

Plantar Talar Head Contusions and Osteochondral Fractures: A Predictor of Ligamentous and Osseous Injury in Ankle Trauma?

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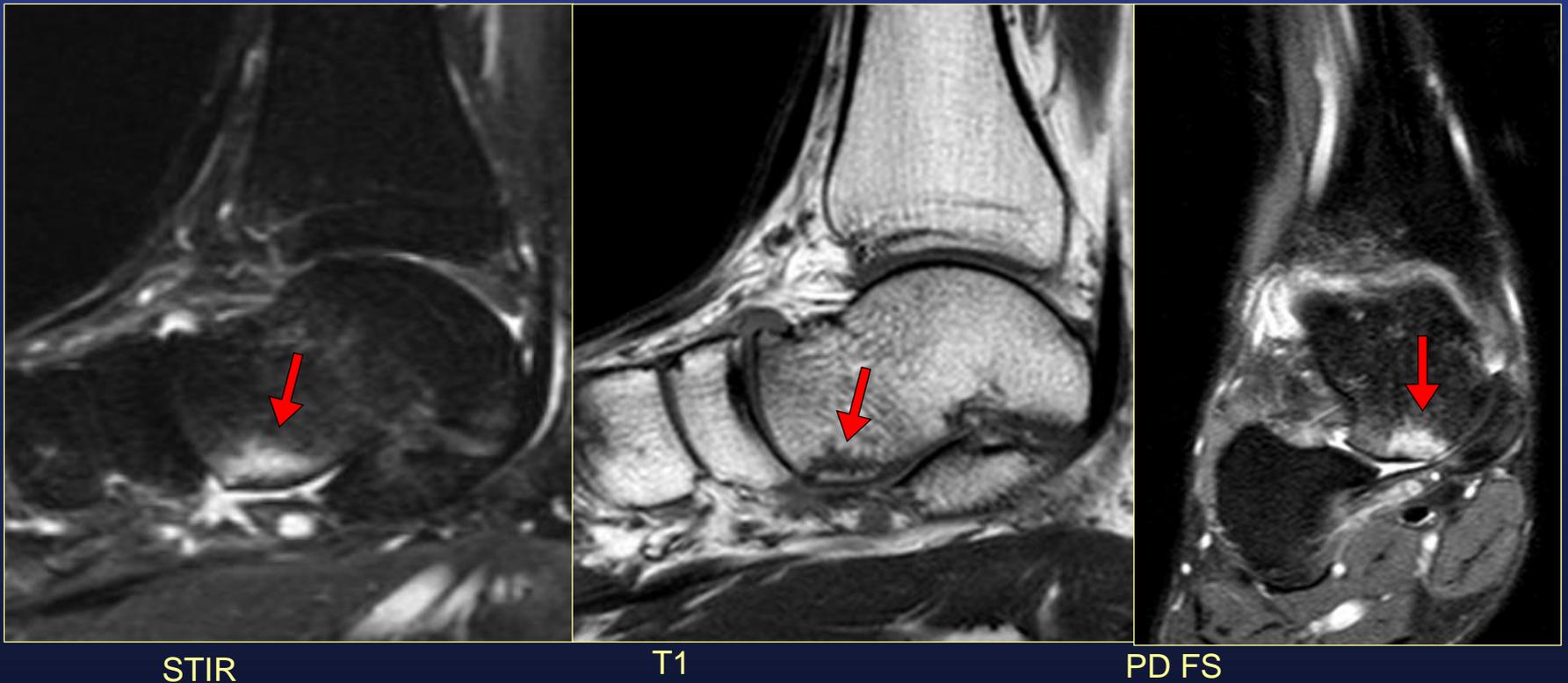
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BACKGROUND

- Bone bruises and fractures are common findings on ankle MRI in setting of trauma
- Studied by multiple investigators (22 articles)
 - Patterns of bone bruises and associations with ligamentous injuries
- We encountered a distinct pattern of focal bone bruising and osteochondral fractures of the **plantar aspect of the talar head**

Osteochondral fracture of the plantar aspect of the talar head:

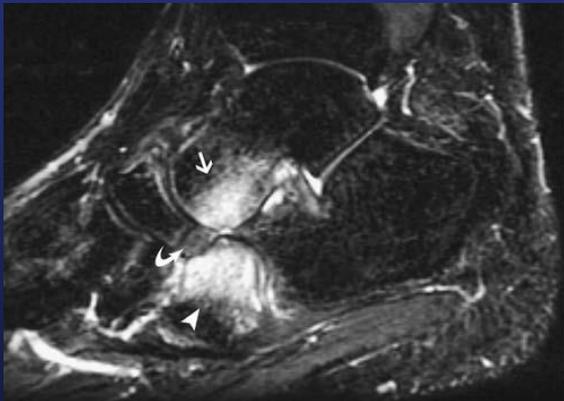


25-year-old male with ankle pain after acute trauma

BACKGROUND

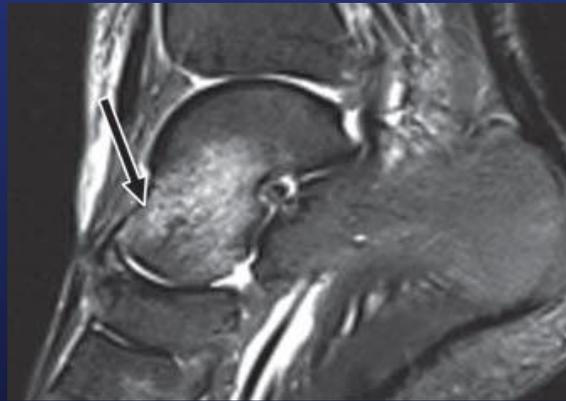
Literature on plantar talar head contusion/ fracture

“MRI of Rupture of the Spring Ligament Complex with Talo-Cuboid Impaction. Case report.”



