Lower Extremity Injuries in the Pediatric Athlete

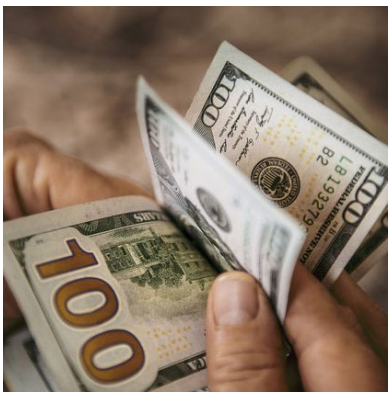
Steven D Gibbons, MD
Assistant Professor, Pediatric Orthopaedics
Associate Program Director
UT Health San Antonio
02/17/2024

UT Health San Antonio

1

Financial Disclosure

I have no financial disclosures related to this talk



UT Health San Antonio Pediatric Orthopaedics

UT Health San Antonio

2

Outline

Patellofemoral Pain Syndrome

Osgood-Schlatter Disease

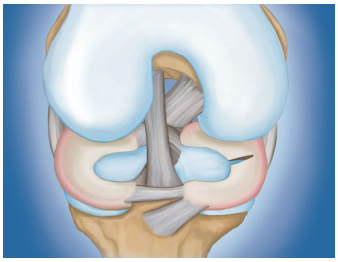
Tibial Tubercle Fractures

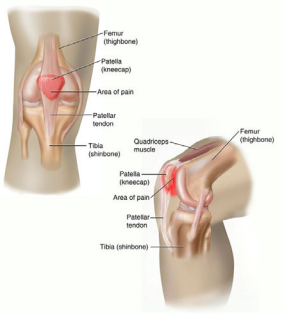
Meniscal Injuries

Ankle Fractures

Ankle Sprains

Overuse





UT Health San Antonio

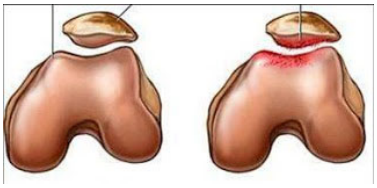
3

Patellofemoral Pain Syndrome

Abnormal tracking of patella over the femoral condyles resulting in anterior knee pain without intra-articular or peripatellar pathology

- ***Most common cause of anterior knee pain in adolescent females***

Females > Males. Common in endurance athletes such as runners or cyclists.



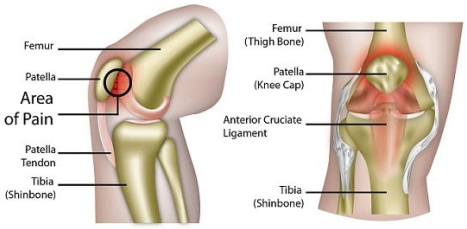
UT Health San Antonio

4

Patellofemoral Pain Syndrome

Risk Factors

- training errors or overuse
- weaker knee extension strength
- generalized ligamentous laxity
- tightness of gastrocnemius, hamstring, quadriceps, or iliotibial band



Clinical Features

- Pain in anterior knee worsened with prolonged sitting ("theater sign" or "movie-goer's knee") or when descending stairs

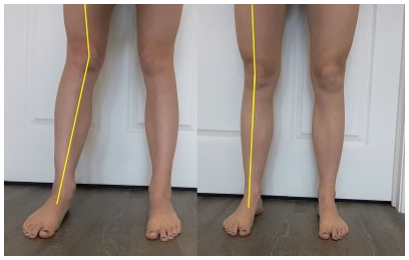
UT Health San Antonio

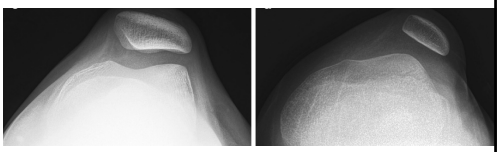
5

Patellofemoral Pain Syndrome

Imaging:

- Diagnosis is largely based on history and physical, though imaging may be considered to exclude other diagnoses





UT Health San Antonio

6

Patellofemoral Pain Syndrome

Management:

- Acute management of painful stage: Rest, Ice, Compression, Elevation (RICE)

