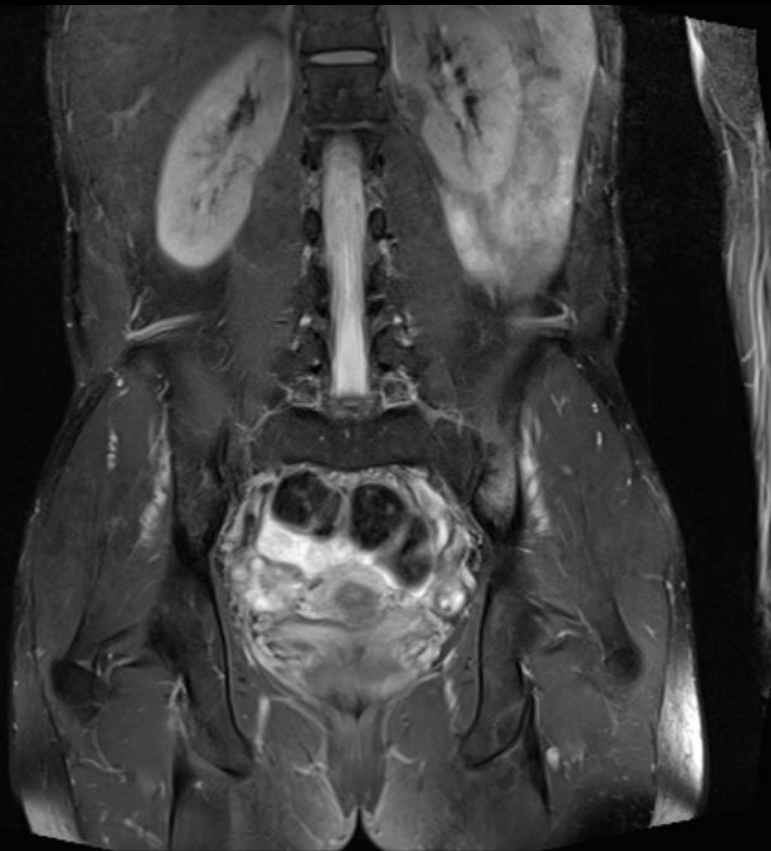
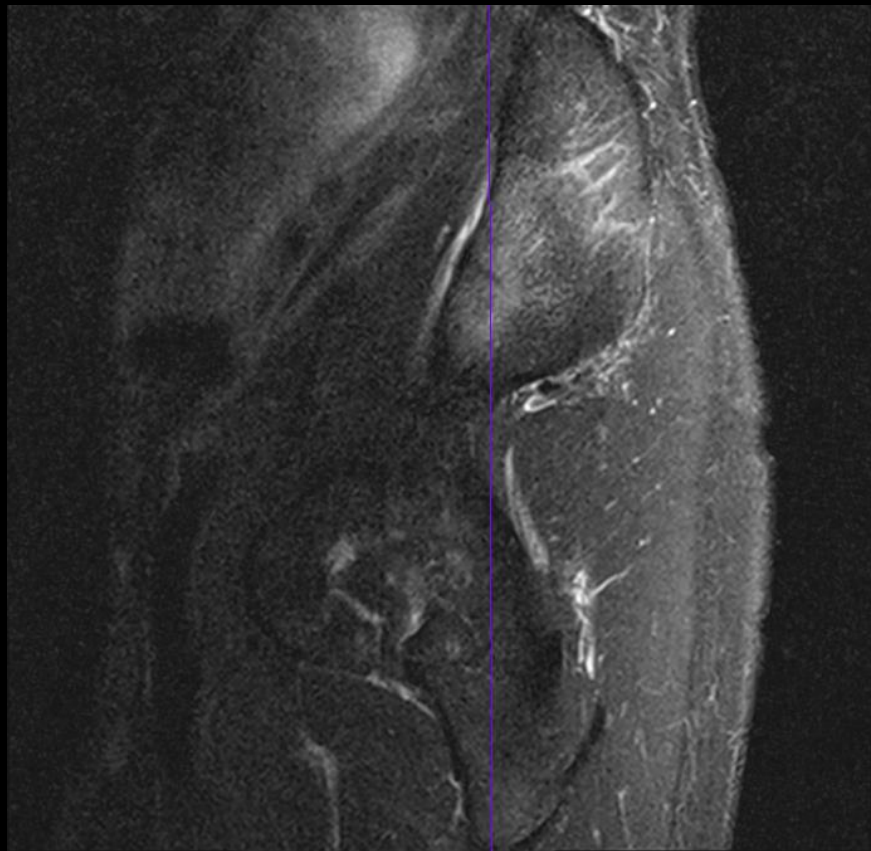
