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# Turf Toe Injury

By

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Foot, Ankle, Shoulder



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# History

- 1966- Houston Astrodome
- First professional sports stadium with synthetic turf installed
- Dense carpet nylon, no fill.
- Skin abrasions, high ball-bounce, new injuries



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# History

- Bowers and Martin 1976
- Turf Toe-  
Hyperextension Injury  
due to hard surface  
and shoe flexibility
- 5 to 6 cases of turf toe  
a season in American  
football players.



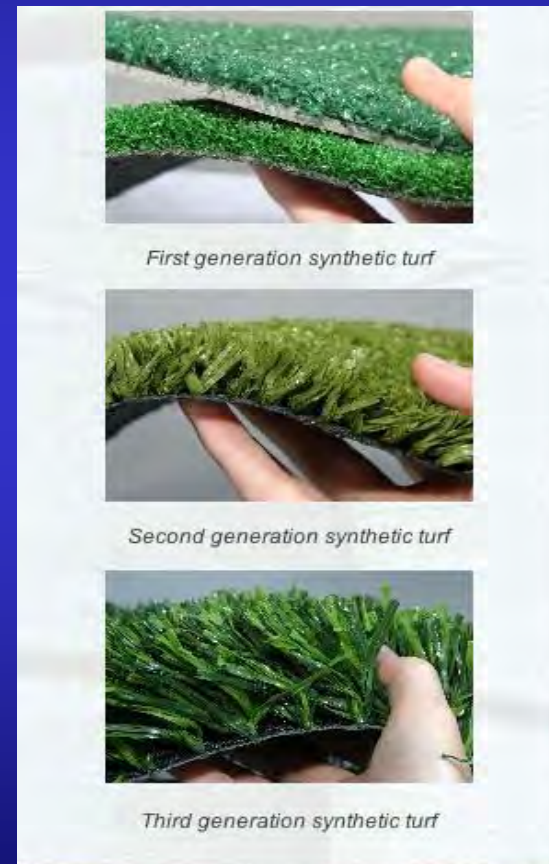
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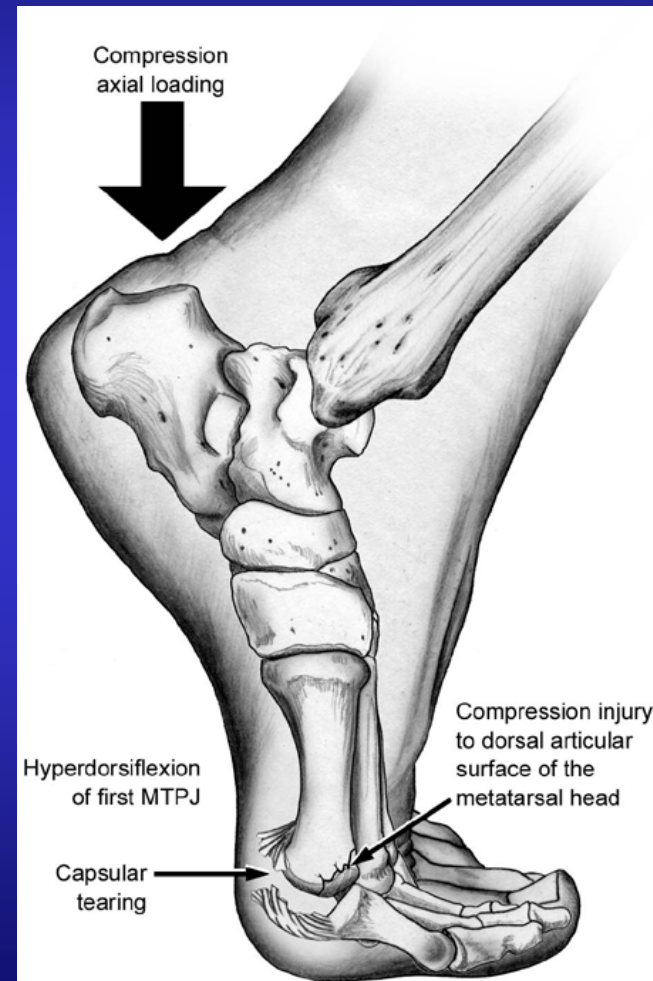
# History

- Rodeo et al suggested artificial turf as risk factor for turf toe
- 1990 - 83% of professional football players sustained the injury on artificial turf.