- PT with focus on quadriceps, iliotibial band, hamstrings, and hip flexors

UT Health San Antonio

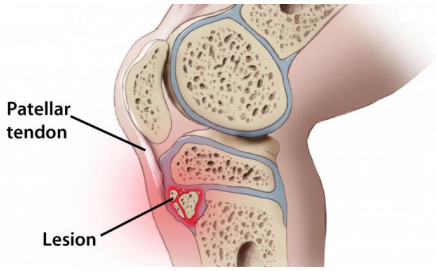
7

Osgood-Schlatter Disease

Traction apophysitis of the tibial tubercle at the insertion of the patellar tendon.

Most commonly age 9-14 years of age after a rapid growth spurt.

Typically presents 2 years earlier in girls compared to boys – correlating with age of skeletal maturity.



UT Health San Antonio

8

Osgood-Schlatter Disease

Anterior knee pain that increases gradually over time

- exacerbated by kneeling, running, jumping, squatting, climbing stairs

Relieved by rest.

Usually unilateral. Bilateral in 25-50% of cases.

UT Health San Antonio

9

Osgood-Schlatter Disease

Physical Exam:

- Prominent point tenderness at the tibial tubercle.

Imaging:

- Xrays show prominence and irregular ossification of the tibial tubercle- may see an ossicle.

Management:

- NSAIDs, ice, hamstring stretching, pads or braces

Prognosis:

- Most symptoms resolve with closure of the physis.
- For those with persistent symptoms after closure of physis: surgical intervention yields good results, particularly for patients with cartilaginous ossicles that may be excised.