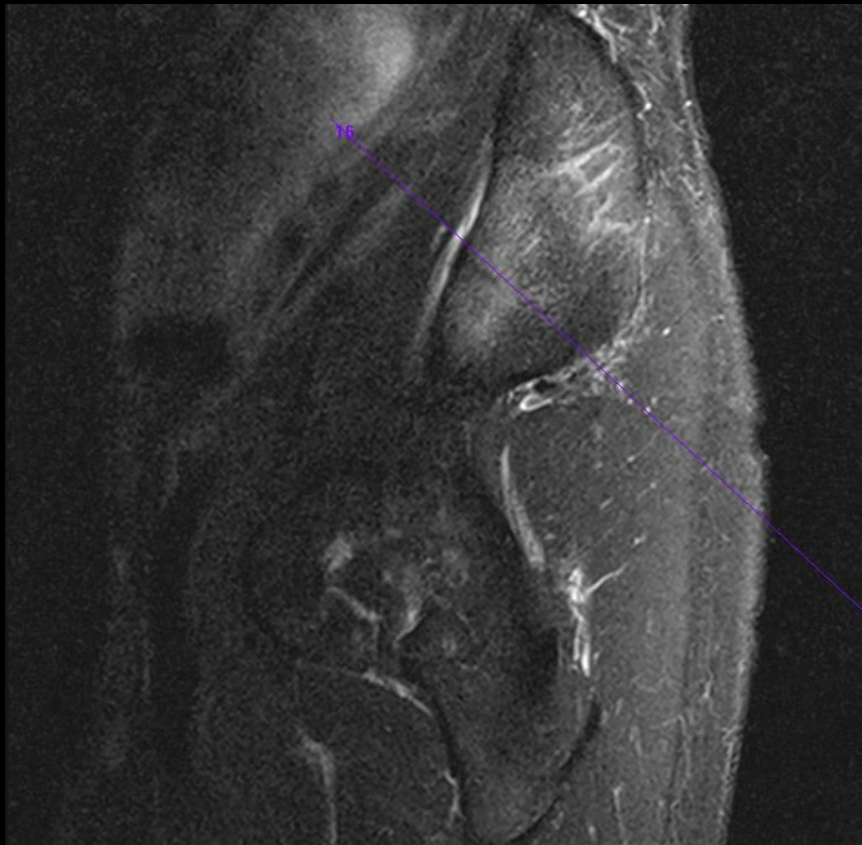
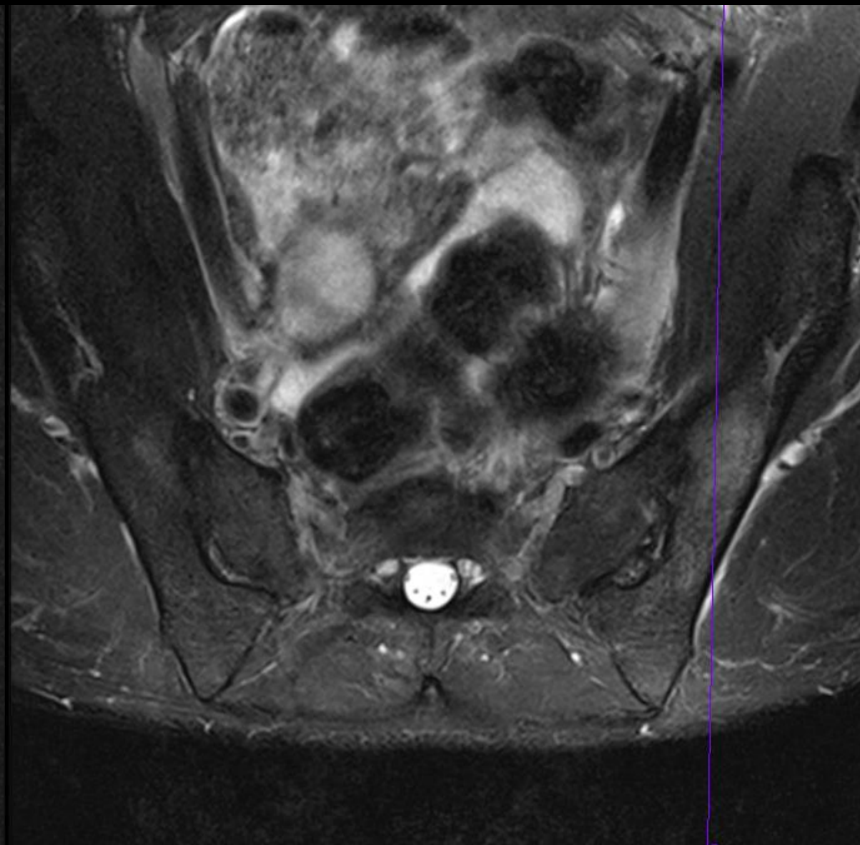


