Disorders of the hallucial sesamoids and accessory bones

John P. Negrine

Foot and Ankle Surgeon

Sydney

Sesamoid variations

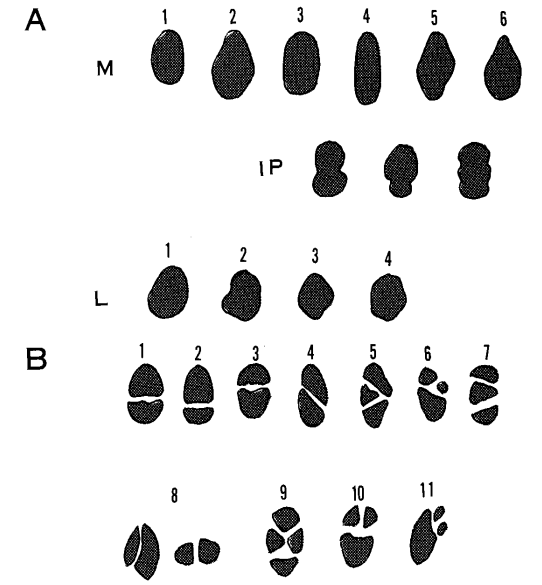

Fig. 2-58. Variations in contour and partition of the sesamoids of the metatarsophalangeal joint of the big toe. (*A*) *M*, medial sesamoid; *L*, lateral sesamoid. *IP*, intermediary partite; (*B*) Partite sesamoids. (Redrawn from Kewenter U: Die Sesambiene des I Metatarso-phalangeal-gelenks des Menschen. Acta Orthop Scand [Suppl] 2: 43, 1936)

- Male 36.6%
- Female 30.1%
- Bi-partite sesamoids are more prone to injury and are not necessarily bilateral

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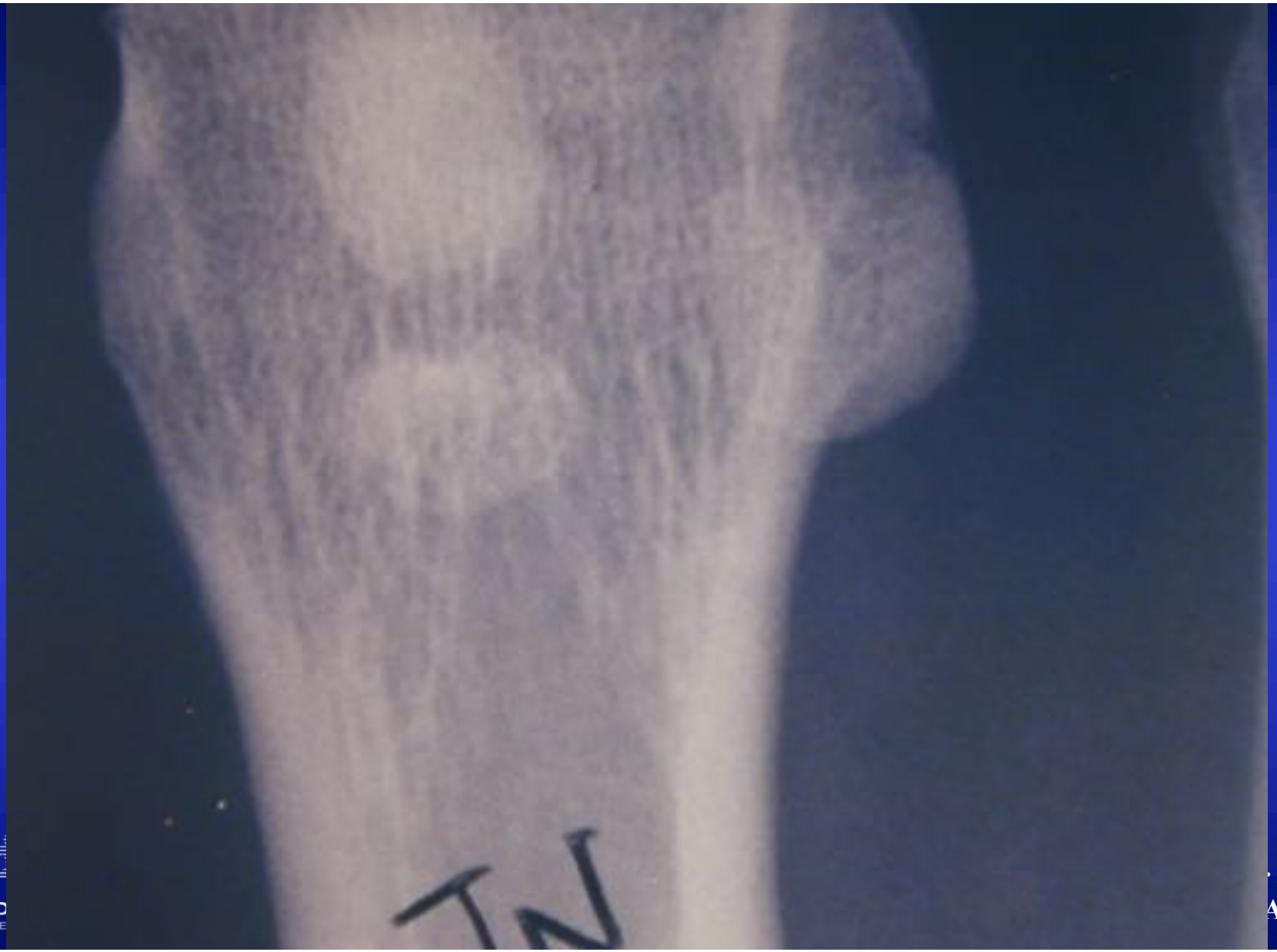

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Sesamoid anatomy

- In the FHB tendon
- Attachments include Adductor (fibular) and Abductor (tibial), plantar plate, sesamoid ligaments and plantar aponeurosis
- Tibial more distal and larger
- Bi-partite approx. 30% and usually tibial
- Congenital absence either or both