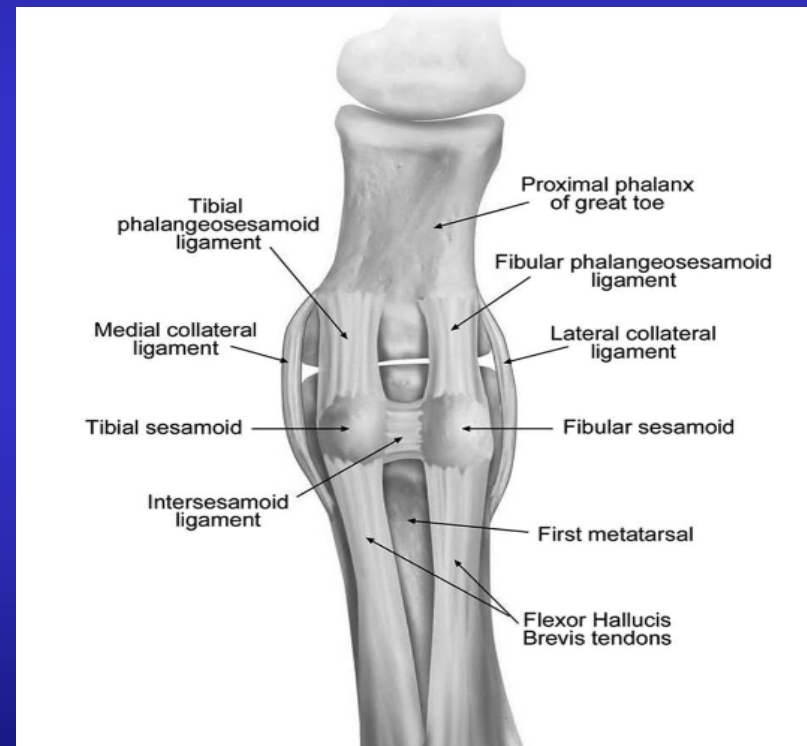
# Turf Toe defined.

- Plantar MTP capsuloligamentous injury resulting in pain, disability and instability.
- Injury patterns include strain, tear, dislocation, MTP impaction, sesamoid fracture.



# Anatomy

- Little bony stability, most soft tissue
- Static Constraints
- Collateral ligament and metatarso-sesamoid ligament
- Plantar Plate
  - Thickening plantar capsule
  - Stronger at prox phalanx



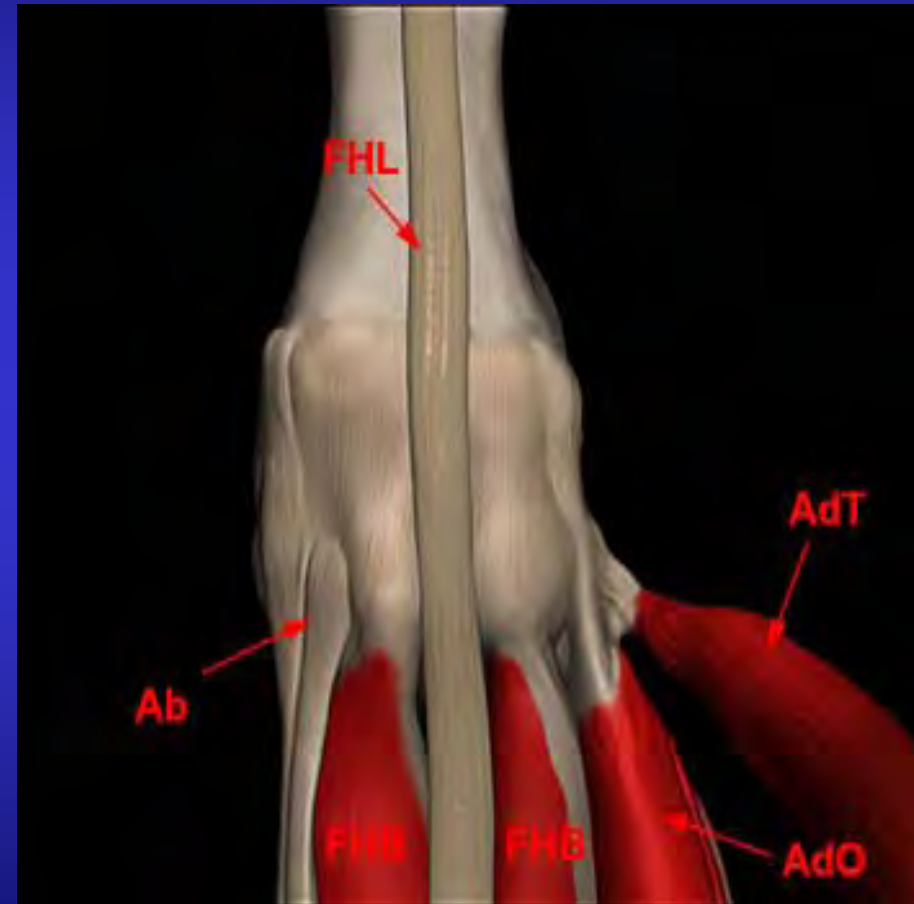
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# Anatomy