Companion Case

- 35 year old with low back and left hip pain. History of fall on ice. Except, she didn't actually fall, just slipped.
- Oh yeah, she is also a competitive long distance runner.







Superomedial Iliac Stress Fracture

- Relatively rare type of stress fracture.
- Associated with long distance running.
- More common in females.
- Look for classic “female athlete triad” of amenorrhoea, osteoporosis and eating disorders.
- Usually treated conservatively with rest and NSAIDs. May restart training gradually after several asymptomatic weeks.

Stress Fracture

Occur after repetitive stress that is insufficient to cause an acute fracture.

- Fatigue Fracture – *Abnormal stress on normal bone**.
 - Usually in athletes, especially runners and dancers.
 - Originally reported in military recruits.
- Insufficiency (Fragility) Fracture – *Normal stresses on abnormal bone***.
 - Predisposing conditions include metabolic disorders, inflammatory conditions, bone dysplasias, neurologic disorders and drug therapy.

Fatigue Fractures

Mechanism

- Repetitive stress responsible for accelerated bone remodeling (*bone resorption prevails over bone replacement*) and quicker increase in muscle strength relative to bone strength leads to mechanical imbalance and bone fatigue. Additionally, there may be decreased dissipation of bone stress by fatigued muscle.

Timing

- Most stress fractures occur 4 to 5 weeks after the onset of a new exercise, are usually relieved by rest, but progress if activity is continued.

Morphology

- Fractures may be primarily cortical or cancellous, depending on the fracture site.
 - In one series, *77% of fractures were cancellous and 23% cortical*. Radiographs are more helpful with cortical fractures.