UT Health San Antonio

10

Osgood-Schlatter Disease

UT Health San Antonio

11

Tibial Tubercle Fractures

Boys nearing maturity

Basketball and football

Forced landing

UT Health San Antonio

12

Tibial Tubercle Fractures

Large effusion

Extensor lag

Potential compartment syndrome

UT Health San Antonio

13

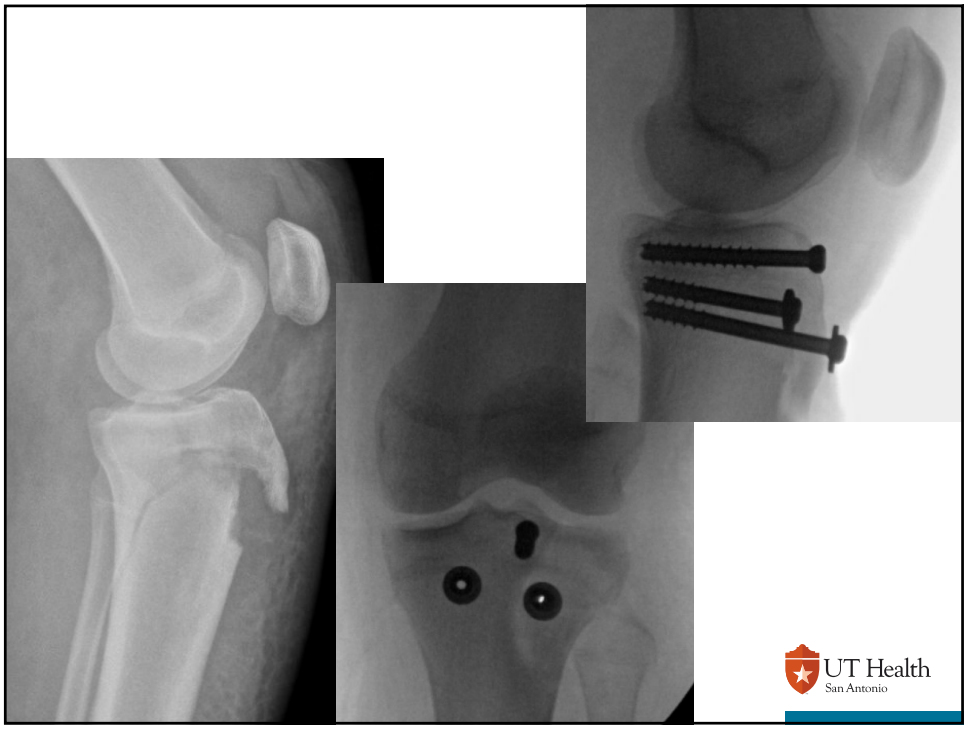
Tibial Tubercle Fractures

Minimally displaced – LLC

Any displacement - ORIF

UT Health San Antonio

14

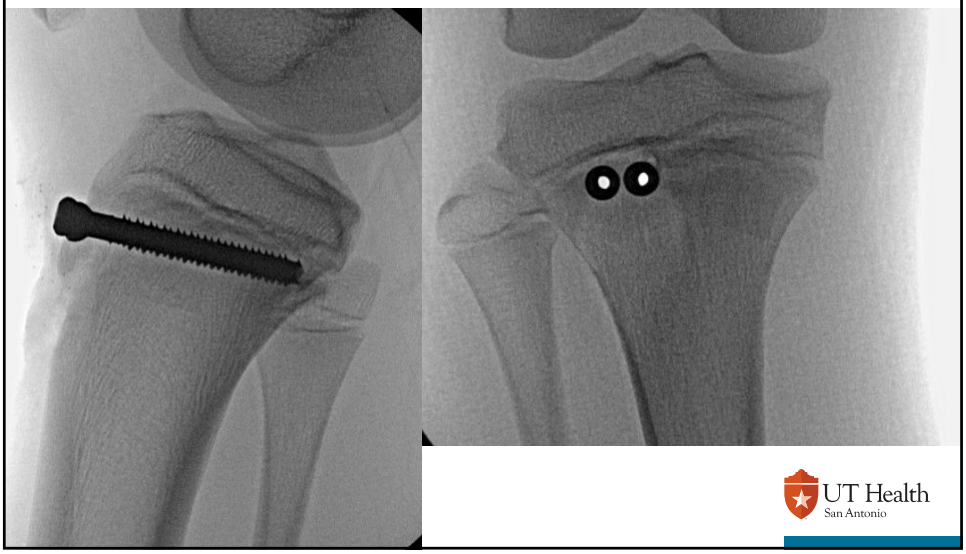


15

Tibial Tubercle Fractures

16

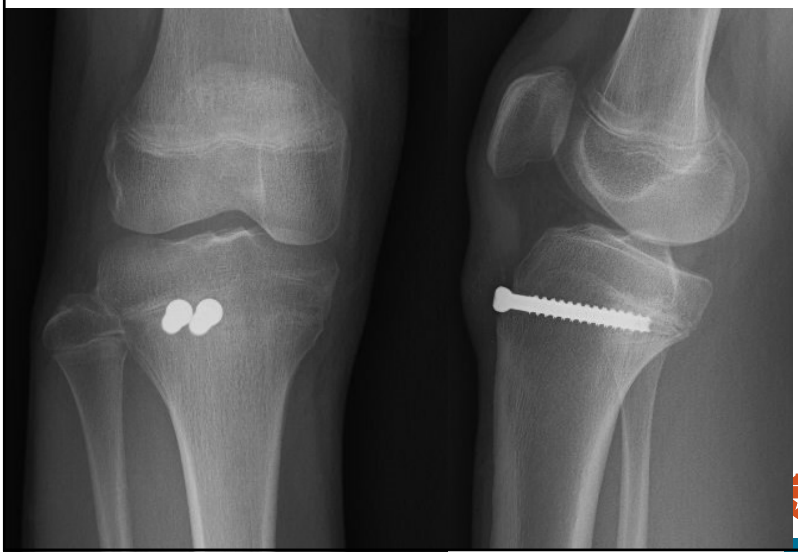
Tibial Tubercle Fractures



UT Health San Antonio

17

Tibial Tubercle Fractures



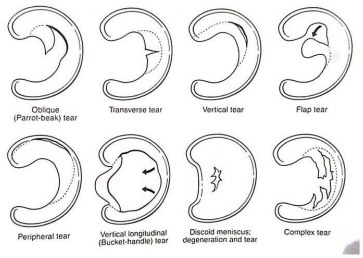
UT Health San Antonio

18

Meniscal Injuries

Mechanism of injury:

- Changes in direction in a manner that involves rotating or "twisting" the knee while the knee is flexed and the foot is planted.