Kavanagh et al.
Skeletal Radiol 2007

“Insufficiency and Nondisplaced Fractures of the Talar Head: MRI Appearances”



Long et al. AJR 2012

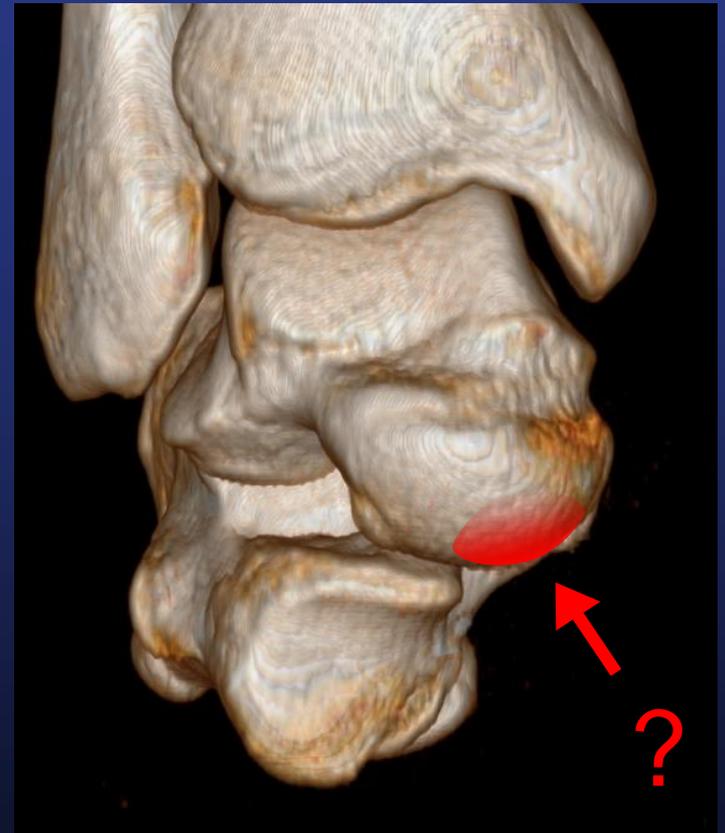
“The Spring Ligament Recess of the Talocalcaneonavicular Joint”



Desai et al. AJR 2011

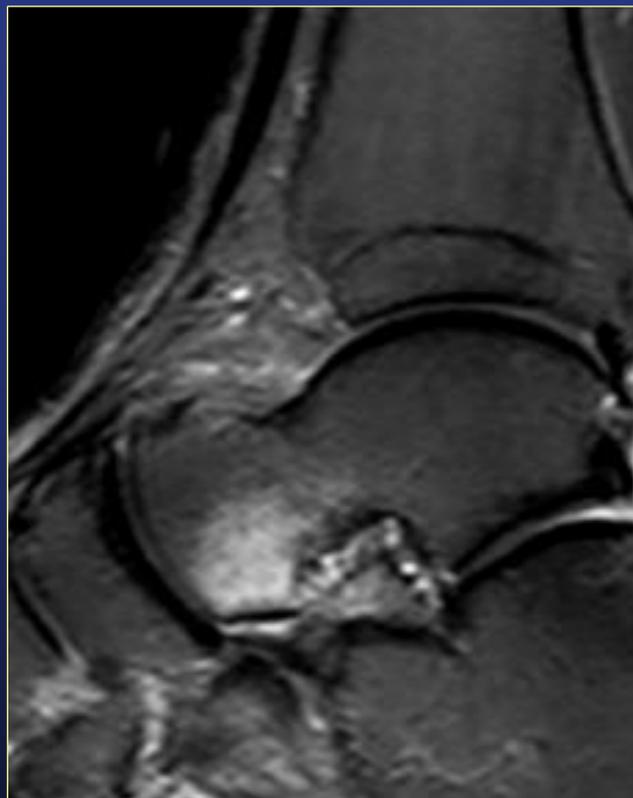
PURPOSE

- Examine the relationship between
 - Bone bruises and/or osteochondral fractures of the plantar talar head and
 - Ligamentous and other osseous abnormalities on ankle MRI
- Hypothesize a mechanism of injury



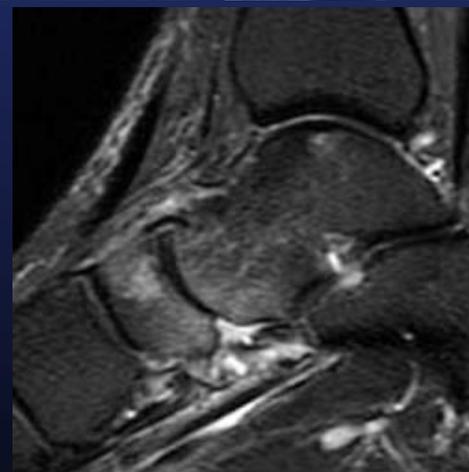
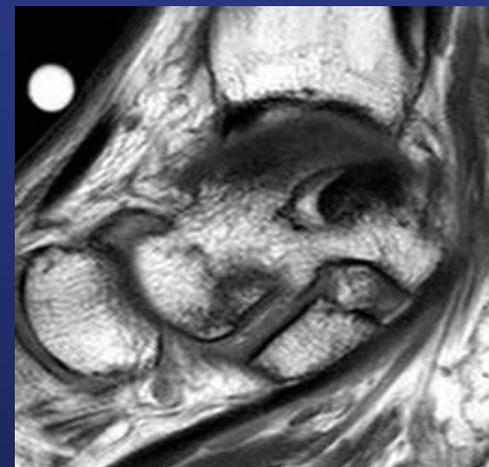
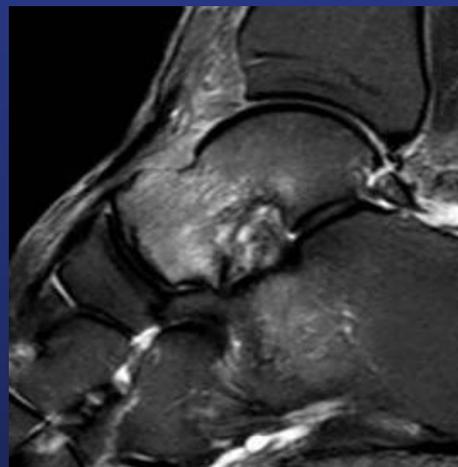
METHODS AND MATERIALS