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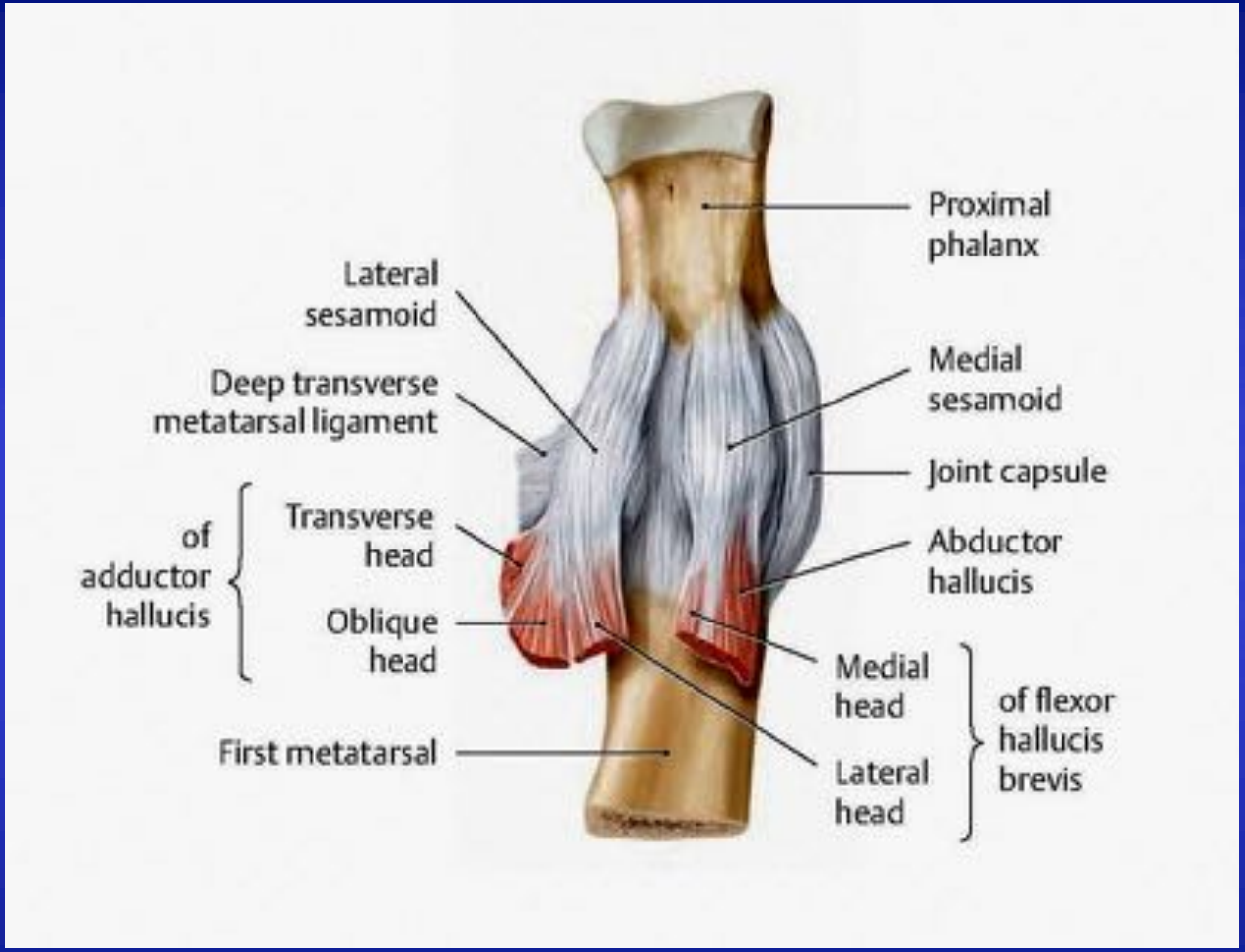

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Sesamoid pathology

- Hypertrophy
- Intractable plantar keratosis
- Bursitis
- Nerve compression
- Degenerative joint disease
- Subluxation
- Osteochondritis dissecans/Osteonecrosis
- Fracture

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What is sesamoiditis?

- Not agreed upon
- ? Fracture (normal x-rays seen on bone scan)
- ? Chondromalacia of the sesamoids
- ? Inflammation of the pertindinous structures surrounding the sesamoids
- ? A diagnosis of exclusion

Probably a term best avoided

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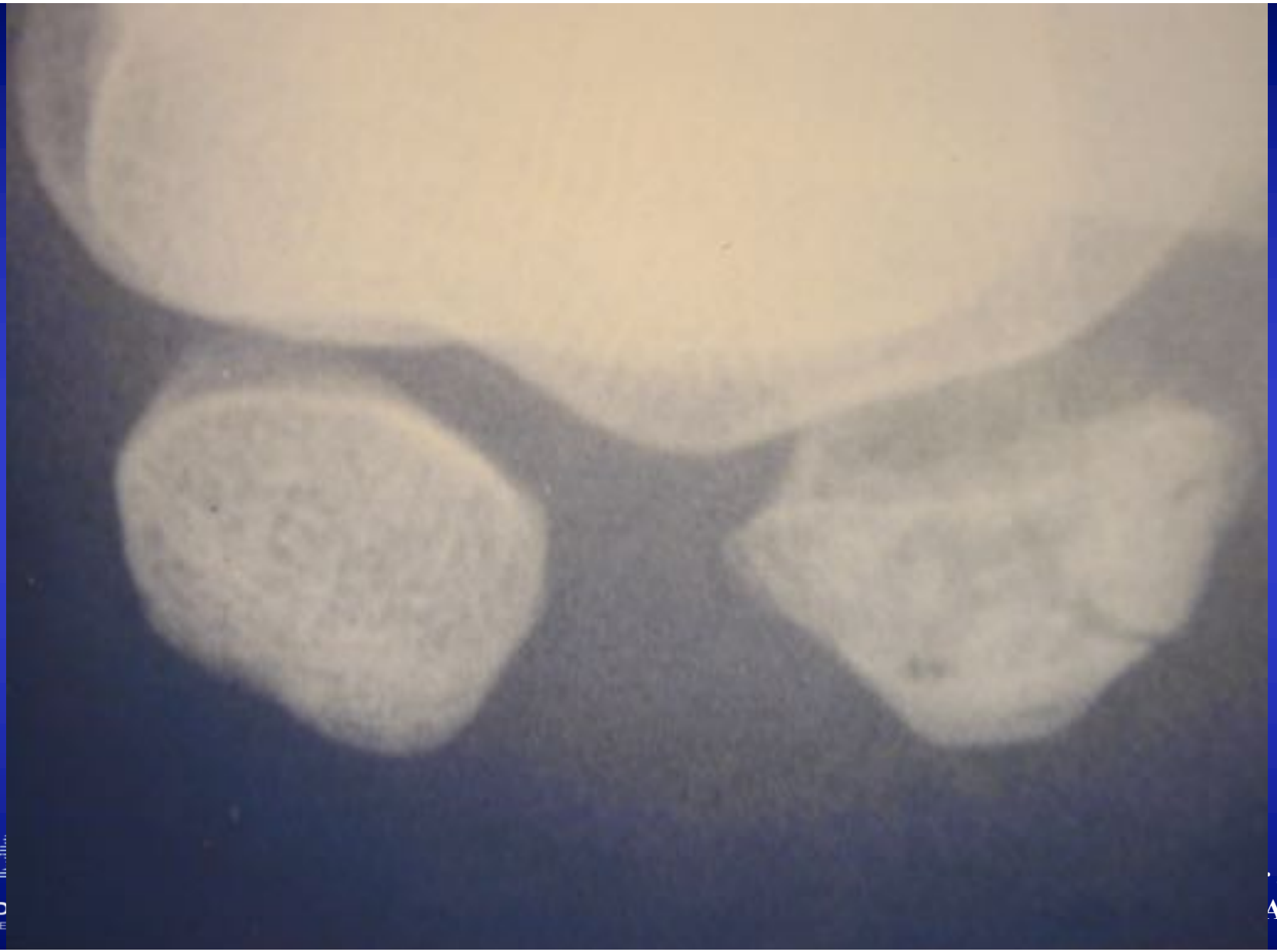
Sesamoid imaging

Plain radiographic views are:

- AP/ lateral
- Add a lateral oblique for the fibular sesamoid
- Add a medial oblique for the tibial sesamoid
- An axial radiograph projects the sesamoids away from the metatarsal head



