AMSER Case of the Month February 2021

12 y.o. F with right ankle pain

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Patient Presentation

12 y.o. F presents with right ankle pain after twisting her ankle while playing. No hx of previous injuries or trauma. Right ankle pain with weight bearing, denies numbness or weakness.

Physical Exam:

Musculoskeletal: ROM b/l, swelling and ecchymosis of right ankle, no deformity, laceration, normal pulse b/l. Tenderness at R lateral malleolus. Normal achilles tendon.

Imaging ordered

Variant 1: **Adult or child 5 years of age or older. Acute trauma to the ankle or acute trauma to the ankle with persistent pain for more than 1 week but less than 3 weeks. No exclusionary criteria present. Initial imaging. Patient meets the requirements for evaluation by the Ottawa Ankle Rules which are positive:**

1. **Inability to bear weight immediately after the injury, OR**
2. **Point tenderness over the medial malleolus, the posterior edge or inferior tip of the lateral malleolus, talus, or calcaneus, OR**
3. **Inability to ambulate for 4 steps in the emergency department.**

Procedure	Appropriateness Category	Relative Radiation Level
Radiography ankle	Usually Appropriate	☢
US ankle	Usually Not Appropriate	O
MRI ankle without and with IV contrast	Usually Not Appropriate	O
MRI ankle without IV contrast	Usually Not Appropriate	O
CT ankle with IV contrast	Usually Not Appropriate	☢
CT ankle without and with IV contrast	Usually Not Appropriate	☢
CT ankle without IV contrast	Usually Not Appropriate	☢
Bone scan ankle	Usually Not Appropriate	☢☢☢

12 yo with acute trauma
Ottawa Ankle rules: 1 + 2

Radiography ankle was ordered by ER physician

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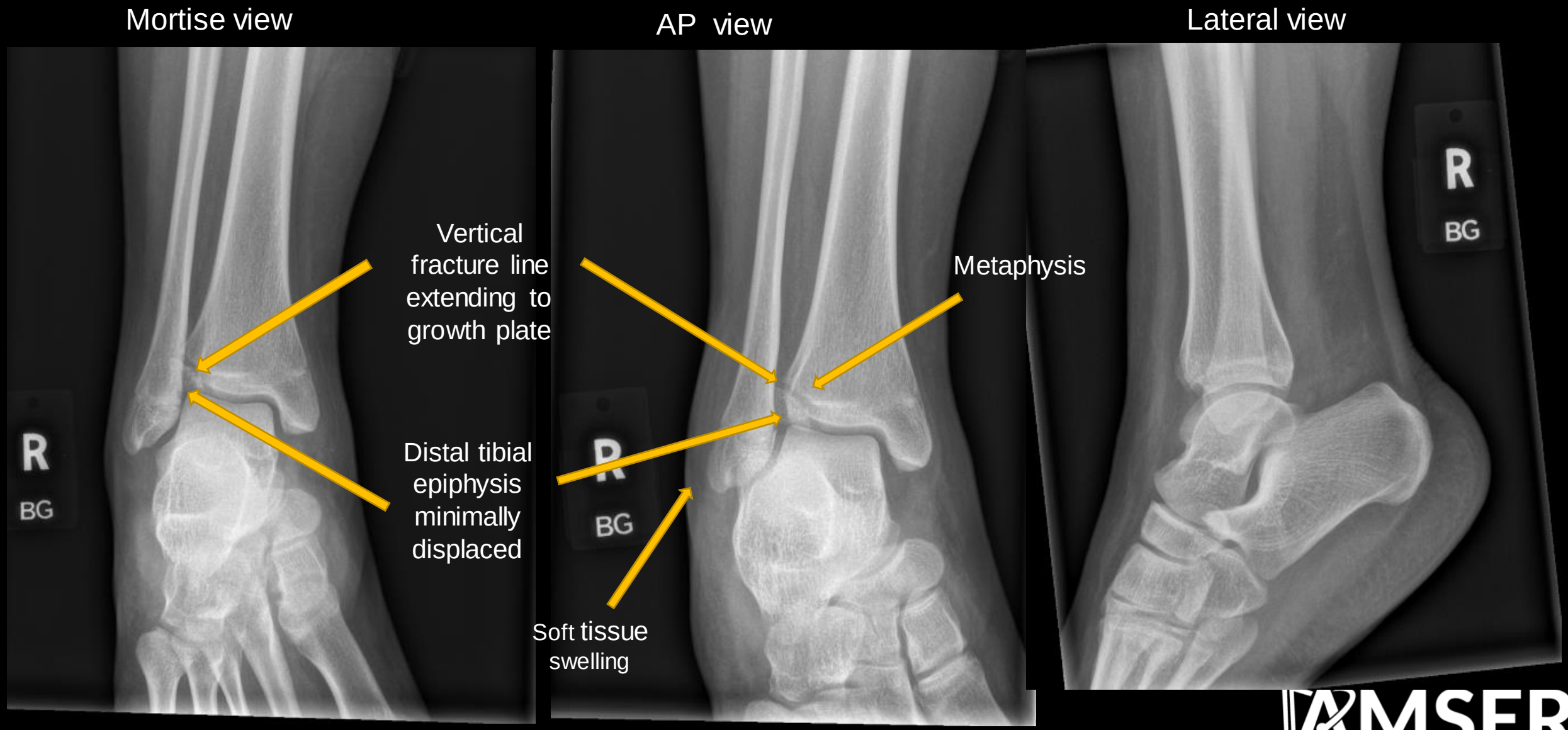
Images ordered (unlabeled)