- Electronic database search:
 - Ankle MRI studies with reported osseous injuries
 - 5 years
 - 589 cases
- Inclusion criteria:
 - ✓ Bone bruises / osteochondral fractures involving the plantar aspect of the talar head
 - ✓ History of acute trauma within the past 6 months



METHODS AND MATERIALS

- Excluded:
 - Diffuse midfoot marrow edema
 - Diffuse talar head edema
 - Talar head osteonecrosis
 - Calcaneonavicular coalition
 - Gross talar head fractures
 - Periarticular marrow edema with effusion and synovitis
 - Follow up MRI studies of the same ankle



METHODS AND MATERIALS

Structures Evaluated

Osseous :

- Talus
- Medial malleolus
- Lateral malleolus/
Distal fibula
- Posterior malleolus
- Calcaneus
- Navicular
- Cuboid

Ligamentous:

- Lateral ligamentous complex
 - Anterior talofibular lig
 - Calcaneofibular lig
 - Posterior talofibular lig
- Deltoid lig
- Spring lig
- Syndesmotic lig

Other:

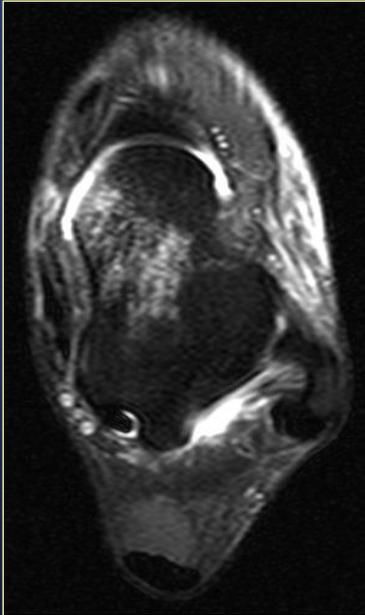
- Medial tendons
- Peroneal tendons
- Extensor digitorum brevis
- Achilles tendon

RESULTS

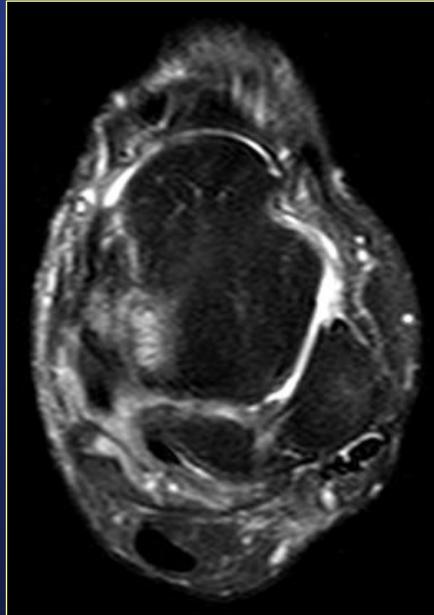
- **37** of 589 studies met inclusion criteria
- Age 29.4 ± 16.0 , mean age 23
- 20 ♂, 17 ♀
- Delay from injury to imaging
 - Mean \pm SD = **25.2 days** \pm 32.6
 - Range 1 to 168 days

