

Keeping Young Athletes in the Game: A Primary Care Approach to Pediatric Sports Injuries

Michael Peyton, MD

Pediatric Primary Care Sports Medicine



Disclosures

I have no relevant financial relationships to disclose



Objectives

By the end of this presentation, participants will be able to:

- Evaluate common pediatric sports injuries using focused history and physical examination findings.
- Select appropriate initial management strategies, including imaging, activity modification, and immobilization when indicated.
- Identify injuries requiring expedited sports medicine or orthopedic referral.



What is Sports Medicine?

Primary Care Sports Medicine

- Family Medicine
- Pediatrics
- Internal Medicine
- Physical Medicine & Rehabilitation
- Emergency Medicine



What is Sports Medicine?

What We Do

Non-operative MSK care

Acute sports injuries

Chronic overuse injuries

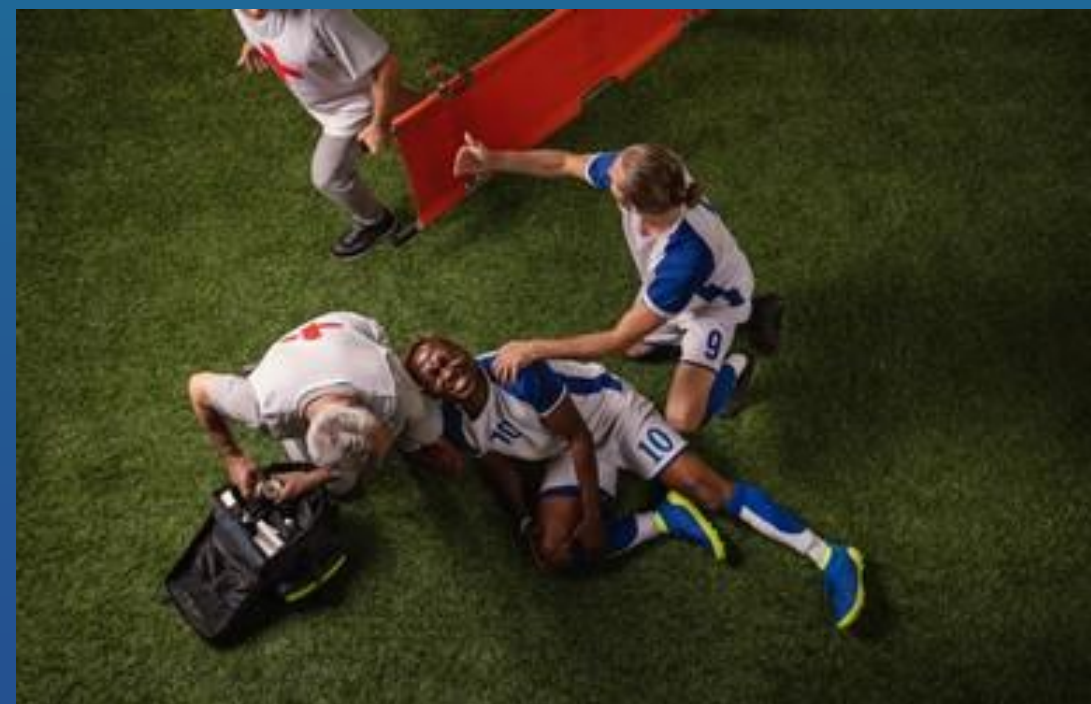
Fracture care

Return-to-play decisions

Concussion management

Injury prevention

Procedures



What is Pediatric Sports Medicine?

Why It Matters

- Nearly 28-30 million children participate in organized sports annually
- Sports injuries are a common reason for ER and PCP visits
- Early recognition improves outcomes
- Many pediatric sports injuries can be managed non-operatively



How do I approach an injury?

History is KEY

- Acute vs Chronic
- Traumatic vs Non-Traumatic
- Worsening vs Alleviating Factors
- What has been tried?
- What events/competitions are coming up?



How do I approach an injury?

Exam for Support

- Inspection and Palpation
- Range of Motion
- Strength
- *Special Testing (if familiar)*



How do I approach an injury?

Imaging to Rule Out and/or Confirm Diagnosis

- X-ray
 - Rule out fracture
 - Assess bone or joint alignment
 - Growth plates open or closed?
- Diagnostic US
 - Superficial soft tissue injuries
 - Drainable fluid
- MRI
 - Deeper structures, intra-articular



Case #1: My Knee Hurts Every Time I Run



My Knee Hurts Every Time I Run

History

13-year-old soccer player

- 2 months of anterior knee pain
- No injury
- Worse with running and jumping
- Plays despite having pain, improves with rest
- Has a tournament this weekend



My Knee Hurts Every Time I Run

Differential

- Tibial tuberosity apophysitis "Osgood-Schlatter Disease"
- Patellofemoral pain syndrome
- Patellar tendinitis
- Osteochondritis Dissecans (OCD) lesion
- Stress fracture



My Knee Hurts Every Time I Run

Exam

- Tender tibial tubercle
- Prominent bump/swelling
- Full range of motion
- Painful resisted knee extension
- No effusion
- Ligaments stable