- Dynamic Constraints
  - Flexor hallucis brevis and sesamoids
    - Insert to plantar plate
  - Adductor hallucis
  - Abductor hallucis
    - Both insert into medial and lateral FHB heads





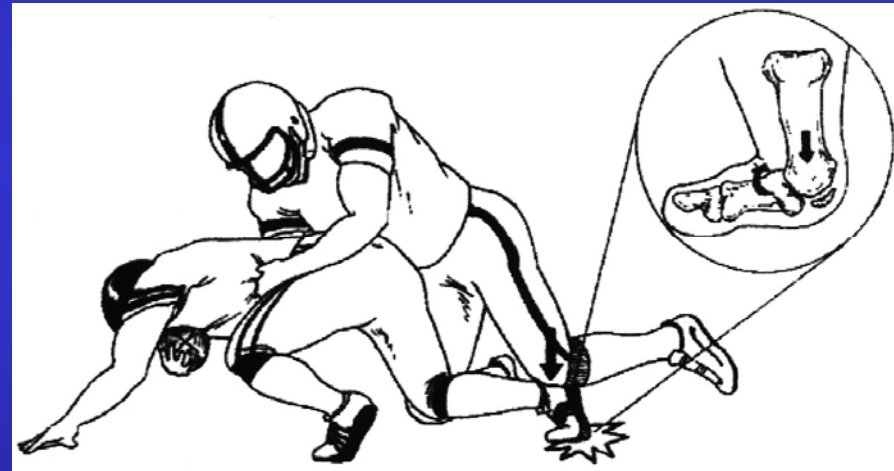
# Relevance of MTP joint

- Normal gait
  - Capsuloligamentous complex of MTP joint withstands 60% body weight.
  - Running- 2-3 X body weight
  - Jumping – 8 X body weight.



# Mechanism of injury

- Axial load to foot in fixed equinus at ankle, great toe in hyperextension.
- Football- player landing on back of foot.