RESULTS

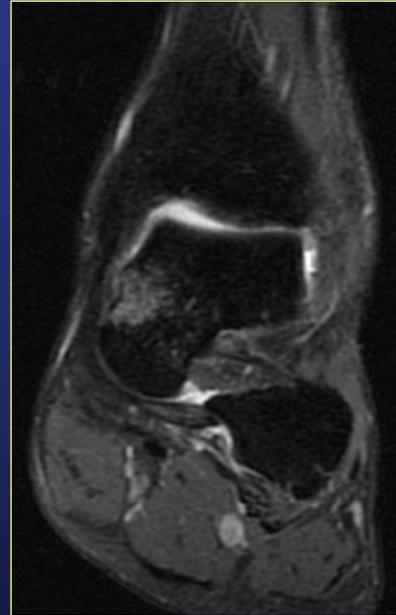
Talar contusions, location



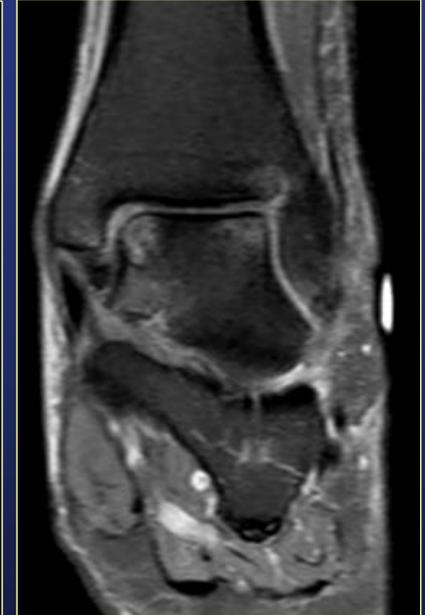
Anteromedial



Posteromedial



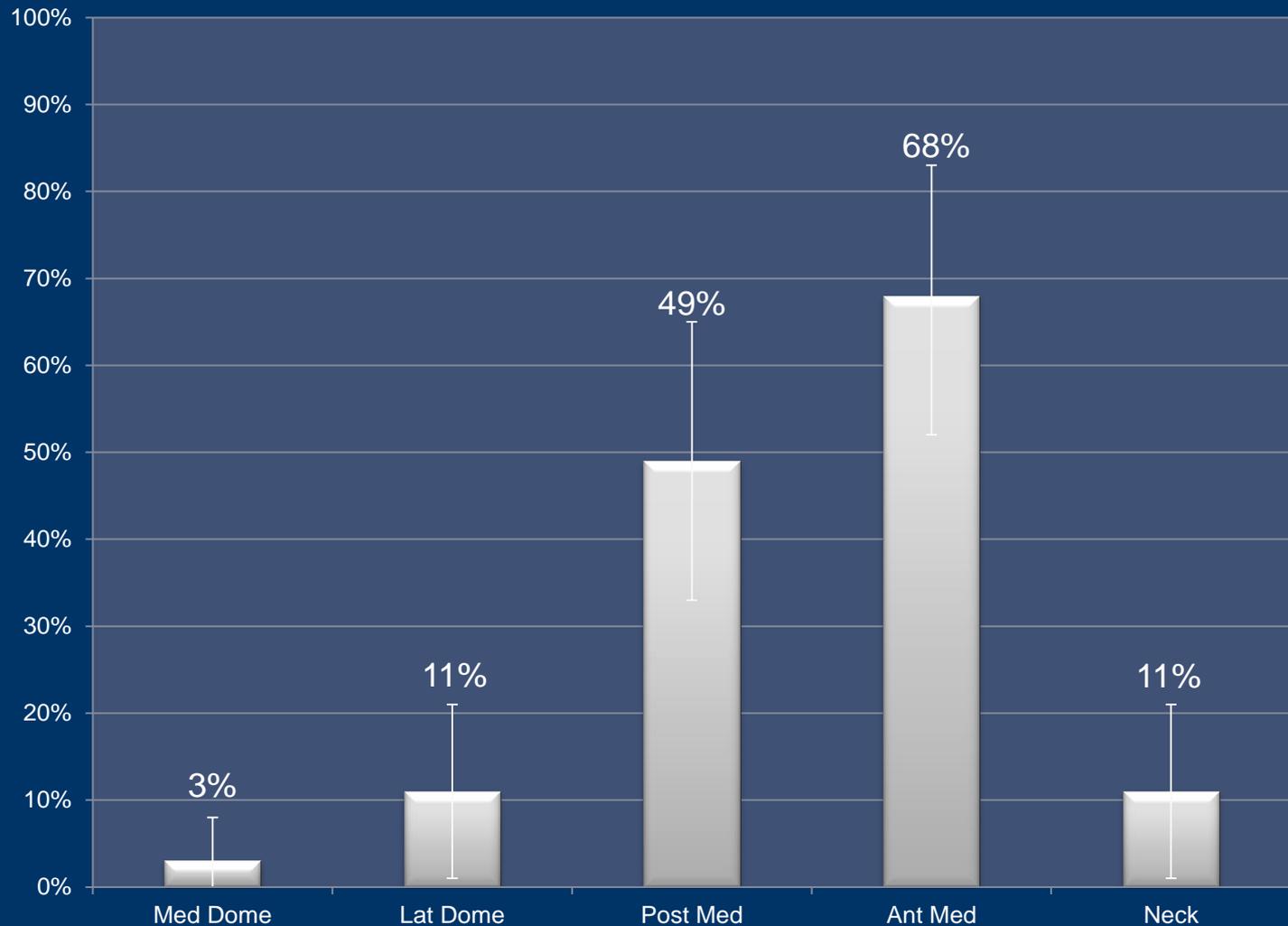
Neck



Medial and Lateral
Domes

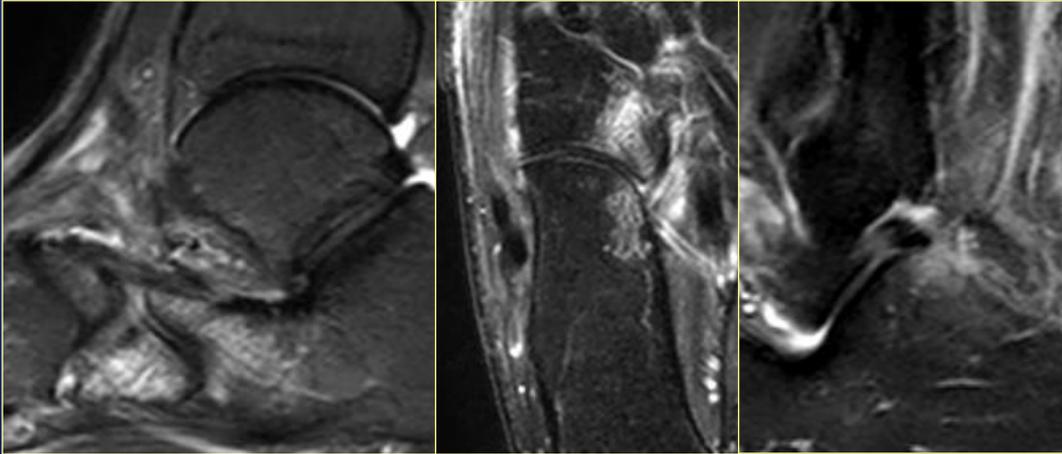
RESULTS

Talar contusions, location

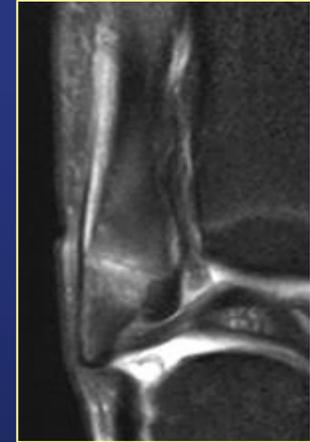


RESULTS

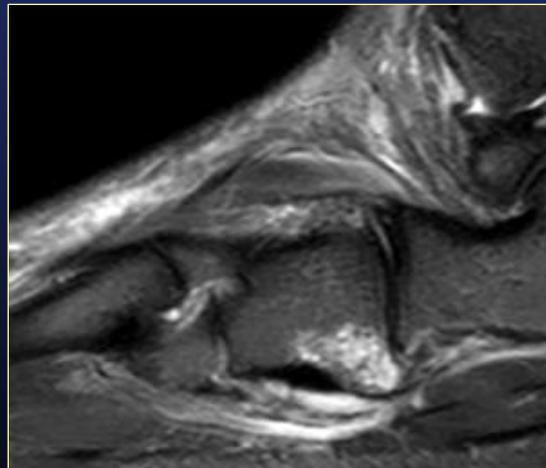
