



Accessory Muscles

Anatomy, Symptomatology, and Imaging

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February 16, 2017

Objectives

Review anatomy of common accessory muscles

Discuss potential role in symptom causation

Describe characteristic imaging features

Introduction

Anatomic variants representing additional distinct muscles along with the normal complement of muscles

Often asymptomatic, incidental finding

Palpable swelling, mass effect on neurovascular structures

MRI can differentiate them from soft tissue tumors

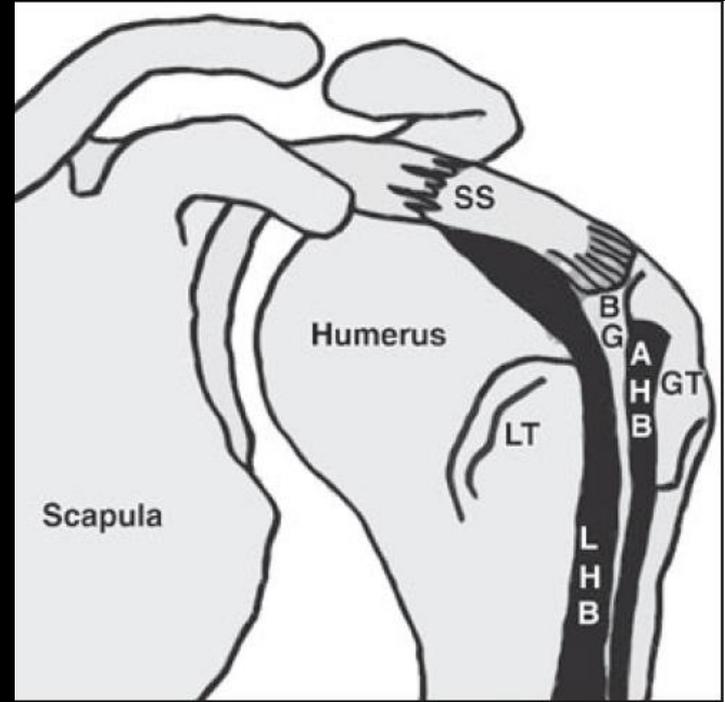
Shoulder

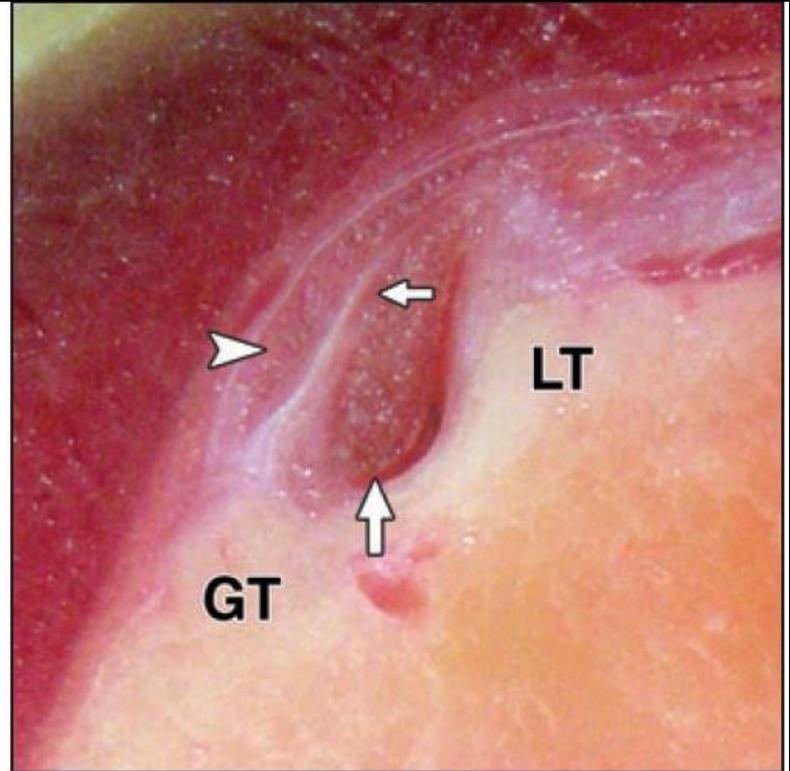
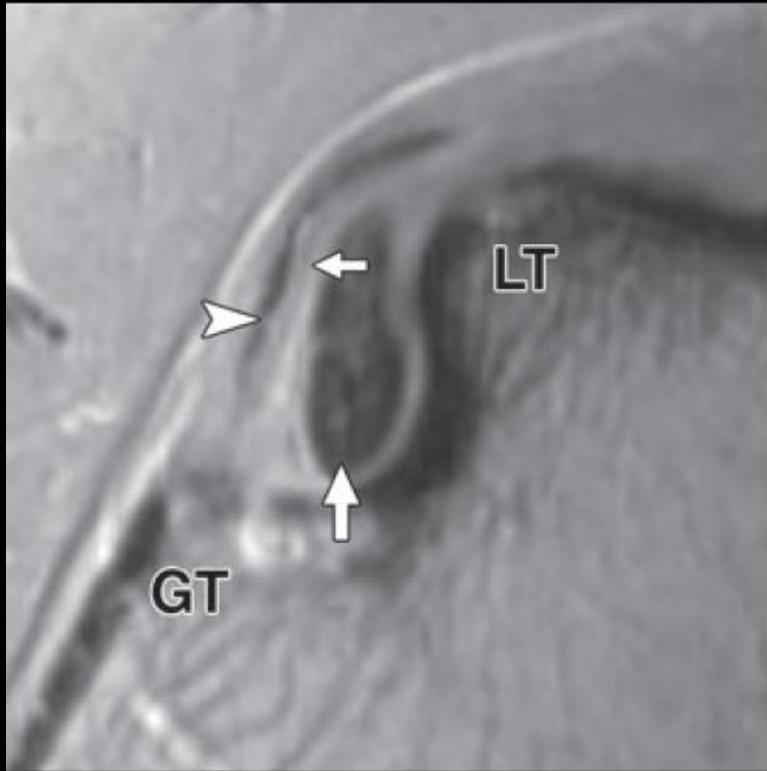
Accessory Head of Biceps Brachii

Prevalence 9-23%

Origin: greater tuberosity close to articular capsule

Insertion: joins other BB muscle heads at level of humerus midshaft





Gheno R, et al. Accessory Head of Biceps Brachii Muscle: Anatomy, Histology, and MRI in Cadavers. AJR 2010.

Key points

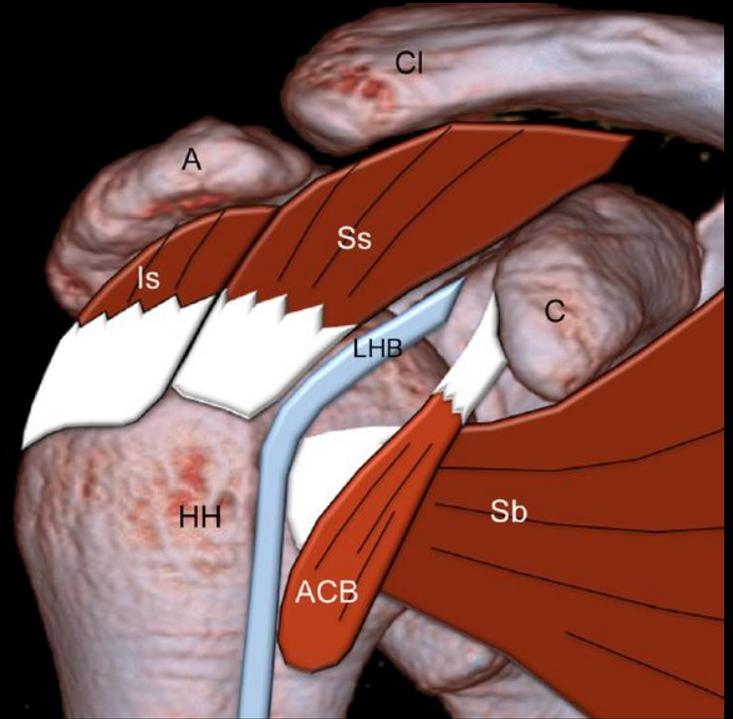
Not to be mistaken for longitudinal tearing of long head biceps tendon

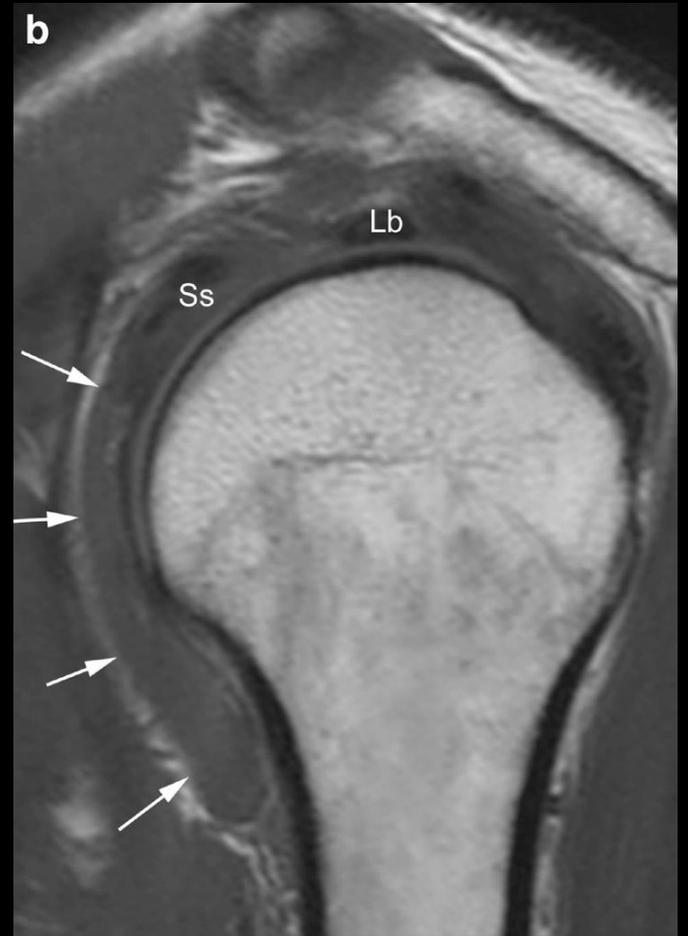
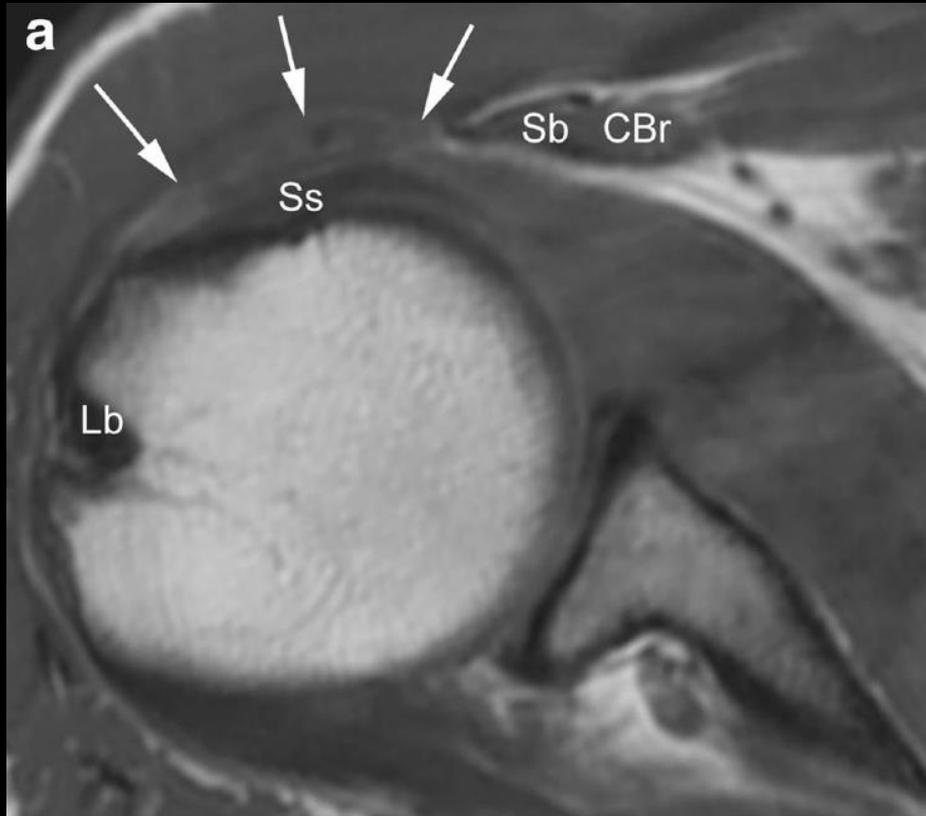
Musculocutaneous nerve can pass behind, in front of, or through the extra head

Accessory coracobrachialis muscle

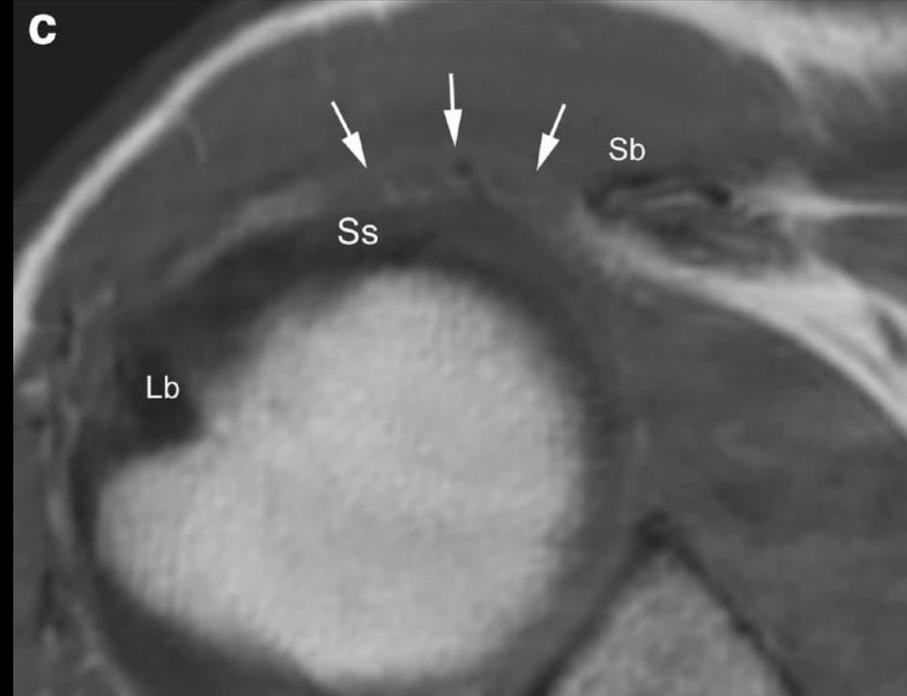
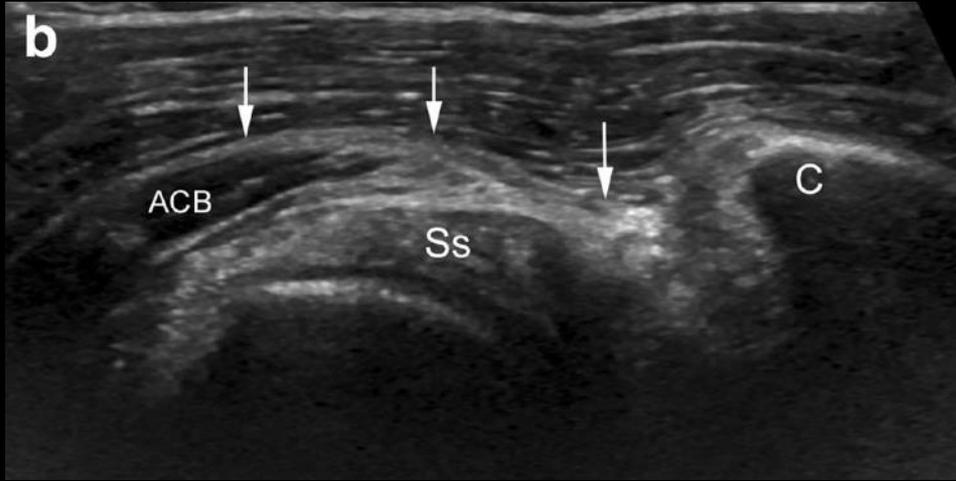
Origin: base/inferior surface of coracoid process

Insertion: anterior capsule of GHJ, medial border of bicipital groove, and medial aspect of humeral surgical neck





Bauones S, et al. The accessory coracobrachialis muscle: ultrasound and MR features. *Skeletal Radiol* 2015.



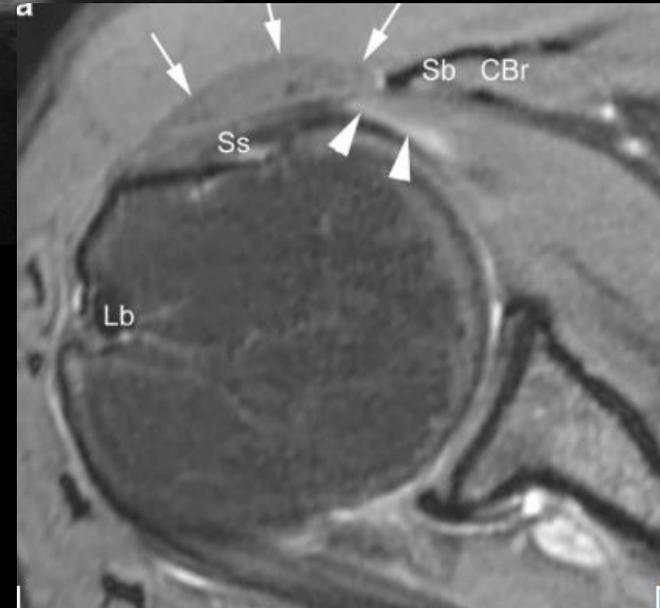
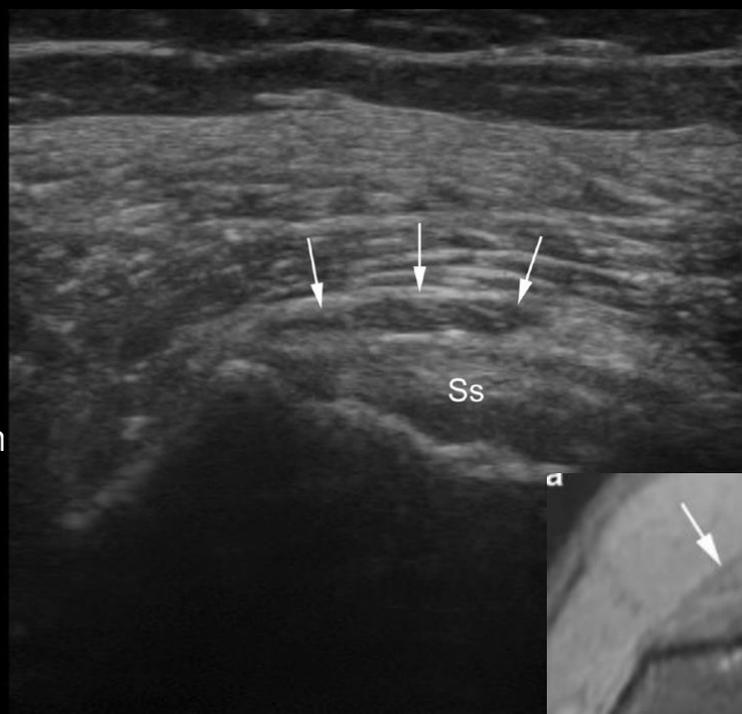
Bauones S, et al. The accessory coracobrachialis muscle: ultrasound and MR features. *Skeletal Radiol* 2015.