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# Traumatic Hallux Valgus

- Medial structures can be damaged more than lateral
- Lateral contraction



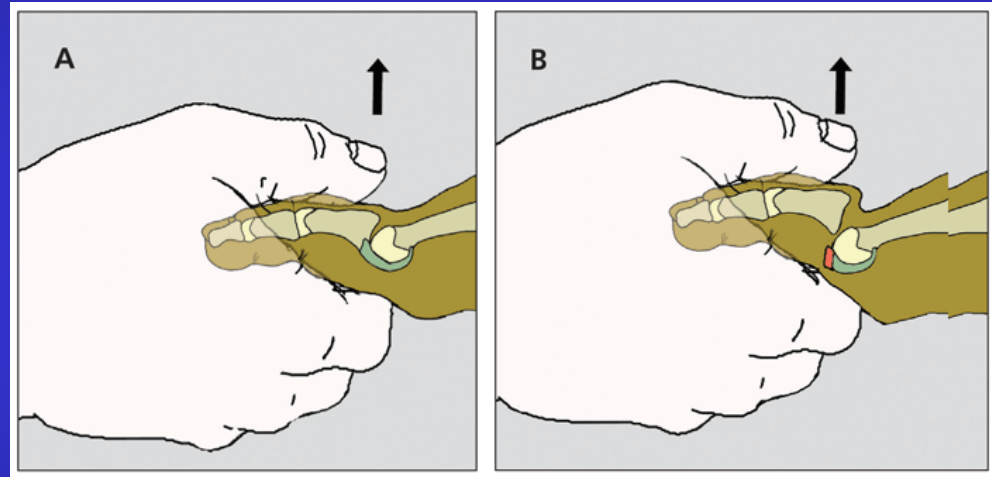
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# Assessment

- Pain at the MTP joint
- Ecchymosis, Swelling
- Pain distal to sesamoids
- Drawer tests for instability/pain
- Decreased plantarflexion strength

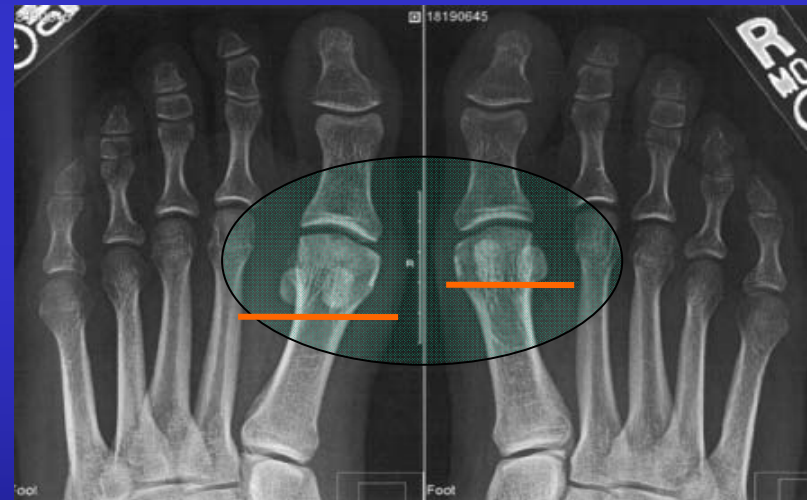


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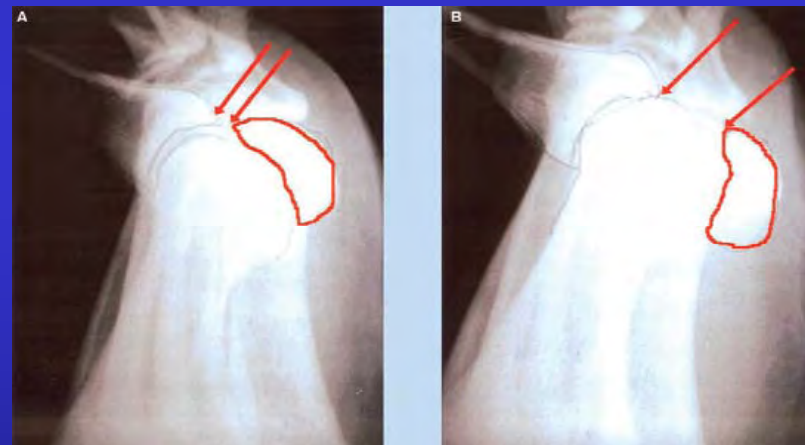
# Imaging

- Standard WB AP, L, Oblique radiographs
- Sesamoid Axial radiographs.
- Proximal migration of sesamoids
- Sesamoid fx



# Dynamic Radiographs

- Forced dorsiflexion lateral view
- Lack of migration of sesamoids indicates plantar plate rupture.