Other contusions



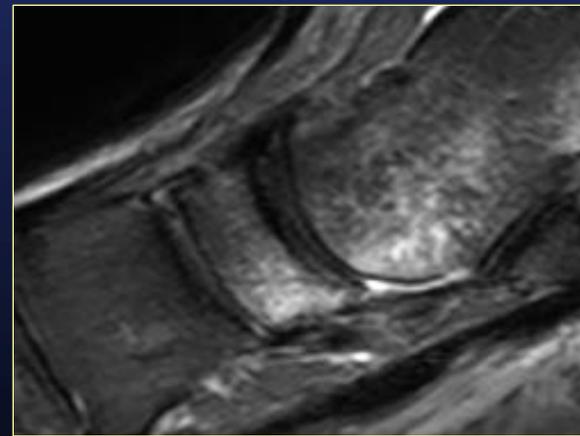
Calcaneus



Salter-Harris fracture of distal fibula



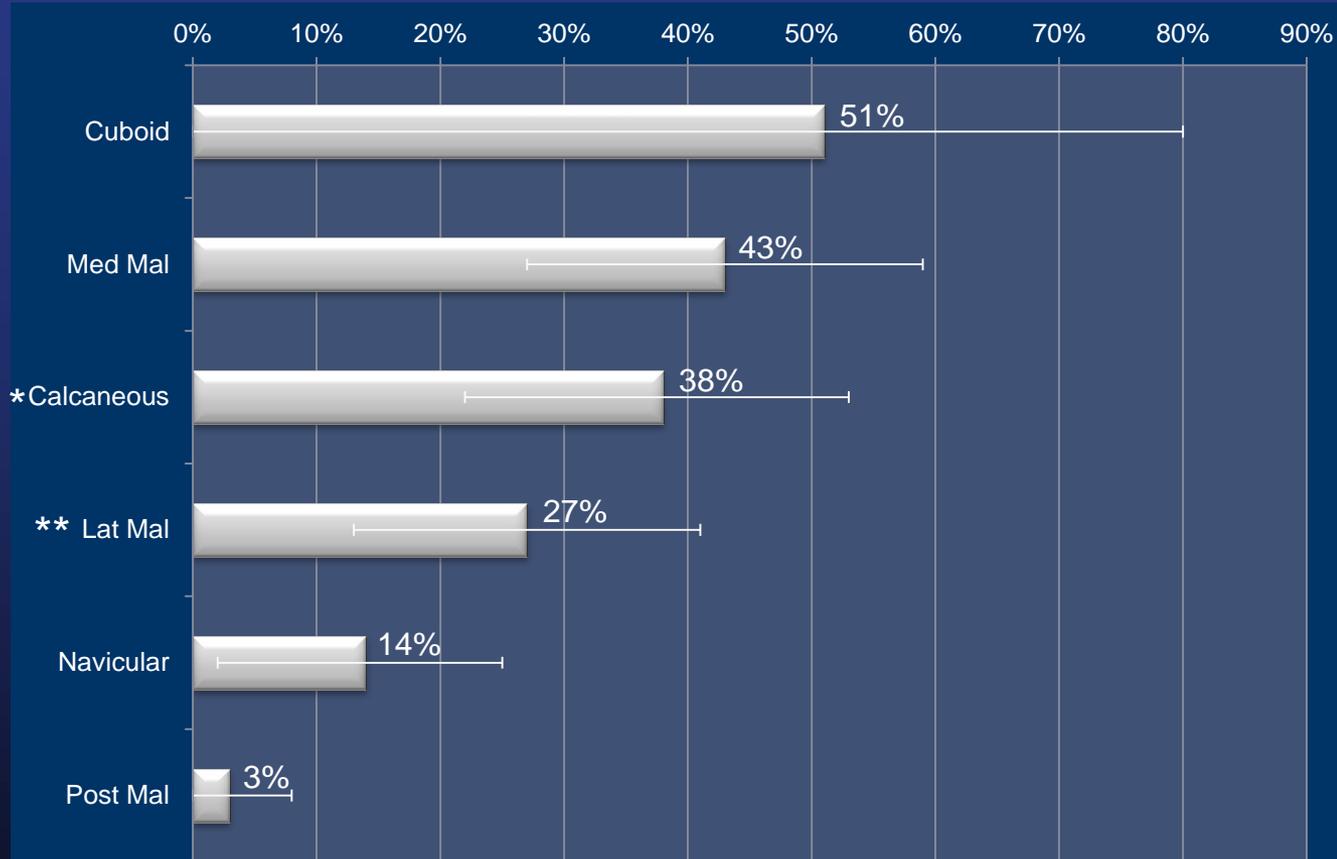
Cuboid



Navicular

RESULTS

Other contusions

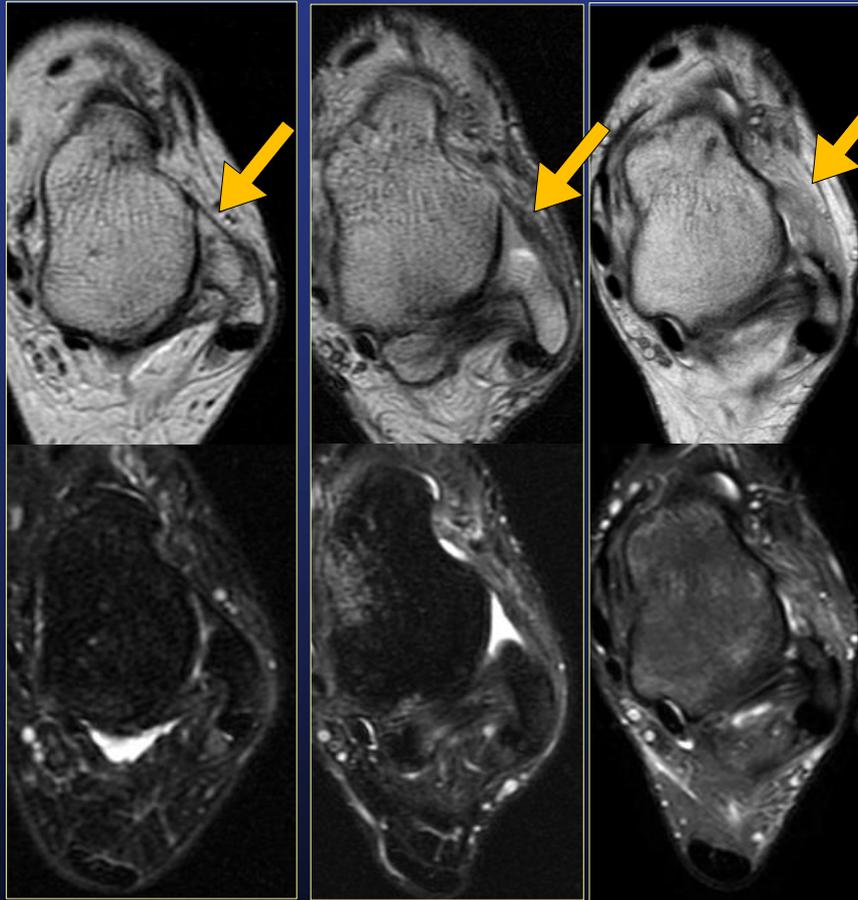


* 11 of 14 cases involved the **anterior process of the calcaneus**

** 5 of 9 patients age ≤ 16 had **Salter-Harris type fractures of the distal fibula**

RESULTS