XR ankle right 3+ view (labeled)



Other Images ordered

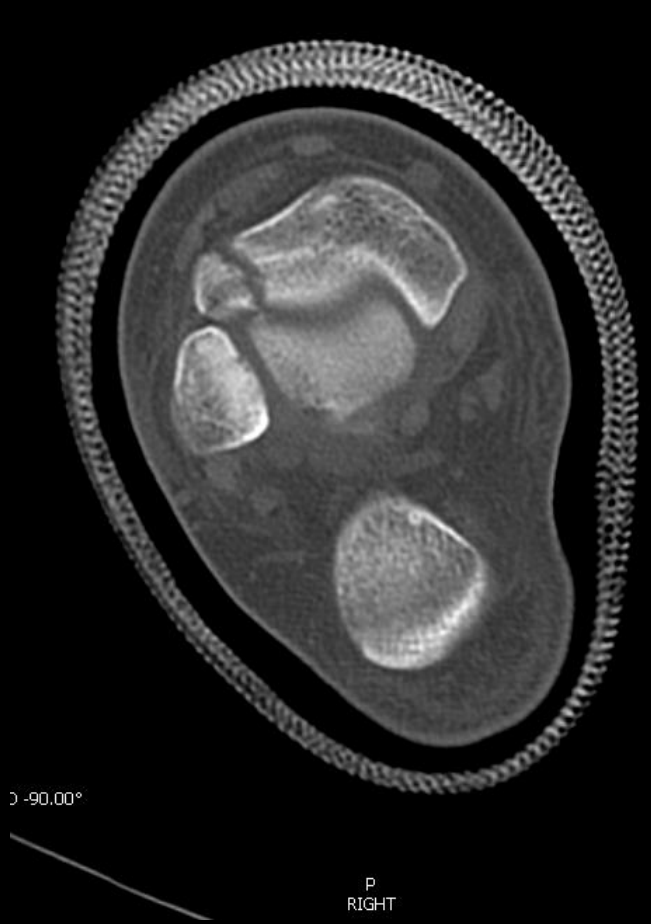
Variant 5: **Adult or child 5 years of age or older. Acute trauma to the ankle. No exclusionary criteria present. Radiographs demonstrate fracture or potential osteochondral injury. Next study.**