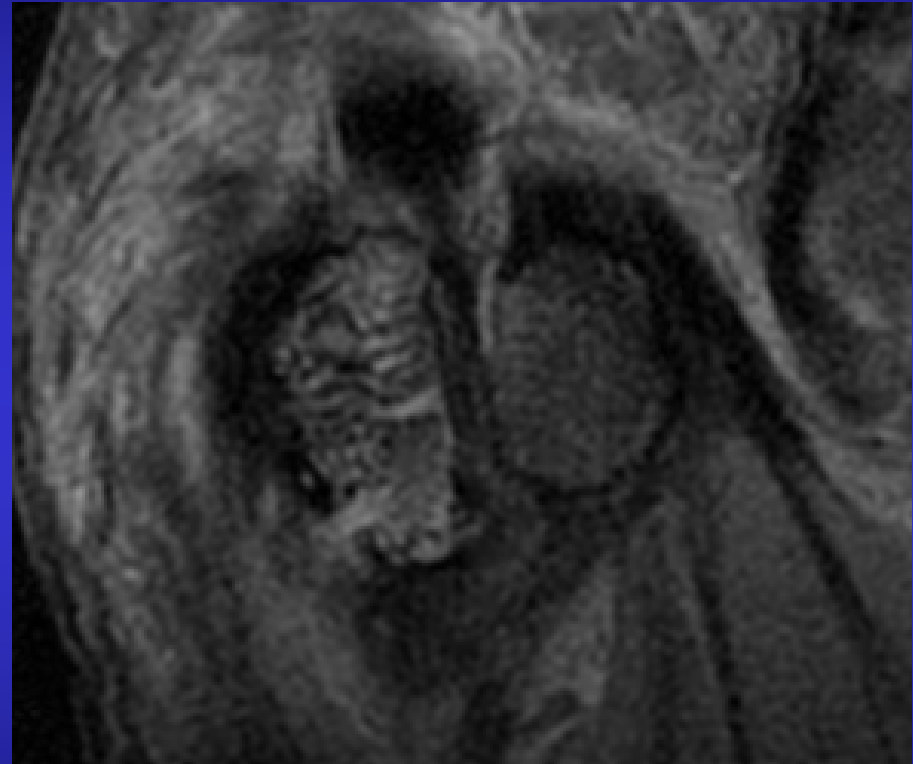
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# MRI

- Confirm suspicion of injury
- Helps with grading
- Demonstrate Chondral injury



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# MRI 1<sup>st</sup> MTP JOINT

- NOT MRI Foot
- NOT MRI forefoot
- If you want detail you have got to ask for it:
  - MRI 1st MTP joint, high resolution
  - 8 cm field of view, 2mm slices.
- Images from James Linklater