Key points

Small muscle belly may mimic subcoracoid bursitis on US

May result in subcoracoid impingement

May compress musculocutaneous nerve, median nerve, or even lateral cord of brachial plexus



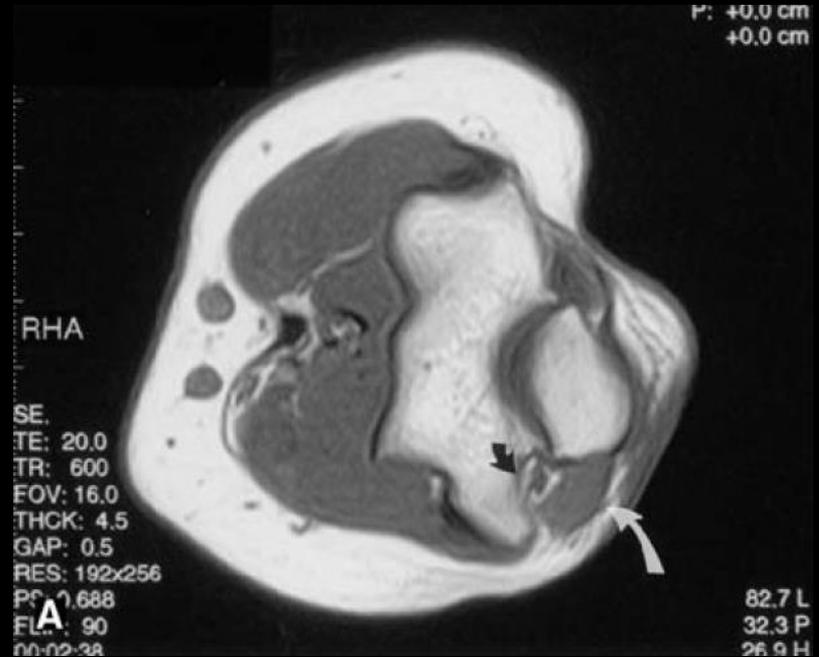
Elbow

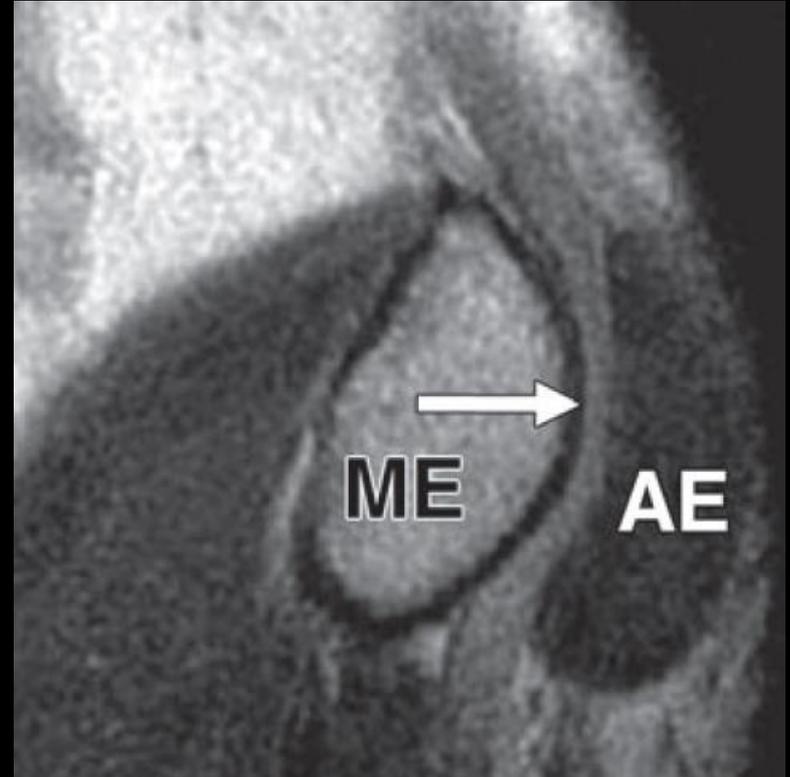
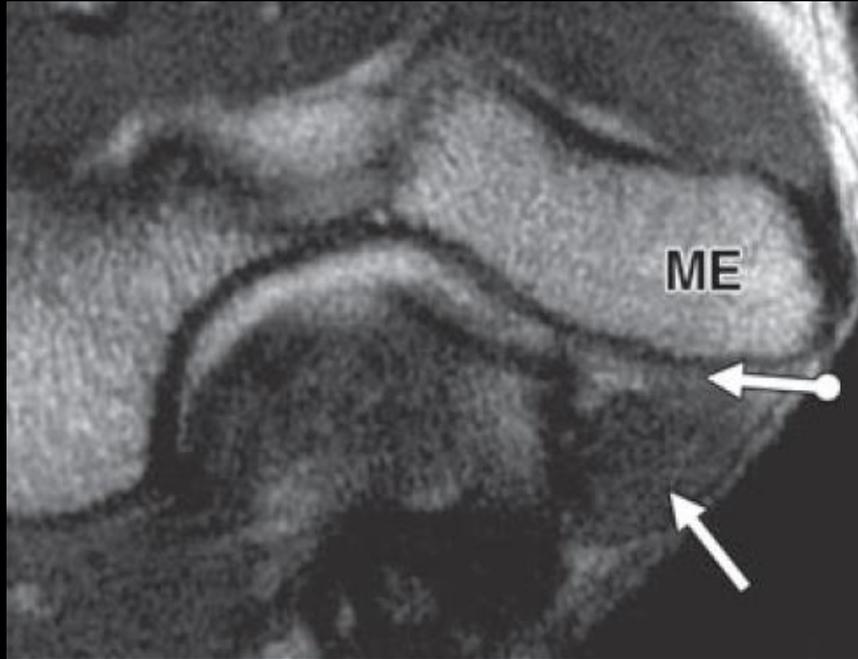
Anconeus epitrochlearis muscle

Prevalence 11-34%

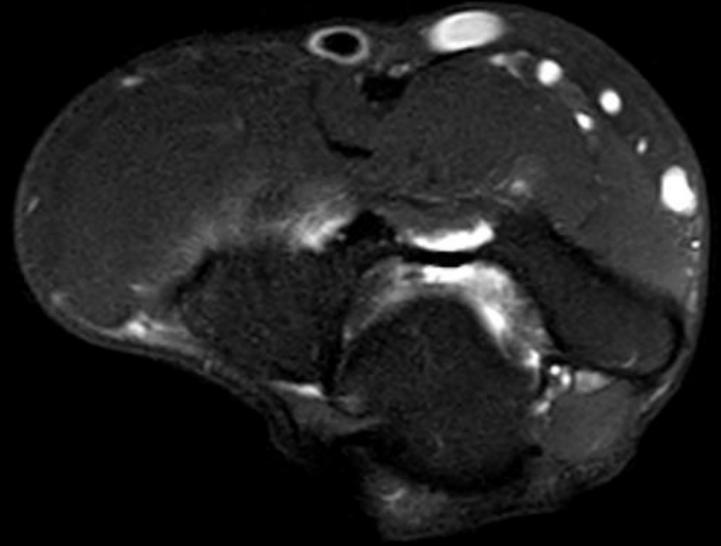
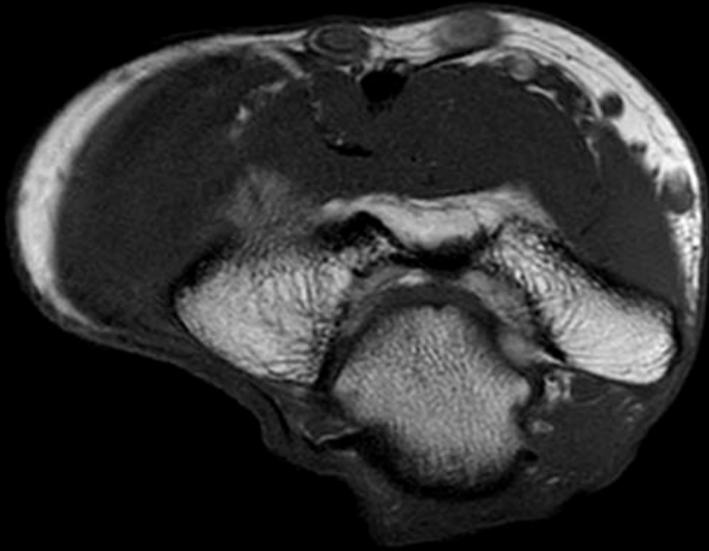
Origin: medial cortex of olecranon

Insertion: inferior surface of medial epicondyle

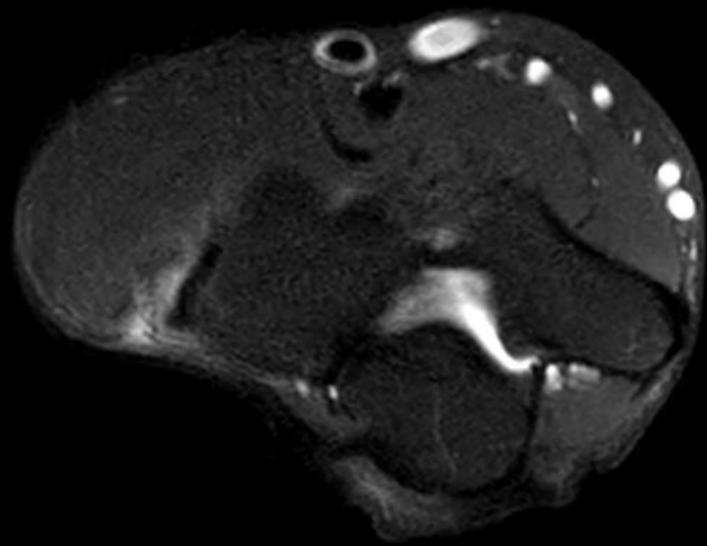
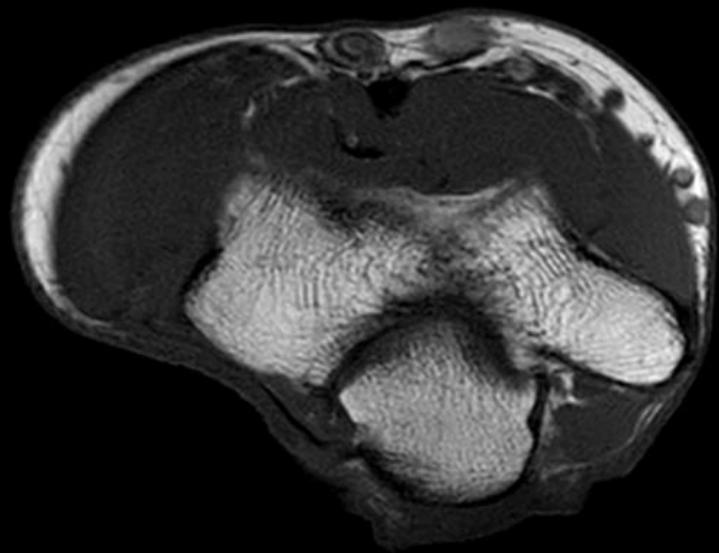


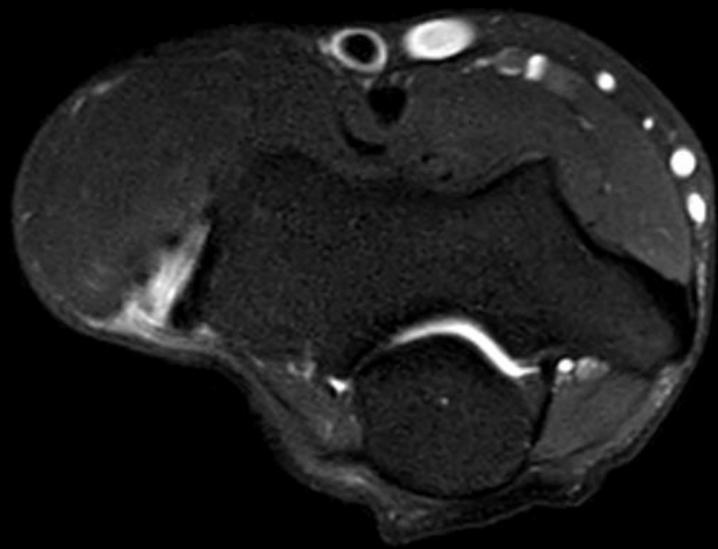
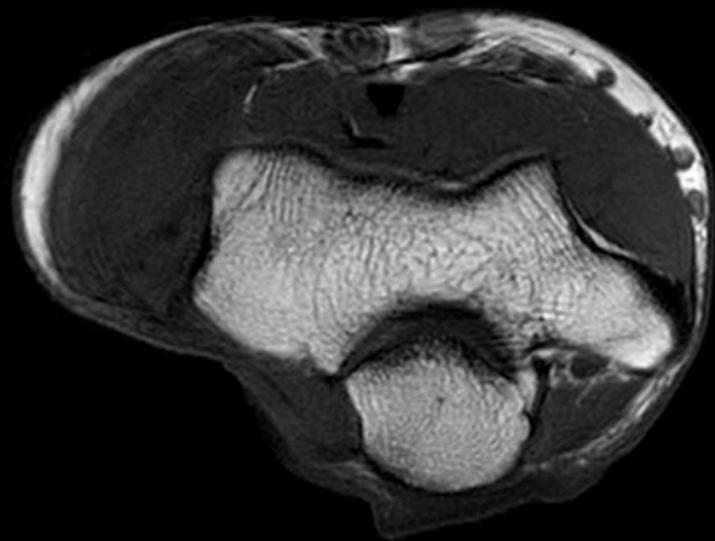


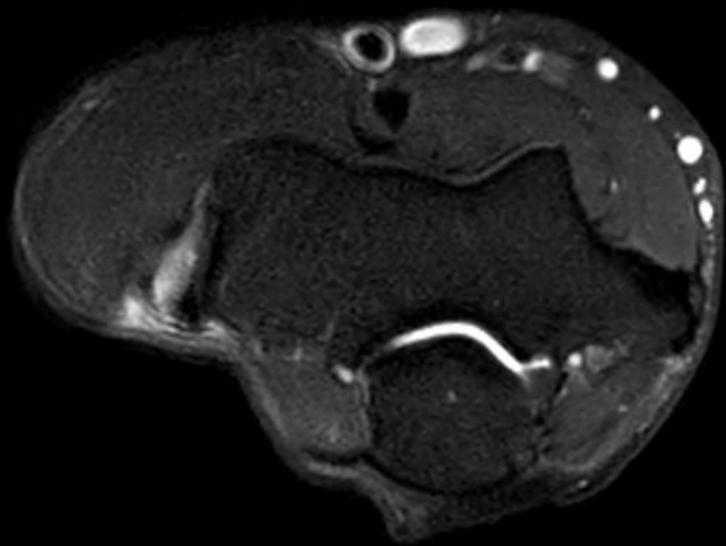
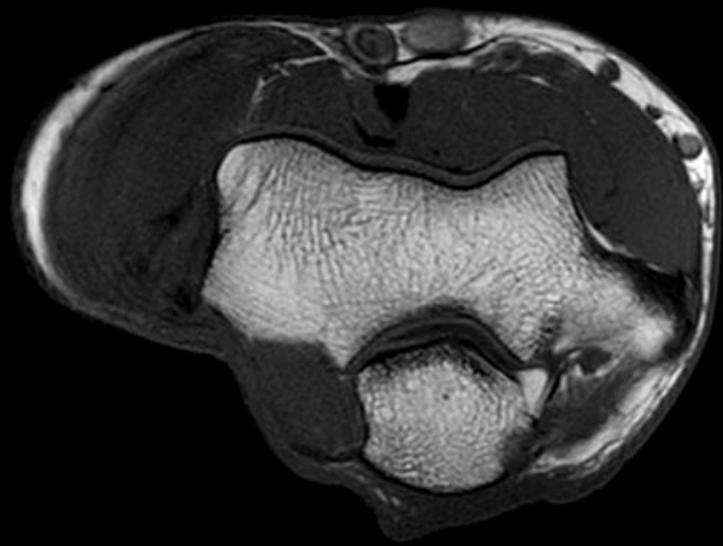
Miller TT, et al. Nerve Entrapment Syndromes of the Elbow, Forearm, and Wrist. AJR 2010; 195:585-594.



Courtesy of Dr. Imwalle



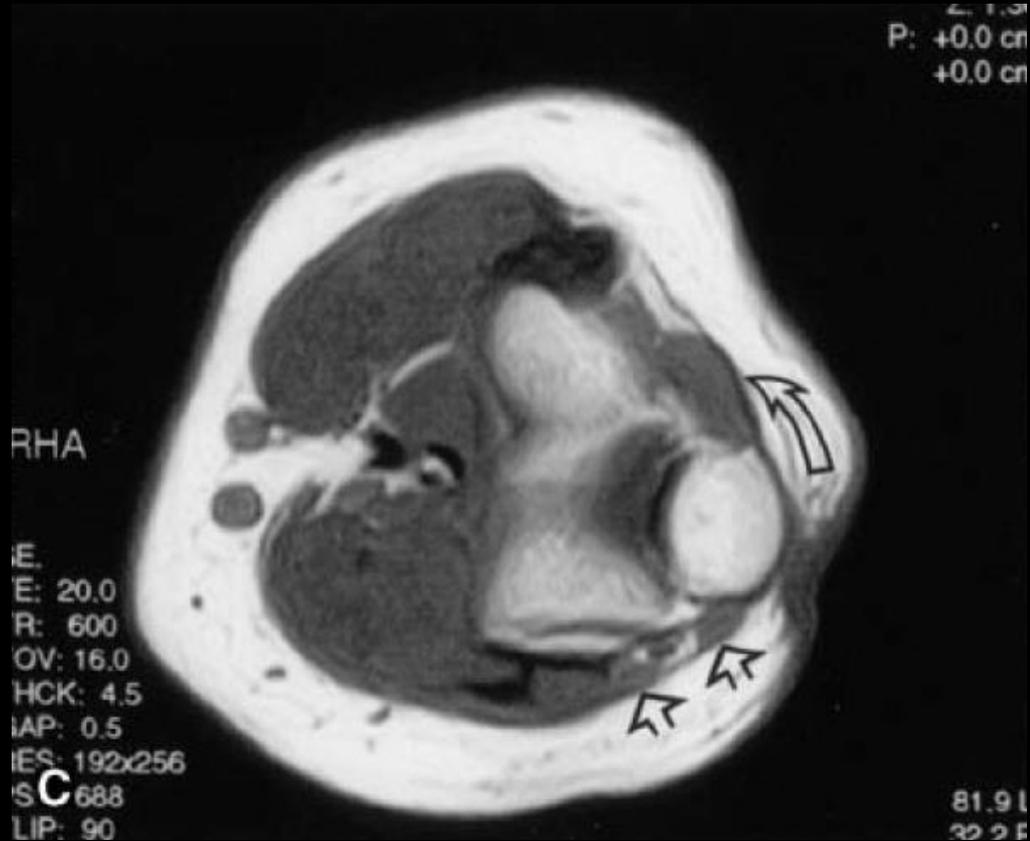




Key points

Relationship to ulnar nerve explains association with cubital tunnel syndrome

Needs to be distinguished from ulnar head of flexor carpi ulnaris muscle (more distal)



Jeon I, et al. MR imaging of edematous anconeus epitrochlearis: another cause of medial elbow pain? *Skeletal Radiol* 2005; 34:103-107.