My Knee Hurts Every Time I Run

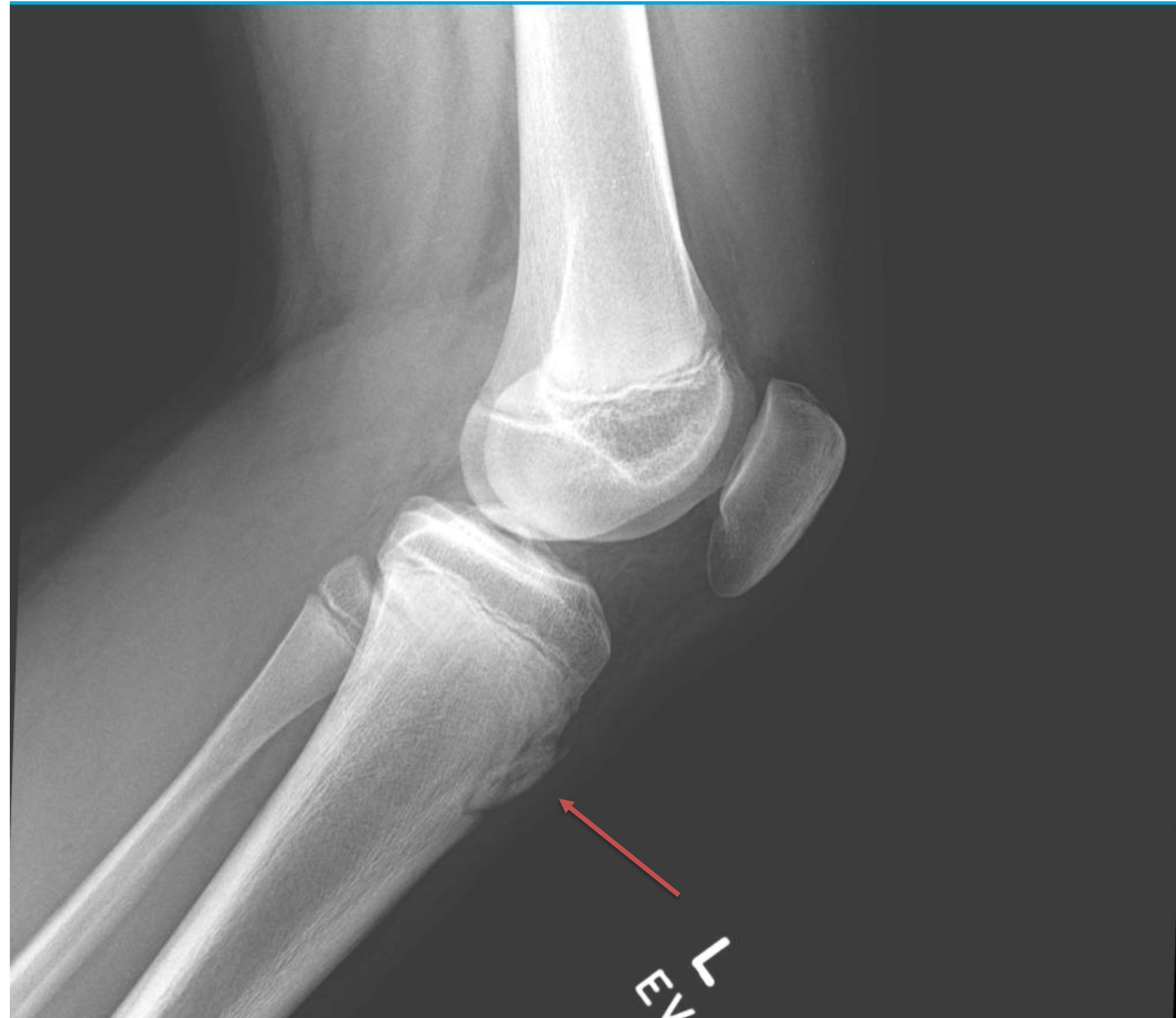
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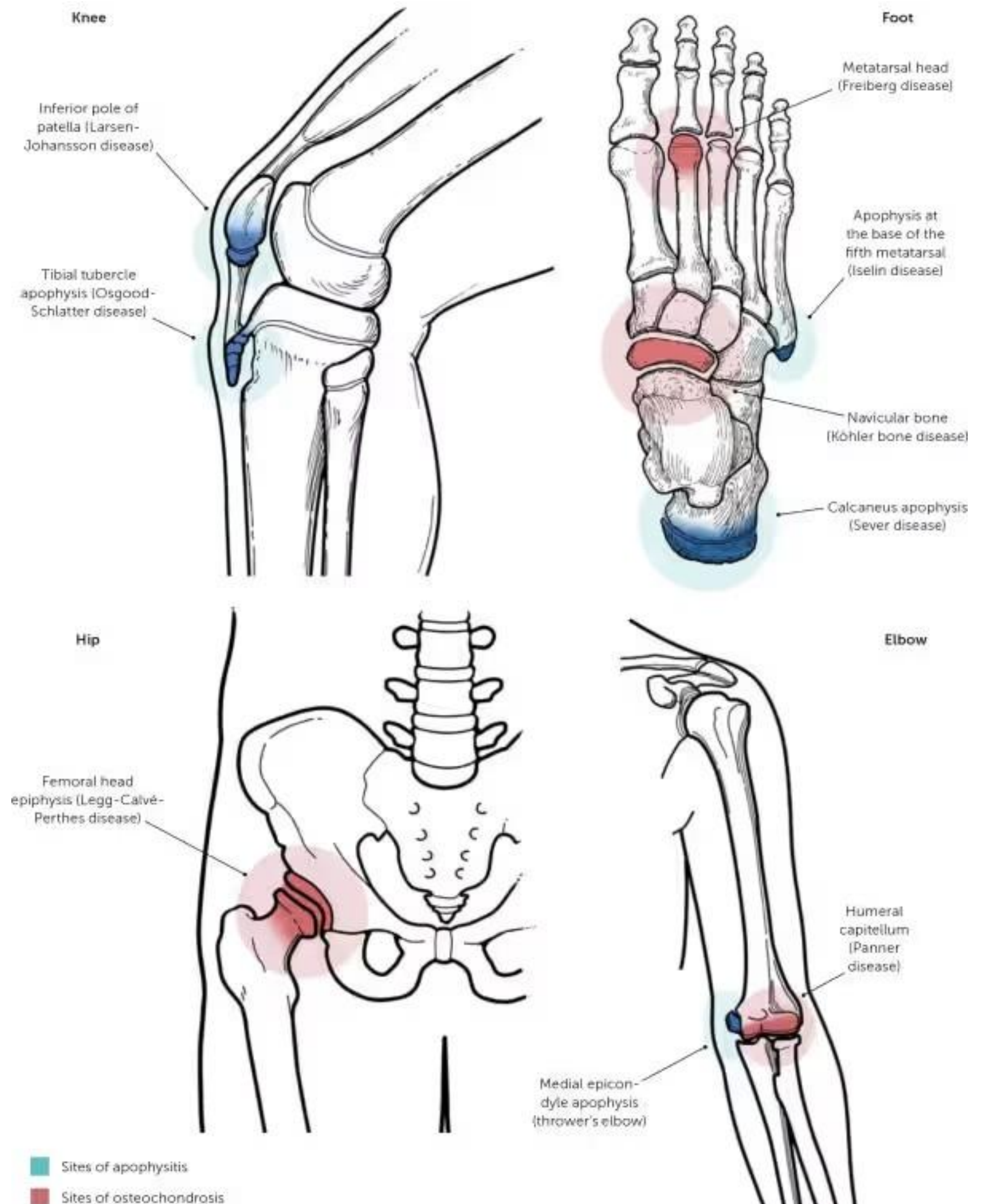
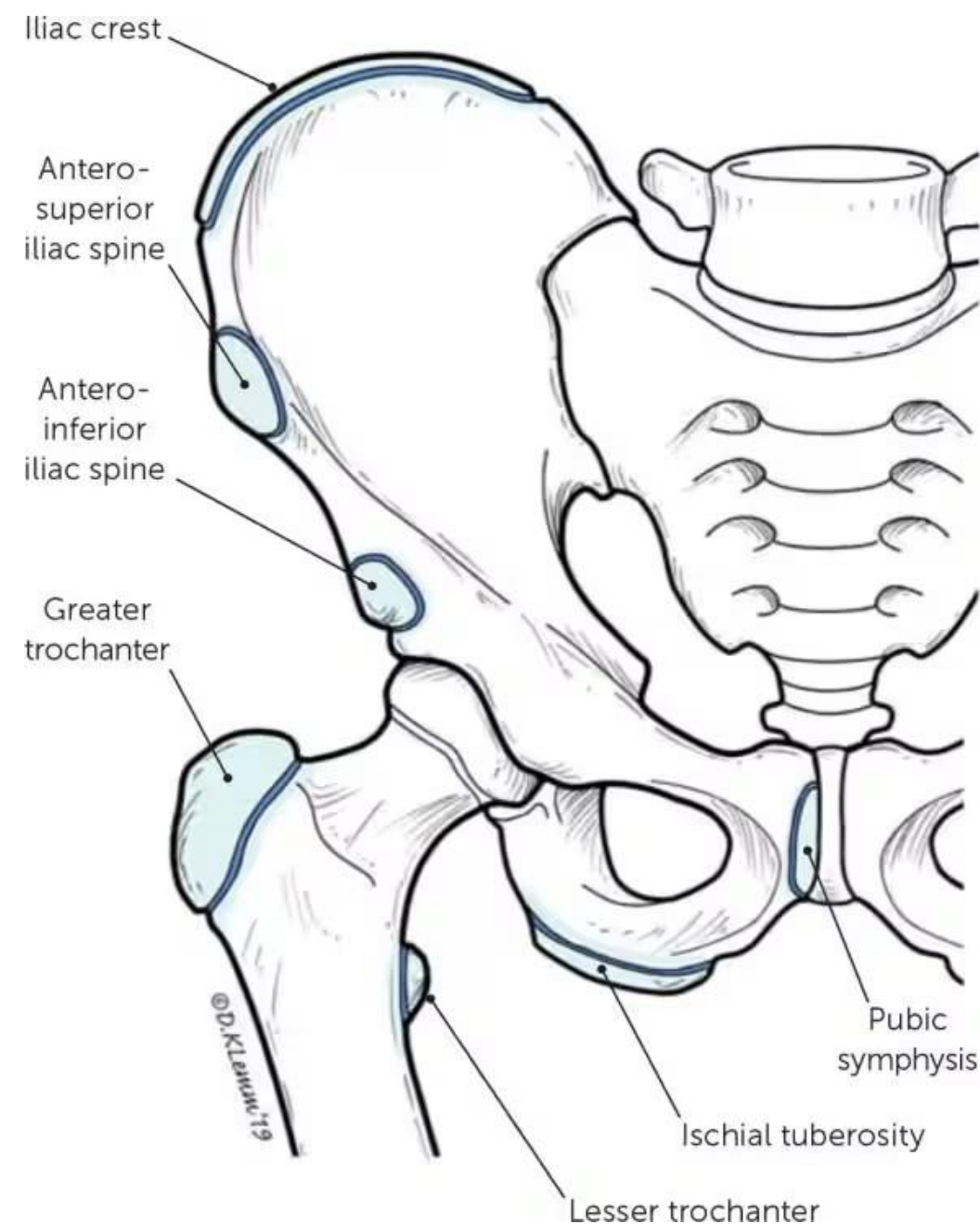
My Knee Hurts Every Time I Run

Imaging



Apophysitis

Inflammation or micro-separation of the growth (ossification) centers caused by repetitive tension from attached tendons



My Knee Hurts Every Time I Run

Management

Imaging

- Usually not required, unless atypical symptoms

Activity

- Modify pain-guided
 - Ask hours per week of total exercise



My Knee Hurts Every Time I Run

Management

Treatment

- RICE
- Stretching program and/or PT
- +/- Bracing or patellar strap
- Do not “minimize” the diagnosis

When to Refer

- Severe functional limitation
- Persistent symptoms
- Uncertain diagnosis



My Knee Hurts Every Time I Run

History

13-year-old soccer player

- 2 months of anterior knee pain
- No injury
- Worse with running and jumping
- Plays despite having pain, improves with rest
- Has a tournament this weekend

Can he play this weekend?

Yes - pain-guided, but requires appropriate guidance

If pain with ADLs, not cleared



PCP Pearls

- Know extent of training and relative recovery
- Not every knee pain needs MRI
- Apophysitis is painful, do not minimize
- Apophysitis is not “growing pains”



Case # 2: Saturday Night Basketball Injury



Saturday Night Basketball Injury

History

15-year-old female basketball player

- Landed on another player foot causing ankle inversion
- Could not continue playing
- Swelling developed overnight
- Presents Monday morning
- Playoffs are in 3 weeks



Saturday Night Basketball Injury

Differential

- Lateral ankle sprain
- Distal fibula fracture
- Physeal fracture
- Syndesmotic injury
- Osteochondral lesion of talus



Saturday Night Basketball Injury

Exam

- Lateral ankle swelling
- Tender ATFL
- Pain with inversion
- No pain in the foot
- Neurovascularly intact
- Can bear weight without pain
- Unable to walk due to pain



Saturday Night Basketball Injury

Differential

- Lateral ankle sprain
- Distal fibula fracture
- Physeal fracture
- Syndesmotic injury
- Osteochondral lesion



Ottawa Ankle Rules

XR to rule out fracture?