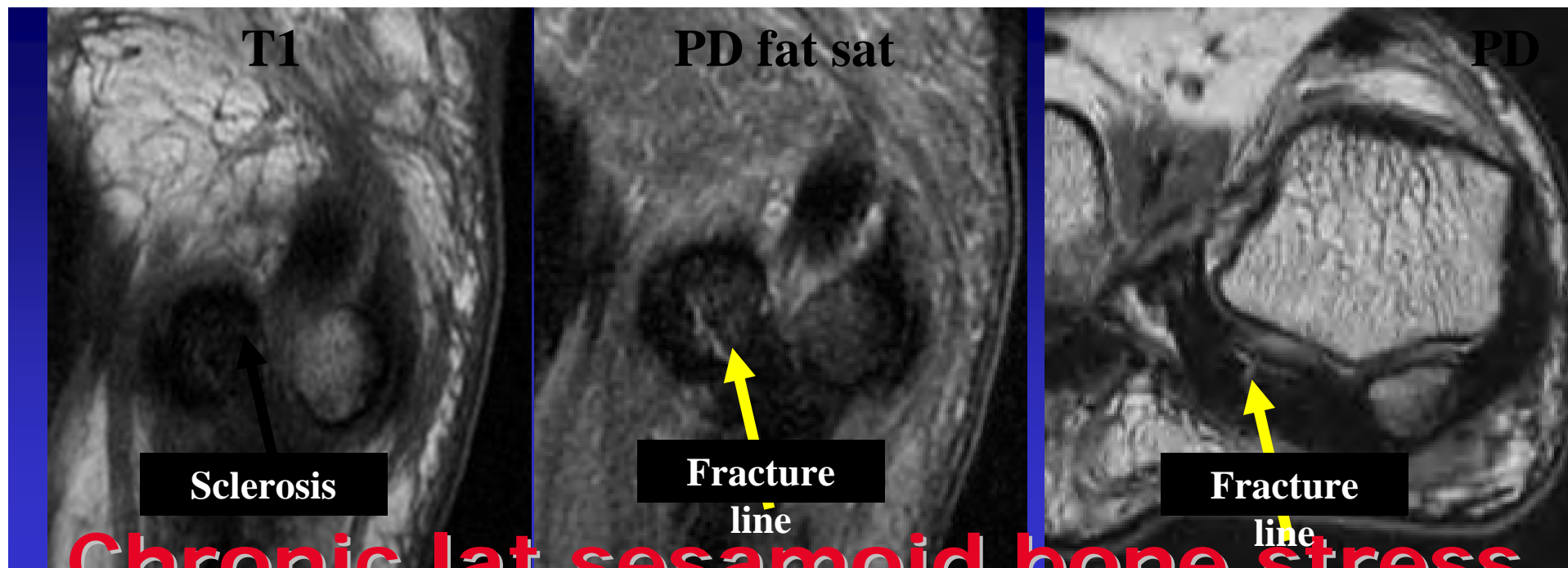


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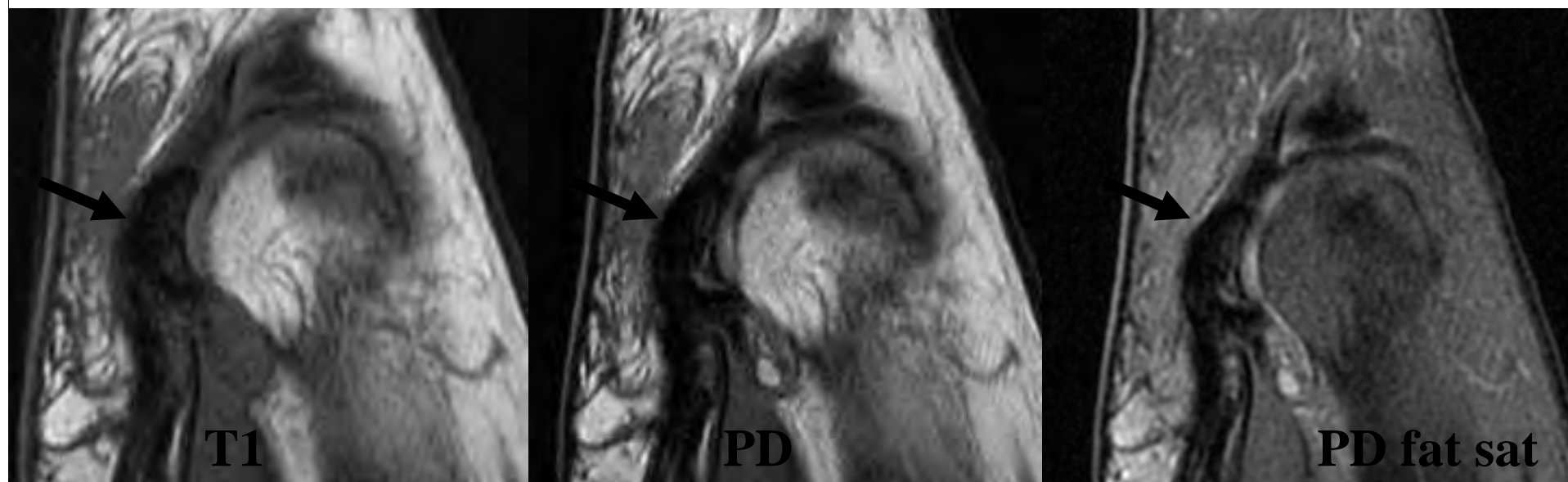
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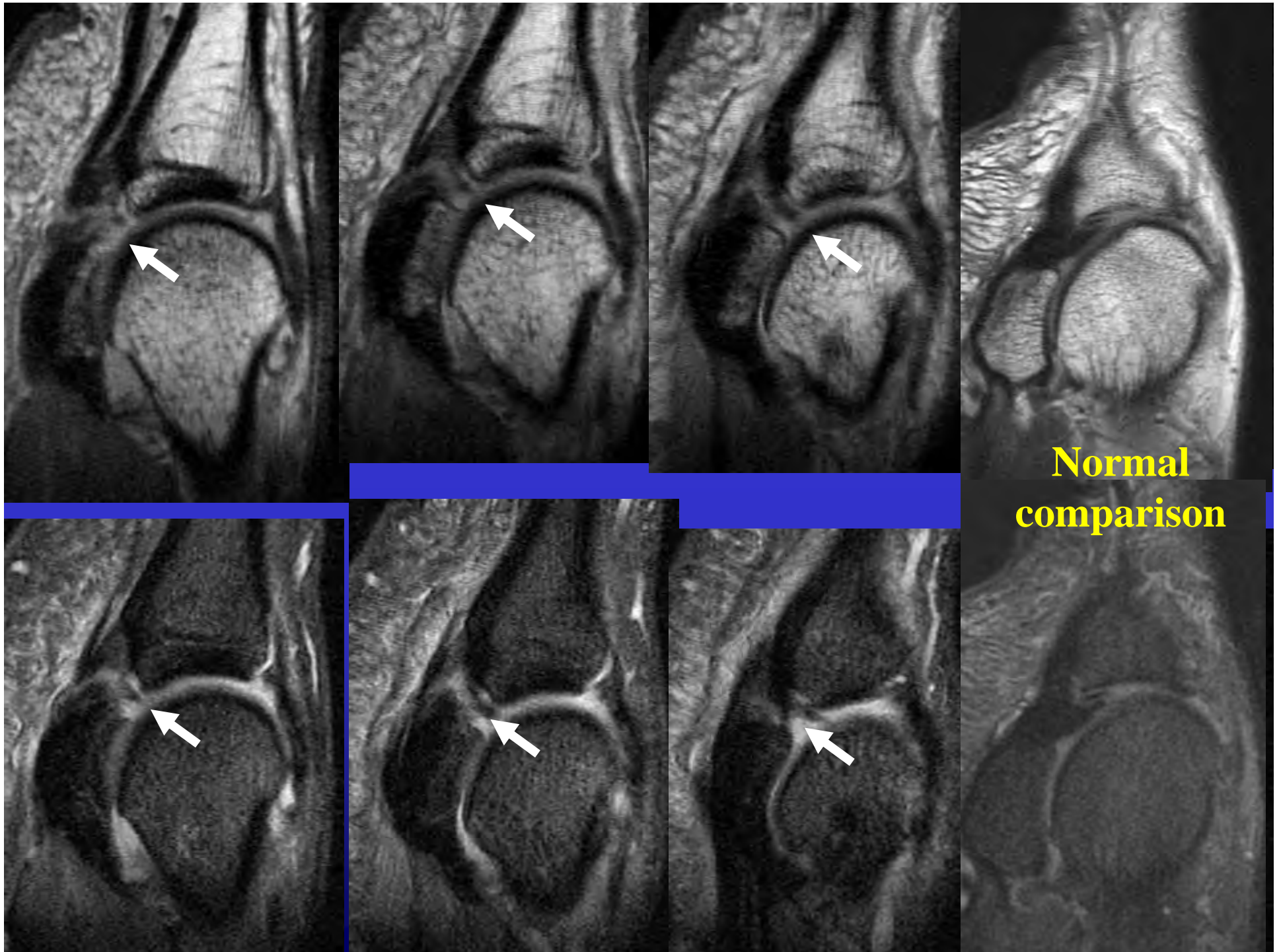
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## Chronic lat sesamoid bone stress & Fx





# 1<sup>st</sup> MT Head Chondral Lesion





# Grading system

Table 1. Summary of turf toe grading and treatment.<sup>a</sup>

Grade	Description/Findings	Treatment	Return to Play
I	Attenuation of plantar structures Localized swelling Minimal ecchymosis	Symptomatic	Return as tolerated
II	Partial tear of plantar structures Moderate swelling Restricted motion due to pain	Walking boot Crutches as needed	Up to 2 weeks May need taping on return to play
III	Complete disruption of plantar structures Significant swelling/ecchymosis Hallux flexion weakness Frank instability of hallux MTP	Long-term immobilization in boot or cast <i>OR</i> Surgical reconstruction	10 to 16 weeks depending on sport and position Likely to need taping on return to play