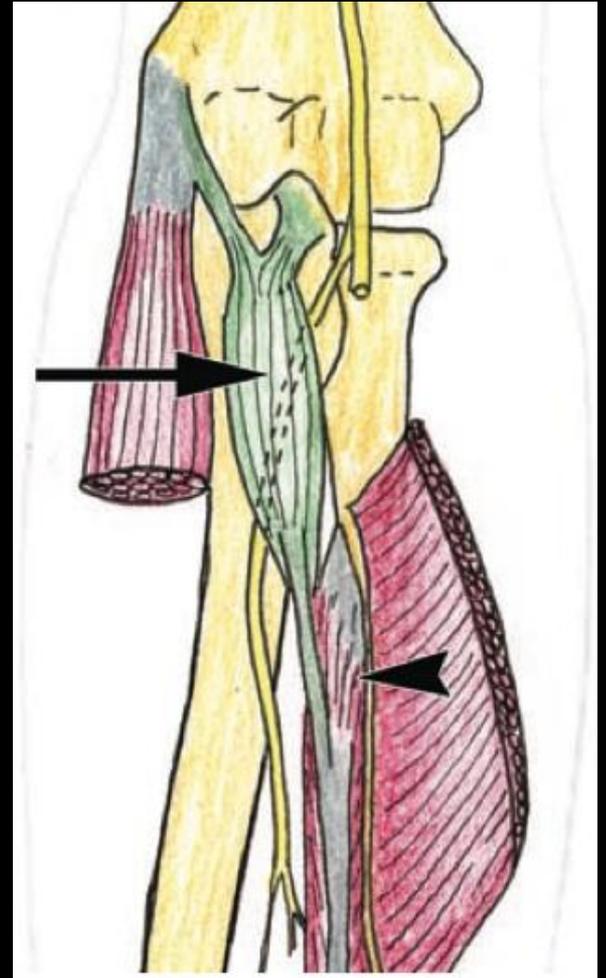
Accessory head of Flexor Pollicis Longus muscle

Aka Gantzer muscle

Prevalence 45-66%

Origin: medial epicondyle vs coronoid process
vs flexor digitorum superficialis muscle

Insertion: ulnar border of FPL



Key points

Can compress median/anterior
interosseous nerves



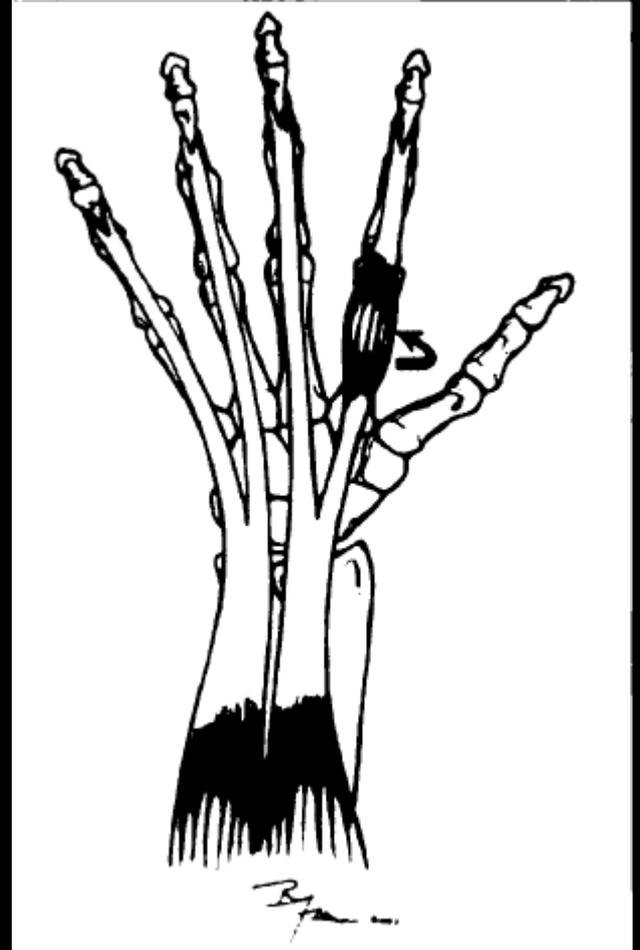
Wrist/Hand

Volar side

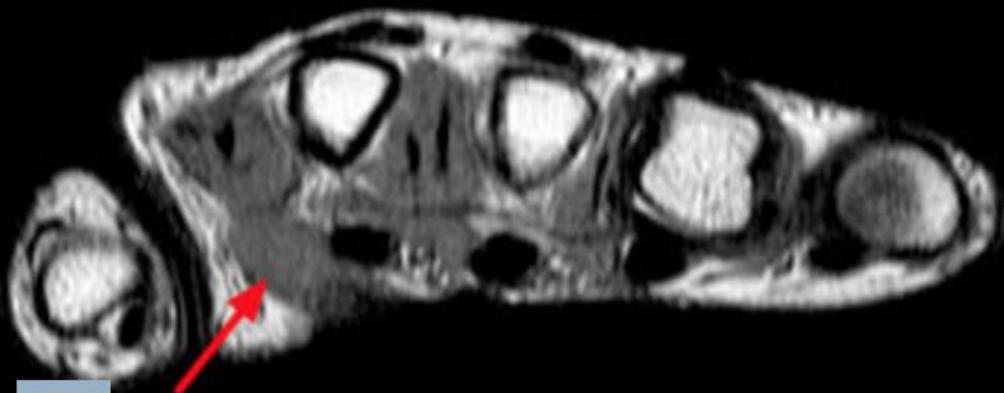
Accessory flexor digitorum superficialis indicis muscle

Origin: FDS tendon adjacent to transverse carpal ligament

Insertion: index finger in region of A1 pulley



Timins ME. Muscular Anatomic Variants of the Wrist and Hand: Findings on MR Imaging. AJR 1999.



2a



2d

Key points

May present as palpable soft tissue mass in the palm

Can compress median nerve in carpal tunnel



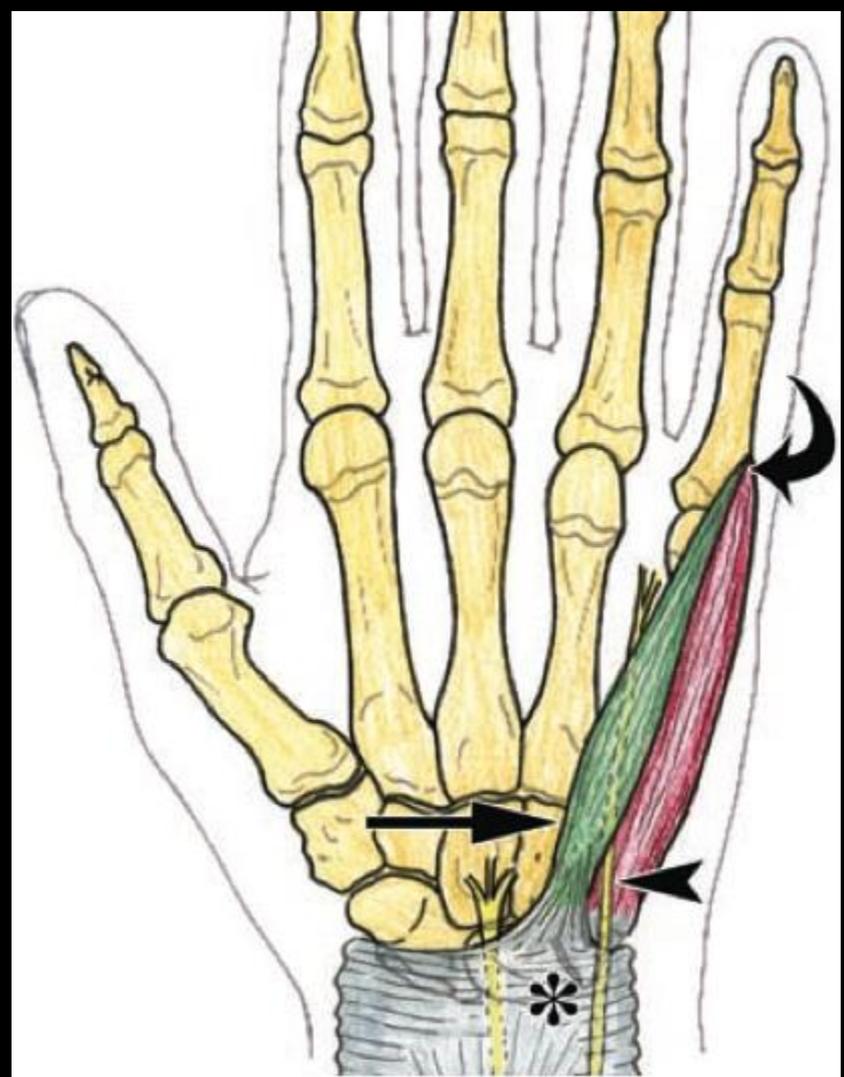
Christensen S. Anomalous Muscle Belly of the Flexor Digitorum Superficialis in Two Generations. *The Hand* 1977.

Accessory abductor digiti minimi

Prevalence 24%

Origin: antebrachial fascia or palmaris longus tendon in lower $\frac{1}{3}$ forearm

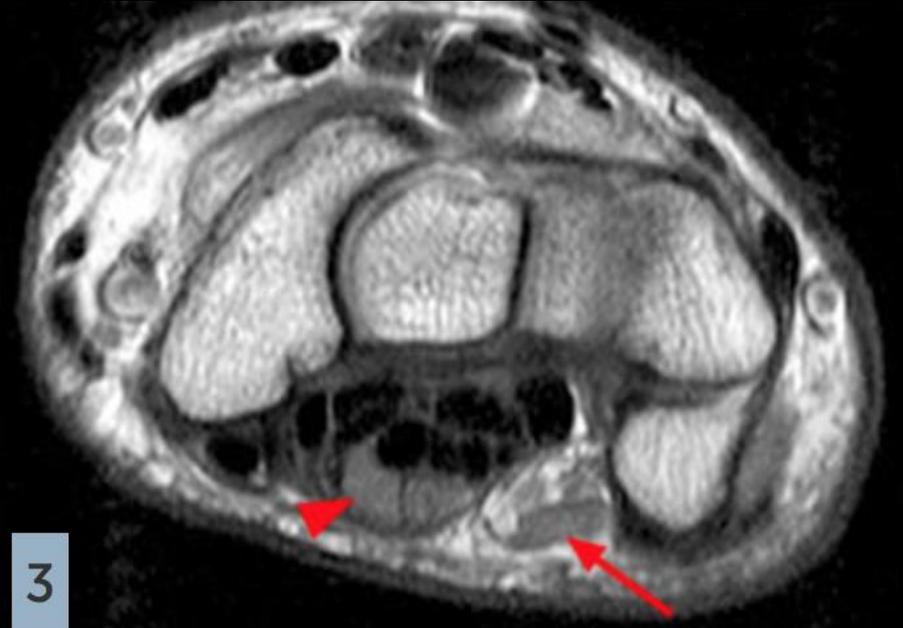
Insertion: on ADM or onto ulnar aspect of proximal phalanx base



Key points

Accessory ADM is still fleshy as it crosses Guyon's canal and can compress ulnar nerve

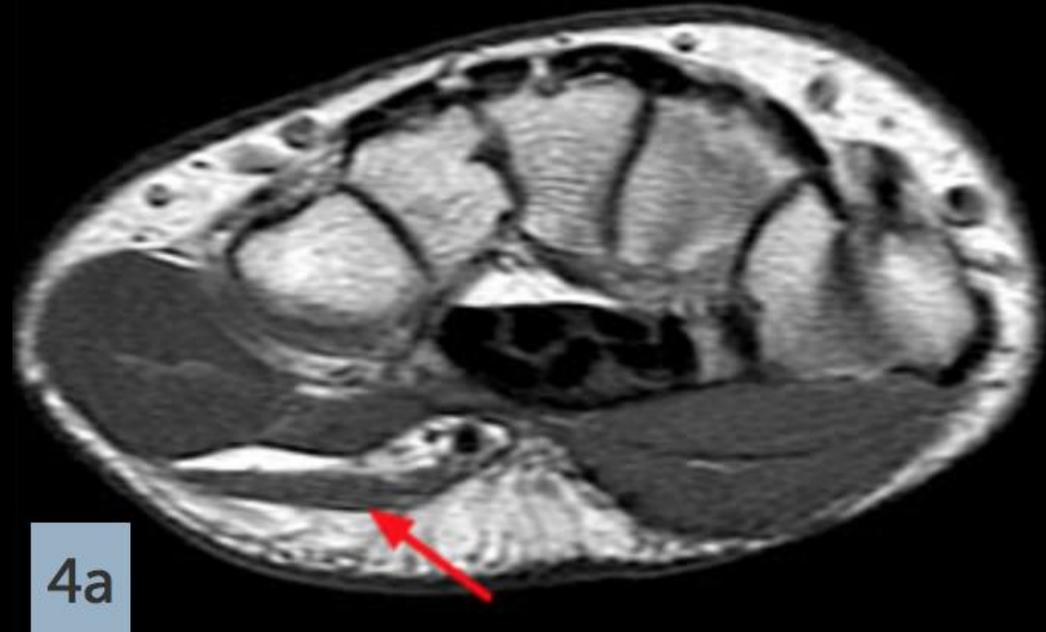
Normally NO muscle in Guyon's canal at level of pisiform



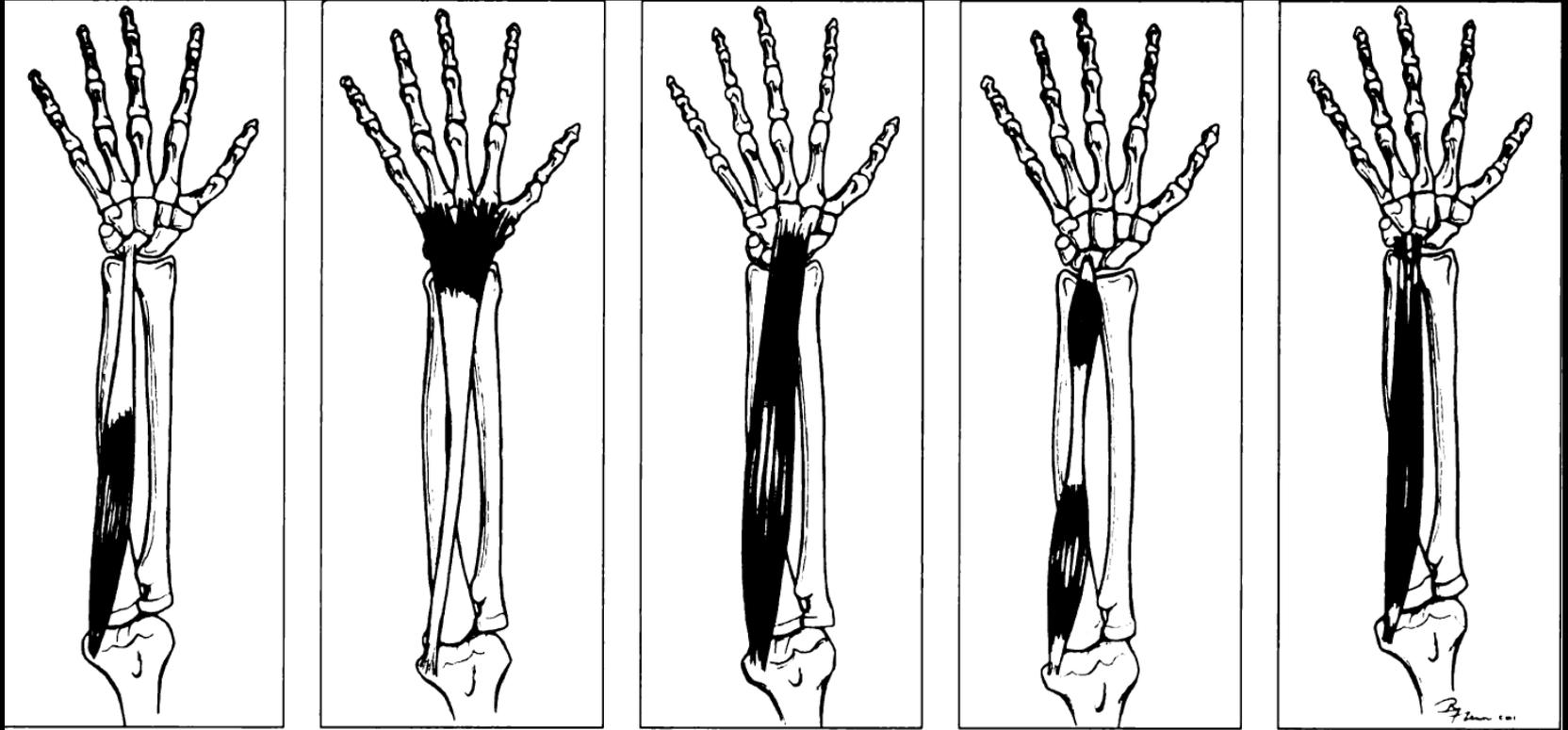
Palmaris brevis muscle

Normal muscle that may be mistaken as a variant

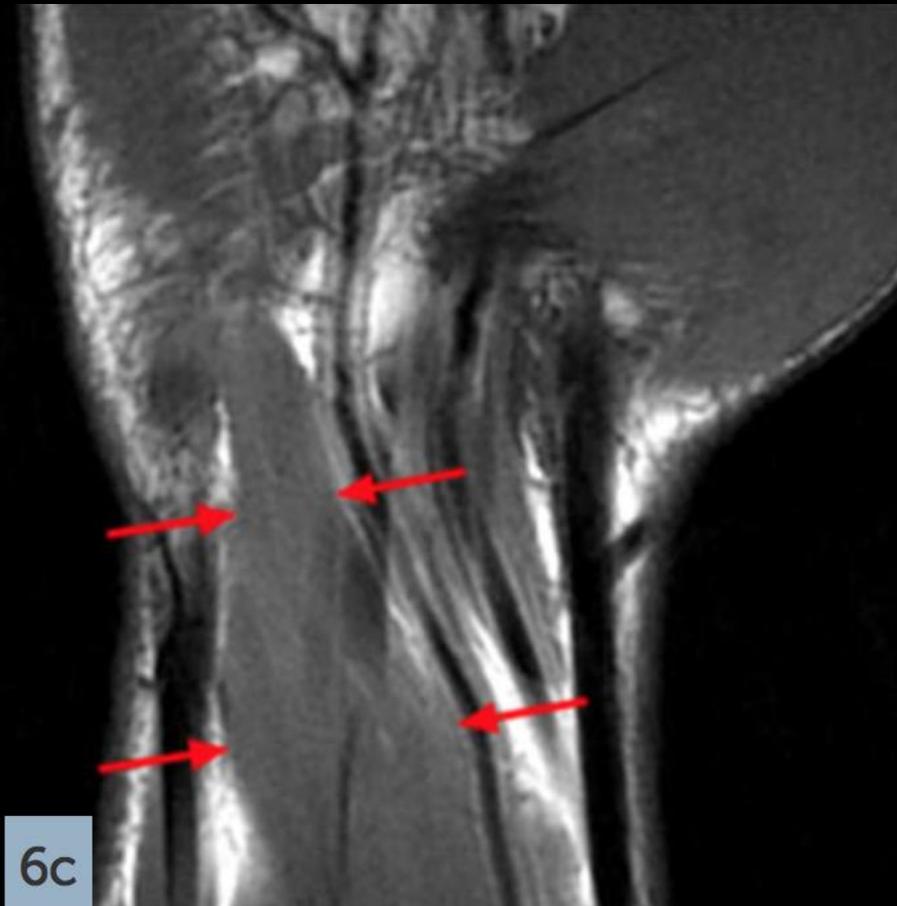
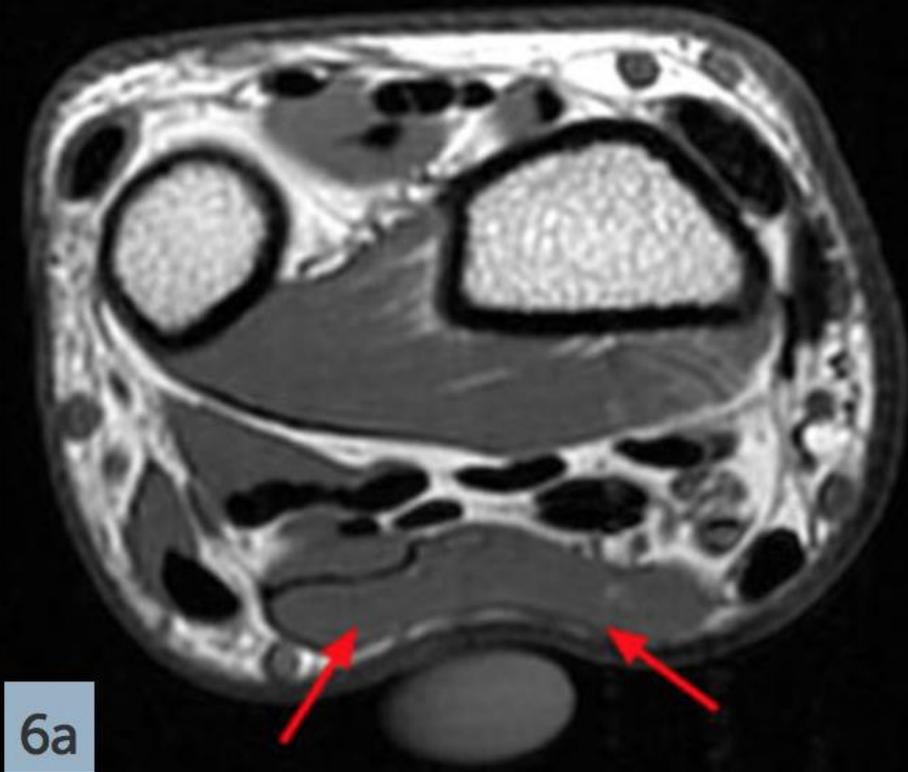
Located in SQ tissues volar to neurovascular structures of Guyon's canal, but DISTAL to pisiform and inserts into the skin