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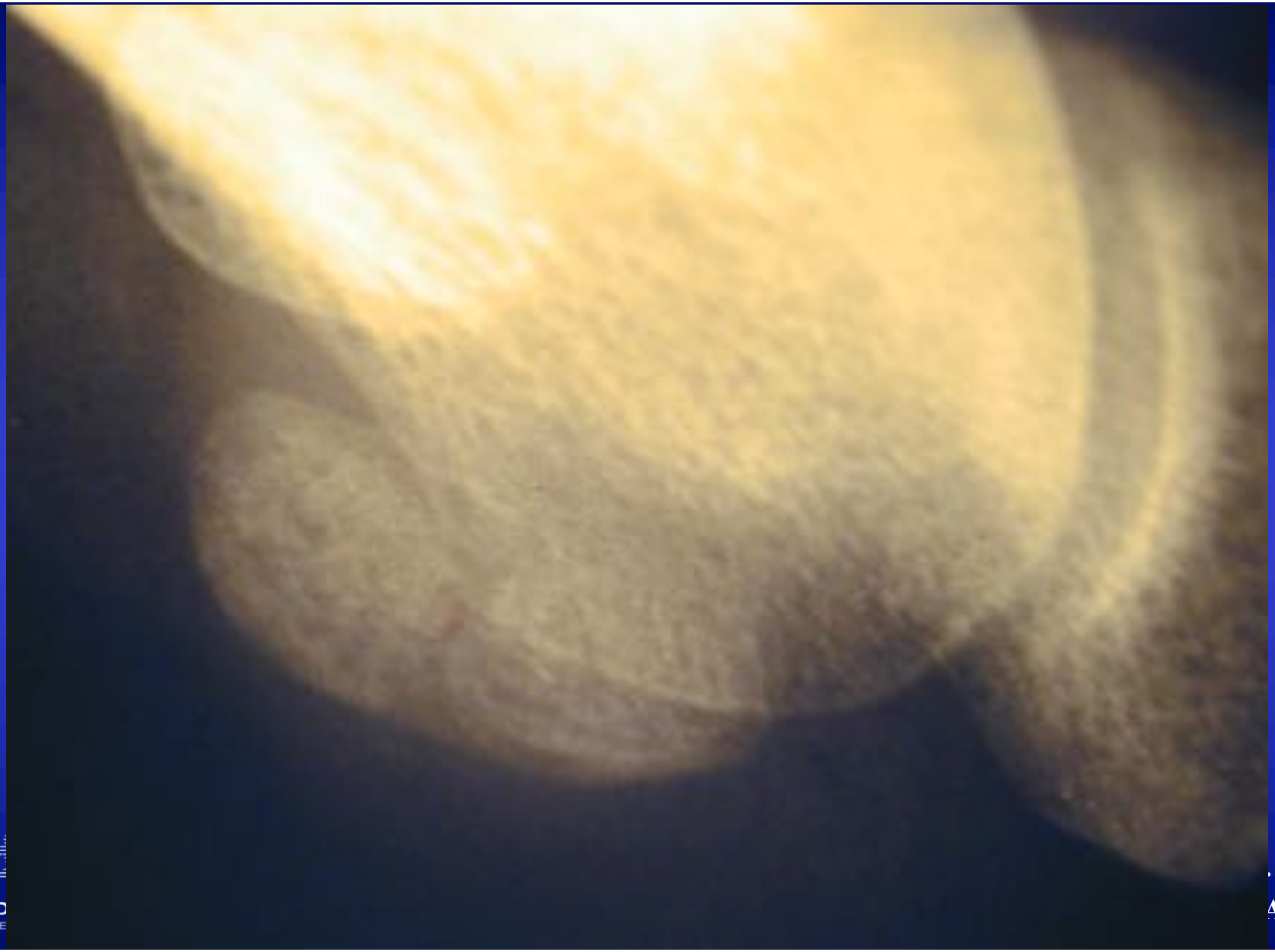

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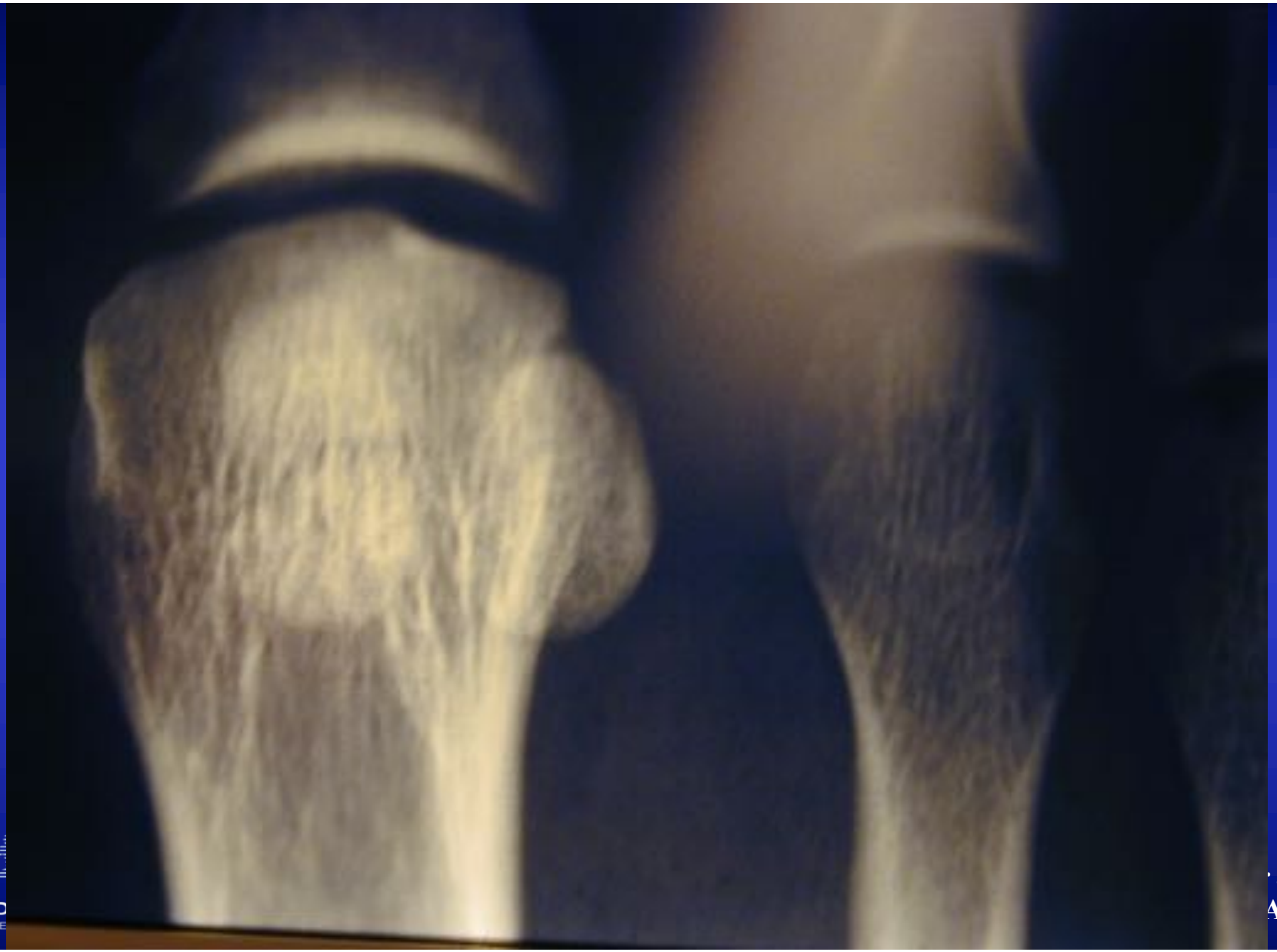