<sup>a</sup>MTP, metatarsophalangeal. Adapted from Anderson RB, Shawen SB. Great-toe disorders. In: Porter DA, Schon LC, eds. *Baxter's The Foot and Ankle in Sport*. 2nd ed. Philadelphia, PA: Elsevier Health Sciences; 2007:411-433.



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# Treatment Non-operative

- RICE
- NSAIDS for pain
- Walking boot
- Position toe in slight plantarflexion
- Protect from dorsiflexion



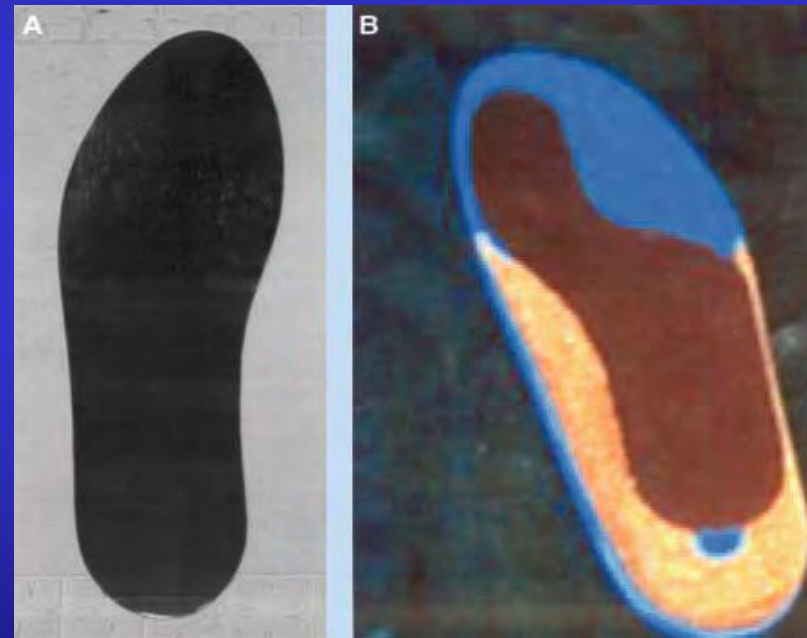
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# Orthotics

- Stiff soled shoe
- Turf Toe Plate
- Orthotic with Morton's Extension



# Taping of Toe

- Held in slight plantar flexion
- Prevent dorsiflexion
- NOT during acute swelling



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# Surgical Treatment

- Restore anatomy
- Restore Stability
- Remove blocks to motion

Table 2. Surgical indications for turf toe injury.<sup>a</sup>

Indications for Surgical Repair of Turf Toe Injury
Large capsular avulsion with unstable MTP joint
Diastasis of bipartite sesamoid
Diastasis of sesamoid fracture
Retraction of sesamoid
Traumatic hallux valgus deformity
Vertical instability (positive Lachman test result)
Loose body in MTP joint
Chondral injury in MTP joint
Failed conservative treatment

<sup>a</sup>MTP, metatarsophalangeal. From McCormick JJ, Anderson RB. The great toe: failed turf toe, chronic turf toe, and complicated sesamoids injuries. *Foot Ankle Clin.* 2009;14(2):135-150.



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# Outcomes

- Coker (1978)- long term **stiffness**
- Clanton (1986)- 50% persistent symptoms of pain and **stiffness** at MTP joint
- Brophy (2009)- **Decreased dorsiflexion**
- Anderson (2002)- 19 Turf Toes elite athletes, 9 required operative repair, 17 returned to same level sport.



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# Summary

- Outcomes remain poor for turf toe injuries
- Awareness
- Prompt Diagnosis



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# Summary

- Proper investigation
  - Grading
  - Prognosis
  - Treatment
- Significant Time off sport



# Thank you



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