Common Sites of Stress Fracture

High risk sites of stress fracture:

- Posterior tubercle of calcaneus
- Base of 5th metatarsal
- Neck of 2nd to 4th metatarsal
- Great toe sesamoids
- Talar neck
- Tarsal navicular
- Anterior cortex of tibia
- Medial malleolus
- Superior side of femoral neck
- Femoral head
- Patella
- Pars interarticularis of the lumbar spine

Low risk sites of stress fracture:

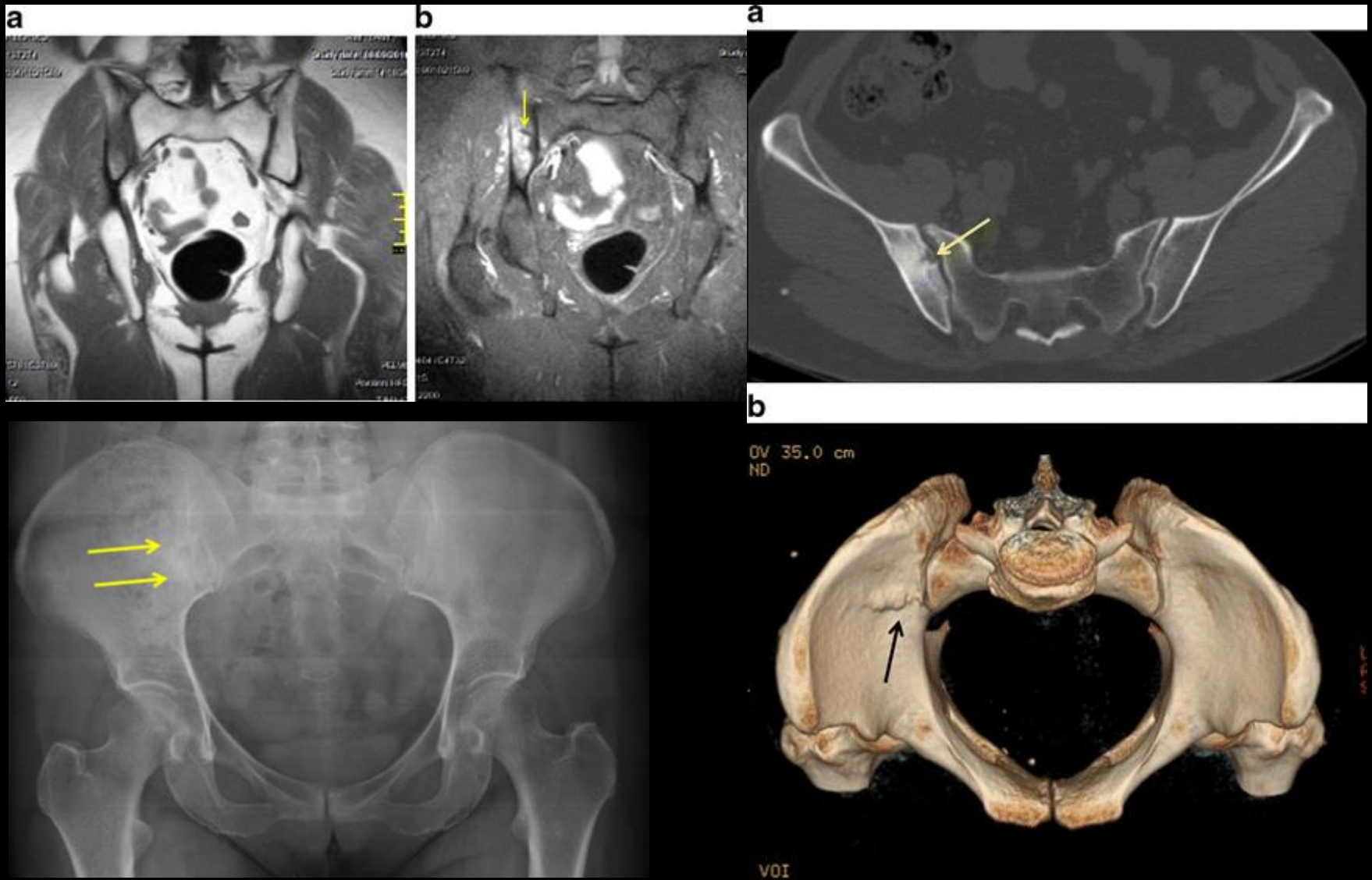
- ***Pubic rami***
- ***Sacrum***
- Ribs
- Proximal humerus/humeral shaft
- Posterior medial tibial shaft
- 2nd to 4th metatarsal shafts