Variations in palmaris longus muscle anatomy



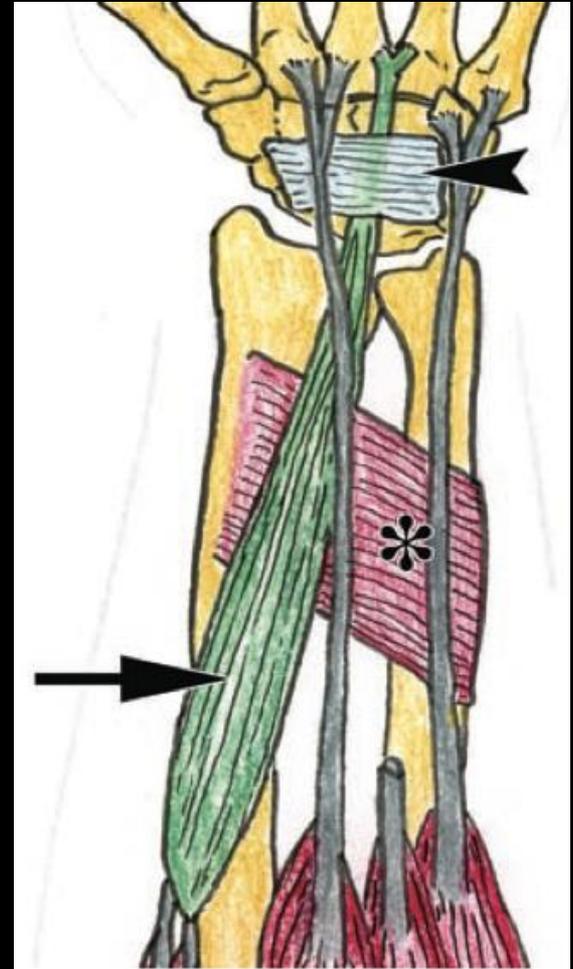
Timins ME. Muscular Anatomic Variants of the Wrist and Hand: Findings on MR Imaging. AJR 1999.



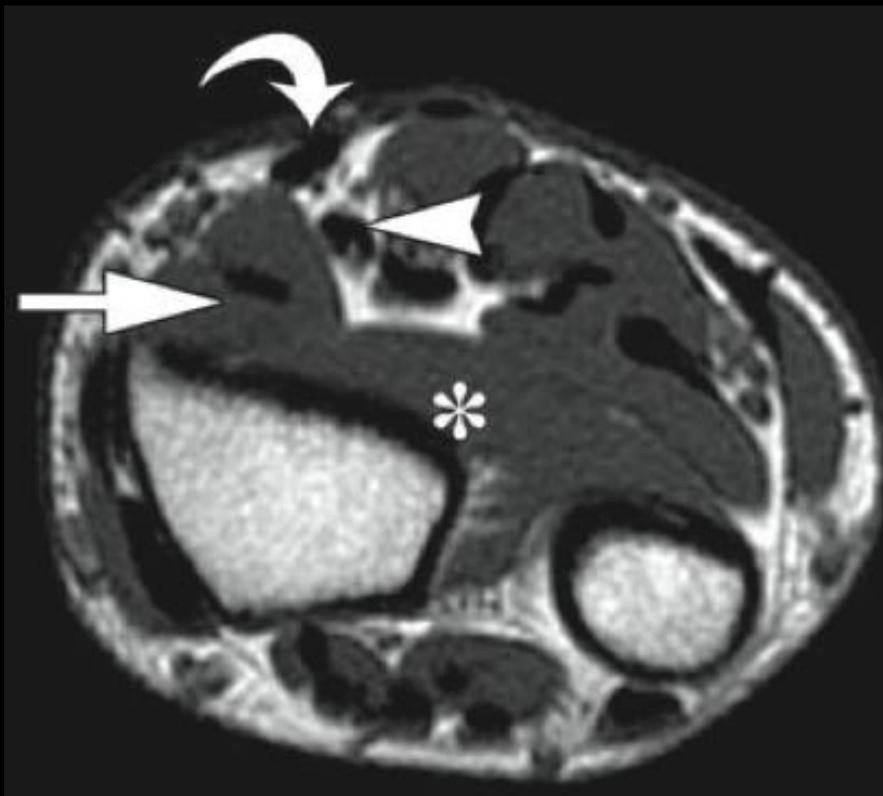
Flexor carpi radialis brevis vel profundus muscle

Origin: volar aspect of distal radius (distal to origin of FPL)

Insertion: onto capitate bone and base of 3rd and 4th metacarpals



Sookur PA, et al. Accessory Muscles: Anatomy, Symptoms, and Radiologic Evaluation. Radiographics 2008.



Sookur PA, et al. Accessory Muscles: Anatomy, Symptoms, and Radiologic Evaluation. Radiographics 2008.

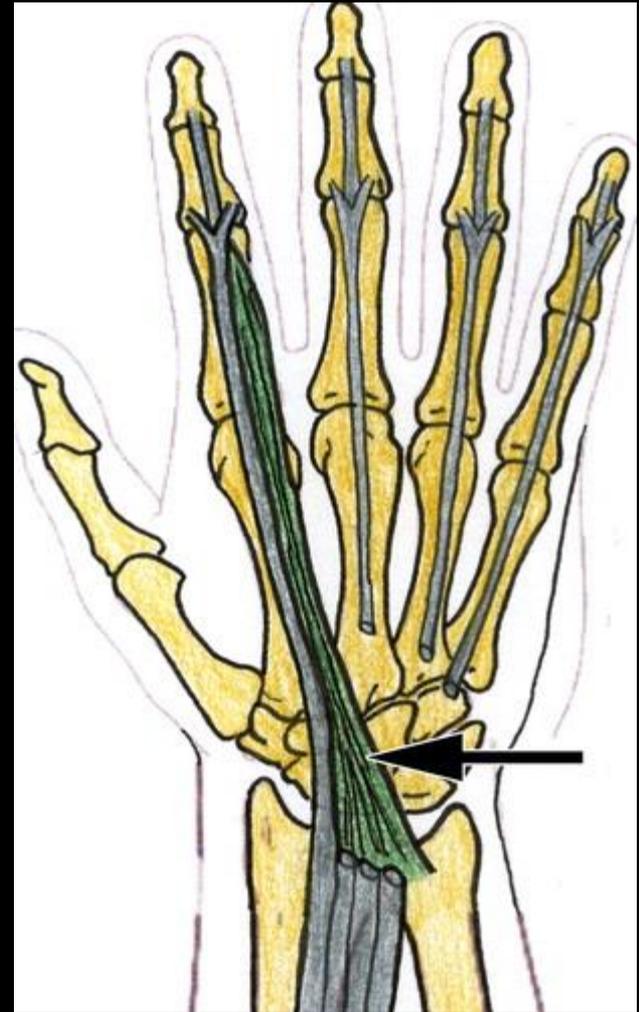
Wrist/Hand

Dorsal side

Extensor digitorum brevis manus muscle

Origin: dorsal wrist capsule deep to extensor retinaculum vs distal radius vs deep carpal fascia

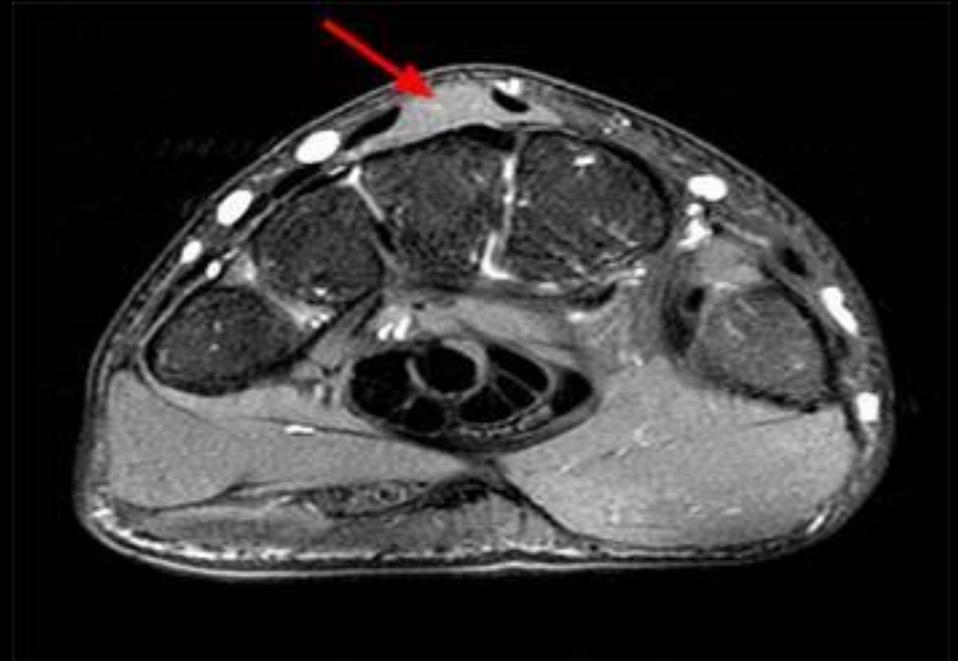
Insertion: extensor hood of 2nd or 3rd finger



Key Points

Often dx clinically as ganglion, synovial nodule/cyst, soft tissue tumor, or a carpal boss

Remember- muscle belly of extensor tendons should NOT extend to level of carpal bones



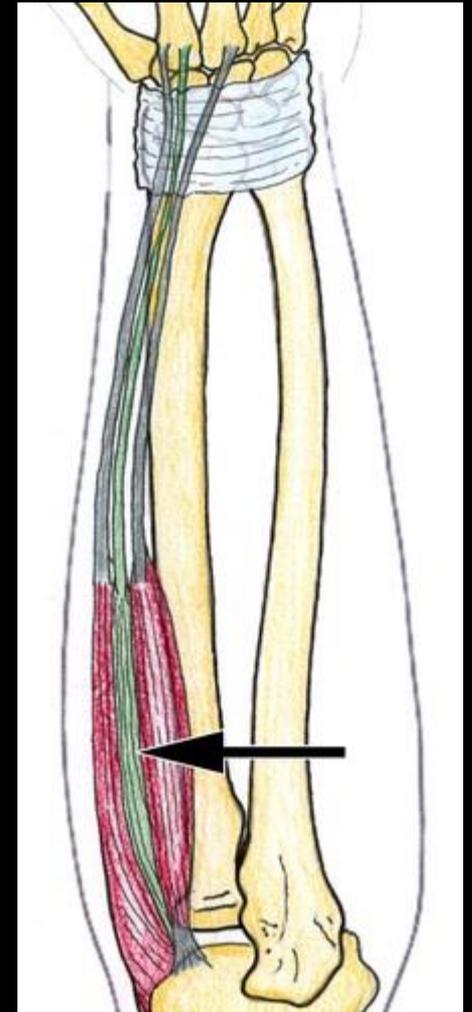
Extensor Carpi Radialis intermedius

Prevalence 12-24%

Origin: between origins of ECR longus and brevis

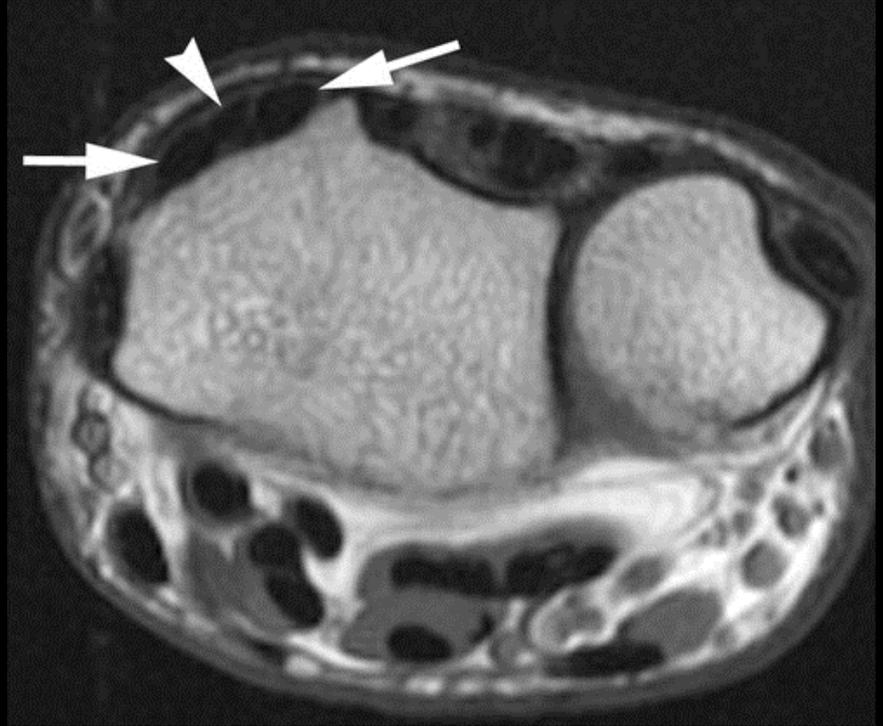
Inserts: onto base of 2nd or 3rd metacarpal or abductor pollicis longus muscle

Sookur PA, et al. Accessory Muscles: Anatomy, Symptoms, and Radiologic Evaluation. Radiographics 2008.

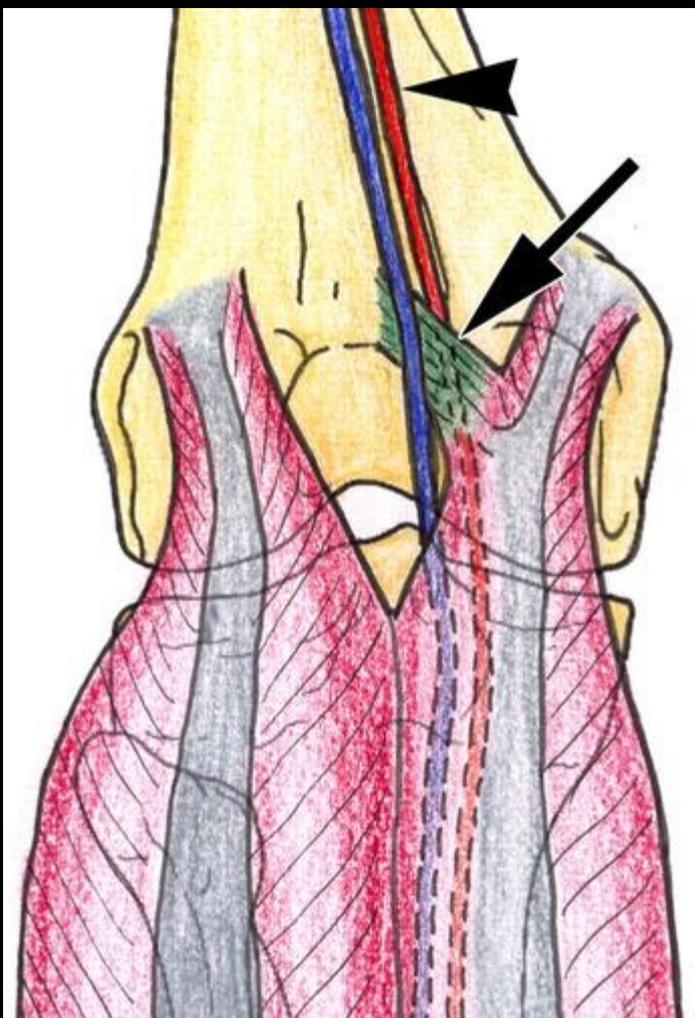


Key Points

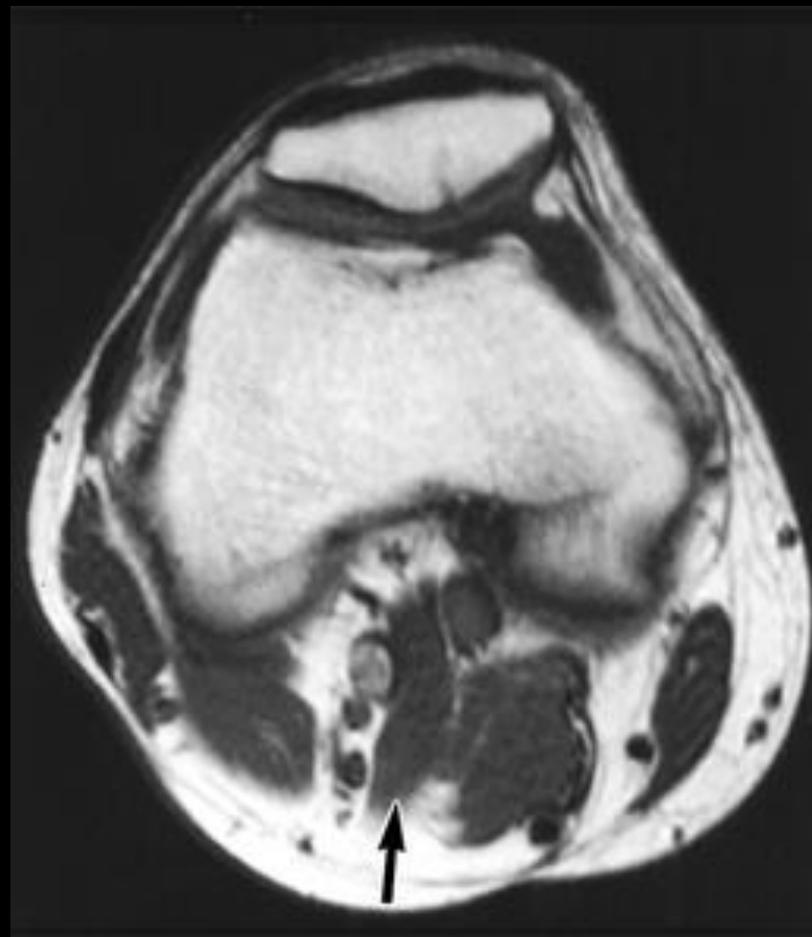
Can mimic split tear of ECR tendons in the 2nd extensor tunnel



Knee



Sookur PA, et al. Accessory Muscles. Radiographics 2008.



Macedo TA, et al. Popliteal Artery Entrapment Syndrome. AJR 2003.