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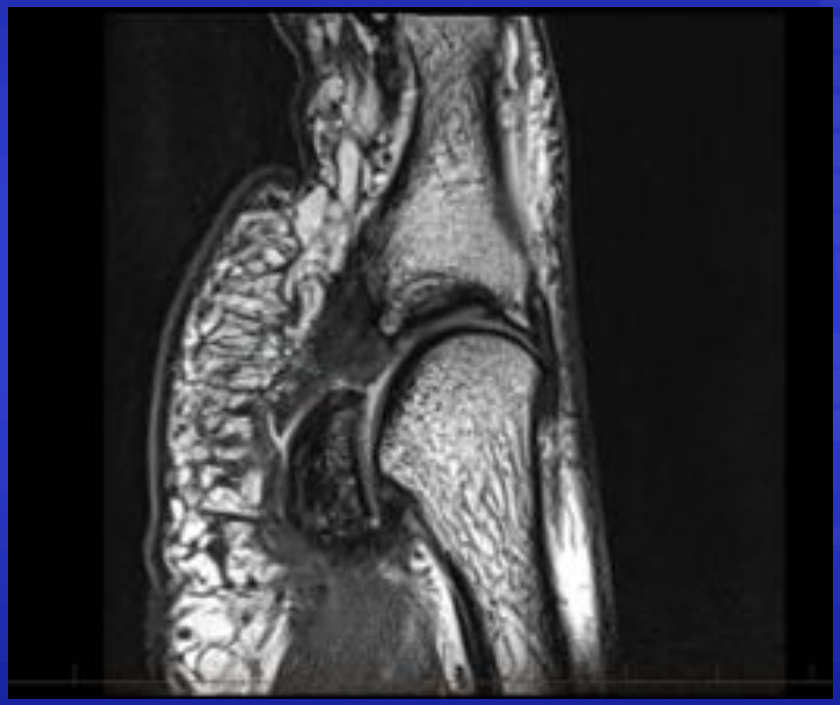
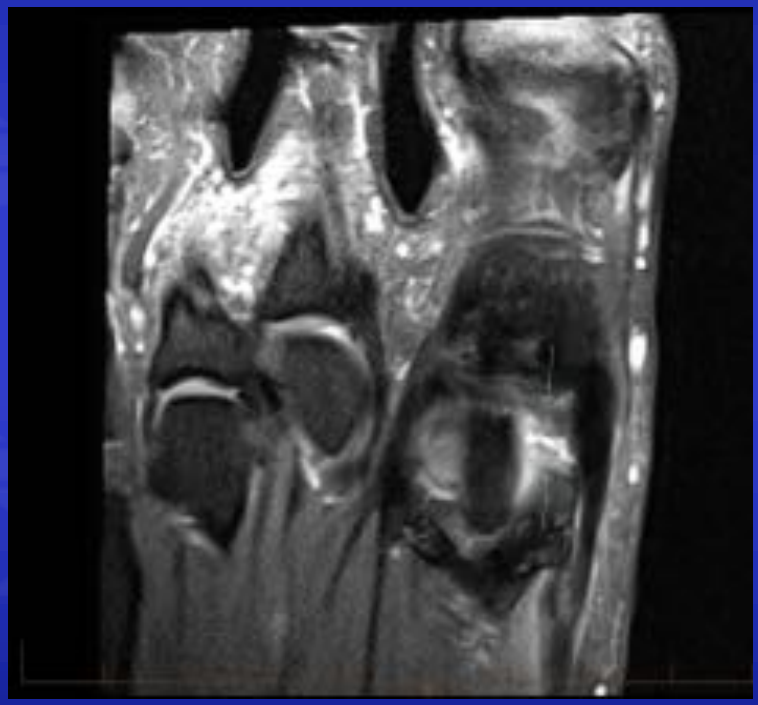
Young rugby forward – sesamoid pain





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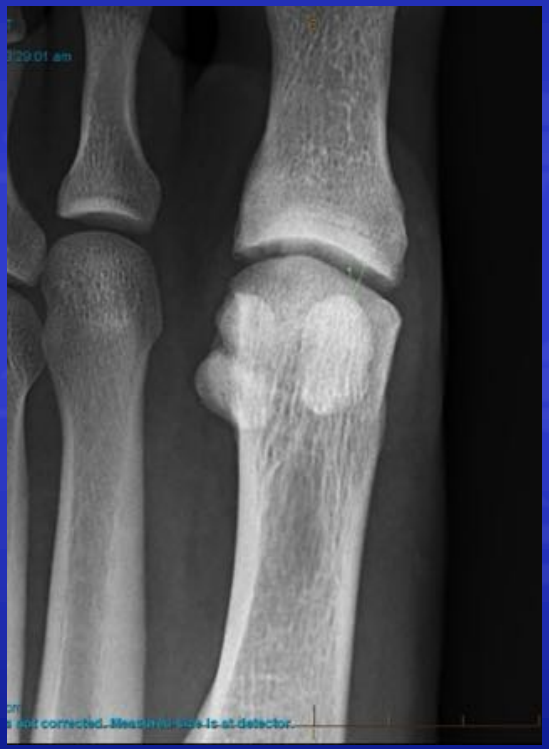
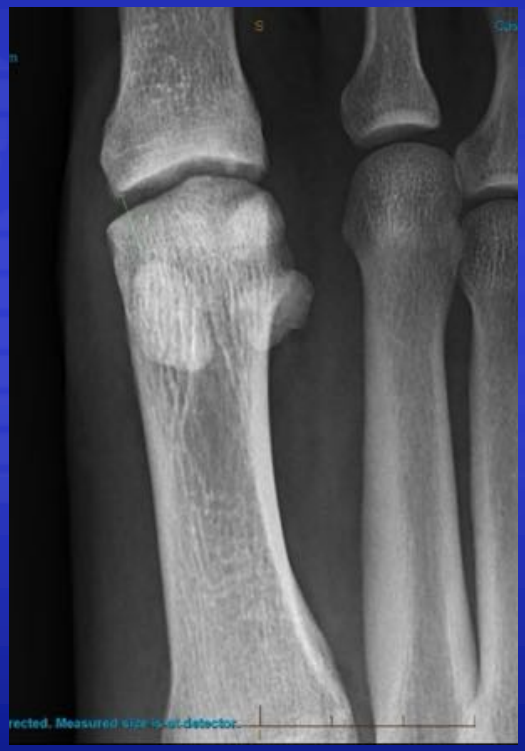
Plain x-ray very instructive





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Additional imaging

- Bone scanning of some use
- CT scanning must be of high resolution with an interested radiologist
- MRI is invaluable in the right hands

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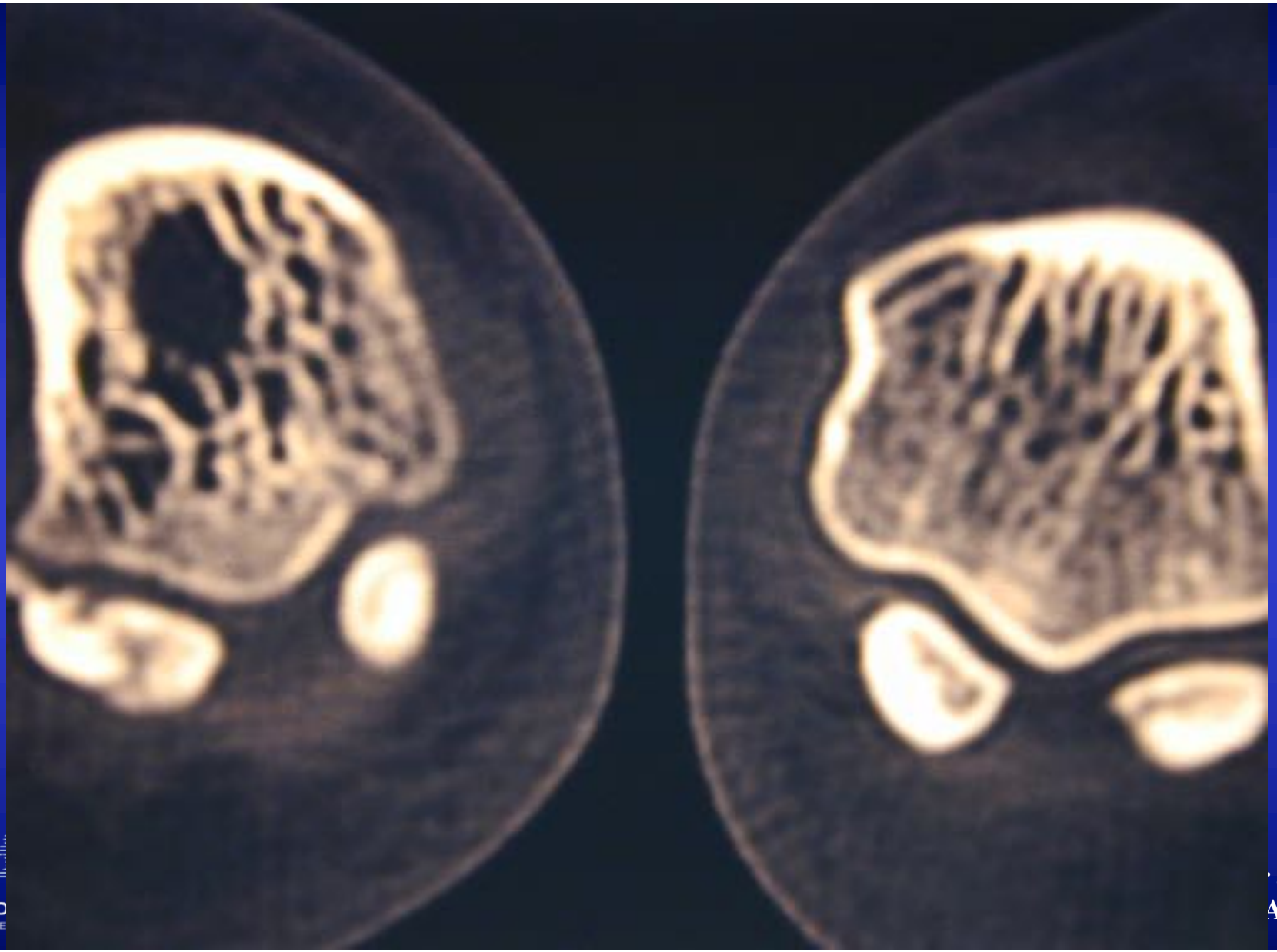