Sites and Associations

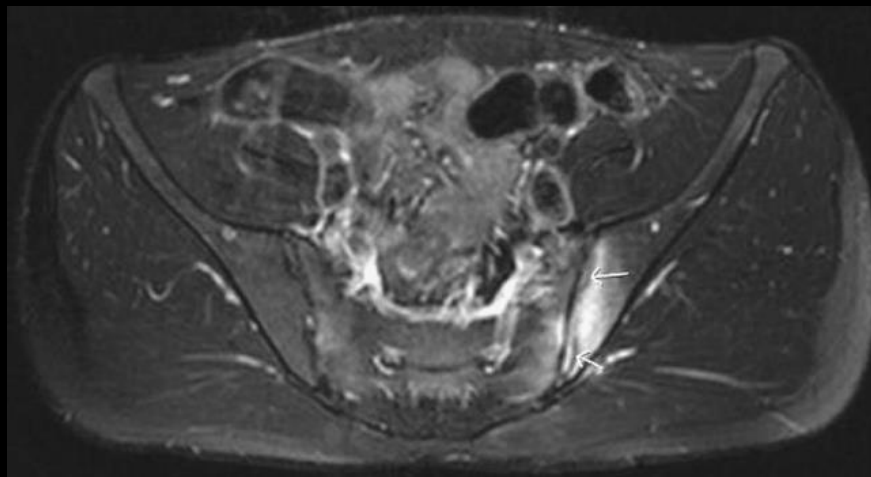
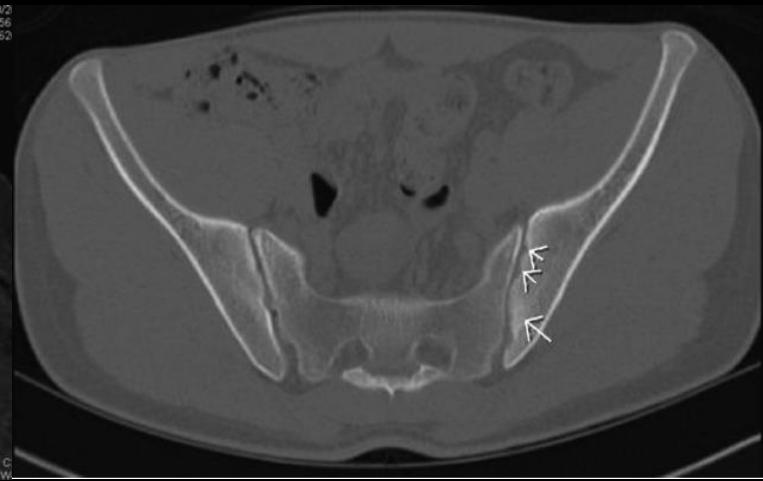
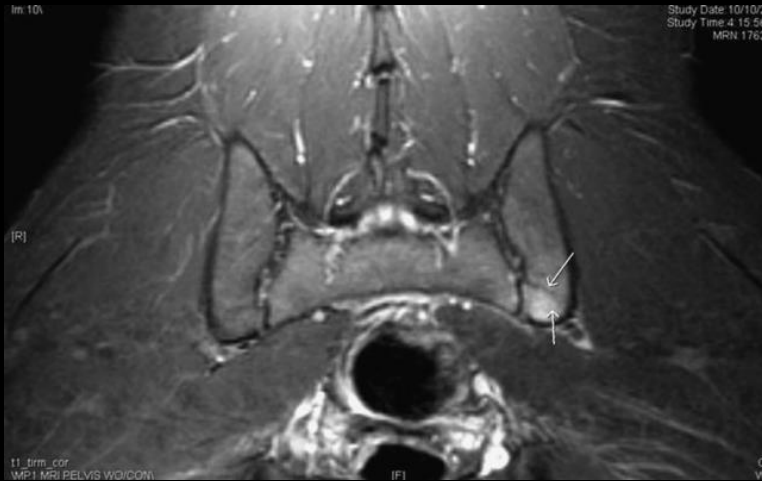
Table 1. Lower limb stress fractures in athletes

