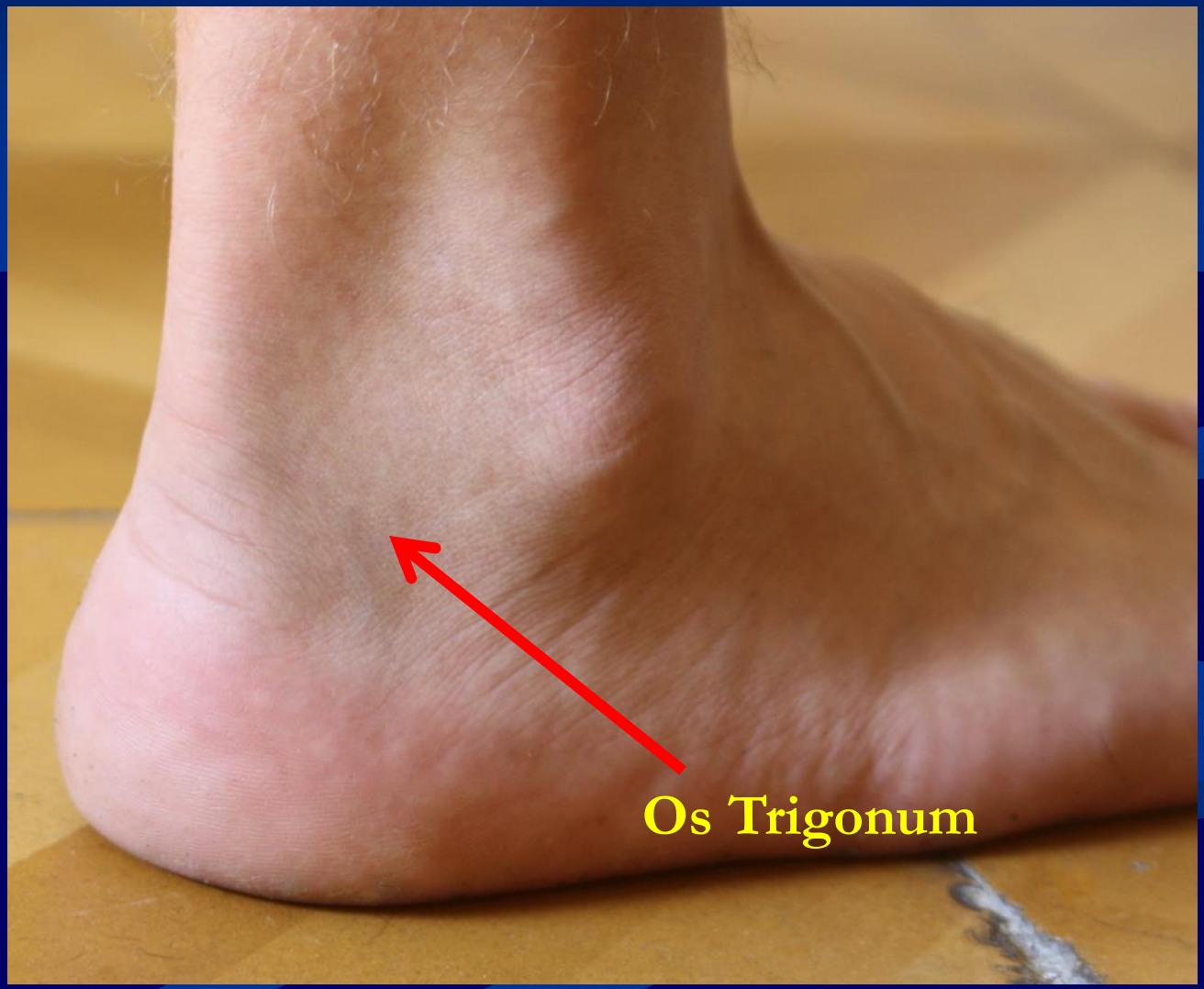
Severe's Treatment

- Reassurance
- Heel cups
- Stretching
- Short term immobilization if acutely symptomatic (rare)
- Self-limited disorder: will not have pain after physeal closure