Procedure	Appropriateness Category	Relative Radiation Level
MRI ankle without IV contrast	Usually Appropriate	O
CT ankle without IV contrast	Usually Appropriate	☢
Radiography ankle Broden's view	May Be Appropriate	☢
US ankle	Usually Not Appropriate	O
MRI ankle without and with IV contrast	Usually Not Appropriate	O
CT ankle with IV contrast	Usually Not Appropriate	☢
CT ankle without and with IV contrast	Usually Not Appropriate	☢
Bone scan ankle	Usually Not Appropriate	☢☢☢

12 yo with acute trauma

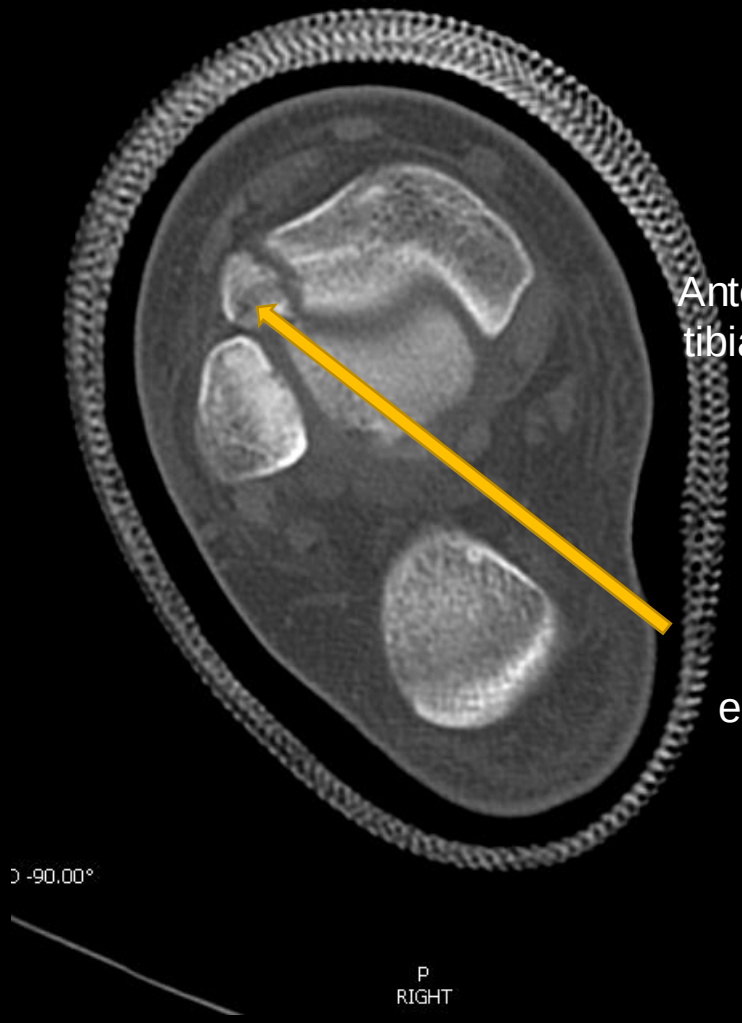
Ankle XR showed fracture of epiphysis – needed to further evaluate fracture pattern and degree of displacement

Radiology Images (unlabeled)