High sensitivity – nearly 100%

Low specificity – 10-50%

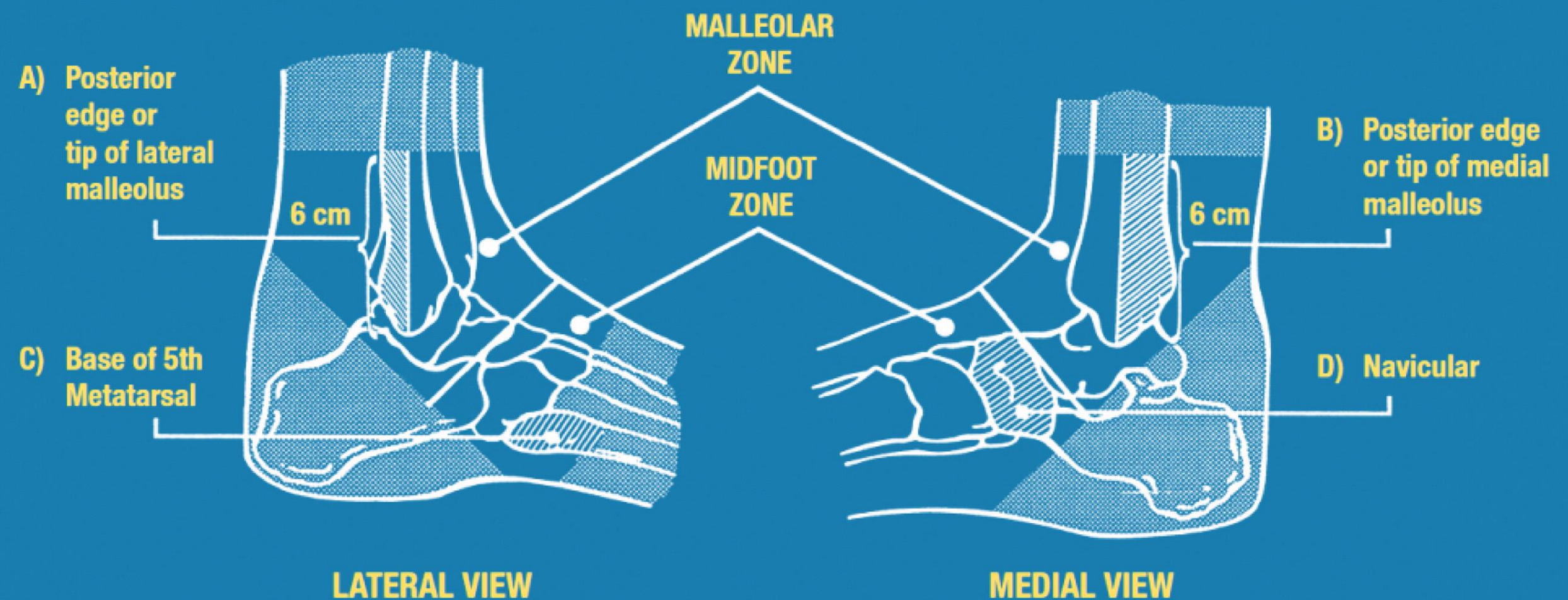
Reduce unnecessary XR by 30-40%

Locations:

- Lateral malleolus
- Medial malleolus
- Navicular bone
- 5th metatarsal base
- Unable to walk 4 steps

OTTAWA ANKLE RULES

for Ankle Injury Radiography



Saturday Night Basketball Injury

Management – Ankle Sprain

Imaging

- XR to rule out fracture
- MRI not typically needed

Immobilization

- Tall walking boot and/or crutches if needed
- Ankle Stabilizing Orthosis (Brace) for mild injuries



Saturday Night Basketball Injury

Management – Ankle Sprain

Activity

- Not cleared for sports
- RICE followed by early mobilization
- Rx for PT
- RTP criteria

When to Refer

- Persistent pain >4-6 weeks
- Suspected syndesmotic injury
- Concern for fracture



Saturday Night Basketball Injury

History

15-year-old female basketball player

- Landed on another player foot causing inversion ankle
- Could not continue playing
- Swelling developed overnight
- Presents Monday morning
- Playoffs are in 3 weeks

Can she play in 3 weeks?

Maybe, but not likely

Prophylactic use of brace with exercise/competition



PCP Pearls

- Check the foot!
- Early movement > Prolonged Immobilization
- MRI for instability
- No pain with dynamic loading
= RTP clearance



Case #3: The Thrower with Elbow Pain



The Thrower with Elbow Pain

History

12-year-old baseball player

- Medial elbow pain
- No injury, no pop
- Developed during this season
- Plays on little league and travel team
- Pitches, SS, and OF
- No pain with batting
- Going to Cooperstown in June



The Thrower with Elbow Pain

Differential

- Medial epicondyle apophysitis "Little League Elbow"
- Medial epicondyle avulsion fracture
- UCL injury
- Flexor tendon strain
- Ulnar neuritis



The Thrower with Elbow Pain

Exam

- Tender over the medial epicondyle
- Full range of motion
- Pain with resisted wrist flexion
- Pain with valgus stress
- Negative Tinel's



The Thrower with Elbow Pain

Differential

- **Medial epicondyle apophysitis “Little League Elbow”**
- Medial epicondyle avulsion fracture
- UCL injury
- Flexor tendon strain
- Ulnar neuritis