Ligaments

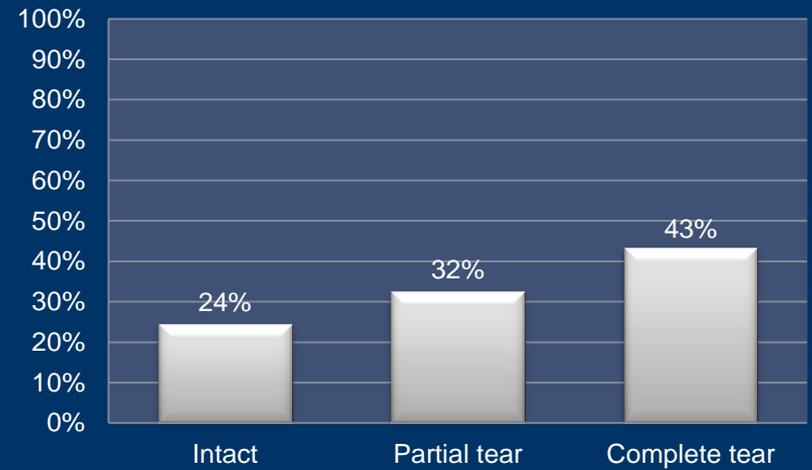


Intact

Partial tear

Complete tear

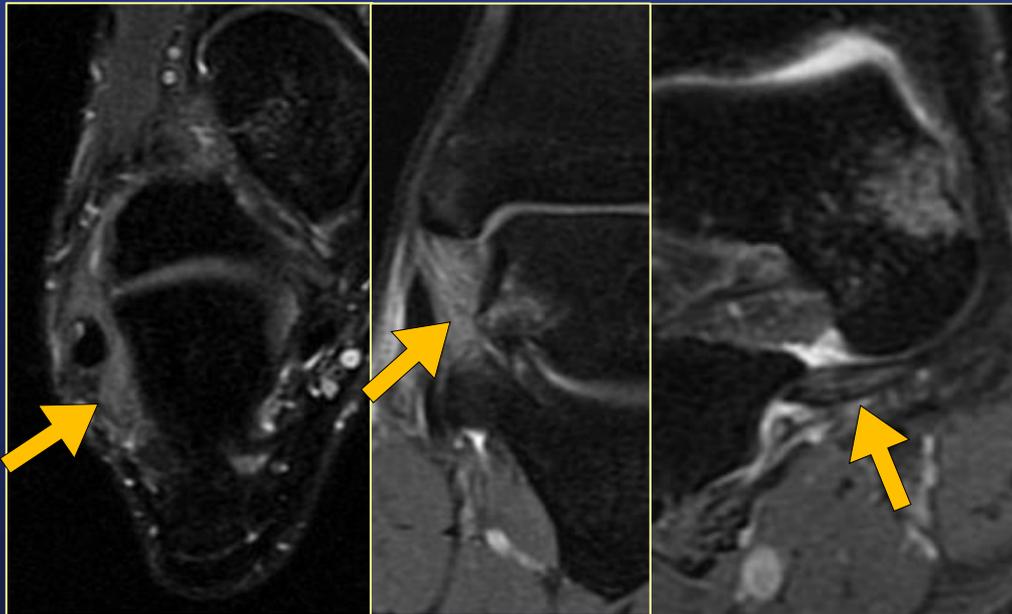
Anterior Talofibular Ligament



% total abnormal = **76%**

RESULTS

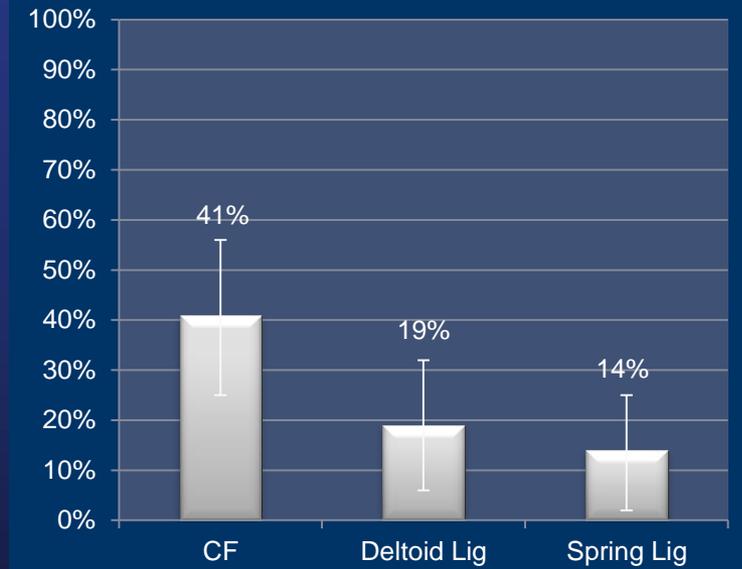
Ligaments



Calcaneofibular
ligament

Deltoid
ligament

Spring ligament



RESULTS

Extensor digitorum brevis



- 27% had strain or avulsion
- 16% had both