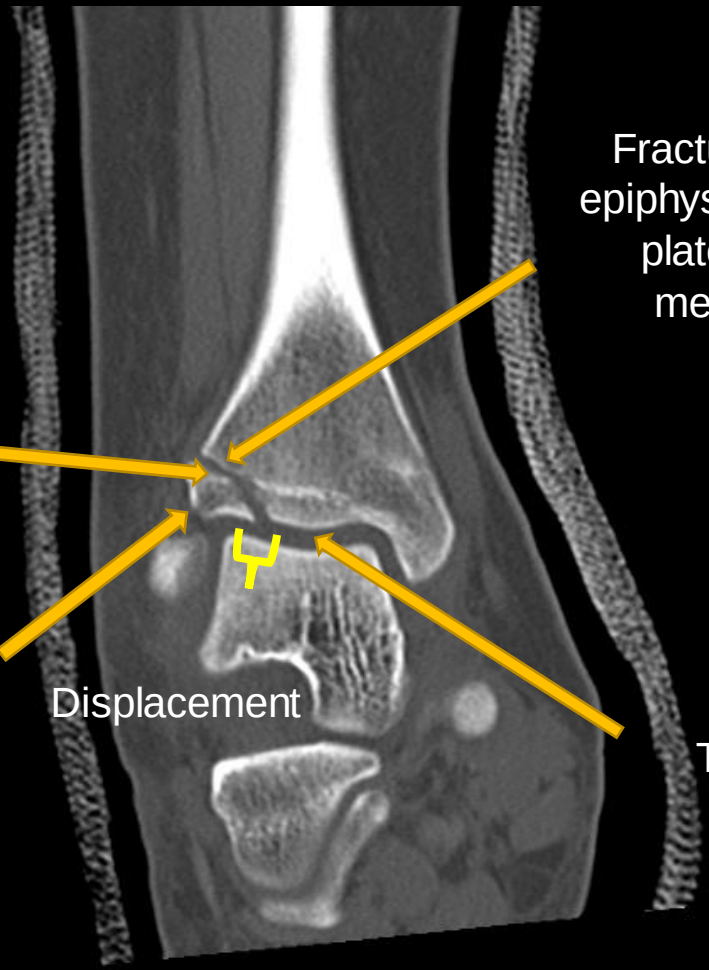
Radiology Images (labeled)

Axial view



Distal epiphysis

Anterolateral tibial growth plate



Displacement

Coronal view

Fracture across epiphysis to growth plate sparing metaphysis

Tibiotalar joint

Sagittal view

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Differential Dx:

Ankle sprain
Tillaux fracture
Triplane fracture
Achilles tendonitis
Fibular fracture
Calcaneus fracture

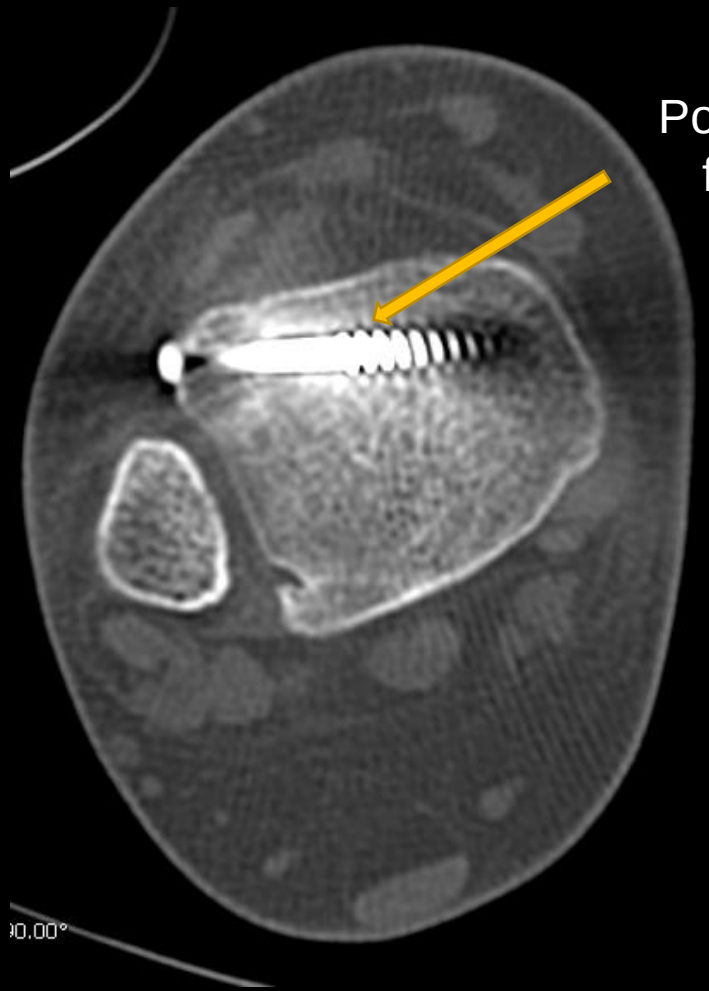
Final Dx:

Juvenile Tillaux Fracture

Case Timeline

- Initial imaging showed minimally displaced fracture of lateral aspect of distal tibial epiphysis
- Significant for right tillaux ankle fracture, closed
- Orthopedic surgery was consulted, and patient was scheduled for closed reduction with percutaneous screw fixation 2 days later

Post- op CT



Axial view

Post screw fixation

Coronal view

Reduction of epiphysis gap

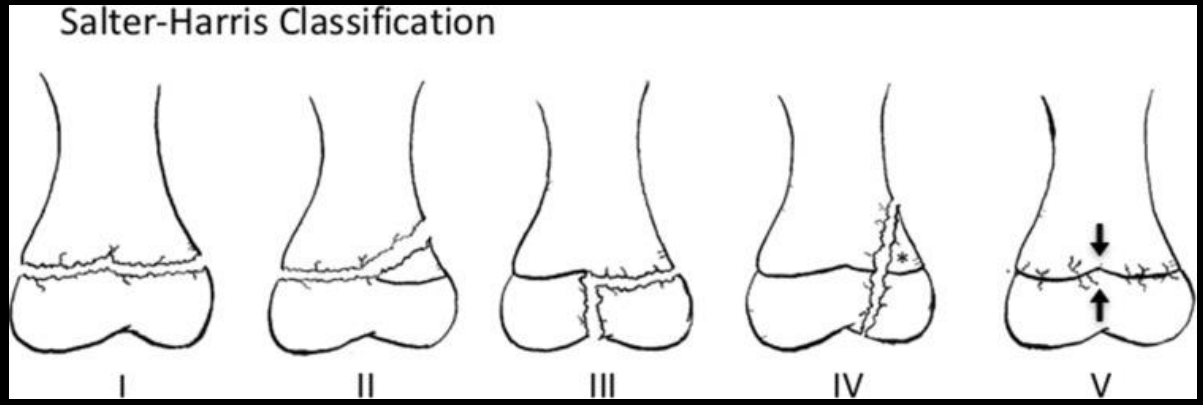
Sagittal view

Case Discussion

- Tillaux fractures is a common traumatic injury, caused by external rotatory force
  - Leads to avulsion fracture of lateral distal bony epiphysis
- Presents in adolescents
  - Pattern of fracture requires partial closure of distal tibial physis
  - Normally occurs within 1 year of closure in adolescents
  - Pattern of physis closure: central -> anterior/medial -> anterior-lateral
  - Antero-lateral portion closes last and is susceptible to fracture

Case Discussion

- Salter-Harris Type III Fracture
  - Intraarticular
  - Enters through physis plane and exit through epiphysis
- 15% of juvenile long bone injuries involve epiphysis
  - Juvenile tillaux fractures occur near the end of physeal closure
- Premature growth arrest is rare
- Risk of early arthritis



Case Discussion

- Patient typically presents with tenderness and swelling at ant/lateral ankle
  - Symptoms similar to ankle sprain
- Requires x-ray to rule out fracture in this age group
- CT may be required to rule out triplane fracture
  - Also caused by external rotatory forces
  - Fracture extends to include metaphysis
- Displacement dictates type of treatment
  - Minimal displacement – non-op and stabilize with short cast
  - Displaced fracture with disrupted articular surface – possible operation with screw fixation or ORIF

References:

- Habusta SF, Shamrock AG, Griffin EE. Tillaux Fracture. [Updated 2020 Aug 16]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2020 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK482332/
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- Felman, A. "Tillaux Fractures of the Tibia (in Adolescents)." *Pediatric Radiology*, vol. 20, no. 1-2, 1989, pp. 87–89, doi:10.1007/BF02010642.
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