The Thrower with Elbow Pain

Management

X-ray

- If concern for avulsion
- Can obtain comparison contralateral view

MRI

- If concern for UCL tear
- Physis should be closed



The Thrower with Elbow Pain

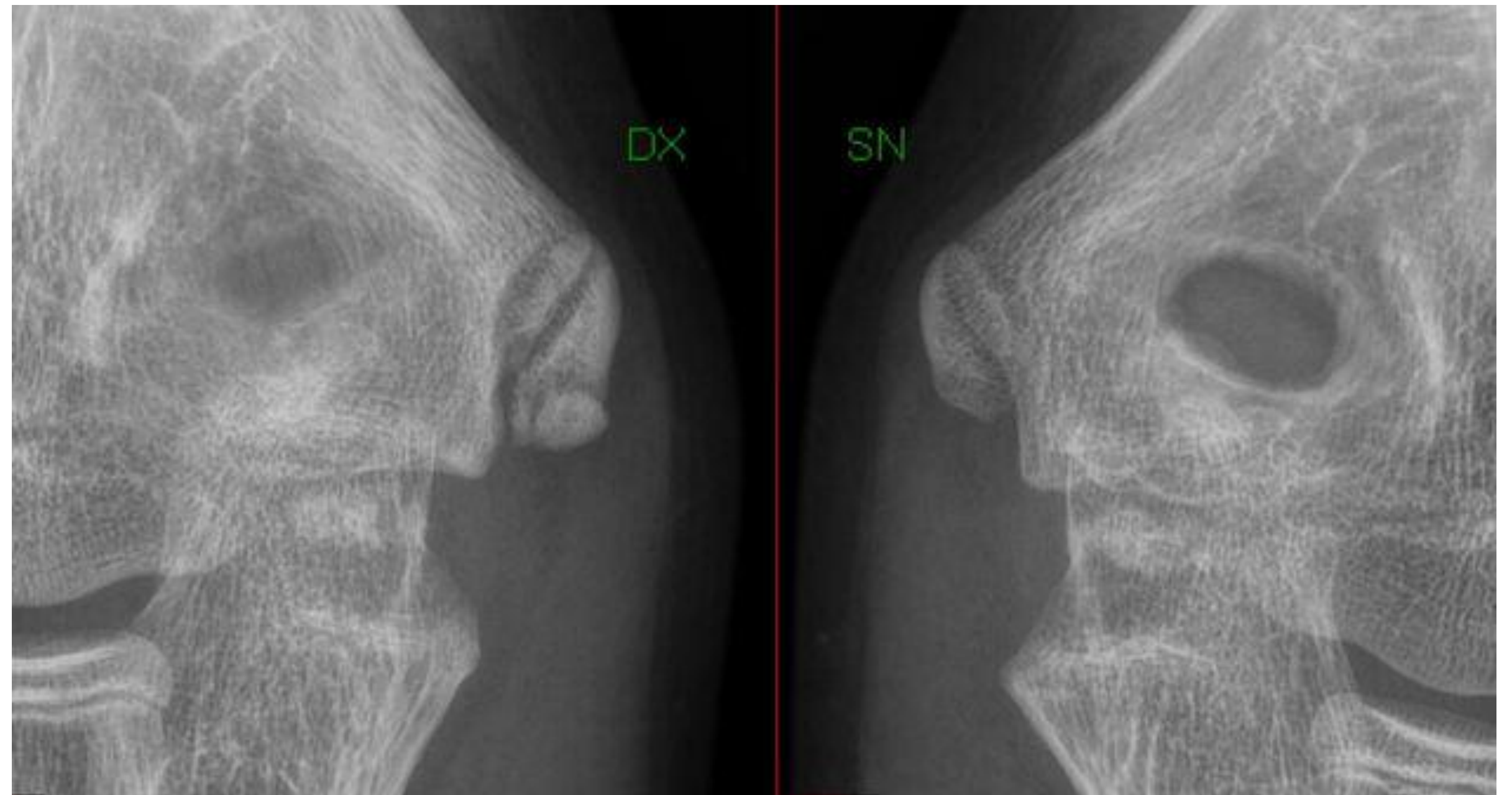
Management

X-ray

- If concern for avulsion
- Can obtain comparison contralateral view

MRI

- If concern for UCL tear
- Physis should be closed



Little league elbow, 2025

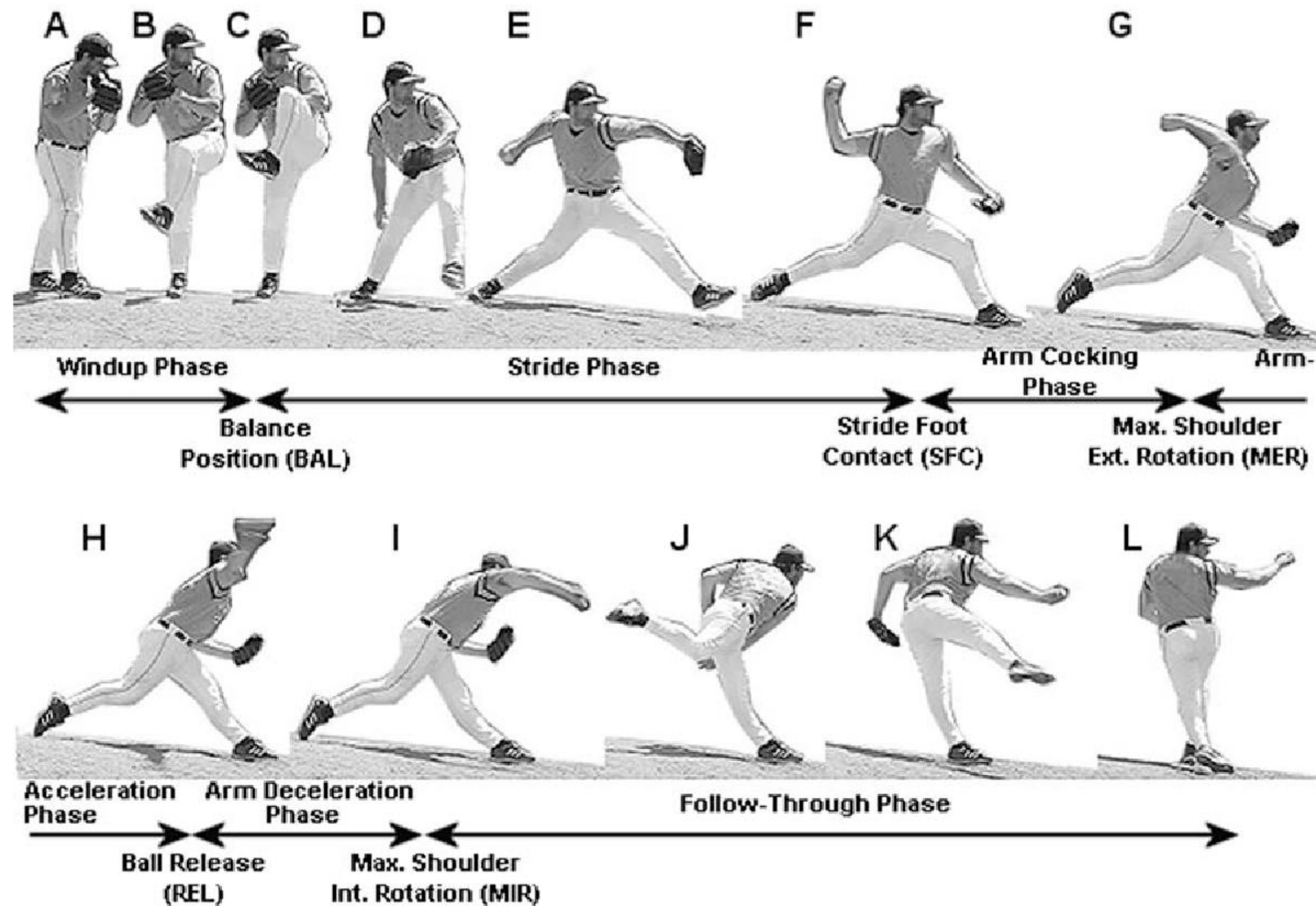


Figure 1 — The critical events and phases in baseball pitching motion.

The Thrower with Elbow Pain

Management

STOP throwing

- Ok for batting, fielding, and running pain-guided

Physical therapy

- Evaluate kinetic chain
- Return to throw protocol once pain resolved

Address pitch count

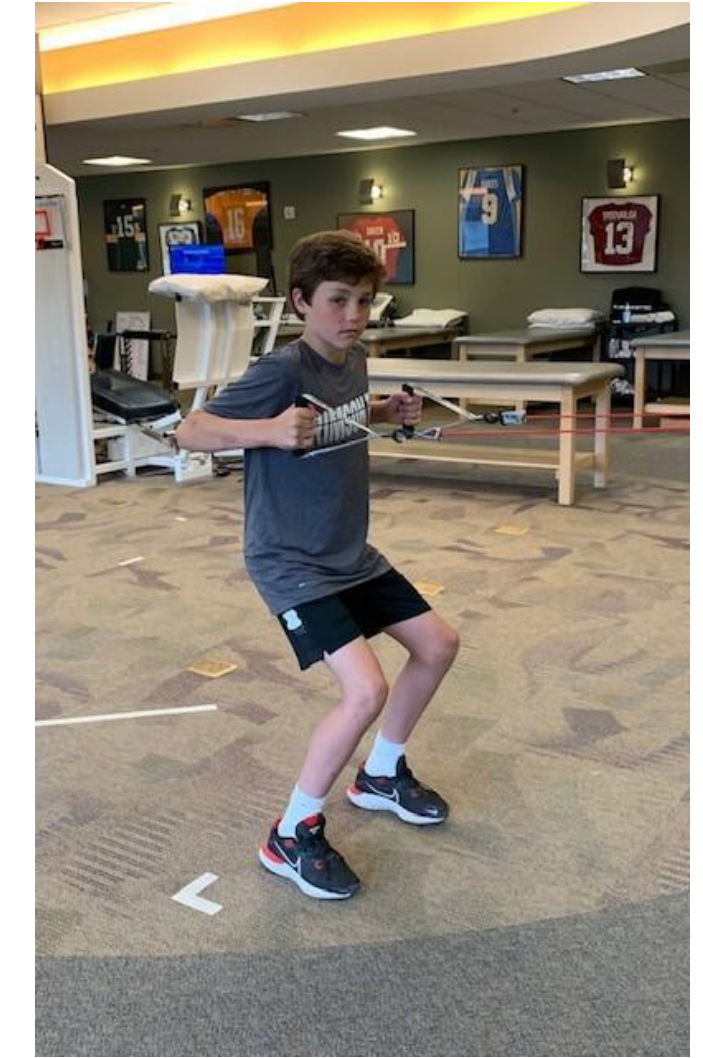
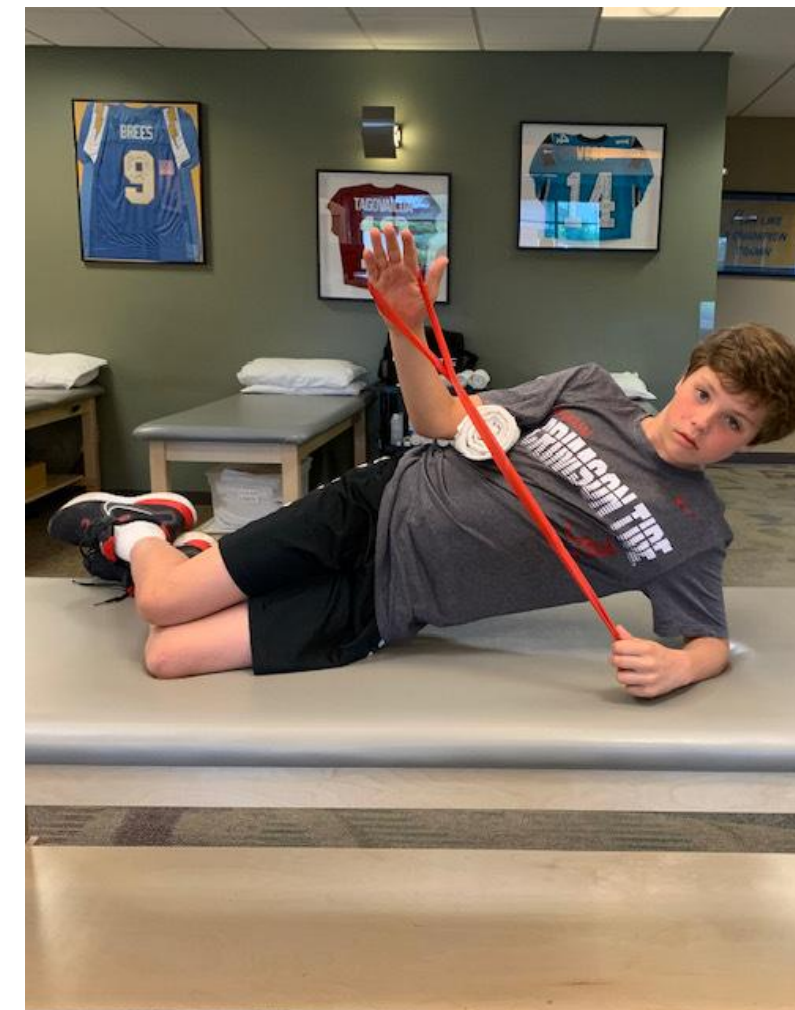
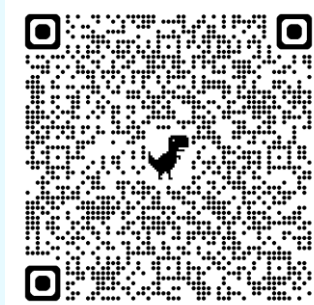


The Thrower with Elbow Pain

Management

Physical therapy

- Evaluate kinetic chain
- Shoulder ROM
- Hip internal ROM
- Posture/scapular stabilization
- Evaluate throwing motion
- Prevention arm care program



The Thrower with Elbow Pain

Return to Throw Program

- Begin once resolved pain on exam
- Should be done under supervision with PT or throwing coach
- Many variations of RTT
- This is meant to be **slow**
- “Don’t Pass Go”

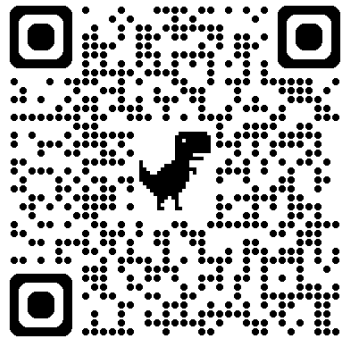
	Week	Sun	Mon	Tue	Wed	Thur	Fri	Sat
Fielders	1	Hitting	45'x50	Hitting	45'x75	Hitting	60'x50	Hitting
	2	60'x75	Hitting	90'x50	Hitting	90'x75	Hitting	120'x50
	3	Hitting	120'x75	Hitting	150'x50	Hitting	150'x75	Hitting
	4	180'x50	Hitting	180'x75	Hitting	180'x50	Hitting	RTP

- At this stage position players may return to play, pitchers will continue to mound progression below:

	Week	Sun	Mon	Tue	Wed	Thur	Fri	Sat
Pitchers	5	50%x15	Rest	Long Toss	50%x30	Rest	Long Toss	50%x45
	6	Rest	Long Toss	50%x60	Rest	Long Toss	50%x70	Rest
	7	Long Toss	50%x45+ 75%x30	Rest	Long Toss	50%x30+ 75%x45	Rest	Long Toss
	8	50%x10+ 75%x65	Rest	Long Toss	75%x60 +BPx15	Rest	Long Toss	75%x45 +BPx45
	9	Rest	Long Toss	75%x(30+15) +BPx60	Rest	Long Toss	75%(30+30) +BPx30	Rest
	10	Long Toss	75%x30 +BPx90	Rest	Long Toss	Simulated Game	Rest	Long Toss
	11	RTP						

- Throwing program developed by Peter Chalmers, MD (<https://www.chalmersmd.com>)





The Thrower with Elbow Pain

MLB Pitch Smart Guidelines

Pitch Count Limits and Required Rest Recommendations

It is important for each league to set workload limits for their pitchers to limit the likelihood of pitching with fatigue. Research has shown that pitch counts are the most accurate and effective means of doing so. See required rest recommendations below.