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Osteonecrosis

- A real vascular phenomenon or an ununited fracture that has collapsed??

- Jahss felt it to be vascular in females ~ 25 years without a history of trauma, tibial and fibular are equally involved

Sesamoid blood supply

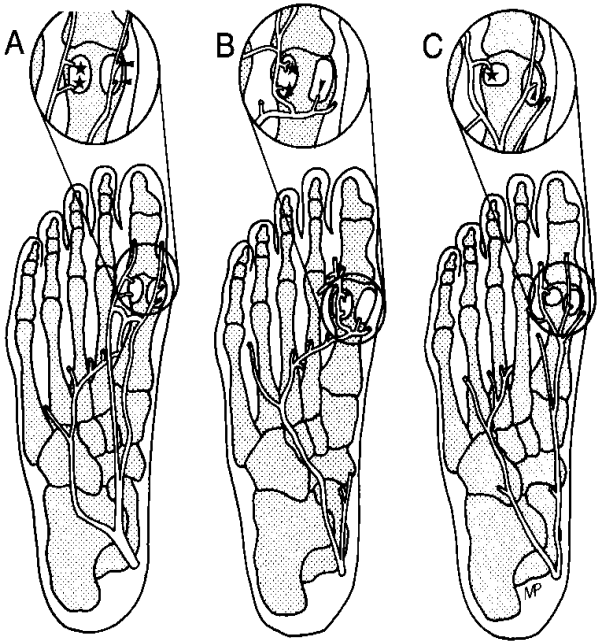

FIG 10–6.
Circulation to the sesamoids. **A,** the most frequent pattern of arterial circulation to the sesamoids (52% of cases) involves a direct branch from both the medial plantar artery and the plantar arch. **B,** in 24% of cases, the sesamoid arterial supply is predominantly from the plantar arch. **C,** in 24% of cases, the major arterial supply is from only the medial plantar artery. When there is only one blood vessel supplying a sesamoid, a fracture may be at greater risk for avascular necrosis or nonunion. (Courtesy of Michael L. Pretterklieber, M.D., and Axel Wanivenhaus, M.D.)

Non operative sesamoid care

- Decrease impact loading in athletes
- Low heels in women
- Walking cast or boot for fractures
- Custom insole eg: Full length EVA, PPT cut out under the sesamoid and fill with silipos
- Taping the hallux in neutral or slight flexion to decrease the pressure

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Surgical treatment:

- Sesamoid shaving for keratoses is effective (for the plantar flexed first ray I add a dorsiflexion osteotomy and plantar fascia release)
- Grafting the non-union is suggested in the young with the right fracture configuration
- Excise but attempt to repair the defect (analogous to the patellar tendon following patellectomy) Use a #64 beaver blade

Tibial Sesamoid grafting

- 40% of sesamoidectomy patients are said to have some residual symptoms
- Grafting is possible in transverse fractures with <1mm separation
- Bone is taken from the distal tibia (or metatarsal head) and the patient immobilised for 6 weeks
- In Anderson & McBryde's series 19/21 cases united and returned to pre-injury sport

“Common accessory ossicles”

- Os peroneum (26%)
- Os trigonum (5 -15%)
- Os vesalainum (0.1 – 5.9%)
- Os calcaneus secundarius (0.6 – 7%)
- Os intermetatarseum (1 – 7%)
- Accessory navicular (4%)
- Os subfibulare (0.2 – 2.1%)

Os peroneum

- A “sesamoid” in the tendon of peroneus longus
- Beneath the cuboid
- Pain on the plantar lateral border of the foot
- Can fracture especially in jumpers/tennis players

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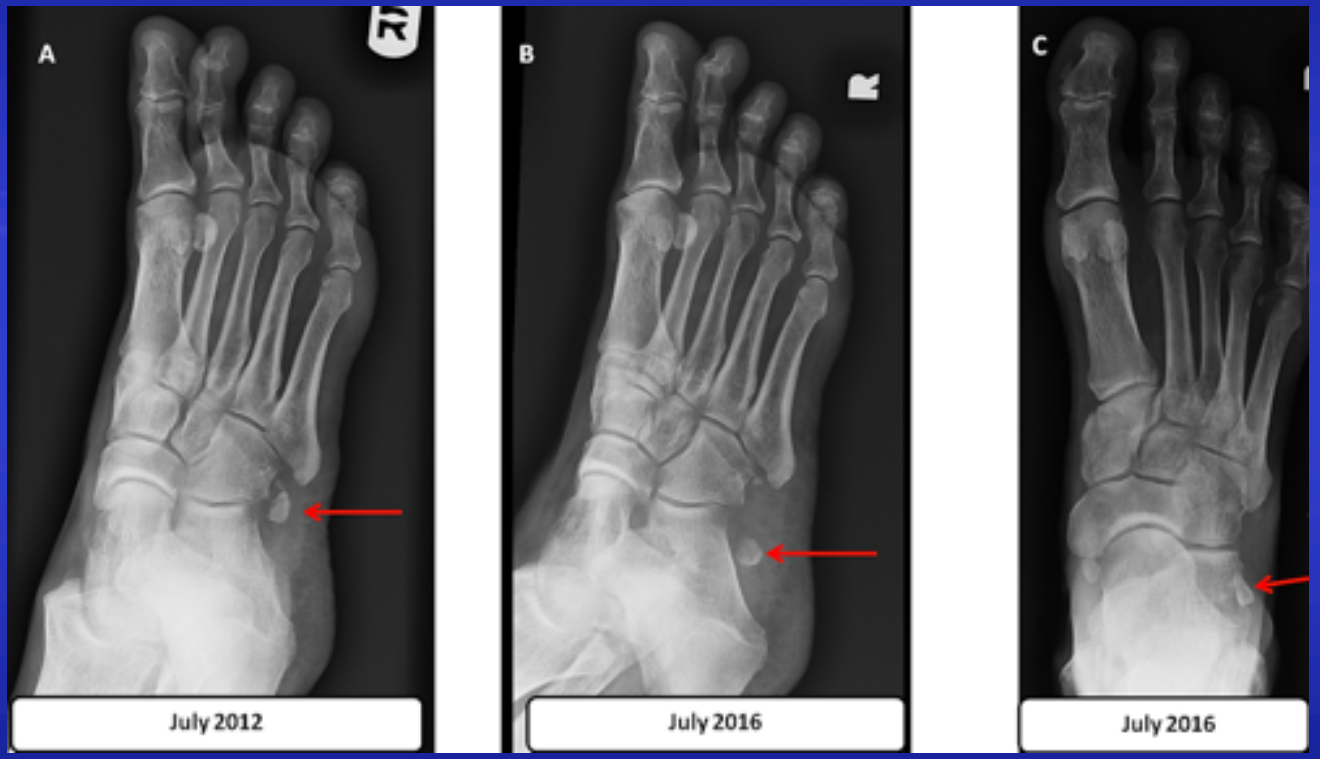
Pain then rupture