Site	Stress fractures [2, 4] (%)	Predominant sporting associations	Predominant bone type
Metatarsals	8.0–24.6	Second and third metatarsal distal shaft and neck: long-distance runners Jones fracture: long-distance runners	Cortical
Tarsals	7.0–25.3	Calcaneum: long-distance runners; jumpers Navicular: track and field athletes; rugby and basketball players Talus: long-distance runners; gymnasts	Trabecular
Tibia	16.0–49.1	Transverse (posterior): long-distance runners Transverse (anterior): jumpers Longitudinal: long-distance runners	Cortical
Fibula	1.3–12.1	Long-distance runners; jumpers	Cortical
Femur	4.2–48.0	Neck: long distance runners	Trabecular
Pelvis	1.3–5.6	Shaft: long distance runners; gymnasts Sacrum: long-distance runners Apophyseal: soccer players; gymnasts Pubic rami: long-distance runners	Cortical Trabecular Cortical Cortical

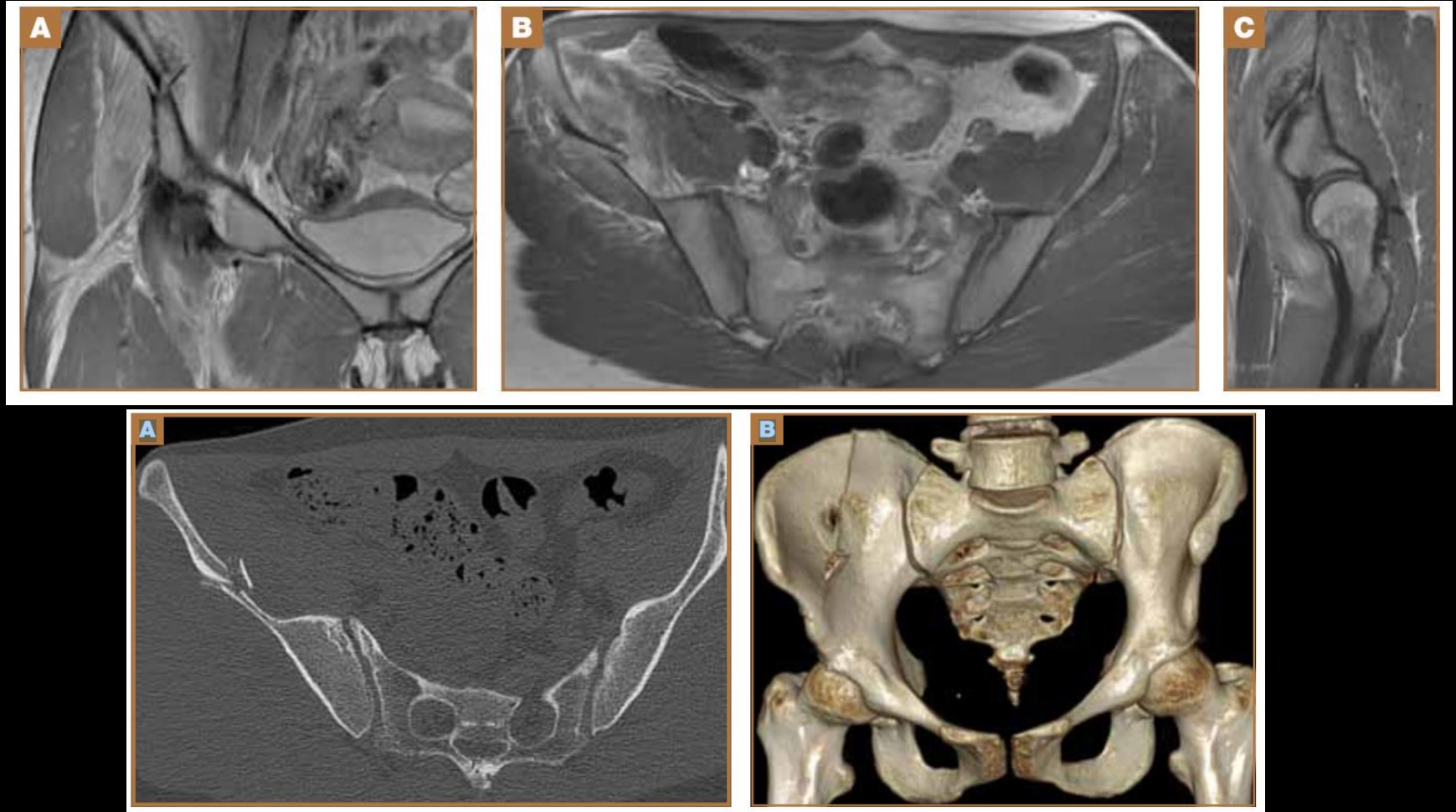
From the Literature



From the Literature

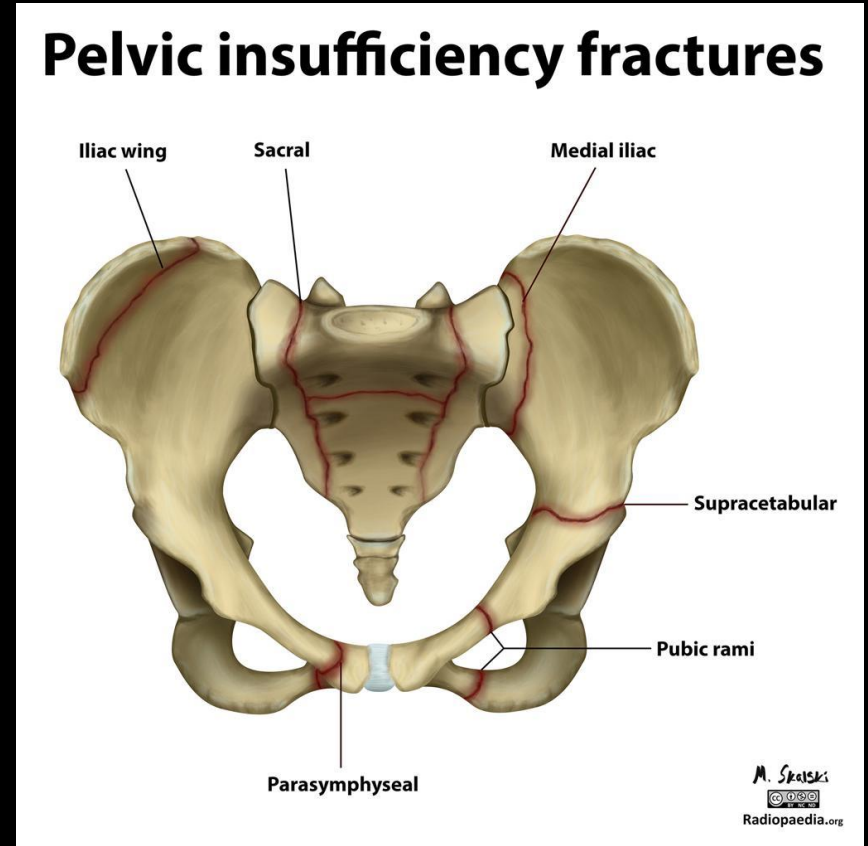


From the Literature



Insufficiency Fracture

- Generally seen in the elderly and more frequently in women.
- Osteoporosis the most common predisposing factor.
- Less common but well documented types include calcaneus insufficiency avulsion in diabetics and proximal femoral fractures in bisphosphonate use.



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