Age	Daily Max (Pitches in Game)	0 Days Rest	1 Days Rest	2 Days Rest	3 Days Rest	4 Days Rest
7-8	50	1-20	21-35	36-50	N/A	N/A
9-10	75	1-20	21-35	36-50	51-65	66-75
11-12	85	1-20	21-35	36-50	51-65	66-85
13-14	95	1-20	21-35	36-50	51-65	66-95
15-16	95	1-30	31-45	46-60	61-75	76-95
17-18	105	1-30	31-45	46-60	61-80	81-105
19-22	120	1-30	31-45	46-60	61-80	81-105

The Thrower with Elbow Pain Management

When to Refer

- Persistent pain >4-6 weeks
- Loss of motion
- Suspected or confirmed fracture



The Thrower with Elbow Pain

History

12-year-old baseball player

- Medial elbow pain
- No injury, no pop
- Developed during this season
- Plays on little league and travel team
- Pitches, SS, and OF
- No pain with batting
- Going to Cooperstown in June

Can he go to Cooperstown in June?

Yes, but depending on position, may still have throwing restrictions in place



PCP Pearls

- Ask for pitch count, months per year, number of teams
- Address mechanics and evaluate whole kinetic chain
- Velocity/power is from the legs!
- RTT program under supervision



Case #4: The Runner with “Shin Splints”



The Runner with “Shin Splints”

History

16-year-old female cross-country runner

- Progressive shin pain bilaterally
- Initially only during runs
- Now hurts while walking
- Increasing mileage to 30-40 miles/week, runs 5d/week
- Season starts soon with races every week



The Runner with “Shin Splints”

Differential

- Medial tibial stress syndrome “Shin Splints”
- Stress fracture
- Chronic exertional compartment syndrome
- Rhabdomyolysis
- Peripheral nerve entrapment
- Lumbar radiculitis



The Runner with “Shin Splints”

Exam

- Focal tibial tenderness
- Generalized muscular tension in posterior chain
- Normal knee/ankle ROM and strength
- Pain hopping on one leg
- Distal motor and sensation intact



The Runner with “Shin Splints”

Differential

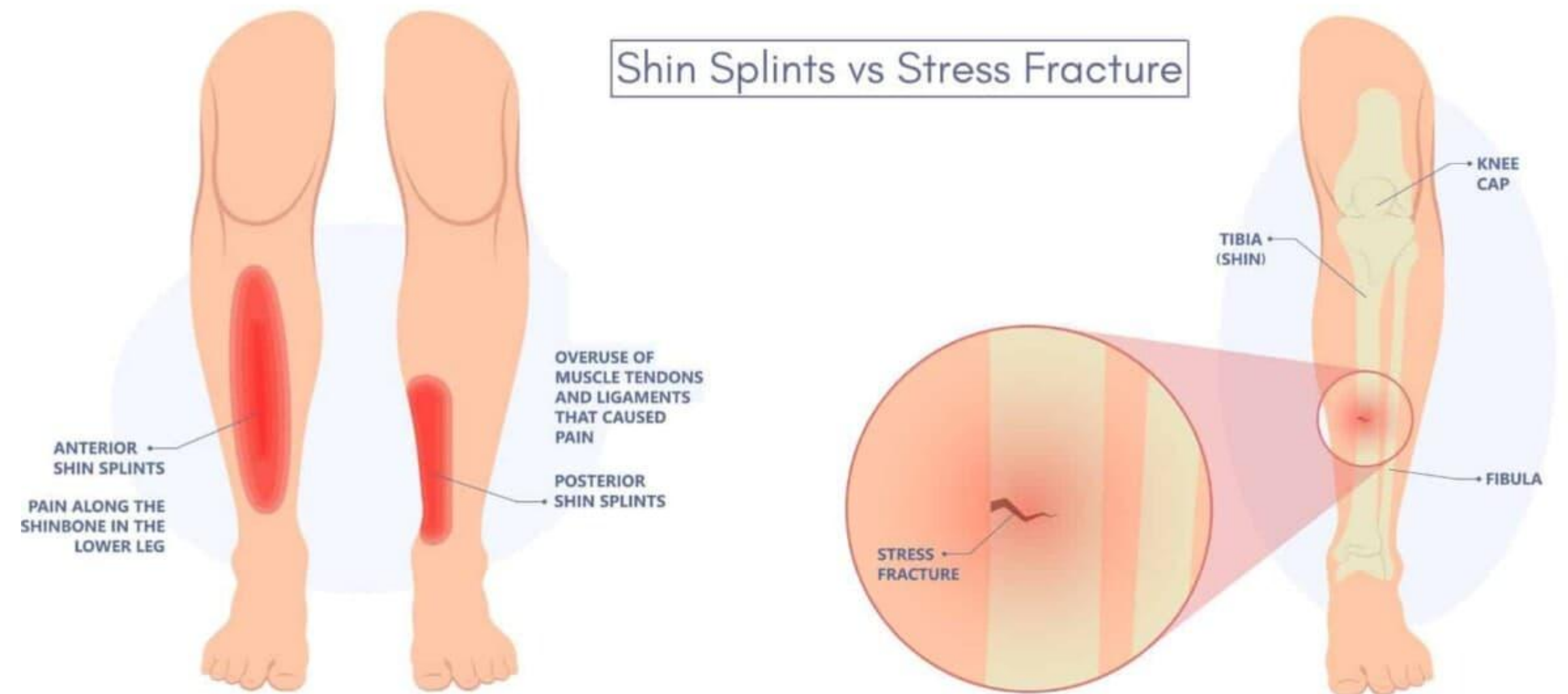
- Medial tibial stress syndrome “Shin Splints”
- **Stress fracture**
- Chronic exertional compartment syndrome
- Rhabdomyolysis
- Peripheral nerve entrapment
- Lumbar radiculitis



The Runner with “Shin Splints”

Medial Tibial Stress Syndrome (Shin Splints)

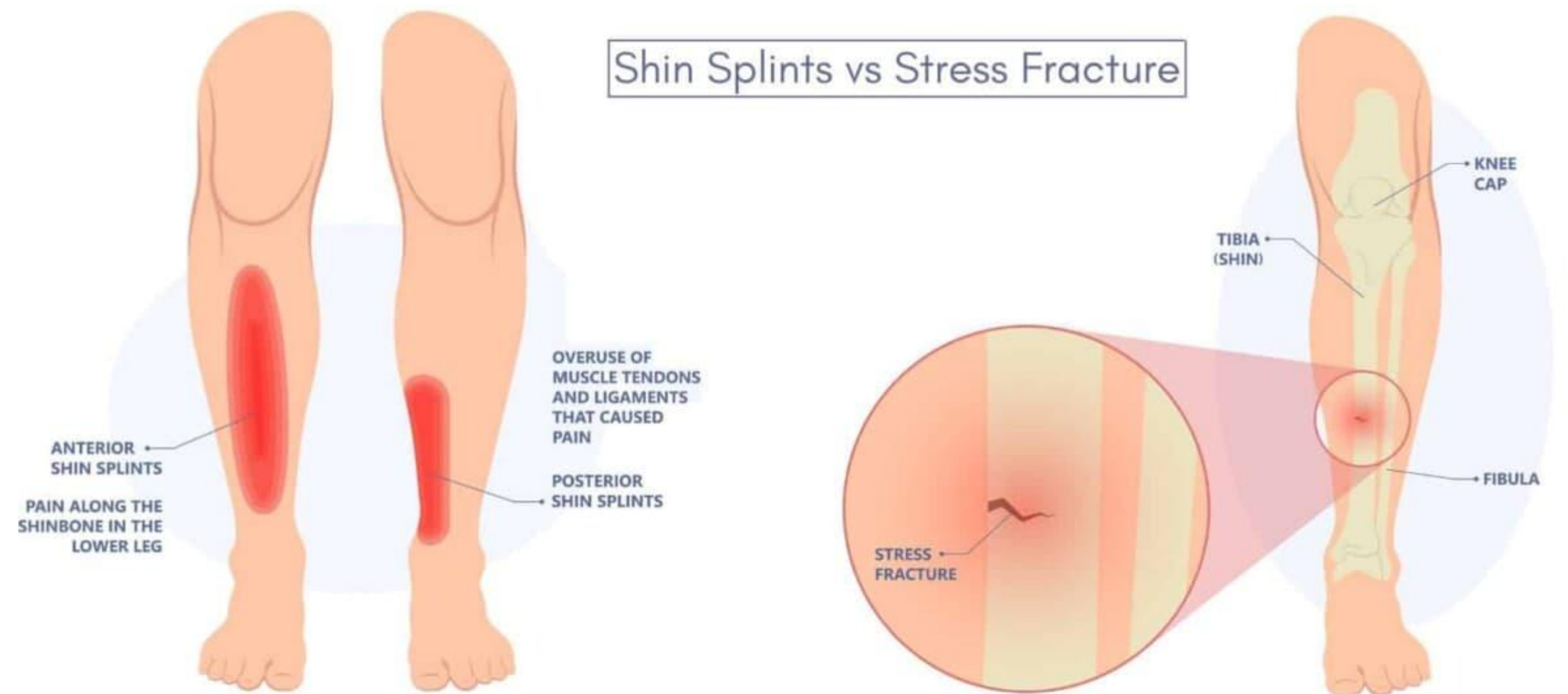
- Diffuse and broad pain
- >5 cm along the posteromedial tibia
- No edema/swelling
- Hop test negative (10 consecutive)
- Pain with activity, may improve with warm-up



The Runner with “Shin Splints”