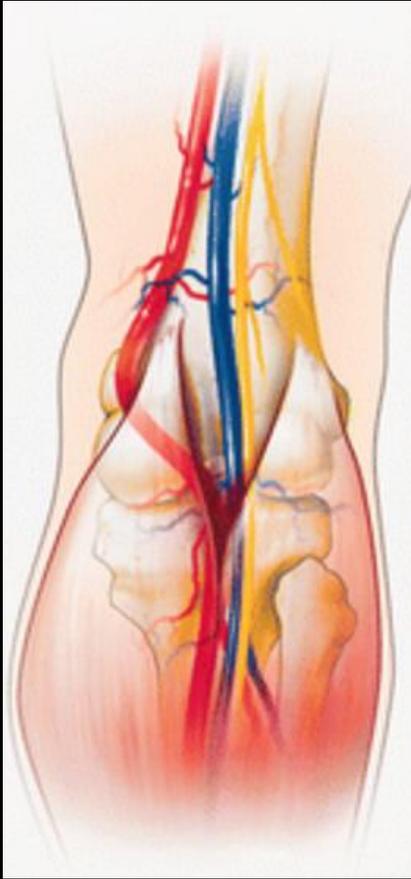
Popliteal artery entrapment syndrome

Table 2. Classification of Popliteal Artery Entrapment Syndrome According to Whelan and Rich Classification

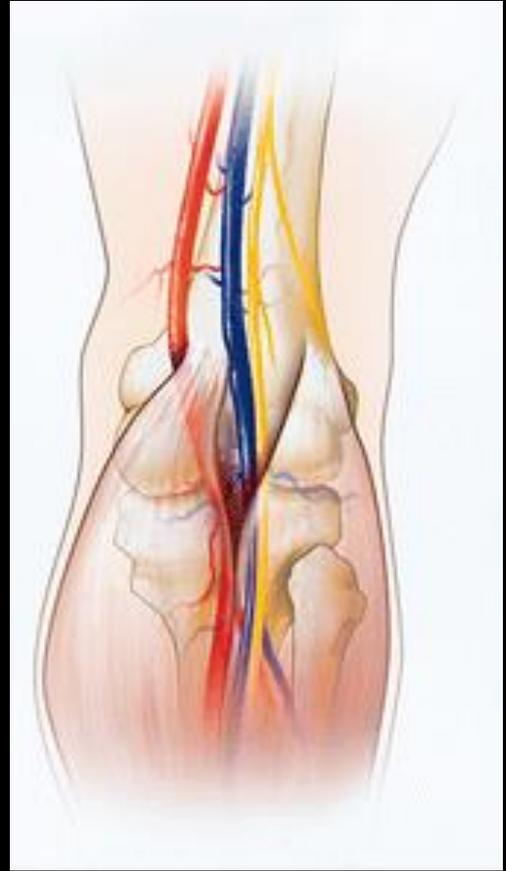
Type 1	Aberrant course of the popliteal artery medial to a normal MHG
Type 2	Abnormal lateral insertion of the MHG and medial deviation of the popliteal artery
Type 3	Compression of a normally positioned popliteal artery by an accessory slip of the MHG
Type 4	Abnormal location of the popliteal artery, deep in the popliteus muscle or beneath fibrous bands in the popliteal fossa
Type 5	Any form of the entrapment that involves both the popliteal artery and vein

Abbreviation: MHG, medial head of gastrocnemius muscle.

Type 1



Type 2



Tensor fasciae suralis muscle

Origin: distal semitendinosus muscle

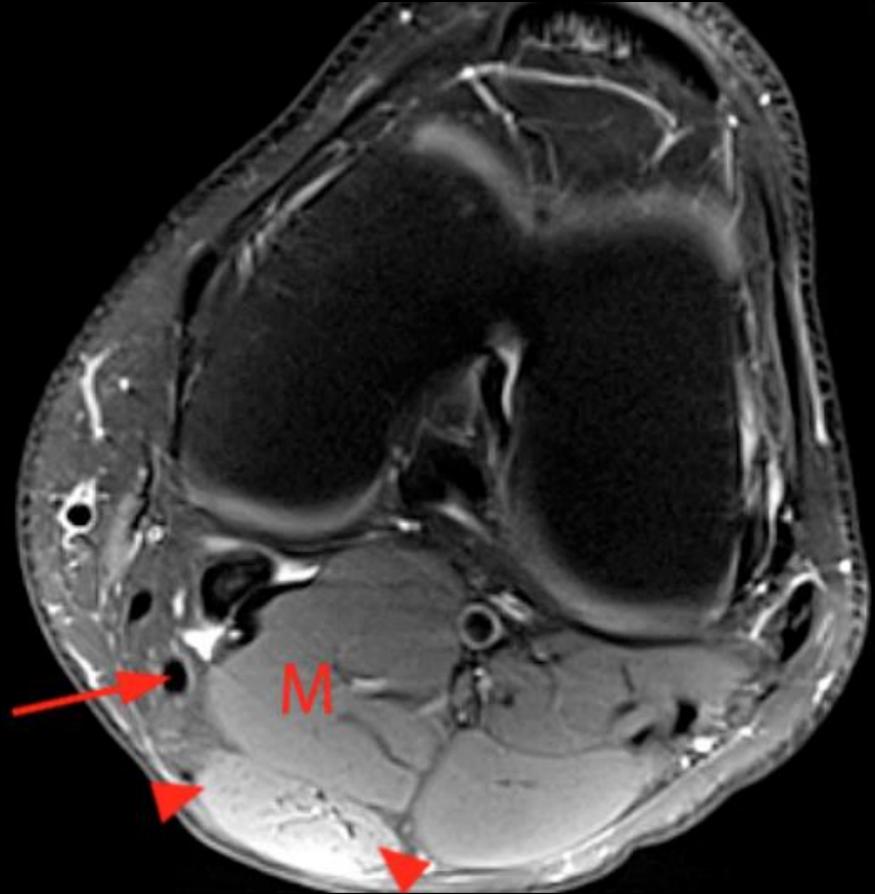
Insertion: posterior fascia of leg, medial head of gastrocnemius, or via a long thin tendon onto superficial Achilles tendon



Key points

Can present with popliteal soft tissue swelling/mass

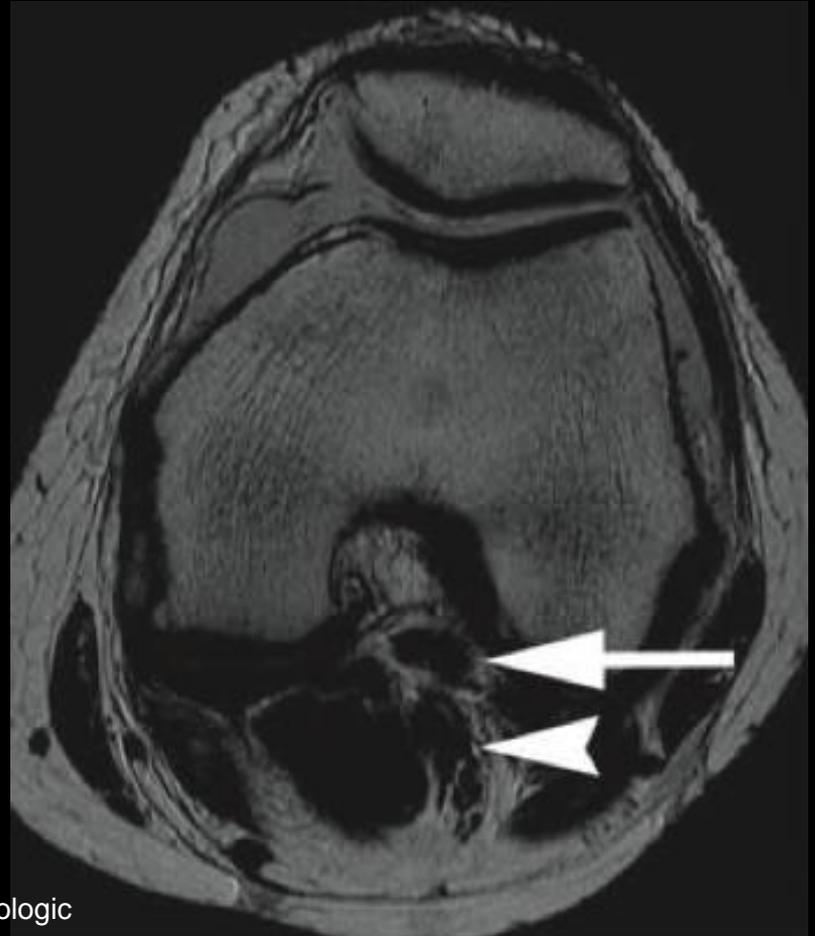
Similar location as accessory semimembranosus



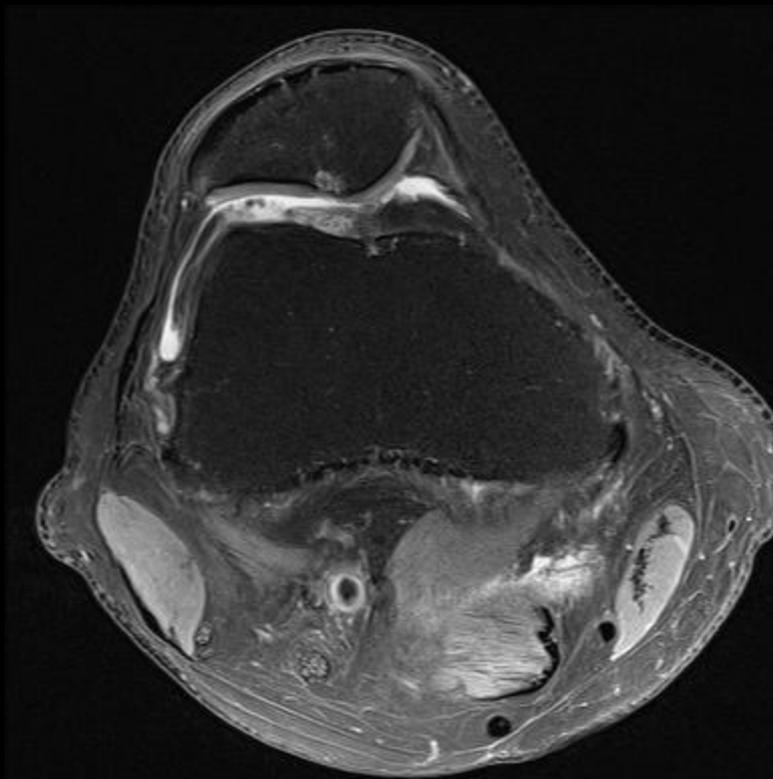
Accessory popliteus

Origin: common with lateral gastrocnemius

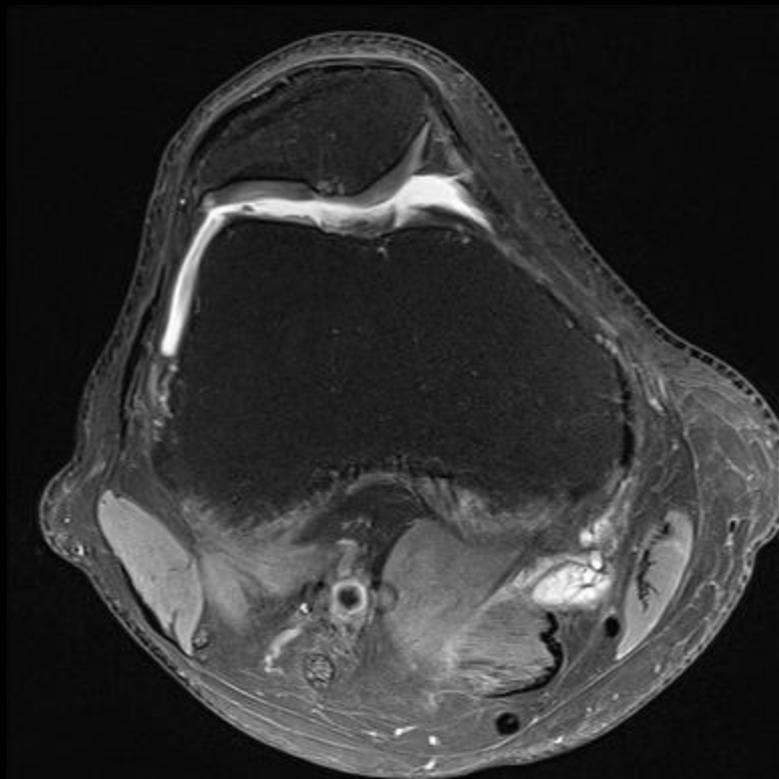
Insertion: posteromedial capsule

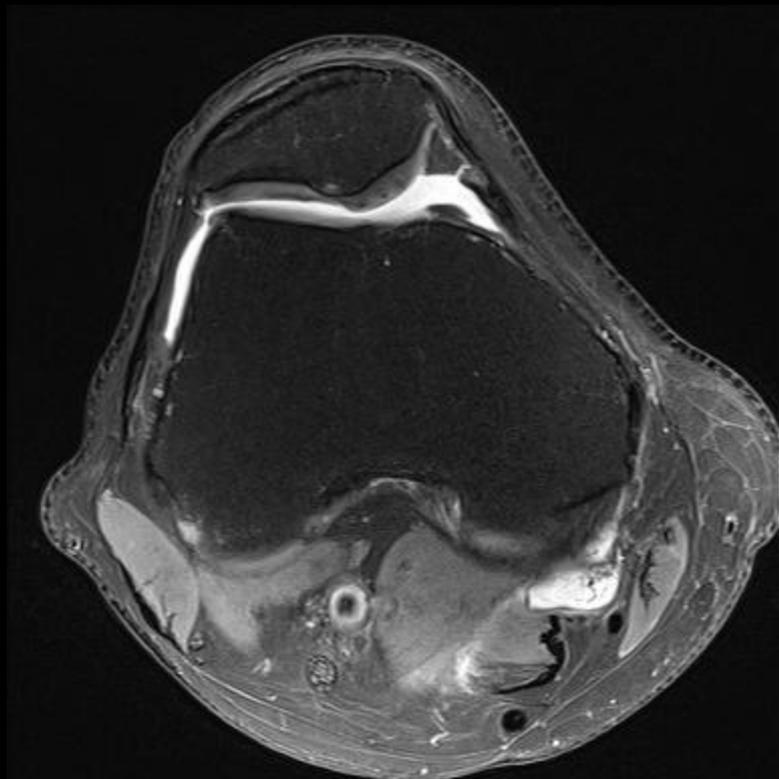


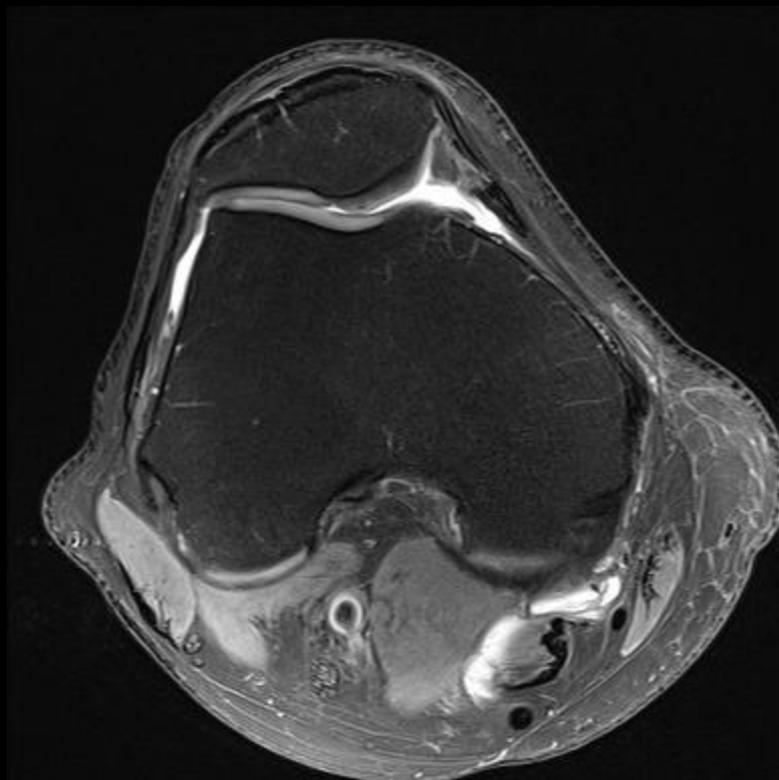
Sookur PA, et al. Accessory Muscles: Anatomy, Symptoms, and Radiologic Evaluation. Radiographics 2008.