From Global radiology network

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Os trigonum

- Cause of posterior ankle pain
- Classically ballerinas/fast bowlers
- Posterior apprehension text highly suggestive
- Non surgically: rest/steroid injection
- Surgically excision does well so long as it is the only pathology present…pre-op MRI very useful

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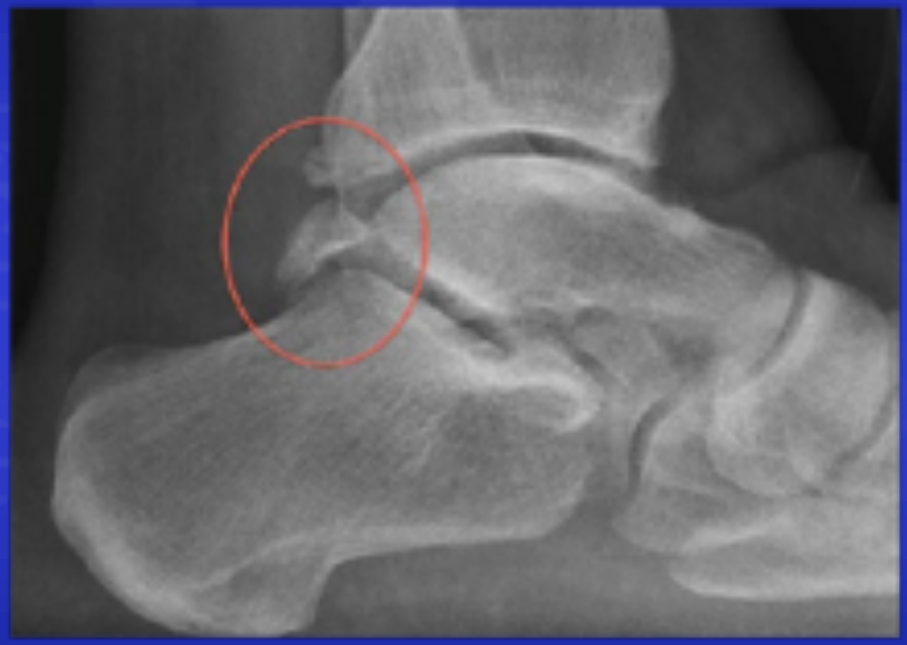
Lateral xray showing os trigonum



Courtesy of researchgate.net

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Os vesalainum

- Base of 5th metatarsal
- Frequently confused with a fracture
- Named after Andreas Vesalius
- An united ossification center
- Usually settles in a boot, if not excise bone and re-attach peroneus brevis

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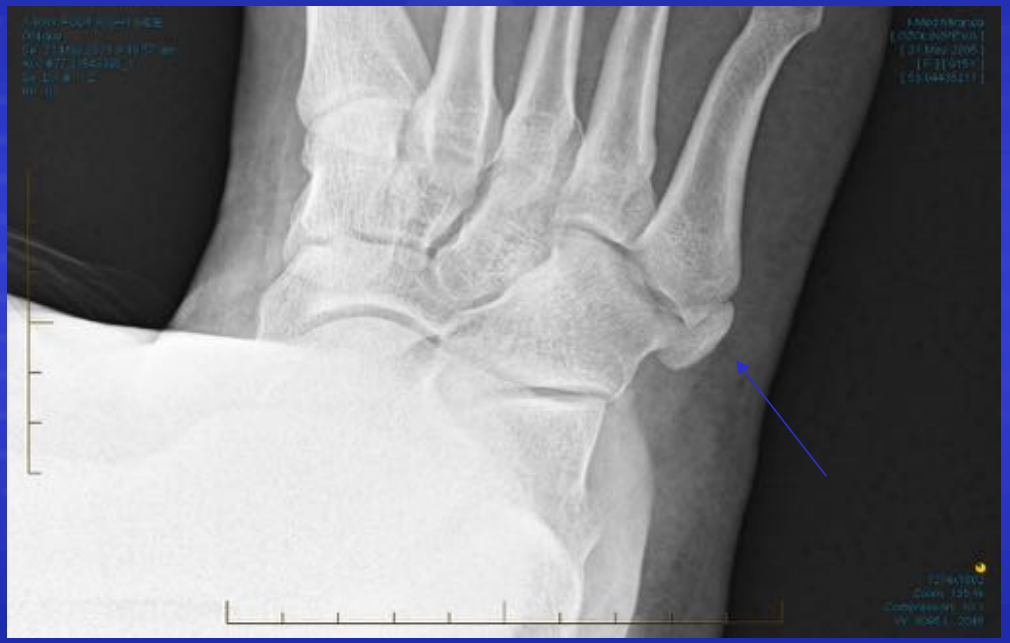
Os vesalainum



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Andreas Vesalius 1514 -1564

- Galen 129 -216 AD for 1300 years it was assumed his anatomical dissections of animals translated to humans
- Vesalius the father of modern anatomy
- Befriended a judge who supplied him with the bodies of executed criminals to dissect
- Anatomy professor in Padua Visited Bologna

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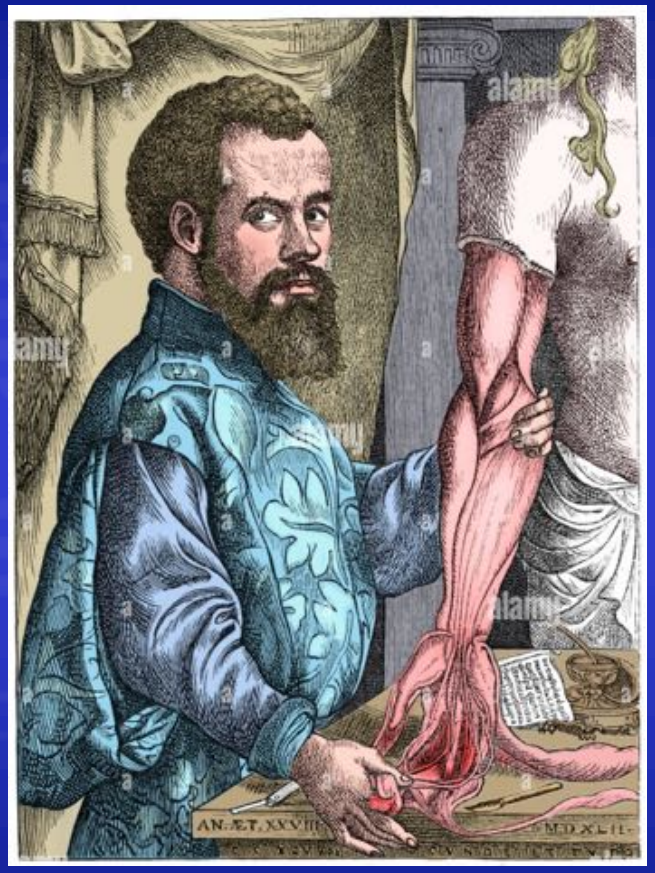