Tibial Stress Fracture

- Focal localized point tenderness
- < 10 cm
- General localized swelling present
- Hop test positive
 - Sensitivity 100%
 - OR 52 when tibia TTP *
- Pain is progressive
- Can eventually be present at rest



The Runner with “Shin Splints”

Medial Tibial Stress Syndrome (Shin Splints)

- Imaging not usually required
- MRI – may show periosteal edema along posteromedial tibial cortex without fracture

Tibial Stress Fracture

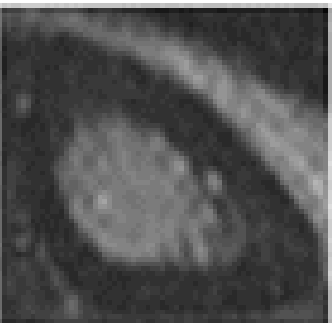
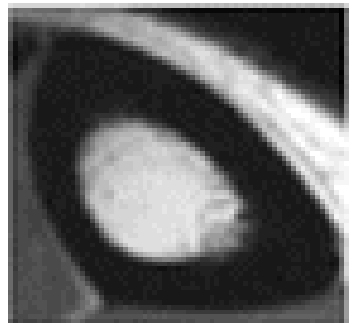
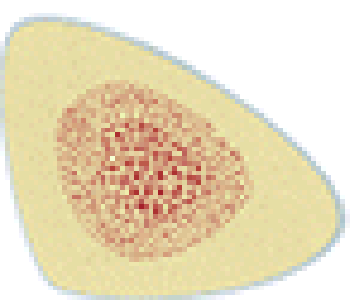
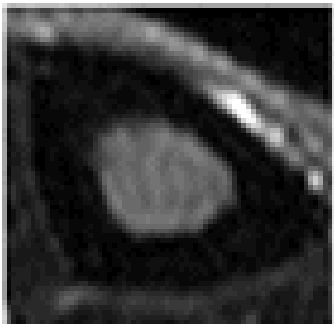
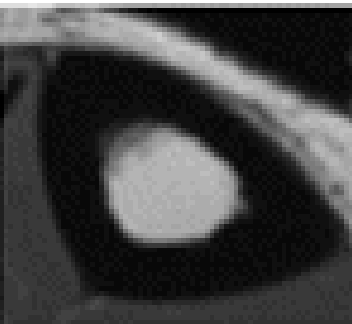
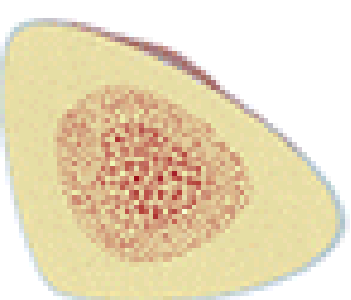
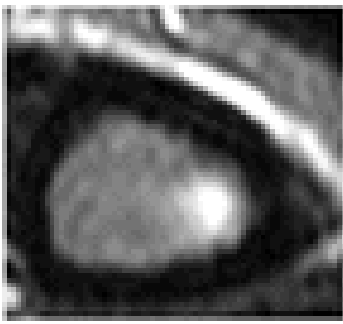
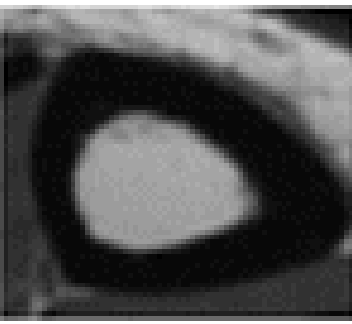
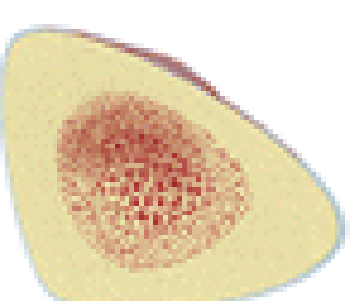
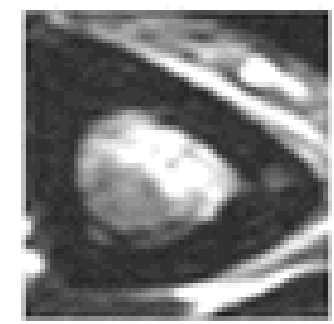
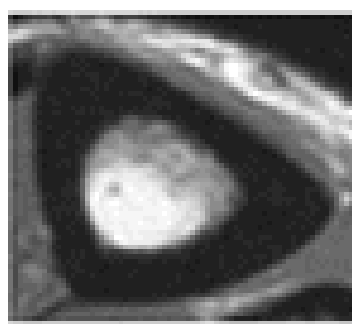
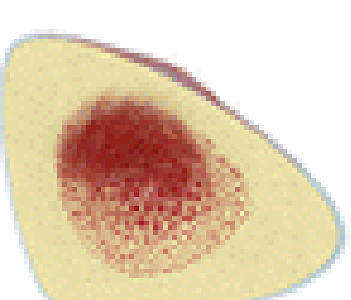
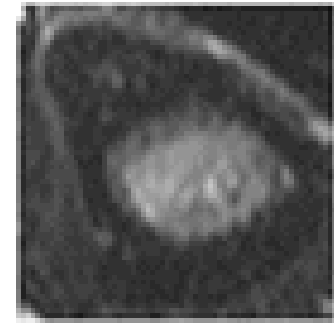
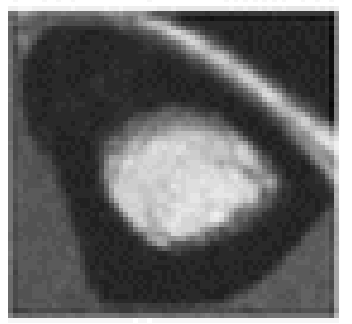
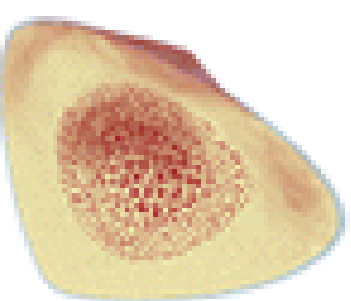
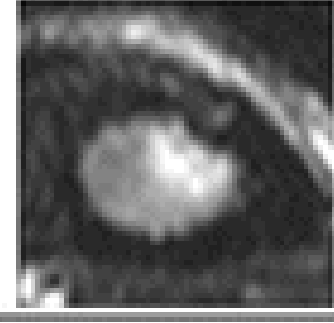
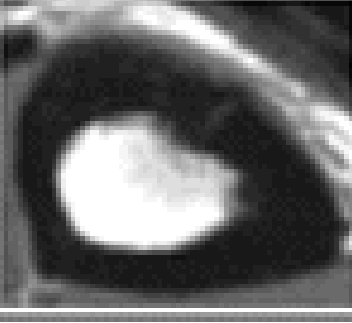
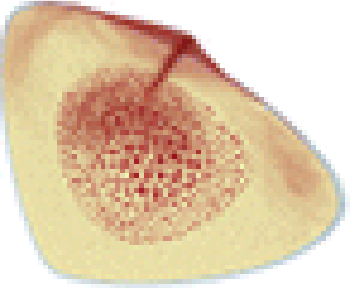
- XR – initial, but low sensitivity (12-56%)
- MRI
 - 99% sensitivity, 97% specific
 - Grade 1 – periosteal edema
 - Grade 2-3 – bone marrow edema
 - Grade 4 – visible fracture line

Fredericson Classification

Grade 1 – periosteal edema

Grade 2-3 – bone marrow edema

Grade 4 – visible fracture line

Grade	STIR	T1	Illustration
0			
1			
2			
3			
4a			
4b			

The Runner with “Shin Splints”

Management

Imaging

- X-ray (initially)
- MRI if suspicion high for stress fracture

Activity

- Stop impact activities
- Walking boot/crutches (?)
- Physical therapy



The Runner with “Shin Splints”

Management

Additional Evaluation

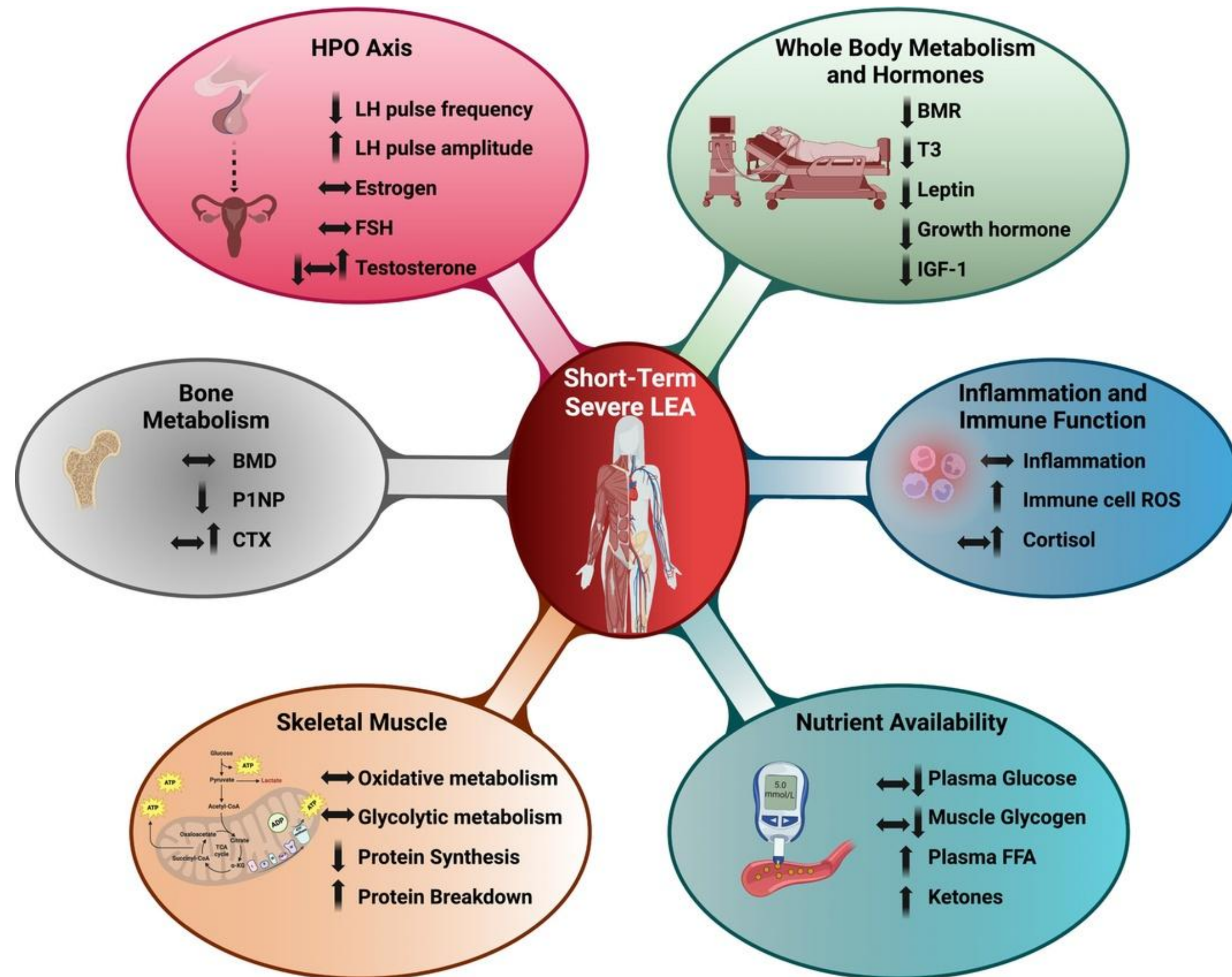
- Relative Energy Deficiency in Sport (RED-S) screening
- Menstrual history (F)
- Nutrition intake
- Weight changes