Os Trigonum

- Accessory bone in the posterior ankle
- Non-tendon posterior Pain

Location of Pain- Lateral Ankle



Os Trigonum Treatment

- Observation
- Casting
- Injection
- Occasional surgery

Pes Planus "Flat Feet"

- Arches Change over time

Pes Planus "Flat Feet"

- Orthotics??
  - Only in the painful child

“The Intoer”

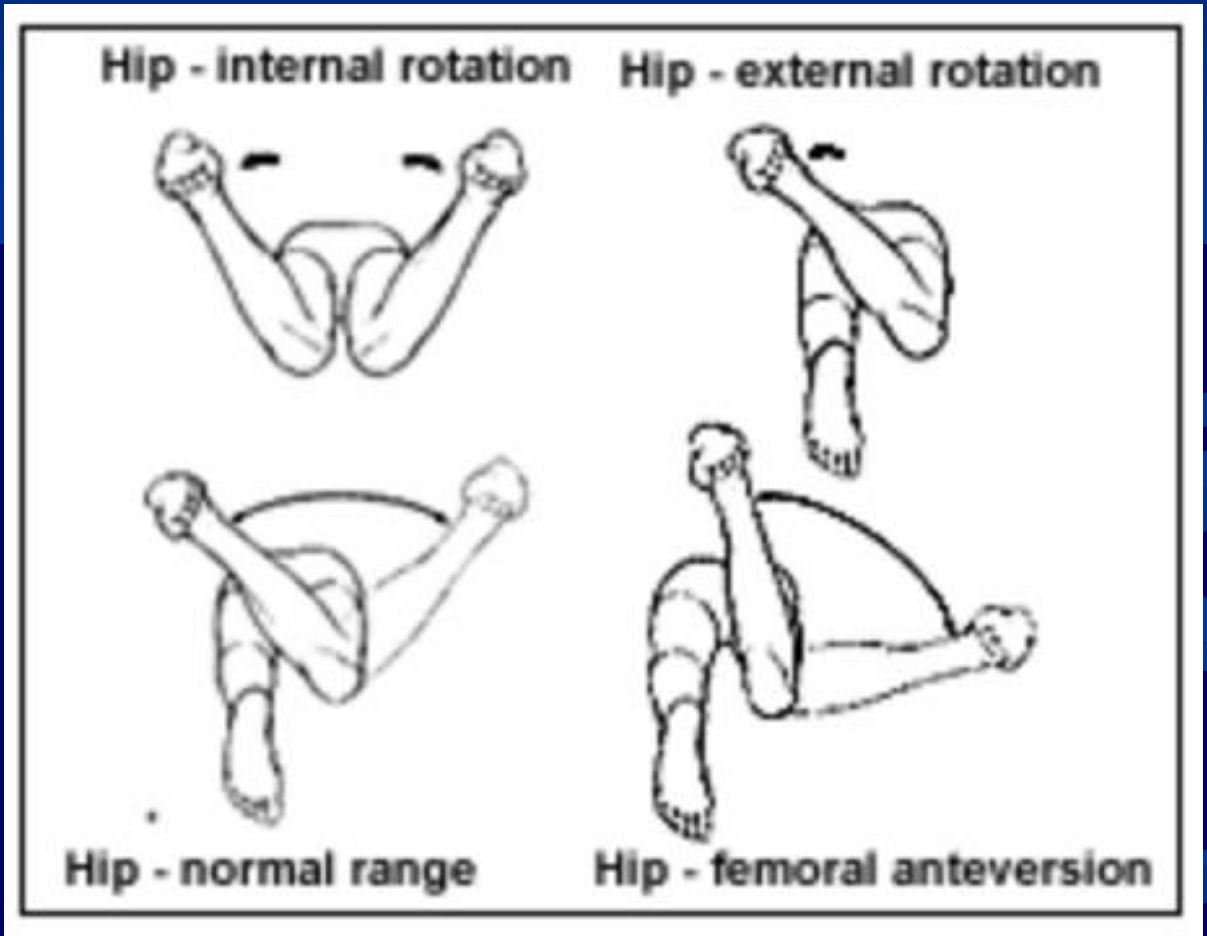
The Intoer

- Most important part of treatment???
  - Acknowledge there is intoeing
  - "We can cut the bone and rotate it and put hardware in, or we can watch and will probably fully resolve"