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Pergamon Galen's birth place

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Anatomy museum Bologna

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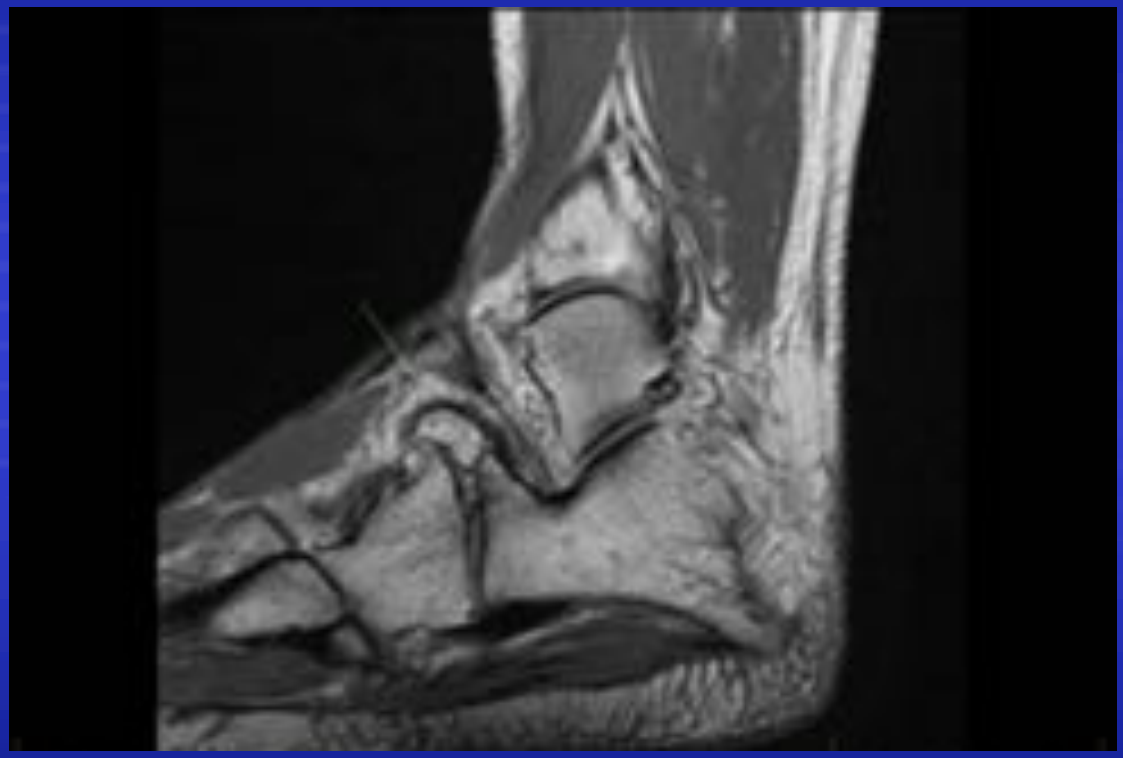
Os calcaneus secundarius

- Between anterior process calcaneus and the navicular
- Can be confused with a fracture or a calcaneo-navicular tarsal coalition
- Again rest in a boot,excise if still painful

Os calcaneus secundarius on MRI



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Os intermetatarseum

- Arises from the cuneiforms or base of first or second metatarsals
- Presents as a bony hard swelling at the base of the first and second metatarsals
- Can cause difficulty in shoewear as well as neuritic symptoms

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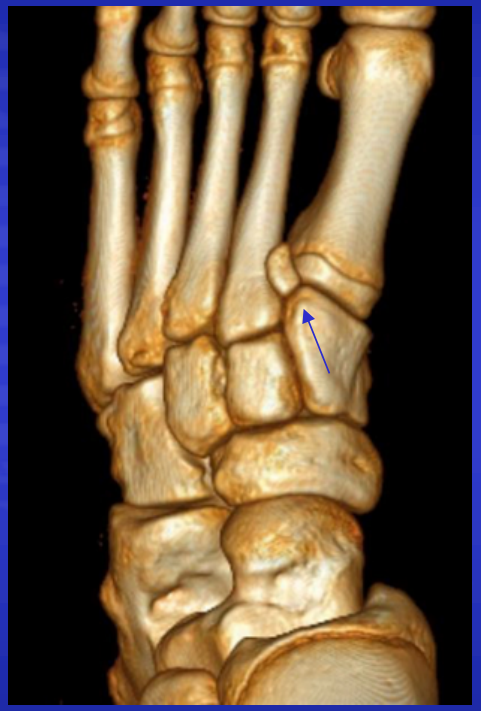
Os intermetatarseum



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Accessory navicular

- I Think of it as a sesamoid in the posterior tibial tendon insertion
- No question most are asymptomatic but can become symptomatic after a fall
- Association with posterior tibial tendinosis and flat feet
- Rest in a boot/insole
- Surgery must excise the bone and repair posterior tibial tendon +/- heel shift

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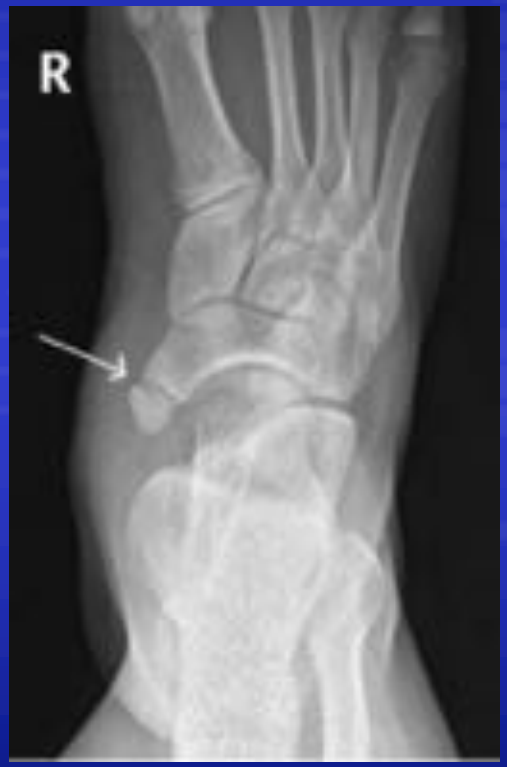

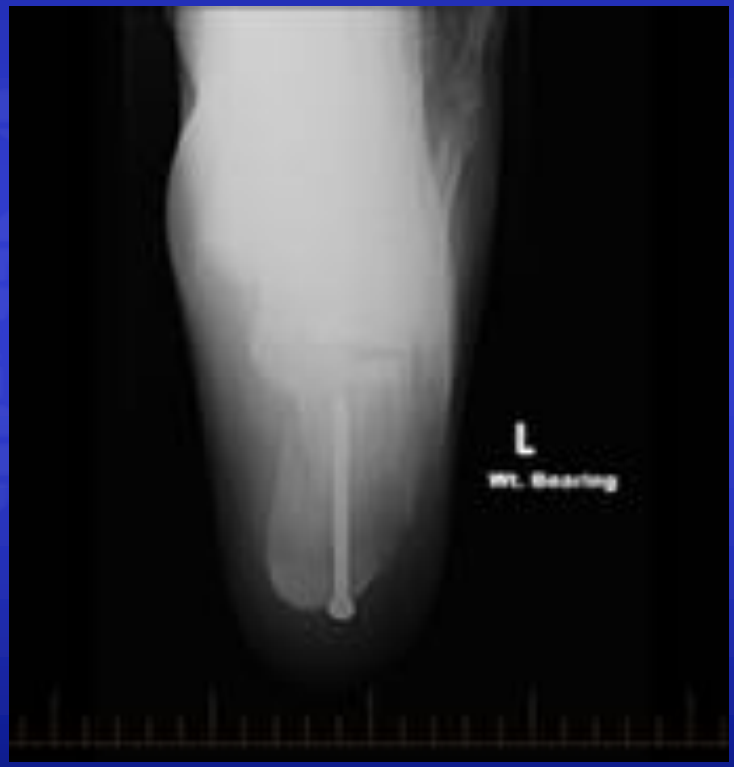

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Os subfibulare

- Ossicle at the tip of the fubula
- Remember ossicles have round edges, fractures sharp edges
- May become symptomatic after a fall
- ? Separate ossification center or avulsion??