The Runner with "Shin Splints"

RED-S

- Low energy availability (inadequate energy intake in relative to exercise energy expenditure) produces a multisystem clinical syndrome affecting both sexes
- Highest risk are endurance, aesthetic, and weight-class sport athletes



The Runner with “Shin Splints”

BSI Minimum Workup

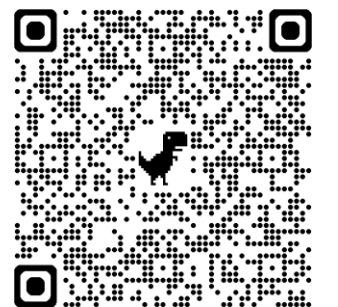
- 25-hydroxyvitamin D
- CBC
- Iron panel with ferritin



Expanded workup

(Grade 3-4, recurrent BSI, RED-S risk factors)

- CMP (Ca, Phos, Renal function)
- TSH, free T3
- Sex hormones (LH, FSH, estradiol, testosterone)
- DXA scan
- Consider PTH, celiac, and bone turnover markers



The Runner with “Shin Splints”

Management

Weight-bearing status

- Low-risk BSI
 - Initial load reduction (crutches/WB)
 - Discontinue as symptoms improve
- High-risk BSI
 - Non-weight bearing immobilization
 - Urgent referral to sports/orthopedics

Bone Stress Injury Sites		
	Trabecular-Rich	Cortical-Rich
High-Risk	Femoral Neck Patella Tibial Plateau Navicular Talus Proximal 2 nd Metatarsal Proximal 5 th Metatarsal Sesamoid	Anterior Tibial Cortex
Low-Risk	Sacrum Pubic Ramus Calcaneus Cuboid Cuneiforms	Femoral Shaft Tibial Shaft Fibula Metatarsal Shafts

The Runner with “Shin Splints”

Management

Repeat Imaging

- Low-risk BSI (grade 2-4)
 - Clinical criteria only
- High-risk BSI (grade 3-4)
 - MRI or CT to confirm fracture line resolution prior to RTR

Bone Stress Injury Sites		
	Trabecular-Rich	Cortical-Rich
High-Risk	Femoral Neck Patella Tibial Plateau Navicular Talus Proximal 2 nd Metatarsal Proximal 5 th Metatarsal Sesamoid	Anterior Tibial Cortex
Low-Risk	Sacrum Pubic Ramus Calcaneus Cuboid Cuneiforms	Femoral Shaft Tibial Shaft Fibula Metatarsal Shafts

The Runner with “Shin Splints”

Management

Return to Run Criteria

- Resolution of bony tenderness on exam
- Pain-free walking (>30 mins)
- Radiological healing (high risk/grade 4)
- Negative loading test (e.g. hop test)
- Contributing factors identified and addressed



The Runner with “Shin Splints”

Phase	Milestone to Enter	Activity
0 — Rest	Diagnosis confirmed	No impact activity; ice, analgesics; cross-train if pain-free (bike/elliptical ≤30 min, 3×/wk)
1 — Walk	Pain-free at rest	Walk 2 min/day → 5 → 10 → 15 min → full weight-bearing without crutches
2 — Hop test	30 min pain-free walking + 3 pain-free cross-training sessions	Single-leg hop without pain at injury site
3 — Walk-Run	Hop test passed + pain-free daily activities ×5 days	Alternate jog/walk intervals on non-consecutive days (e.g., 1 min jog / 4 min walk → 2/3 → 3/2 → 4/1 → continuous jog)
4 — Volume	Walk-run program completed pain-free	Increase continuous running distance by ≤10%/week; no speed work yet
5 — Intensity	Target base mileage reached	Add hills, tempo, intervals, plyometrics
6 — Return to sport	Full training tolerated pain-free	Cleared by physician for competition

Sample management plan for low-risk BSI by AAFP
Schroeder et al., 2024

The Runner with “Shin Splints”

History

16-year-old female cross-country runner

- Progressive shin pain bilaterally
- Initially only during runs
- Now hurts while walking
- Increasing mileage to 30-40 miles/week, runs 5d/week
- Season starts soon with races every week

Can she train or compete this season?

If confirm a stress fracture – No

If somewhere in-between – possible end of season return, but not likely

If MTSS – yes, pain-guided after RTR criteria met



PCP Pearls

- Persistent localized bone pain is concerning for stress fracture
- NWB for high-risk BSI, support for low-risk BSI
- Identify RED-S risk factors
- Shin splints can progress to stress fracture



Case #5: The Football Player Who Heard a “Pop”



The Football Player Who Heard a “Pop”

History

18-year-old Varsity senior football player

- Made a cutting move to get space and felt a “pop”
- Fall to ground with immediate pain
- Unable to continue playing
- Large swelling within hours
- Friday night game



The Football Player Who Heard a “Pop”

Differential

- Anterior cruciate ligament (ACL) tear
- Lateral patellar dislocation
- Tibial spine fracture
- Meniscus tear
- Medial collateral ligament sprain/tear



The Football Player Who Heard a “Pop”

Exam

- Generalized tenderness
- Large knee effusion
- Limited range of motion
- Antalgic gait
- Lachman likely without firm end-point but guarding



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- **Anterior cruciate ligament (ACL) tear**
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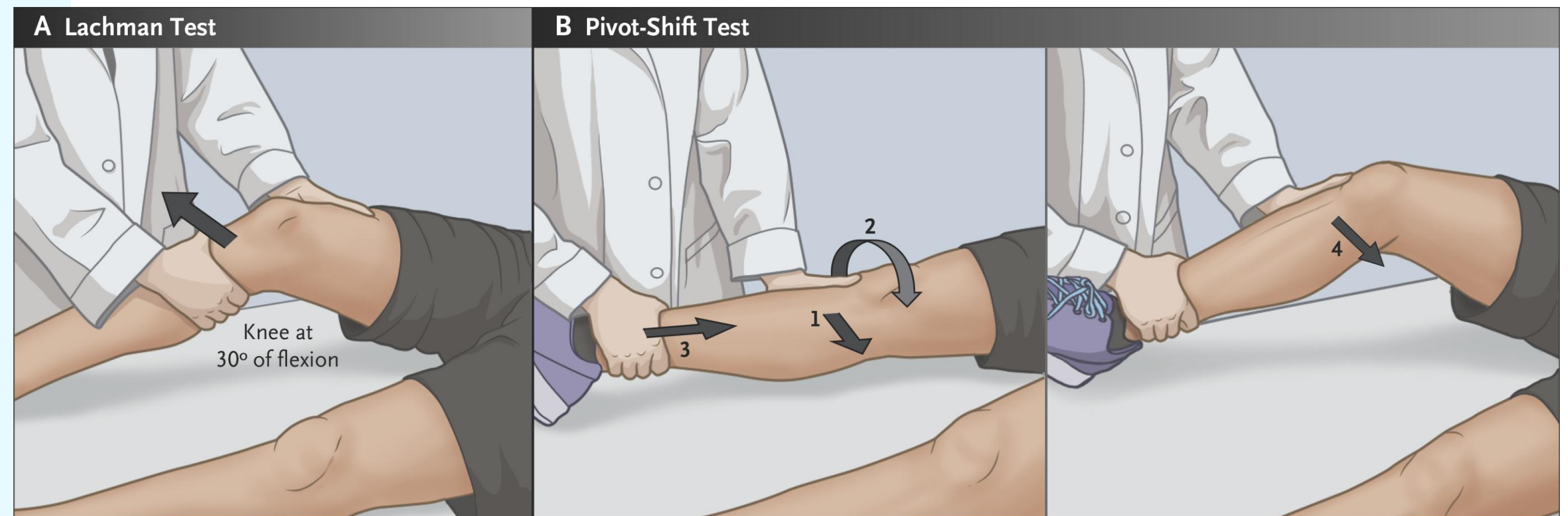
Physical Exam

Lachman test

- Most sensitivity - 0.76-0.87
- Specificity 0.89-0.97
- Assess end-point quality
- Compare to contralateral

Pivot-shift test

- Lower sensitivity 0.49-0.59
- High specificity 0.97-0.98
- Tests dynamic rotatory instability
- Easier to do in OR



The Football Player Who Heard a “Pop”