RESULTS

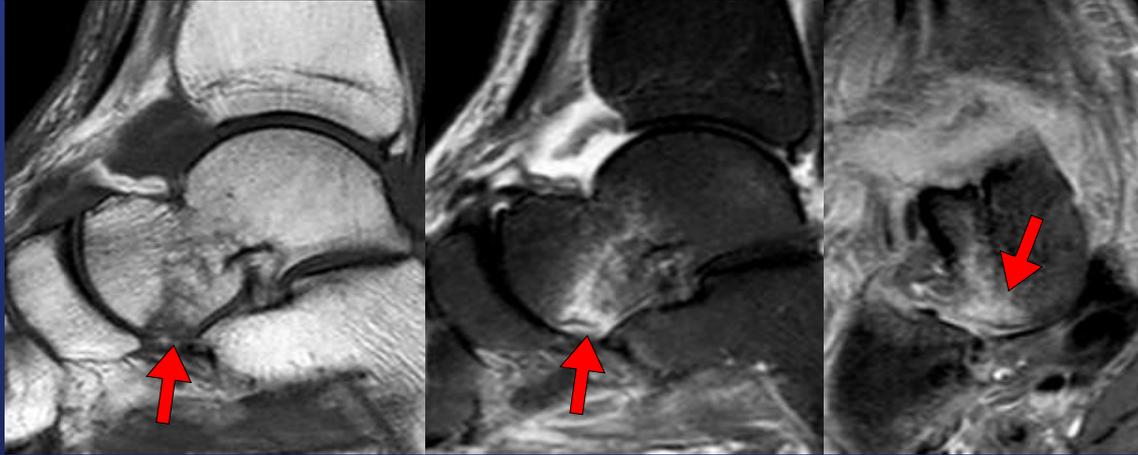
Summary

- 86% (32/37) had other concurrent osseous injuries
- 76% (28/37) showed lateral ankle ligamentous sprain
- 51% had multi-ligamentous injuries

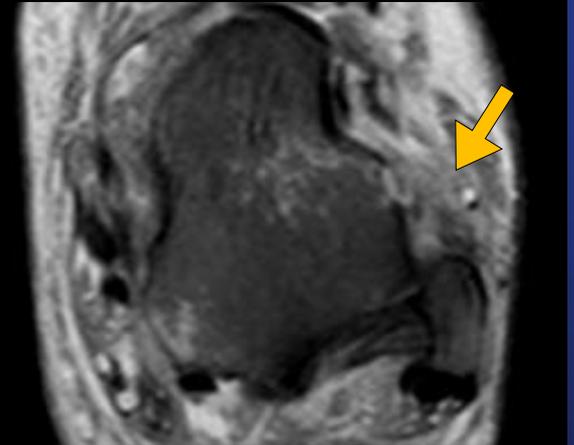
CASE EXAMPLE

57yo female, twisting injury to left ankle 10 days prior

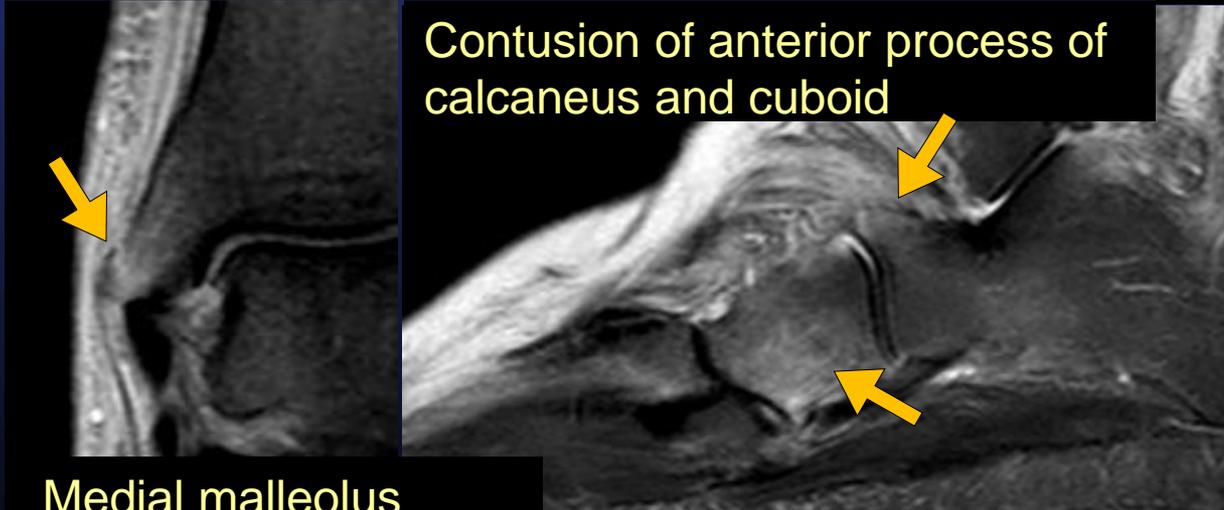
Osteochondral fracture of plantar talar head