Epidemiology:

- Rare in children <10 years and tears that occur in these younger patients often result from a discoid or abnormal shaped meniscus.

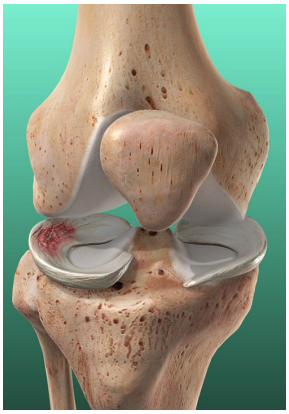
UT Health San Antonio

19

Meniscal Injuries

Clinical Features:

- Degree of pain at the time of injury is variable
- Acute event is followed by the insidious onset of pain and swelling over 24 hr.
- Pain exacerbated by twisting or pivoting movements.
- Some patients describe a tearing or popping sensation at time of injury.
- Patients with untreated meniscal tears can present weeks after the injury complaining of popping, locking, catching



UT Health San Antonio

20

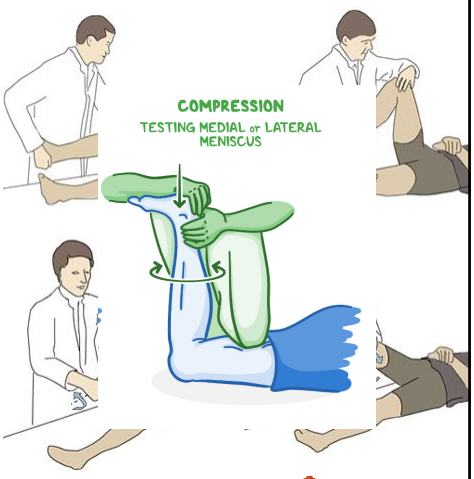
Meniscal Injuries

Physical Exam:

- Joint line tenderness (sensitive but not specific)
- Abnormal knee motion with inability to fully extend
- Inability to squat or kneel
- Sometimes joint effusion.

McMurray Test

Apley Test



UT Health San Antonio

21

Meniscal Injuries

Imaging:

Xray: Usually negative.
- effusion

MRI: most sensitive and specific

UT Health San Antonio

22

Meniscal Injuries

Treatment

Non-op:

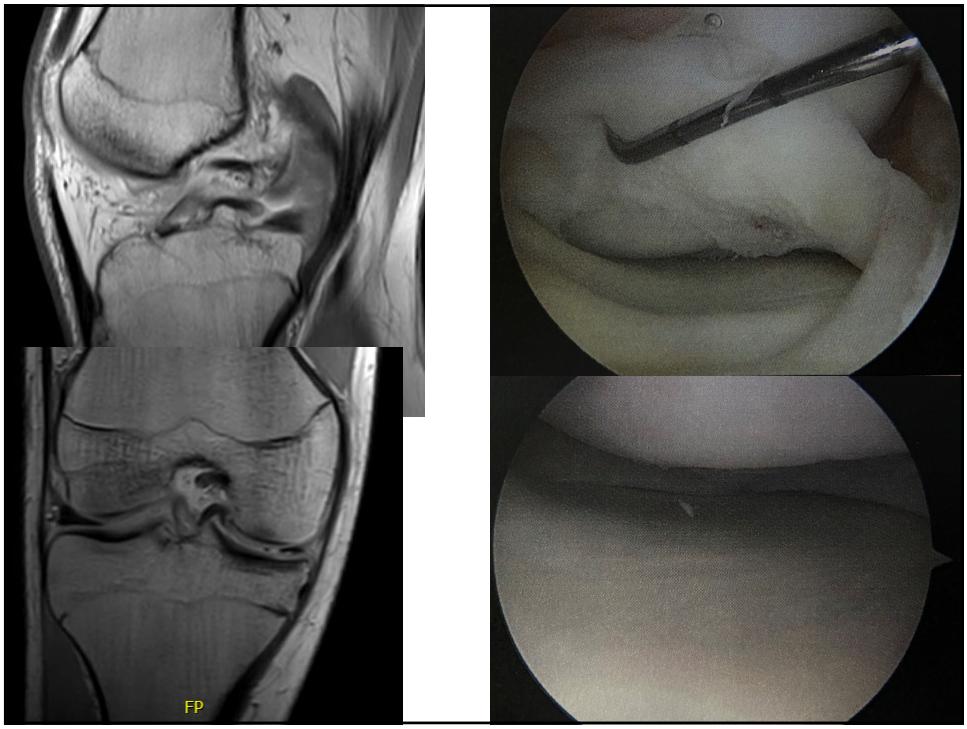
- Small peripheral tears??