Management

Imaging

- X-rays (initial)
 - Second fracture
 - Tibial spine fracture
- MRI often needed
 - 97% sensitivity, 100% specificity
 - 50-70% of ACL tears have associated meniscal injuries, possible collateral ligament, posterolateral corner, and chondral damage

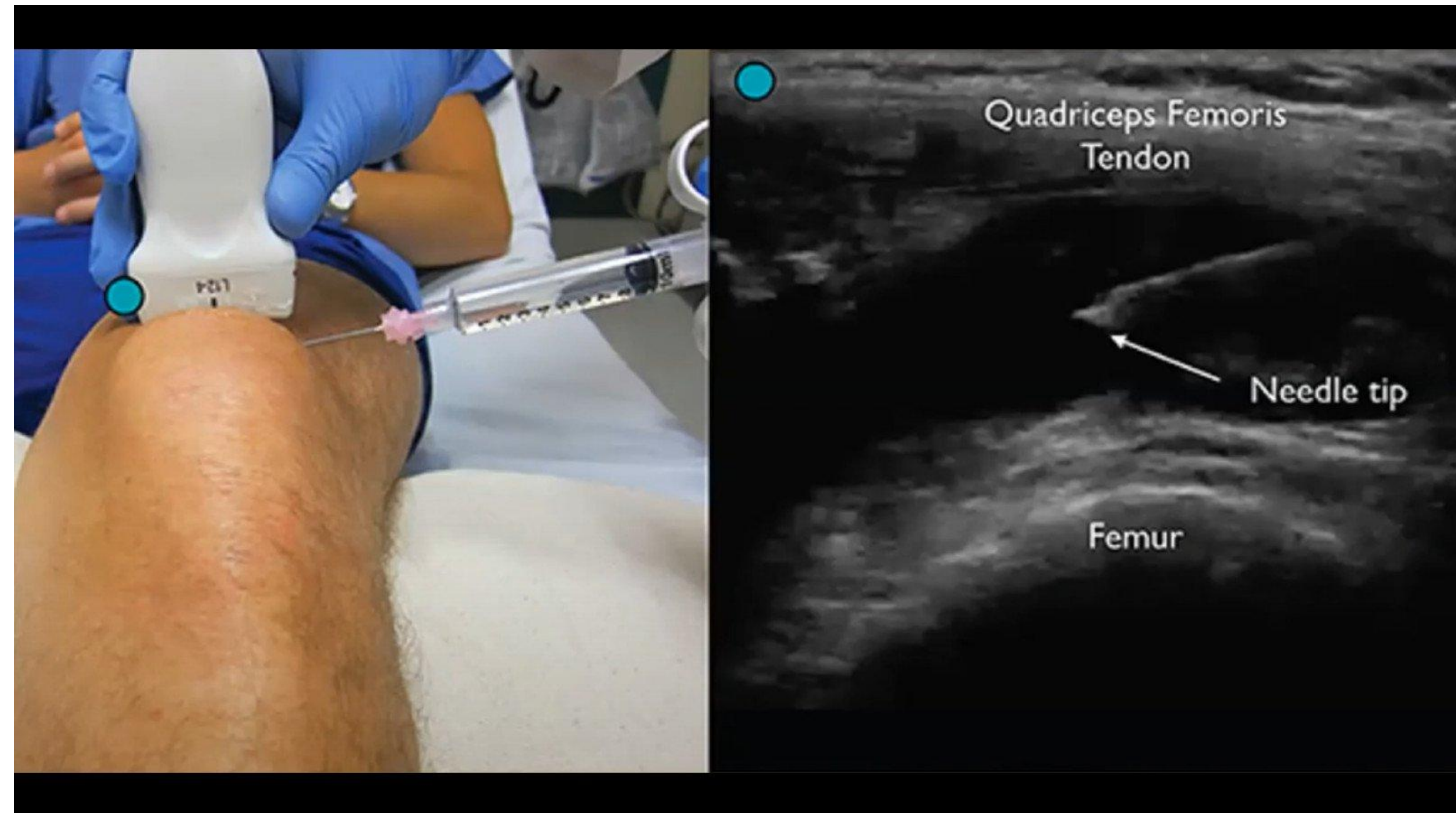


The Football Player Who Heard a “Pop”

Management

Initial Management

- Crutches, Brace/splint
- Aspiration of hemarthrosis
 - If tense/painful, can help symptomatically
 - No specific improved outcomes with arthrofibrosis
- RICE
- Restriction from sports
- Referral to sports medicine/orthopedics (urgent)



The Football Player Who Heard a “Pop”

Management

Psychological Impact

- 42% with depression and high rates of anxiety, kinesiophobia, and fear of reinjury can impede rehab and return to sport
- Preoperative MH screening to identify at-risk patients
- Pre-existing depression/anxiety predicts worse postoperative complications and functional outcomes
- Nearly 48% of patients score below acceptable psychological readiness at 6-12 months post-reconstruction



The Football Player Who Heard a “Pop”

Management

Psychological Impact

- 2026 meta-analysis found psychological interventions significantly improved pain, kinesiophobia, knee self-efficacy, and patient-reported knee function
 - Cognitive-behavioral PT
 - Imagery/visualization training
 - Counseling and social support
 - Adjunctive taping, bracing, continued team involvement



The Football Player Who Heard a “Pop”

History

18-year-old Varsity senior football player

- Made a cutting move to get space and felt a “pop”
- Fall to ground with immediate pain
- Unable to continue playing
- Large swelling within hours
- Friday night game

When can he return to sport?

ACL graft ligamentization takes 9-12 months



PCP Pearls

- Traumatic swollen knee requires prompt evaluation
- Rule out fracture
- Mental health screening and interventions can improve outcomes for rehab and RTS



When Should PCPs Refer?

Same Week Referral

- Swollen joint
- Fracture (acute/stress)
- Significant loss of motion

Routine Referral

- Persistent pain >6-8 weeks
- Return-to-play concerns
- Recurrent sports injuries

If a young athlete cannot safely participate in sport or exercise



What if the patient is injured on the weekend (Friday-Sunday)?

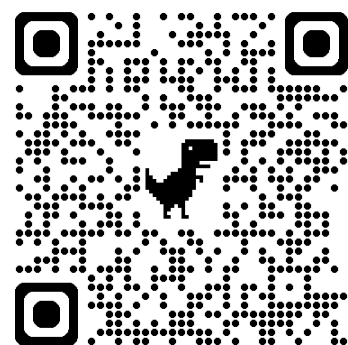
Where is the best place to refer?

- Emergency Room
- Urgent Care
- Schedule next week in clinic



A Resource for Orange County Families

- Acute evaluation for musculoskeletal injuries
- Pediatric-focused orthopedic and sports medicine providers
- Coordination of specialty care
- All Walk-Ins are welcome
- Saturday AMs (for now)



RADY CHILDREN'S ORTHOPEDIC INSTITUTE

SAME-DAY SPORTS INJURY & FRACTURE CARE

POINT YOUR PATIENTS TO FAST, SPECIALIZED ORTHOPEDIC CARE

Rady Children's Orthopedic Institute's Same-Day Sports Injury & Fracture Care gives your pediatric patients a faster, more appropriate walk-in alternative to the emergency department for fractures and sports injuries. **Evaluation, imaging, casting, and follow-up coordination happen in one visit, with board-certified pediatric orthopedic and sports medicine specialists.**

Why refer here:

- Pediatric orthopedic specialists — not general urgent care
- X-ray, casting, and follow-up coordination in a single visit
- Seamless transition from acute care to PT and long-term follow-up in one place
- Shorter wait times than a pediatric emergency department
- Convenient weekend hours



Saturdays, 8 AM – 12 PM



CHOC Specialty Care Clinic
555 S. Main St.,
2nd Floor, Orange, CA 92868



Walk in or call ahead:
1-844-GET-CHOC
1-844-438-2462

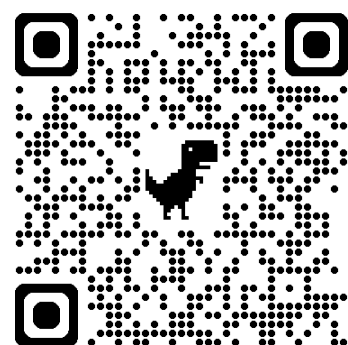


Sports Injury Clinic

- Broken bones (fractures)
- Sprains and strains
- Sports-related injuries

ED or UC

- Skin is punctured
- Obvious external deformity
- Head or neck injury
- Concussion
- Extreme pain
- Medical Emergency



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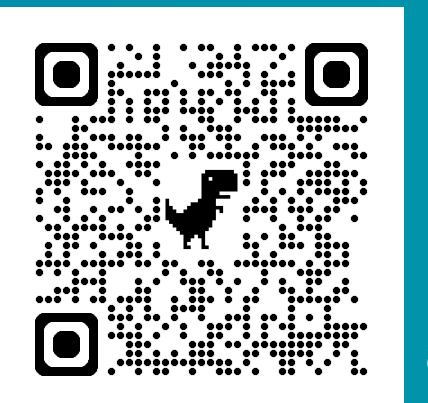
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Take-Home Messages

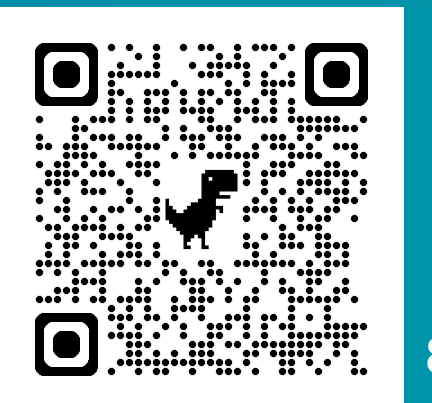
- Most pediatric sports injuries can be accurately diagnosed and initially managed using a focused H&P
- XR to rule out fracture/dislocation, MRI for red flags
- Proper initial immobilization and activity modifications can prevent prolonged recovery
- Referral and resource pathways for definitive care





Questions?

Michael.Peyton@choc.org



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