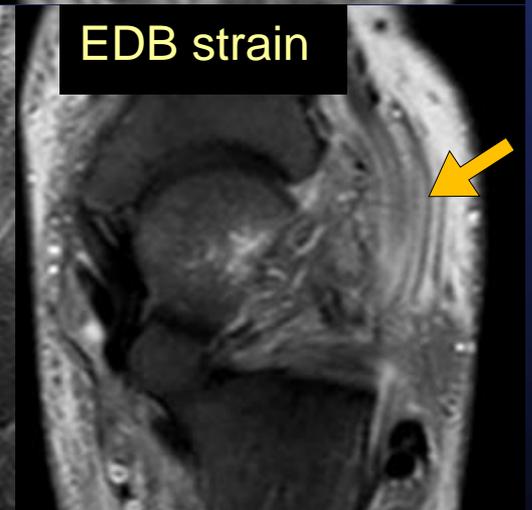
ATFL complete tear



Contusion of anterior process of calcaneus and cuboid



EDB strain

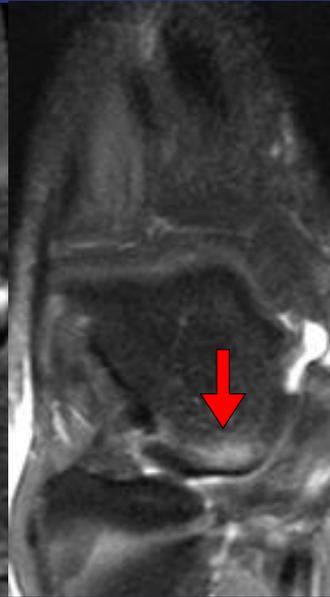
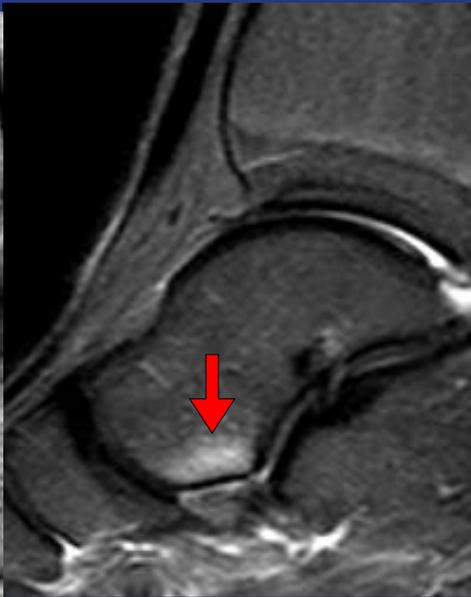
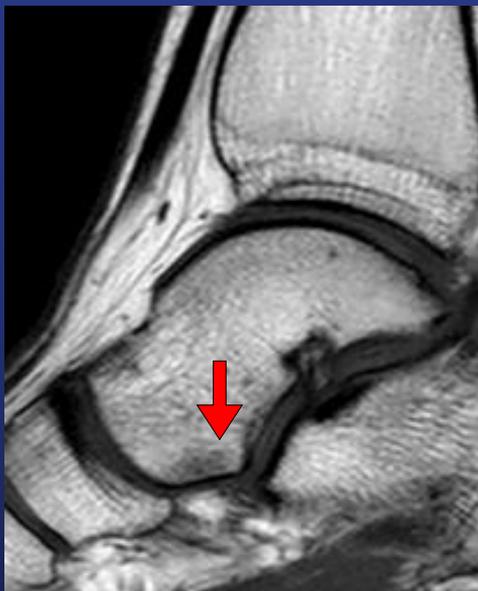


Medial malleolus fracture



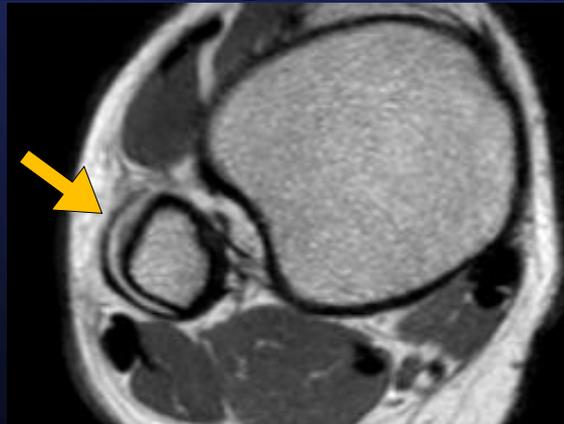
CASE EXAMPLE

13yo male with ankle pain, injury 10 days ago



Bone contusion of plantar talar head

Salter-Harris type fracture of distal fibula with subperiosteal hematoma



DISCUSSION

Patterns of talar contusions most frequently described in literature involve the talar dome, body, and neck

- Labovtiz et al. Foot Ankle Int 1998
- Elias et al. BMC Musculoskeletal Disorders 2008

Nishimura et al described 4 patterns of bone bruising and correlation between talar contusions and lateral ligamentous injuries

- Does not address plantar talar head contusion

Desai et al studied spring ligament recess

- 16 of 49 patients had “talar head impaction injury”
- 15 of those had lateral ankle sprain
- 4 had spring ligament tear

DISCUSSION

- Plantar talar head contusion implies *increased severity of ankle injury*
 - Multiple other contusions
 - Multi-ligamentous injury
- Probably due to *inversion-supination mechanism*
 - medial distribution of bony contusions
 - high prevalence of injuries to the lateral ankle ligaments

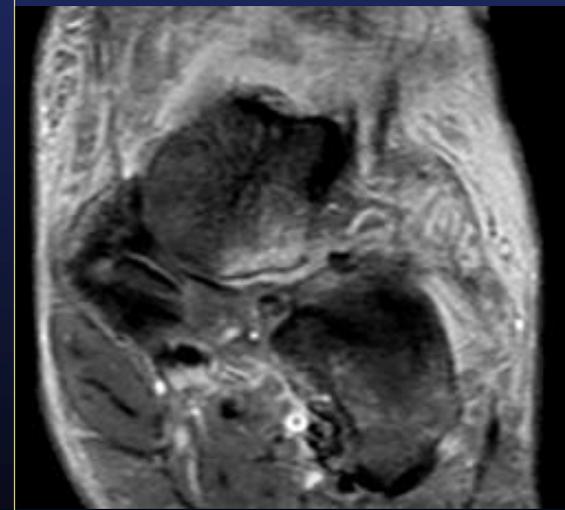
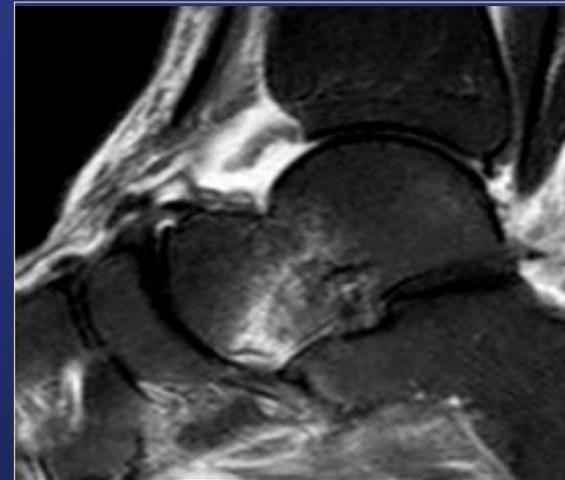
LIMITATIONS

- Retrospective review
- No control group
- Variable time from injury to imaging
 - different healing time for various abnormalities
- No long term clinical or imaging follow-up to determine the outcome

CLINICAL RELEVANCE

Plantar Talar head contusion

- Search for concurrent osseous and ligamentous injuries
- In adolescents, they can be associated with Salter-Harris type injury to distal fibula



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