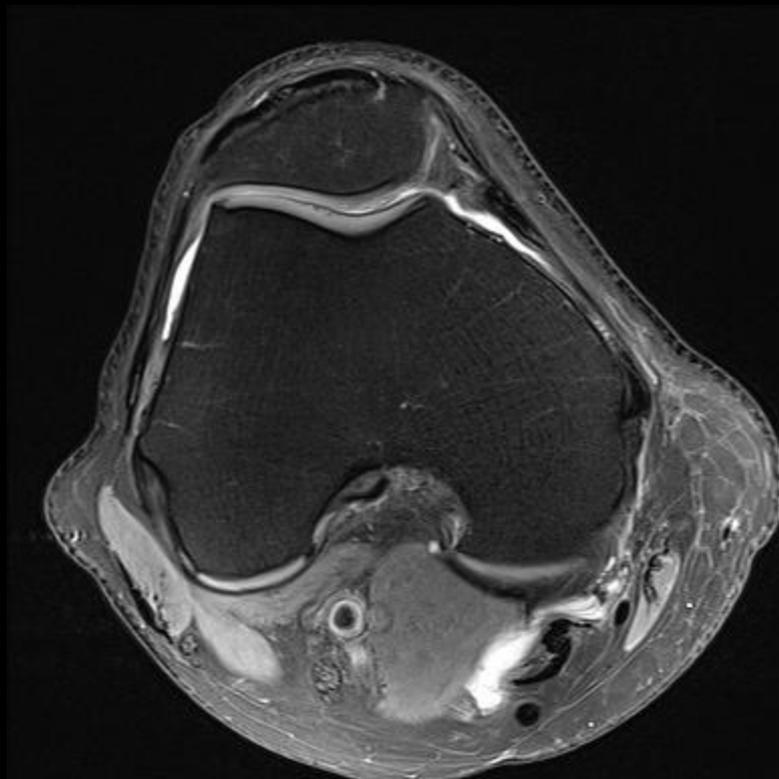


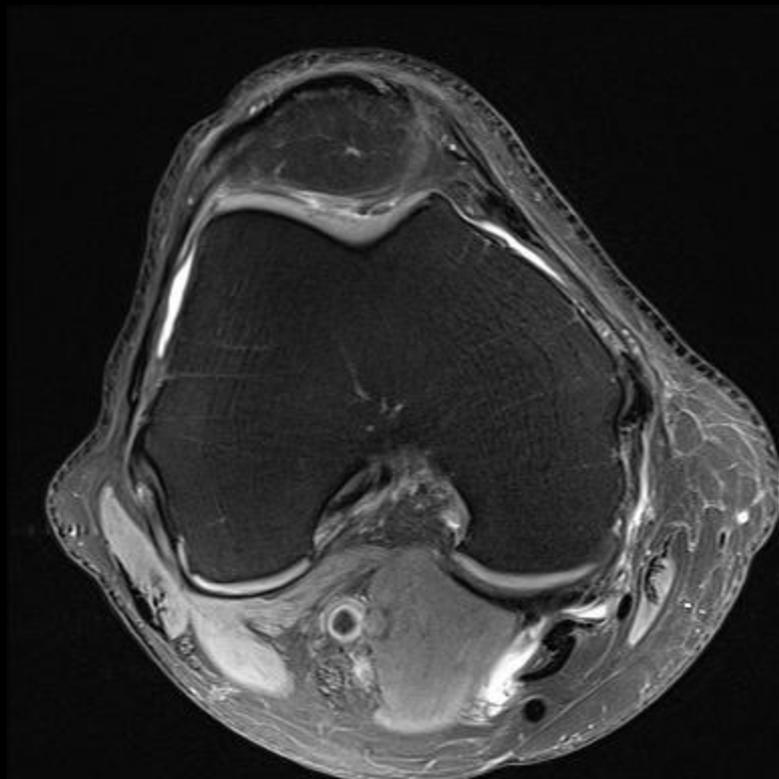
Courtesy of Dr. Smitaman

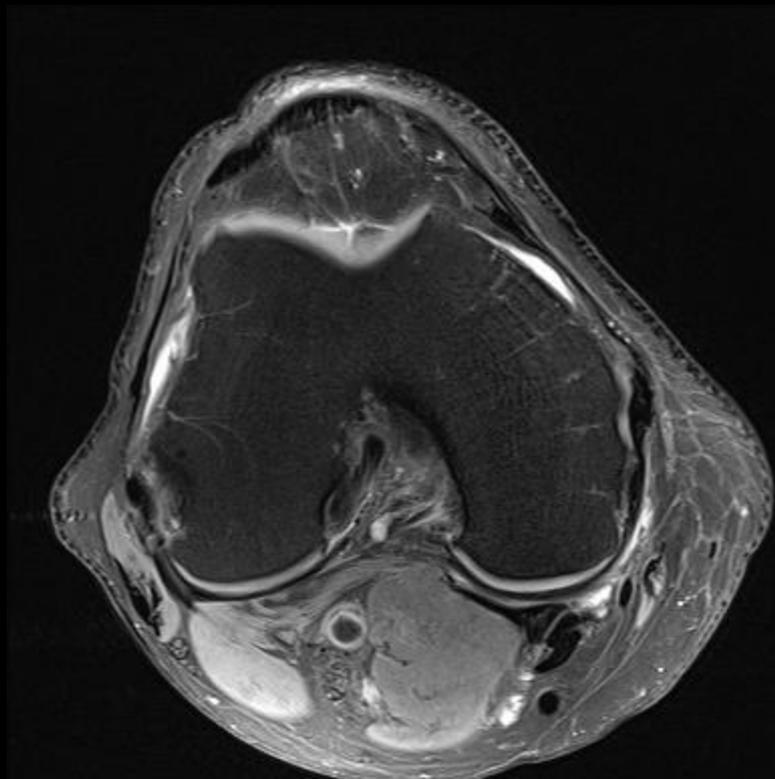


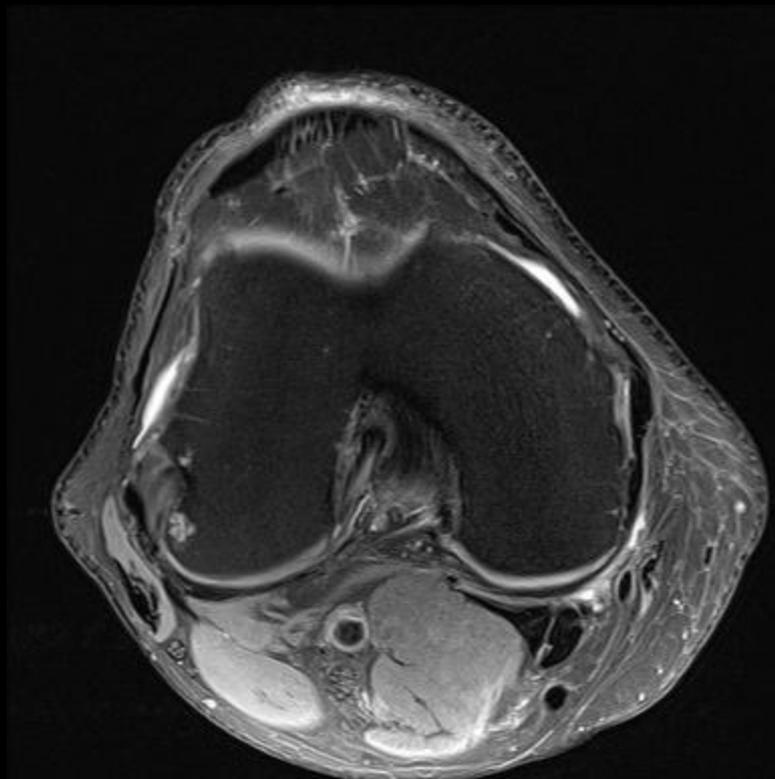


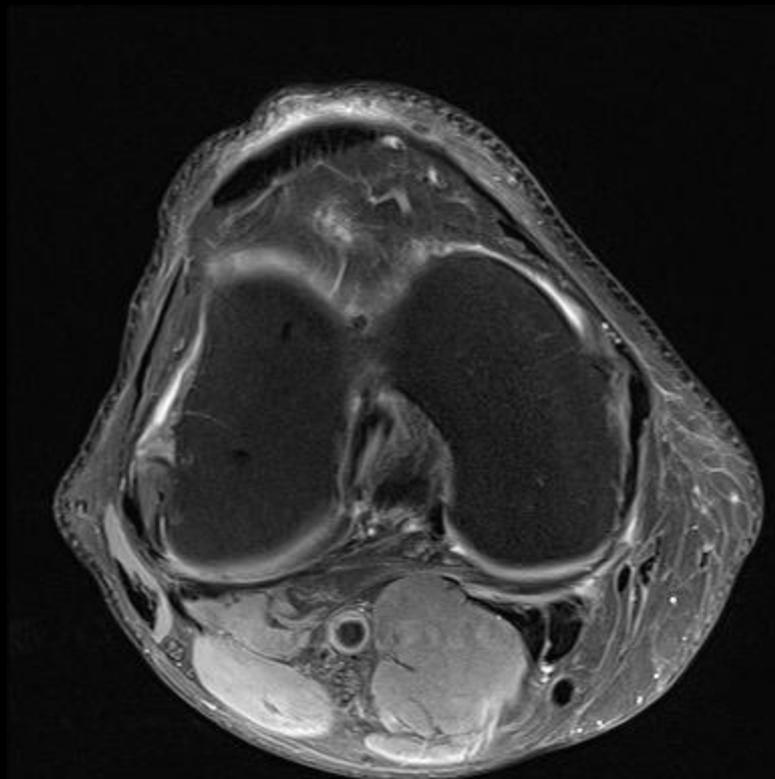














Ankle

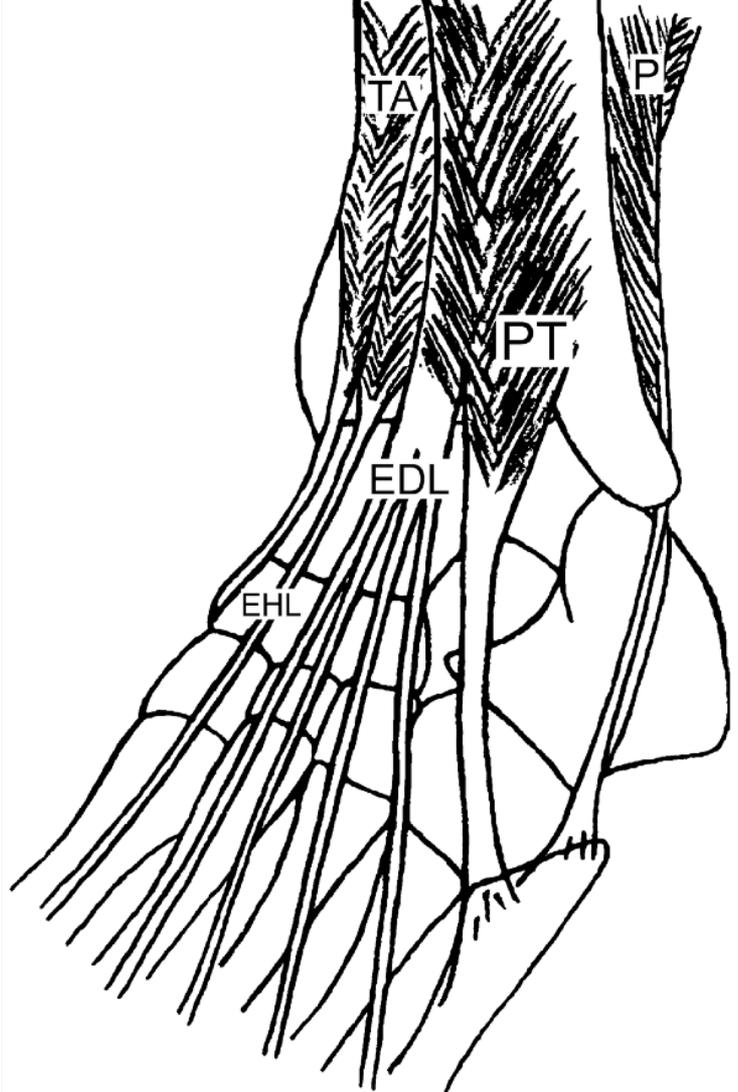
Lateral side

Peroneus tertius

Prevalence: 83-95%

Origin: anterior surface distal fibula and EDL muscle

Insertion: base/dorsal surface of 5th metatarsal shaft



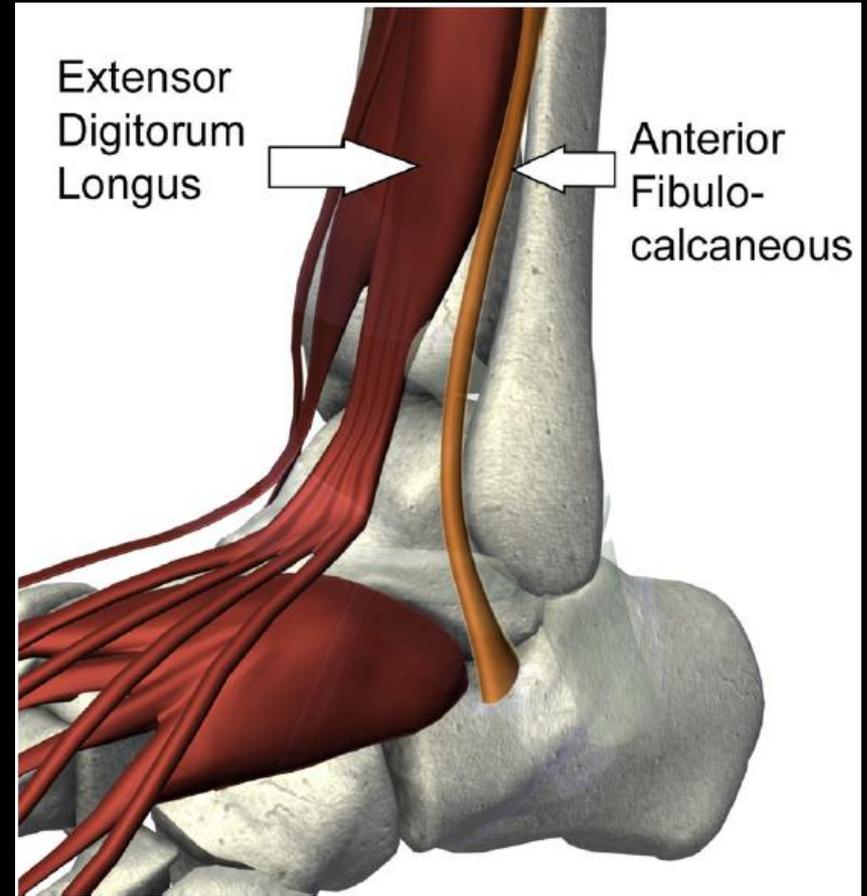
Key Points

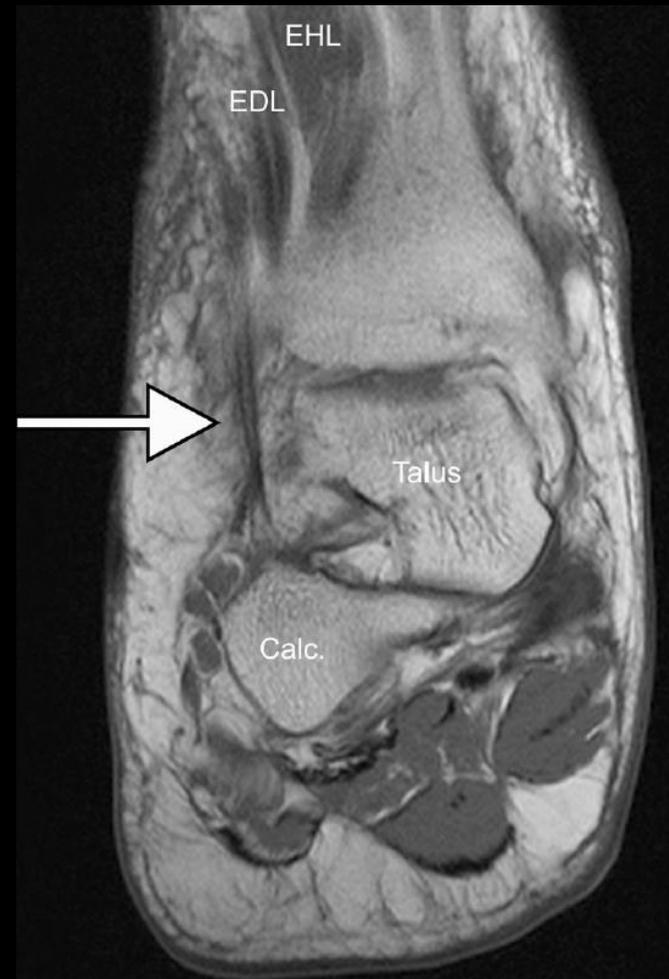
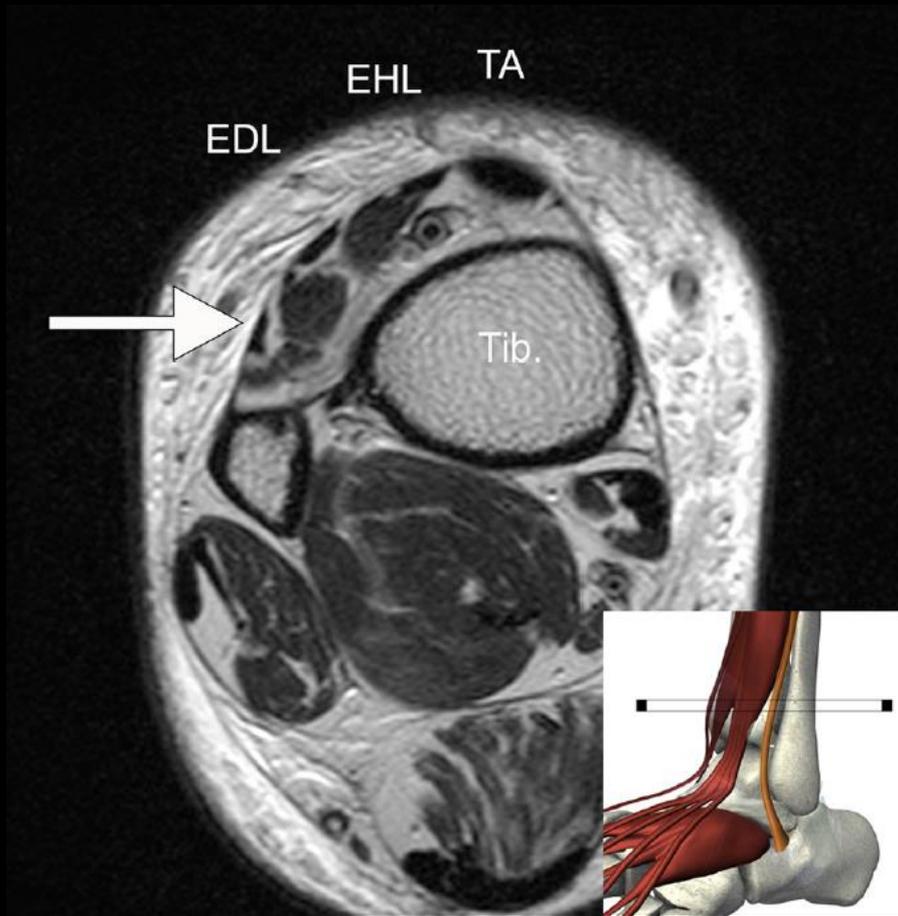
May cause snapping over lateral talar dome

Anterior fibulocalcaneus

Origin: fibula and anterior crural septum

Insertion: critical angle of Gissane on calcaneus





Key Points

May be mistaken for peroneus tertius in anterior compartment, look at distal insertion

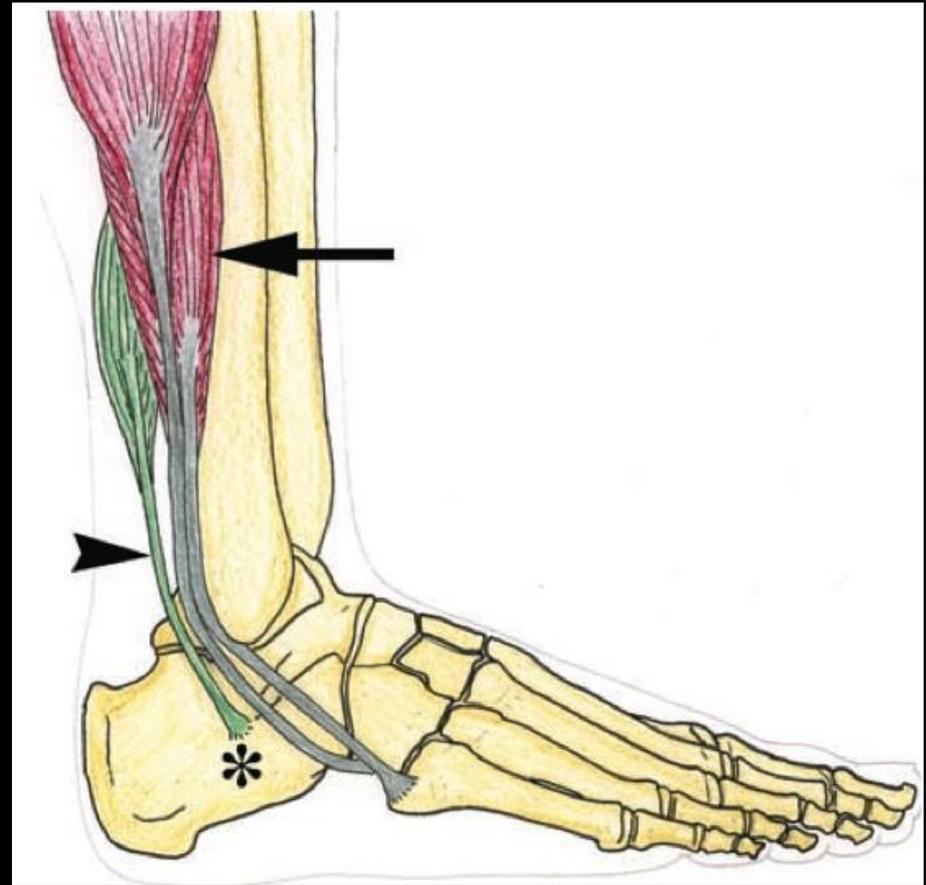
Peroneus quartus

Prevalence 13-26%

Origin: peroneus brevis (less often posterior fibula or peroneus longus)

Insertion:

- Peroneocalcaneus externum: peroneal tubercle or retrotrochlear eminence
- Peroneocuboideus
- Peroneoperoneolongus
- Inferior peroneal retinaculum adjacent to retrotrochlear eminence



Sookur PA, et al. Accessory Muscles: Anatomy, Symptoms, and Radiologic Evaluation. Radiographics 2008.