Operative:

- Based on tear size and Location

UT Health San Antonio

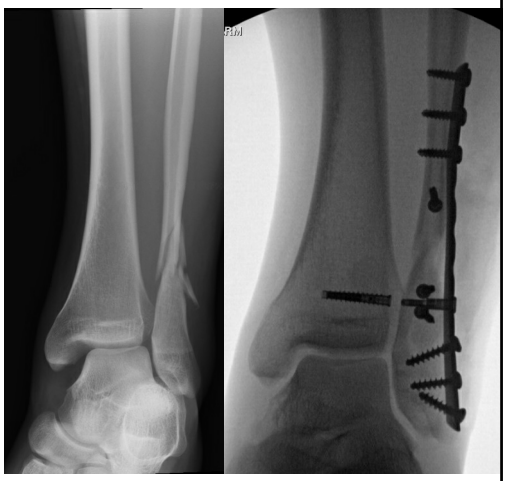
23



24

Ankle Fractures

- Distal tibial and fibular physes form a “plane of weakness” about the ankle
- Ligaments often stronger than physeal cartilage leading to increased risk of physeal injury over ligamentous sprain
- Ankle fractures treated similar as in adults



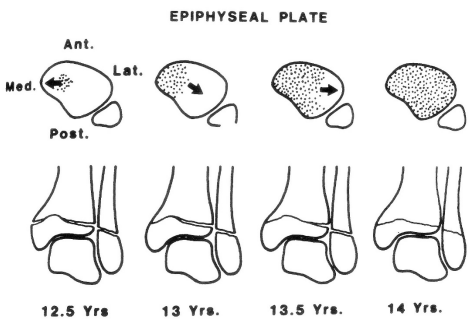
UT Health San Antonio

25

Transitional Ankle Fractures

Distal tibia physis closes:
- About age 12-15 yrs girls
- About age 13-17 yrs boys

Asymmetric closure over ~18 months
- Closes center then medially and posteriorly
- Anterolateral portion of physis is the last to close



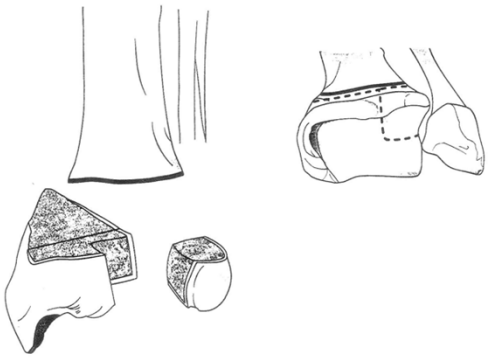
UT Health San Antonio

26

Transitional Ankle Fractures

Tri-plane:

- Combination of Salter II and III fractures: usually near end of growth (Complex type IV fracture)
- Anterior epiphyseal fracture with large posteriomedial metaphyseal fragment…fibula may also be fractured