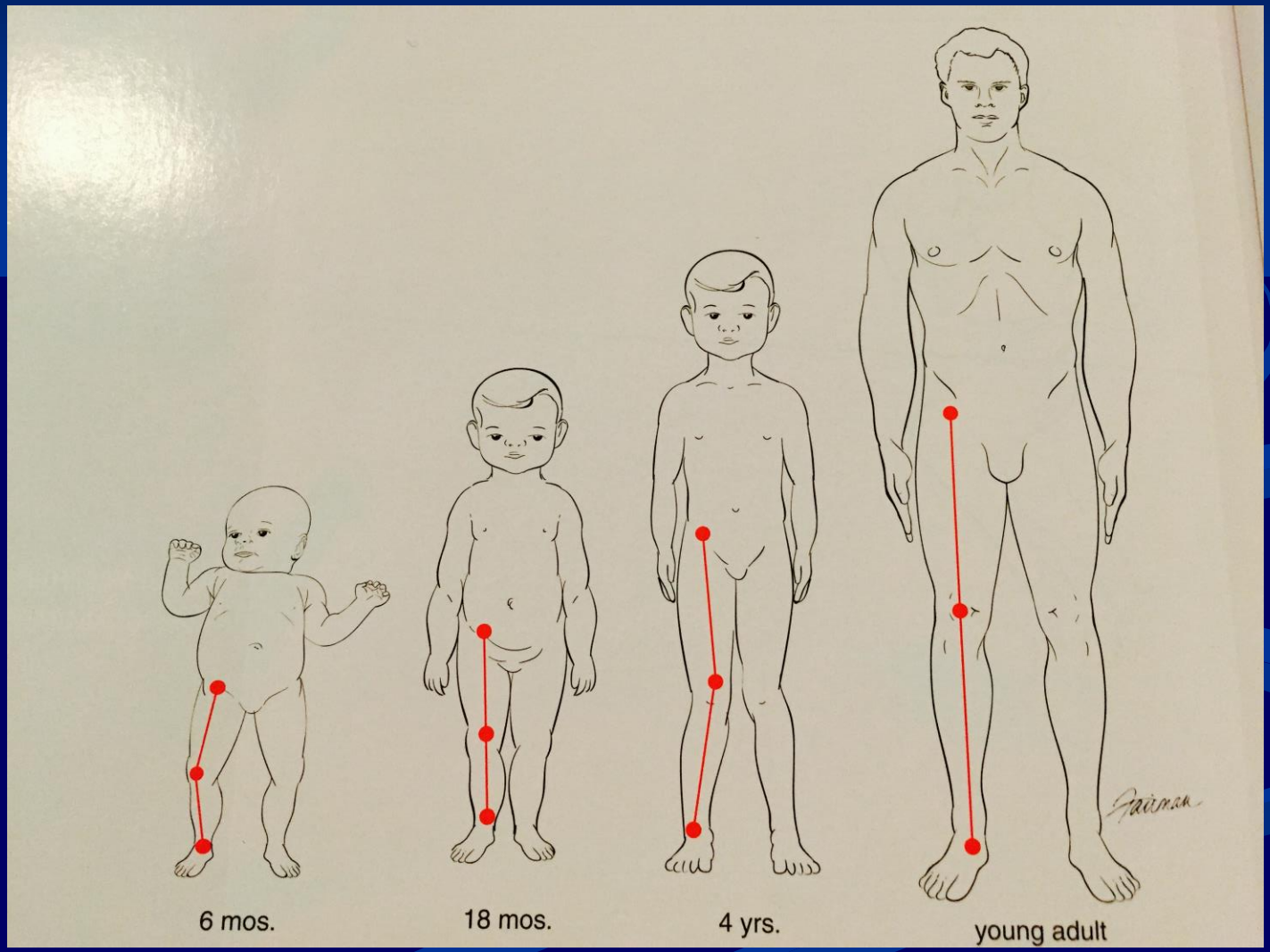
The Intoer

- Evaluate patient with knees pointing forward
- Most of the problem comes from tibial torsion

Rotational Alignment



Bow legged



Questions?