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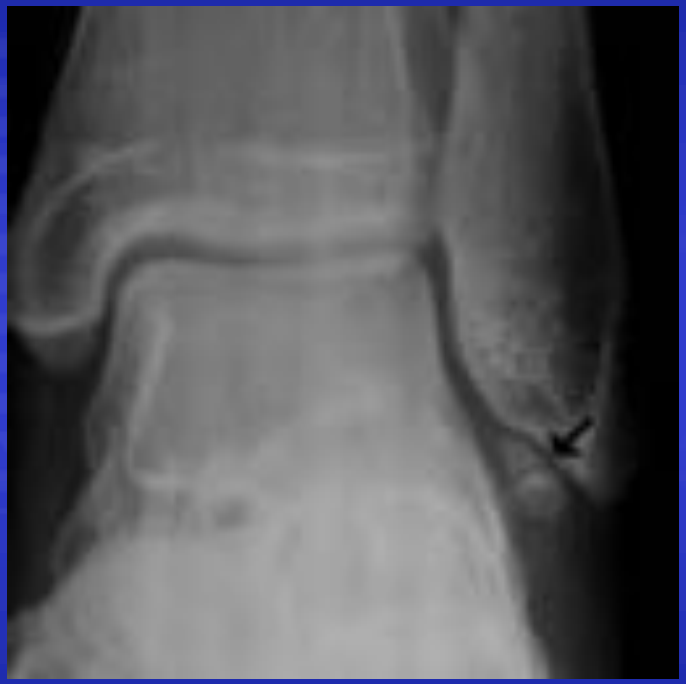
Os subfibulare



Courtesy radiopaedia.org

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Achilles tendon rehabilitation

Comparison of Tendon Lengthening With Traditional Versus Accelerated Rehabilitation After Achilles Tendon Repair: A Prospective Randomized Controlled Trial

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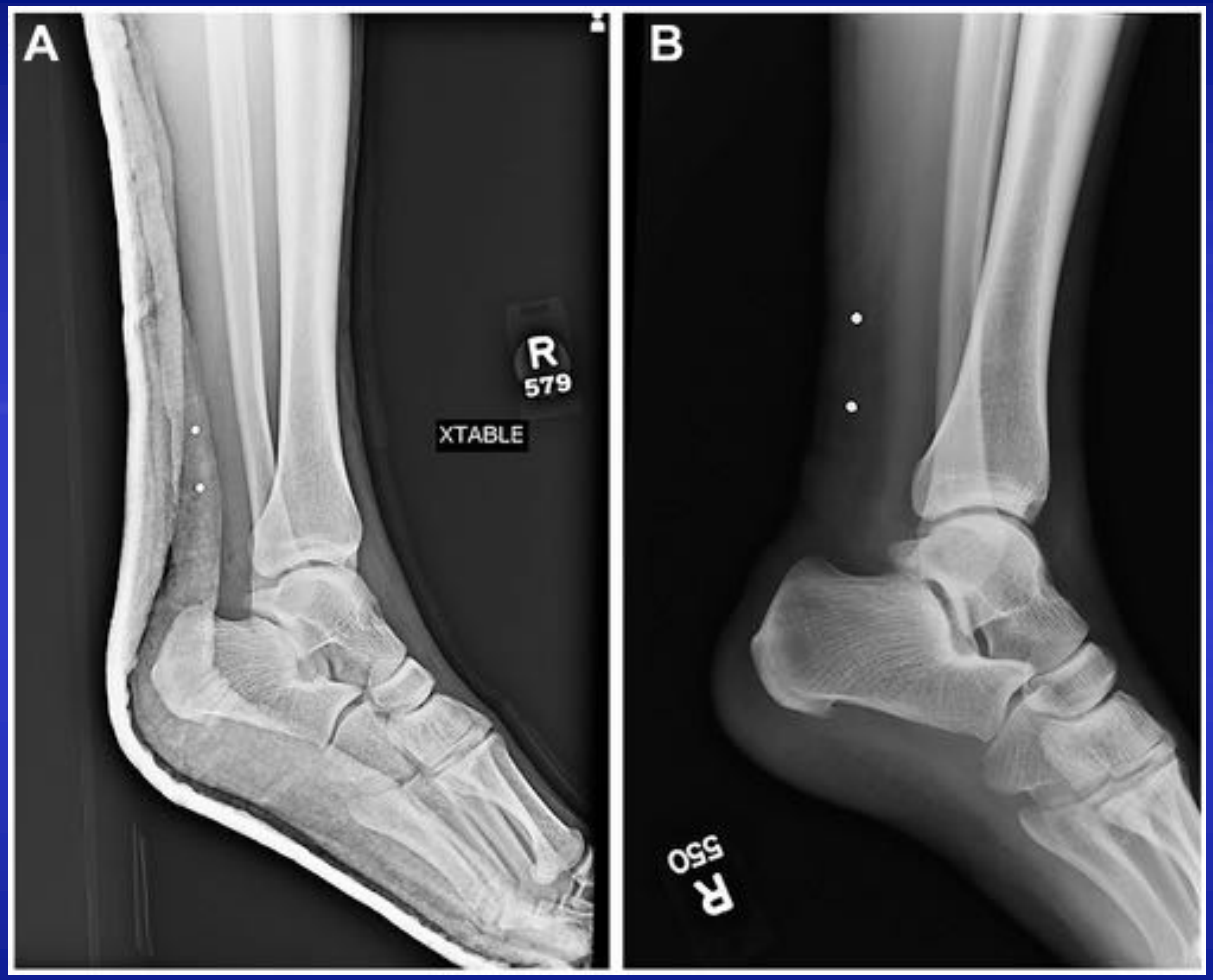
Effect of rehabilitation type on tendon lengthening

- Am. J Sports Med 48 (7) 1720 2020
- Study from Detroit – Henry Ford Hospital
- 18 patients Level 1 Evidence RCT
- Metal markers inserted at the time of surgery
- Distance measured then the patients randomised to various rehabilitation protocols



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Protocols

- Traditional 6 weeks non-weightbearing

VS

- 2 weeks non-weight bearing then in a boot weightbearing with progressive removal of wedges till 6 weeks

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Measured

- Distance between the beads ie. rupture lengthening
- Distance between insertion and distal bead – tendon lengthening distally
- Distance between insertion and proximal bead = both of the above

Results

- Both groups lengthened
- Average 16mm
- Most lengthening occurred between 2 and 6 weeks
- Some lengthening also occurred between 6 and 12 weeks

My issues with the study

- 3 different surgeons
- 2 different repair techniques (Karkow and Bunnell)
- 2 different types of suture material
- Small numbers (10 and 8)

So what's the point?

- If we are concerned with tendon lengthening as a cause of failure to achieve push off strength for the first 3 months we shouldn't push dorsiflexion
- Not everyone after an Achilles rupture returns to sport and over lengthening is part of the problem

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Palazzo Doria-Pamphilj

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