UT Health San Antonio

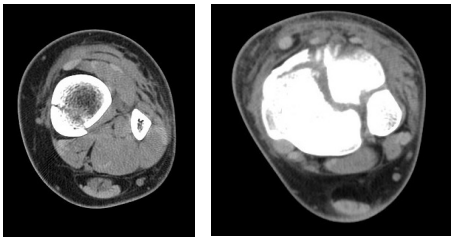
27

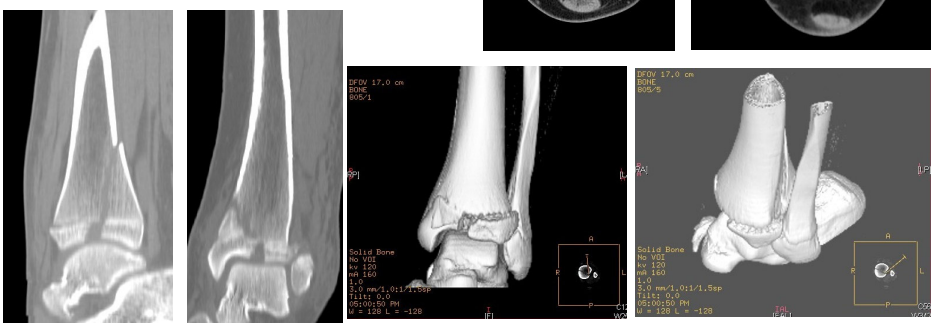
Transitional Ankle Fractures

Tri-plane:

CT gives 3D visualization of fracture patterns

Essential for operative planning



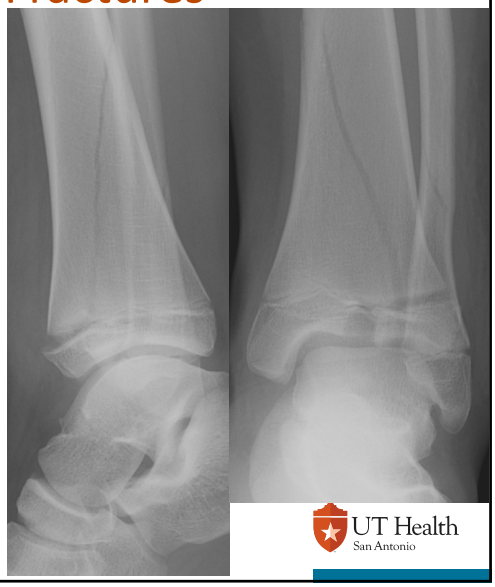


28

Transitional Ankle Fractures

Tri-plane:

- Non-displaced = cast
- Displaced = closed reduction or operative



UT Health San Antonio

29

Transitional Ankle Fractures

UT Health San Antonio

30

Transitional Ankle Fractures

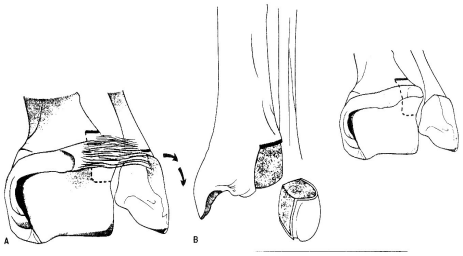
UT Health San Antonio

31

Transitional Ankle Fractures

Tillaux

- Patients tend to be older than those with triplane fx
- Local tenderness at anteriolateral joint line
- Mortise view essential
- May need CT scan
- Although literature based on small series, excellent results with anatomic reduction noted



UT Health San Antonio

32

Transitional Ankle Fractures

Tillaux

Non-operative:
- <2mm displaced
- Cast

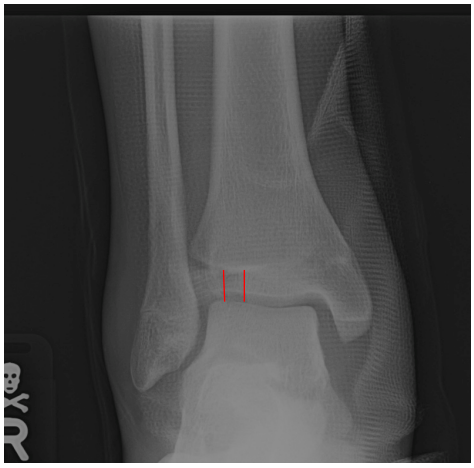
Operative:
- >2mm displaced
- Athletes?