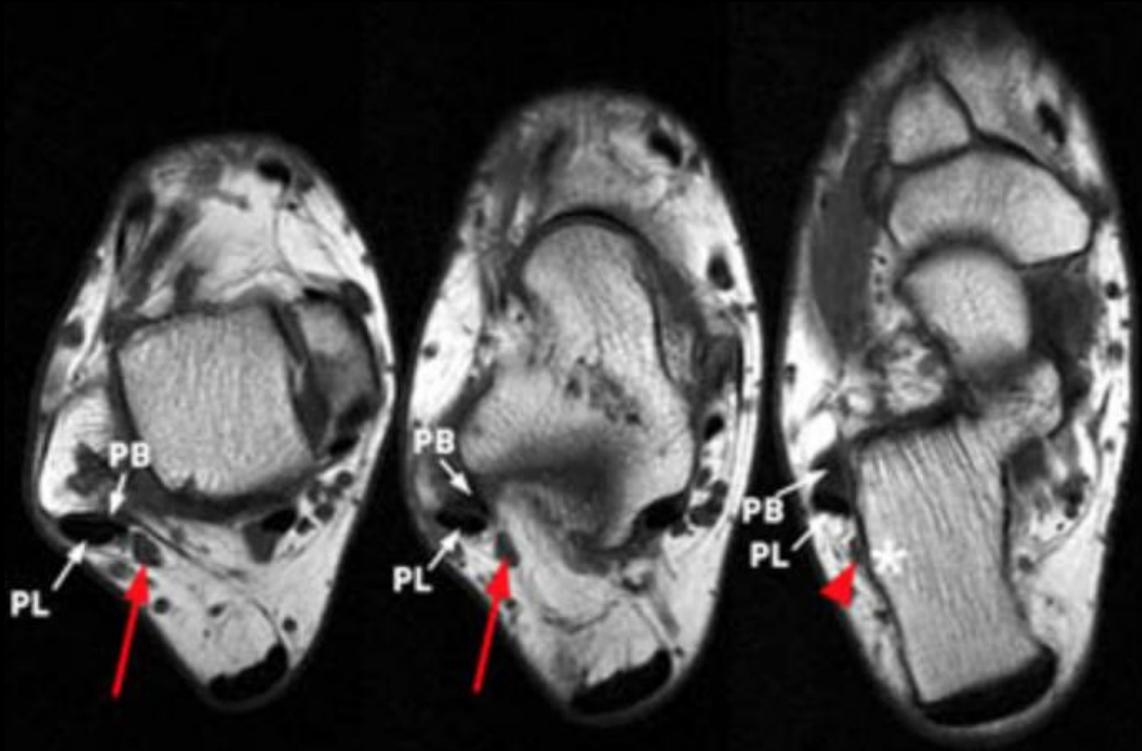
Key points

May be mistaken for longitudinal split tear of peroneal tendons

May cause lateral ankle pain/instability

“Crowding effect”

Associated with retrotrochlear eminence hypertrophy



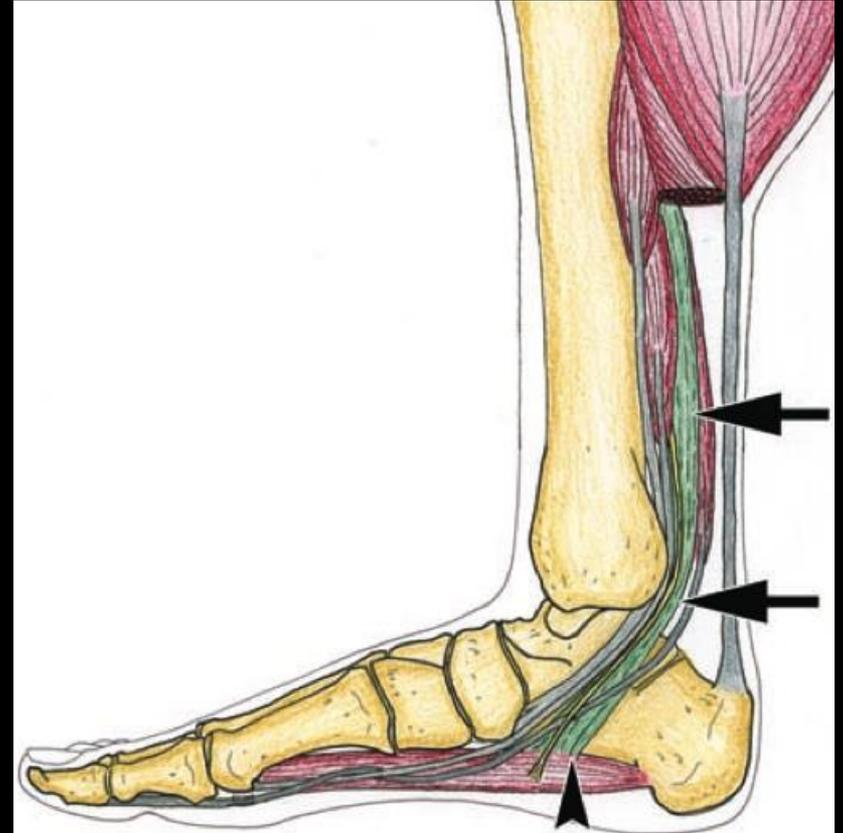
Ankle
Medial side

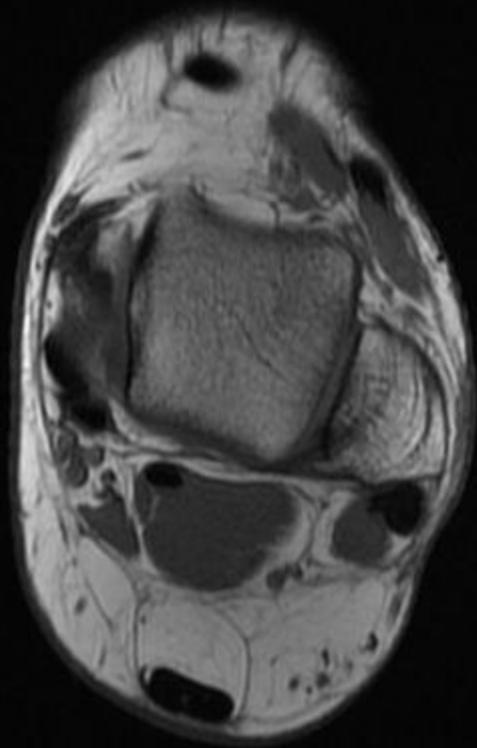
Flexor digitorum accessorius longus

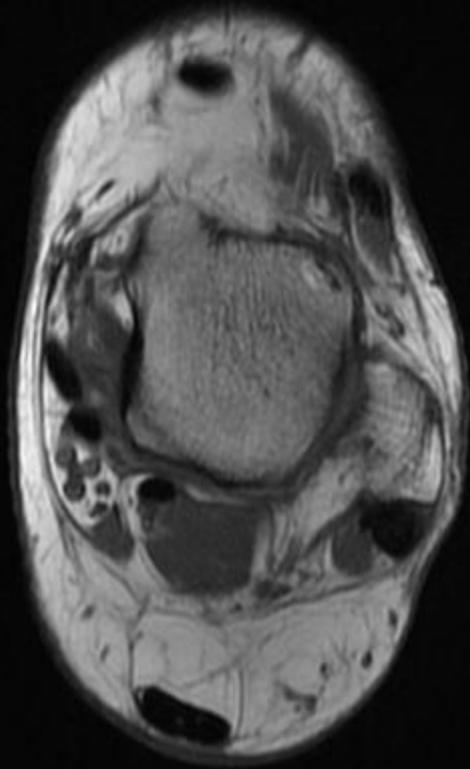
Prevalence 6-8%

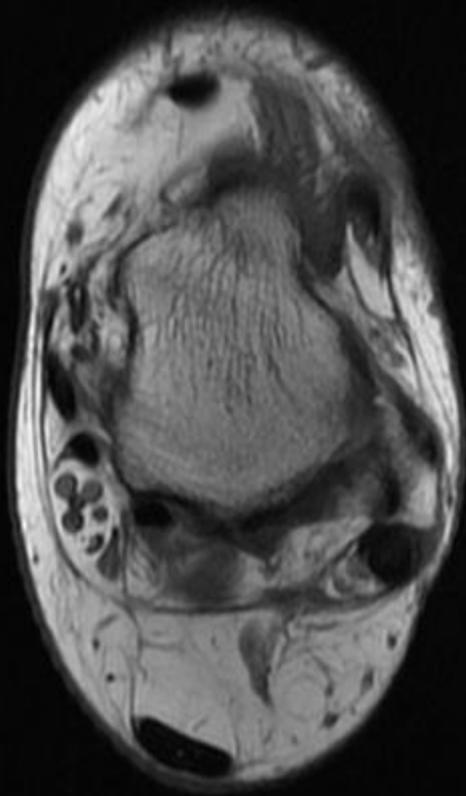
Origin: medial margin of tibia and fascia of deep posterior compartment or lateral margin of fibula distal to origin of FHL

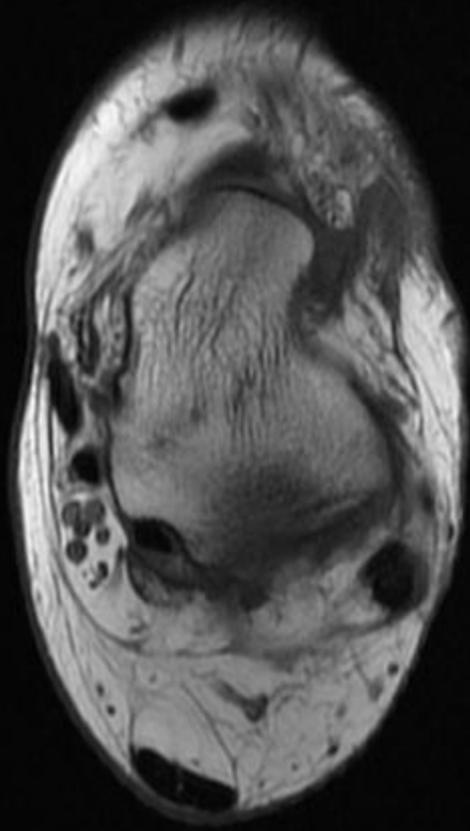
Insertion: quadratus plantae muscle or FDL tendon

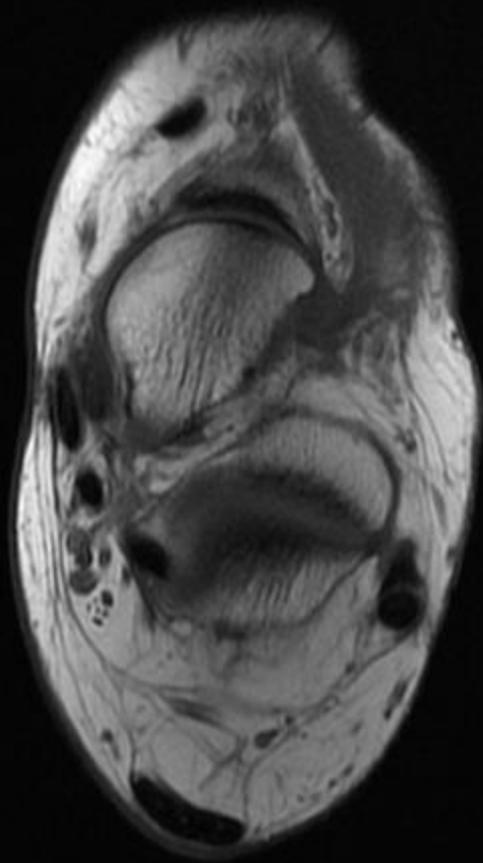


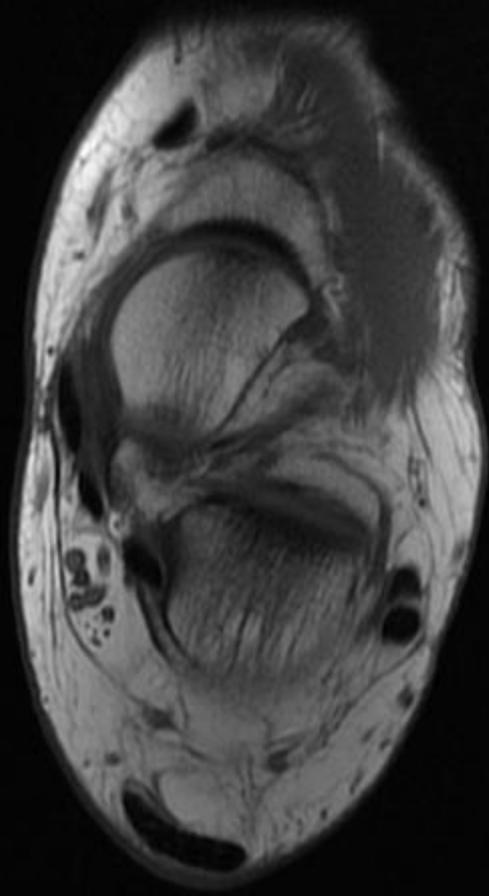


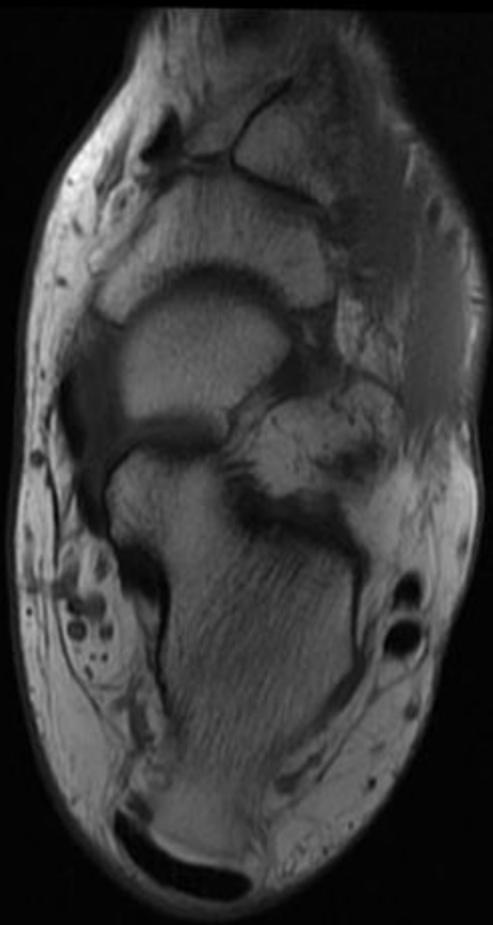


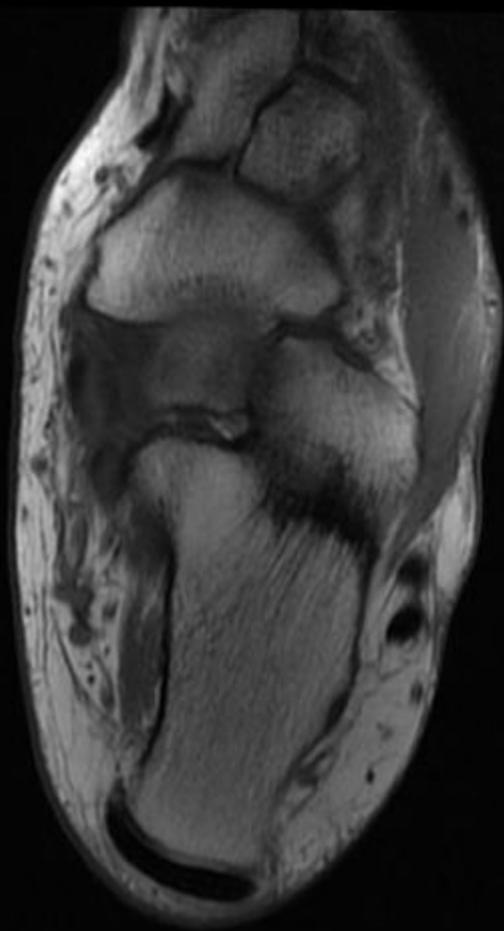










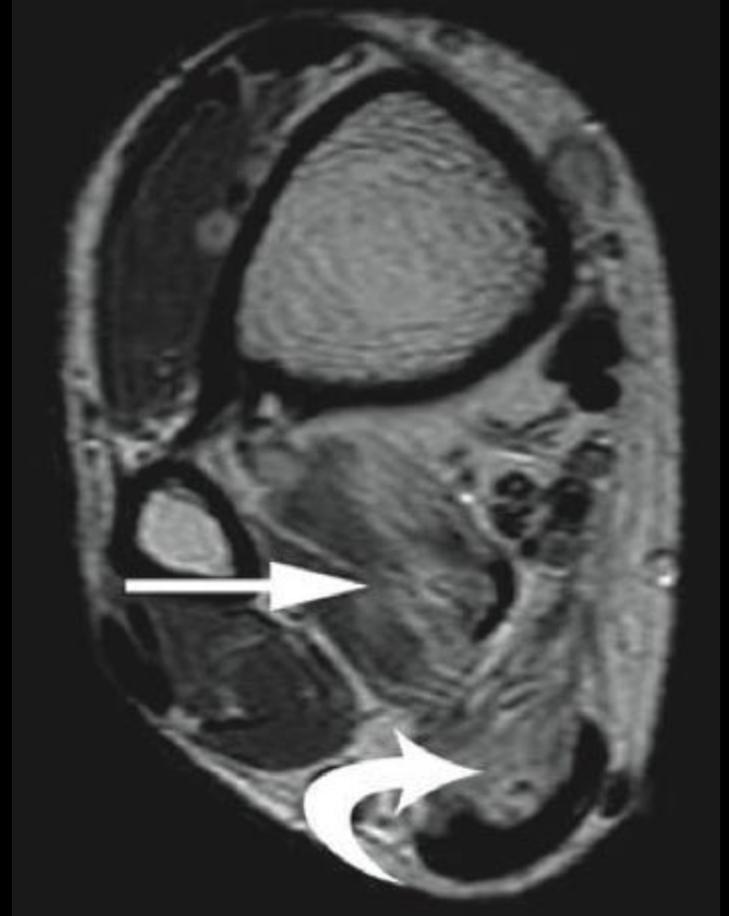




Sookur PA, et al. Accessory Muscles: Anatomy, Symptoms, and Radiologic Evaluation. Radiographics 2008.

Key points

Associated w/ tarsal tunnel syndrome and FHL tenosynovitis

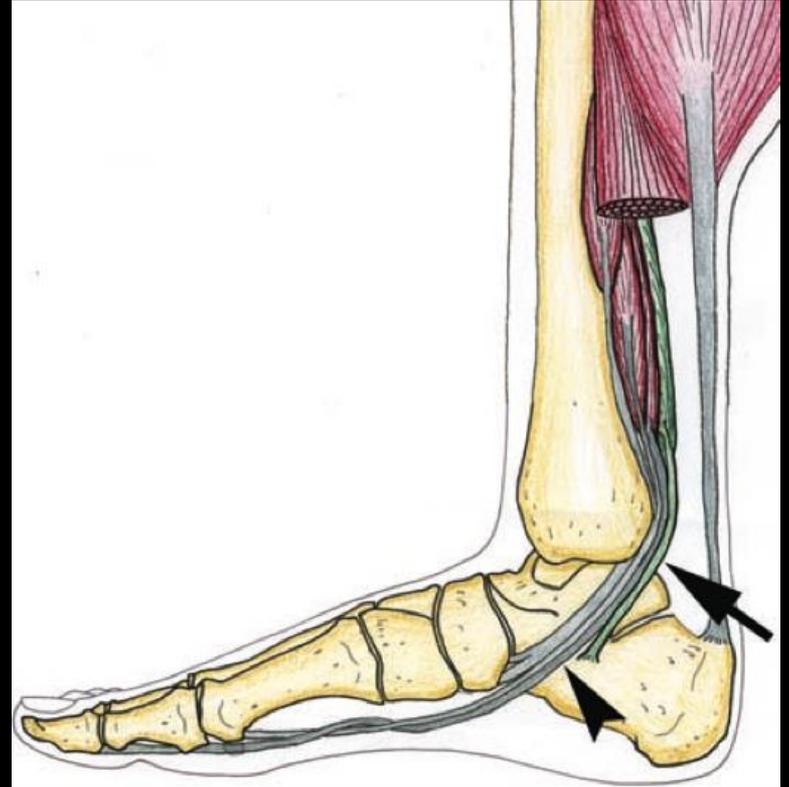


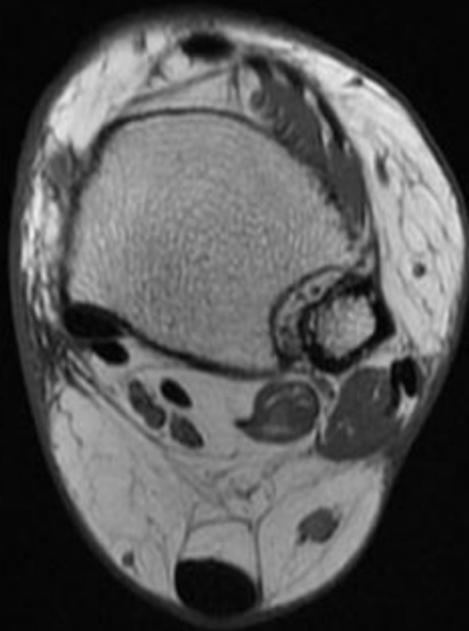
Peroneocalcaneus internus

Prevalence 1%

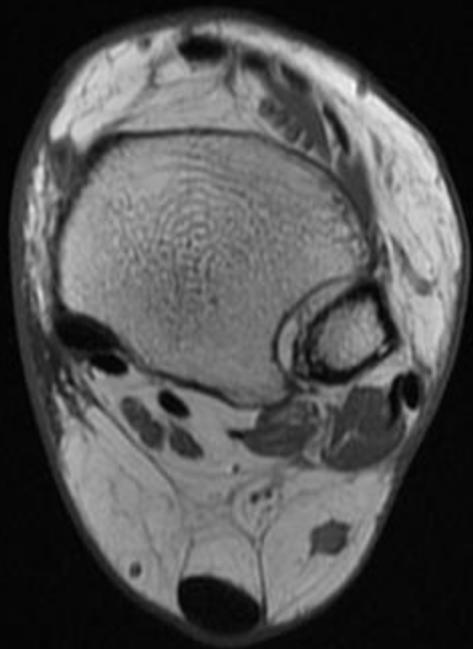
Origin: inner aspect lower $\frac{1}{3}$ fibula, below FHL origin, w/interdigitation between these 2 muscles

