40 yr old female runner presents with ongoing posterior foot / heel pain

Ultrasound:

- Achilles tendon preserved with no significant tendinopathy
- Minor Haglund deformity with trace of fluid at superior calcaneal bursa
- Small fluid collection lying in the posterior recess subtalar joint
- Ligamentous structures and ankle tendons intact

➢ Suggested MRI for further assessment

MR right ankle/foot:

- Coronal/oblique plane jagged linear low signal through the superior cortex and medullary bone of the calcaneal body consistent with stress fracture (*classic* appearance – perpendicular to dorsal surface)
- Marked adjacent marrow oedema

Discussion: Stress Fractures of the Foot & Ankle
Stress fractures or 'march fractures' first described by Breithaupth, a Prussian army physician in 1855.

- ***Chronic, repetitive injury that leads to incomplete or complete macroscopic fracture***
  - *Stress response*: Marrow oedema or long-segment periosteal reaction without fracture line
  - *Fatigue fracture*: Fracture due to abnormal stress on normal bone
  - *Insufficiency fracture*: Fracture due to normal stress on weak bone
  - *Pathologic fracture*: Fracture due to underlying tumour or infection
- Often overlap between fatigue and insufficiency fractures
- Foot biomechanics as well as overload predispose to stress fractures

Imaging

MRI (modality of choice)
- Jagged hypointense fracture line (complete or incomplete) with surrounding bone marrow oedema

CT (limited role – mostly for healing)
XR (not sensitive to early stress fracture)
- Focal periosteal reaction often earliest radiographic sign
- Sclerotic band perpendicular to long axis of bone is most reliable sign
- Fracture line may be incomplete or complete, lucent or sclerosis

Clinical

- Pain ↑ with activity and improves with rest
- Hindfoot - Vague, deep pain
- Metatarsals - Precisely localized pain
- Sesamoids of great toe - Pain with running, toe dorsiflexion
- Become clinically asymptomatic at 3-6 weeks
- However MR findings typically present for 6 months

Locations

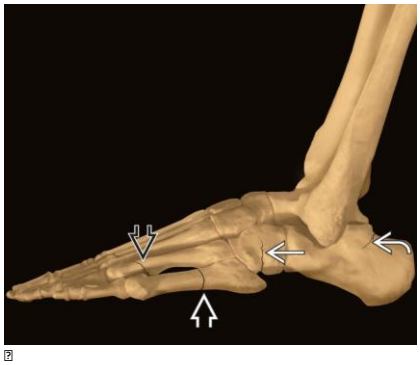
Most common:
1. Metatarsals
2. Navicular
3. Calcaneus

Other: Med malleolus, 1st toe sesamoids, Cuboid, Talus

Navicular stress fracture -> may progress to non-union (leaving a chronic cleft) +/- osteonecrosis
5th MT stress fracture -> high non-union rate

Differential Diagnoses

- Traumatic Fracture
- Osteomyelitis
- Stress Response
- Inflammatory Arthropathy



Further Reading:
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