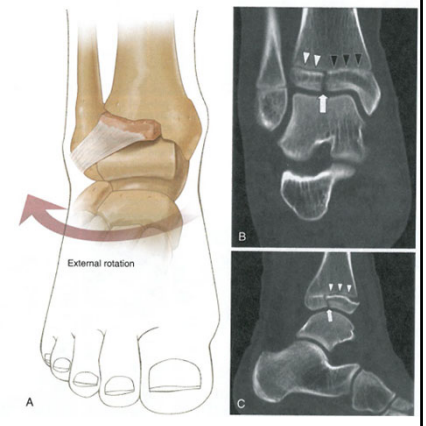
UT Health San Antonio

33

Transitional Ankle Fractures

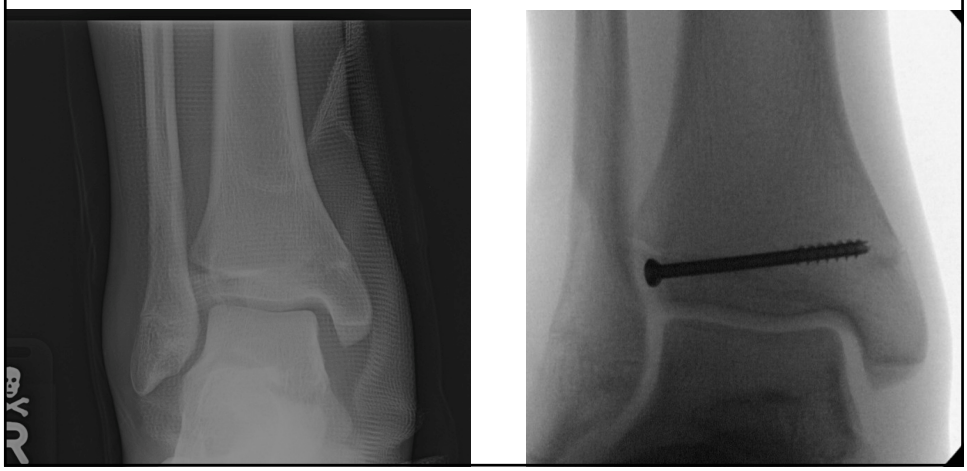
Tillaux





UT Health San Antonio

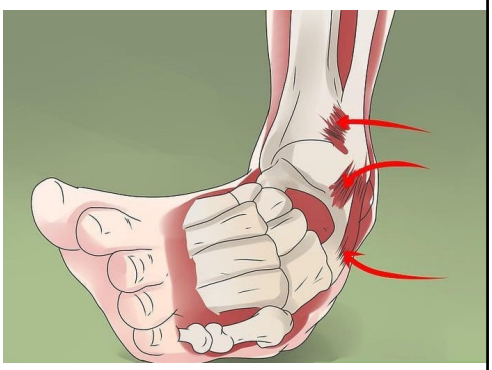
34



35

Ankle Sprains

- Ankle sprains reported to make up as much as 25% of athletic injuries
- High grade ankle sprains unusual in the skeletally immature (ligament stronger than bone/physis)
- Physeal fracture until proven otherwise
- Lower grade ankle sprains respond well to conservative mgmt with treatment mimicking adults models



UT Health San Antonio

36

Ankle Sprains

Non-Operative:

RICE

Immobilization
- Lace-up ankle brace
- Stirrup brace
- Fracture-boot

Physical therapy – early

UT Health San Antonio

37

Sever's Disease

Pain brought on by activity

Improves with rest, ice, NSAIDs

Returns with activity

No pain at rest

When pain resolves; has no pain with weight bearing

UT Health San Antonio

38

Sever's Disease

Imaging:
- Foot xrays

Findings: nothing?

Sclerosis and fragmentation vs. normal development of the apophysis

UT Health San Antonio

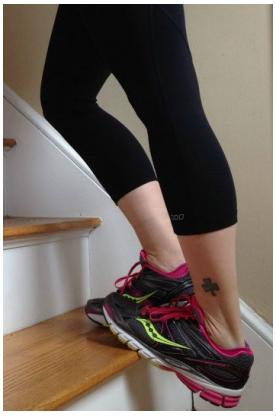
39

Sever's Disease

Treatment
- Rest, ice, NSAIDs
- Activity modification
- Achilles tendon stretching
- Pad the shoe cleat
- Temporary use of heel cups if desperate

Have to get serious to improve the pain
- Boot for 2 weeks?
- Many wait to finish the season

Recurrence possible/common until skeletally mature



UT Health San Antonio

40

Thank You

UT Health San Antonio
Pediatric Orthopaedics

gibbonss2@uthscsa.edu
214-679-9368

UT Health San Antonio

41