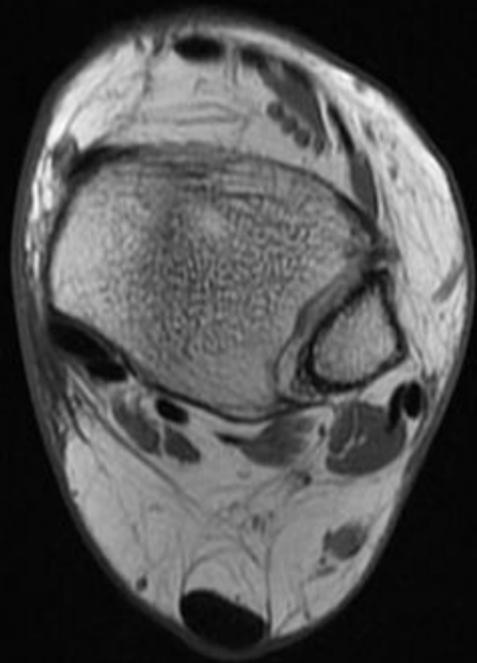
Insertion: small tubercle on medial calcaneus below sustentaculum tali

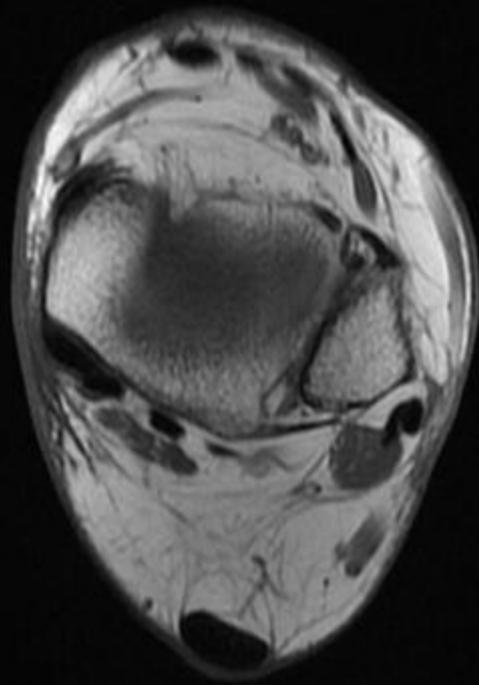


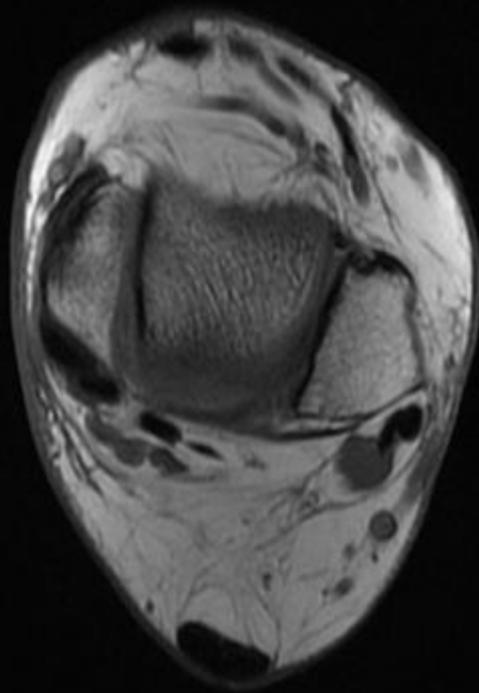


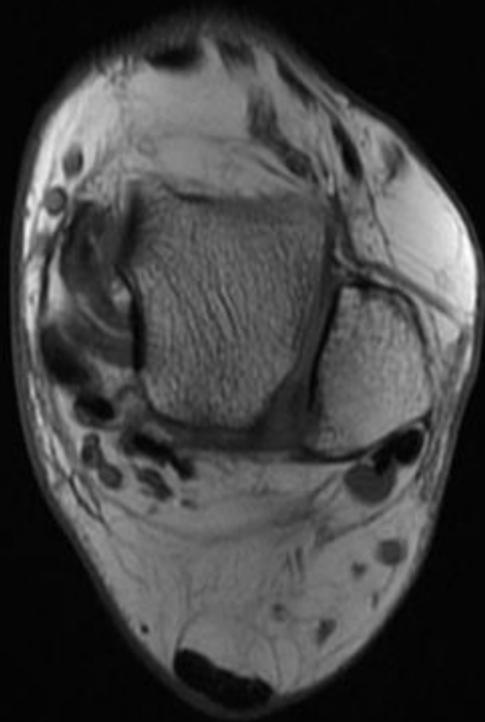
Courtesy of Dr. Smitaman

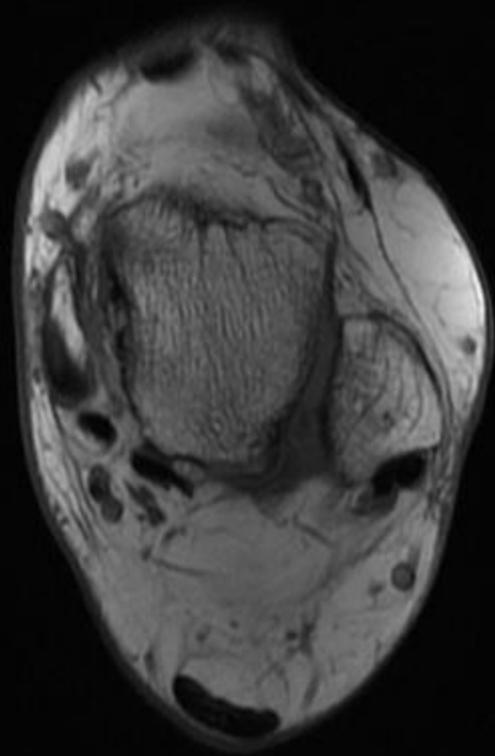


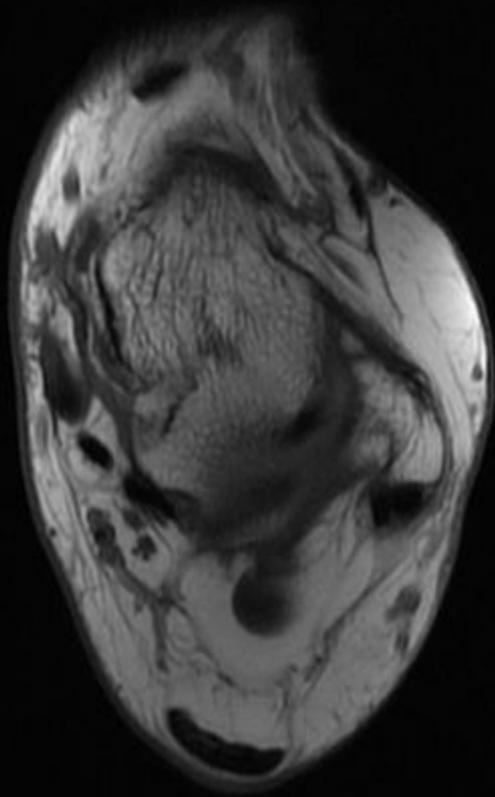


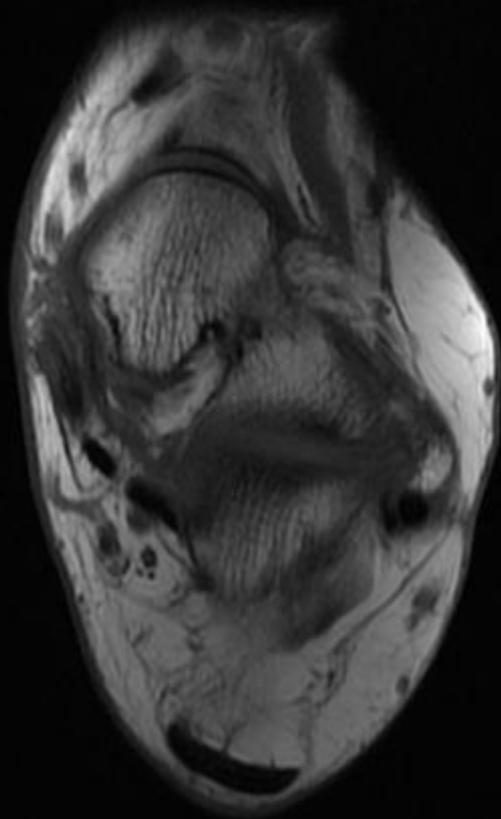


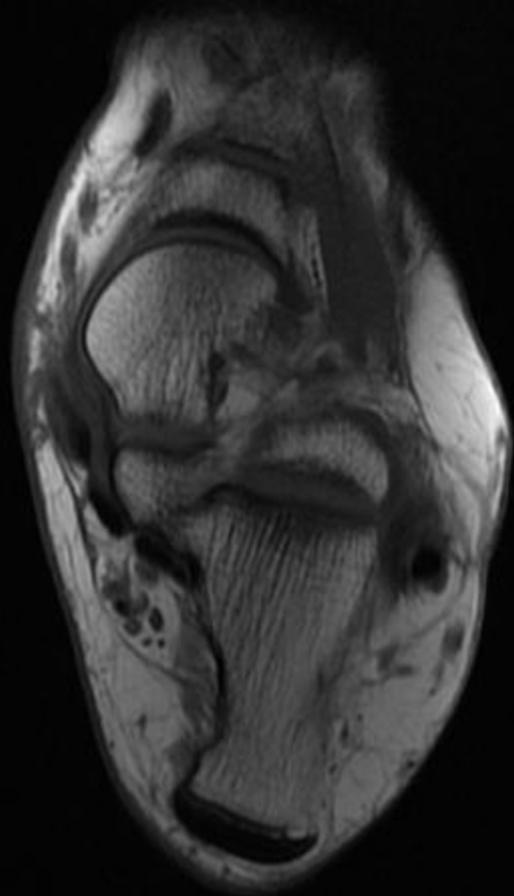


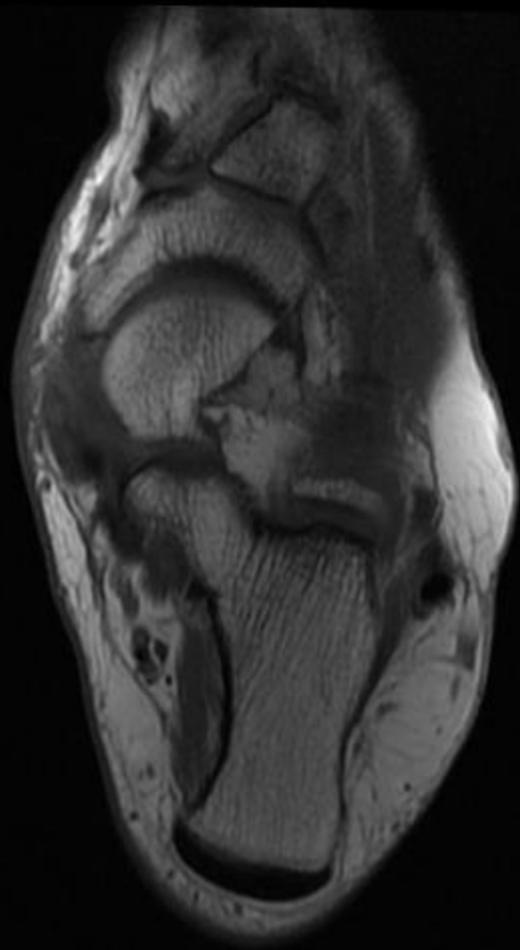








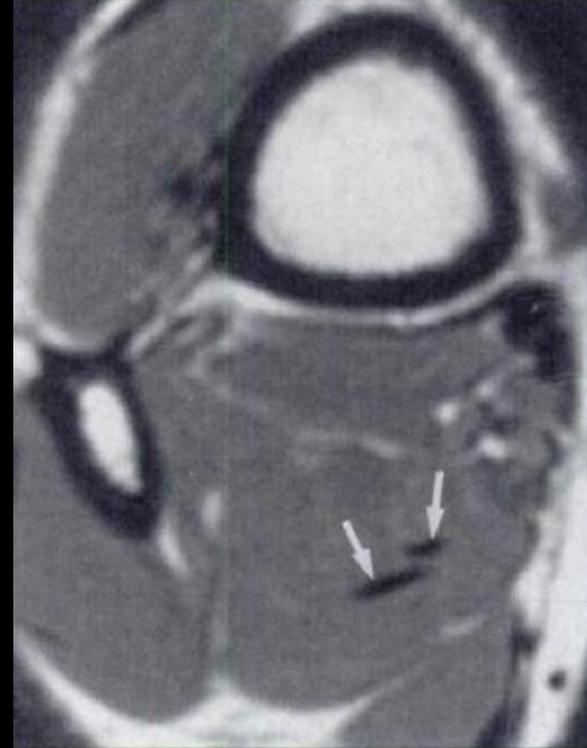




Key points

Can displace FHL muscle medially, indirectly compressing neurovascular bundle

FHL can have 2 tendon slips, may be mistaken for PCI tendon

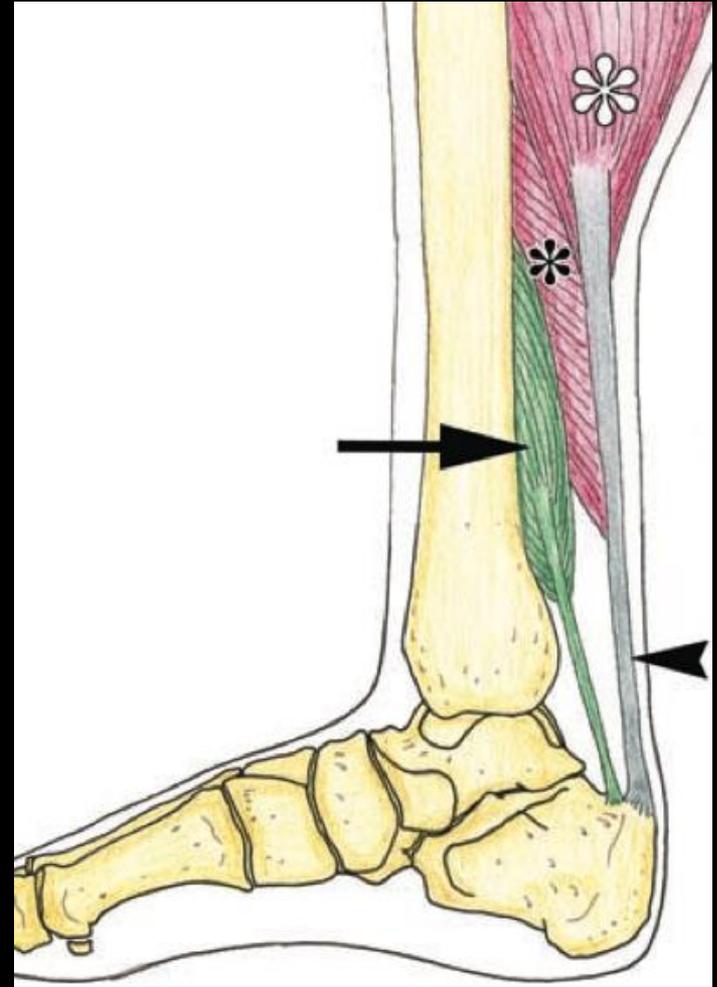


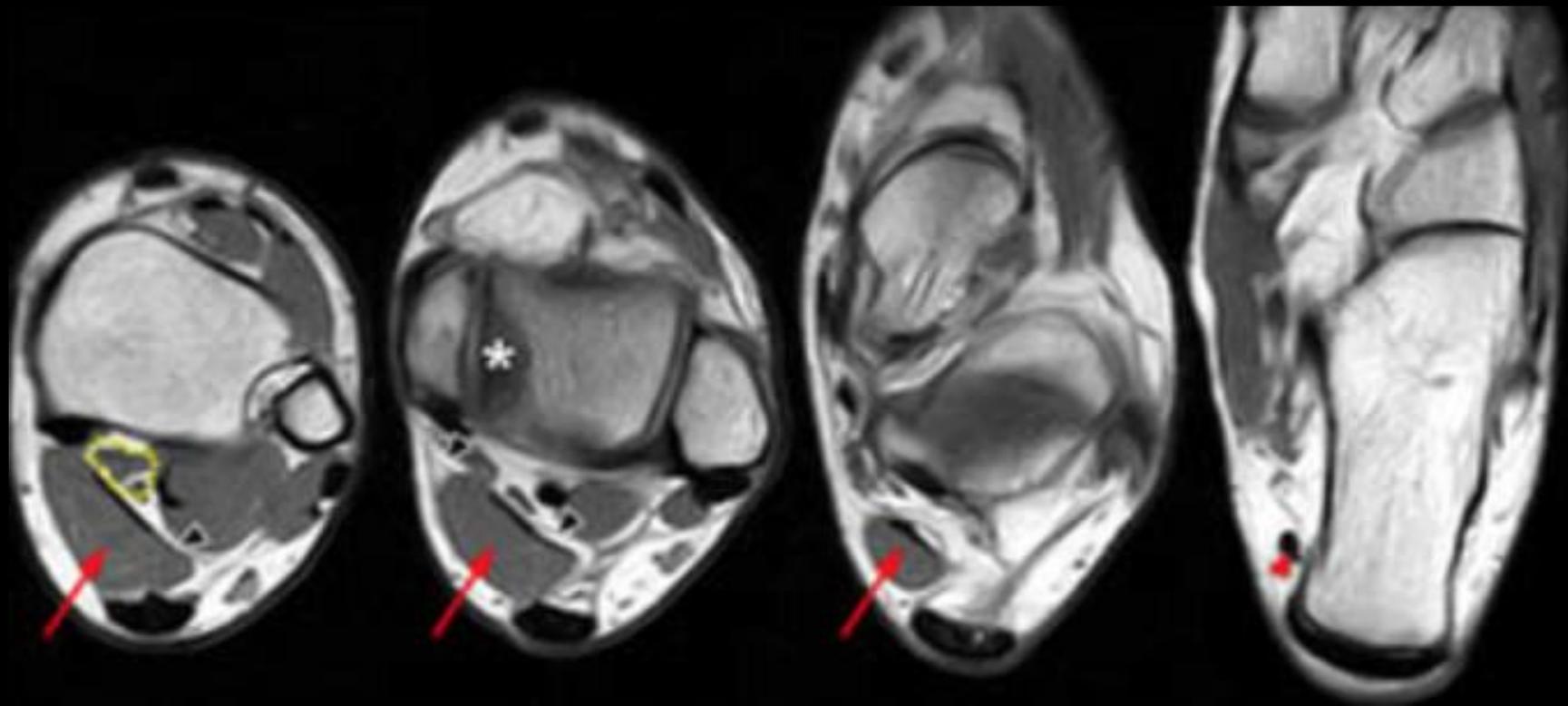
Accessory soleus

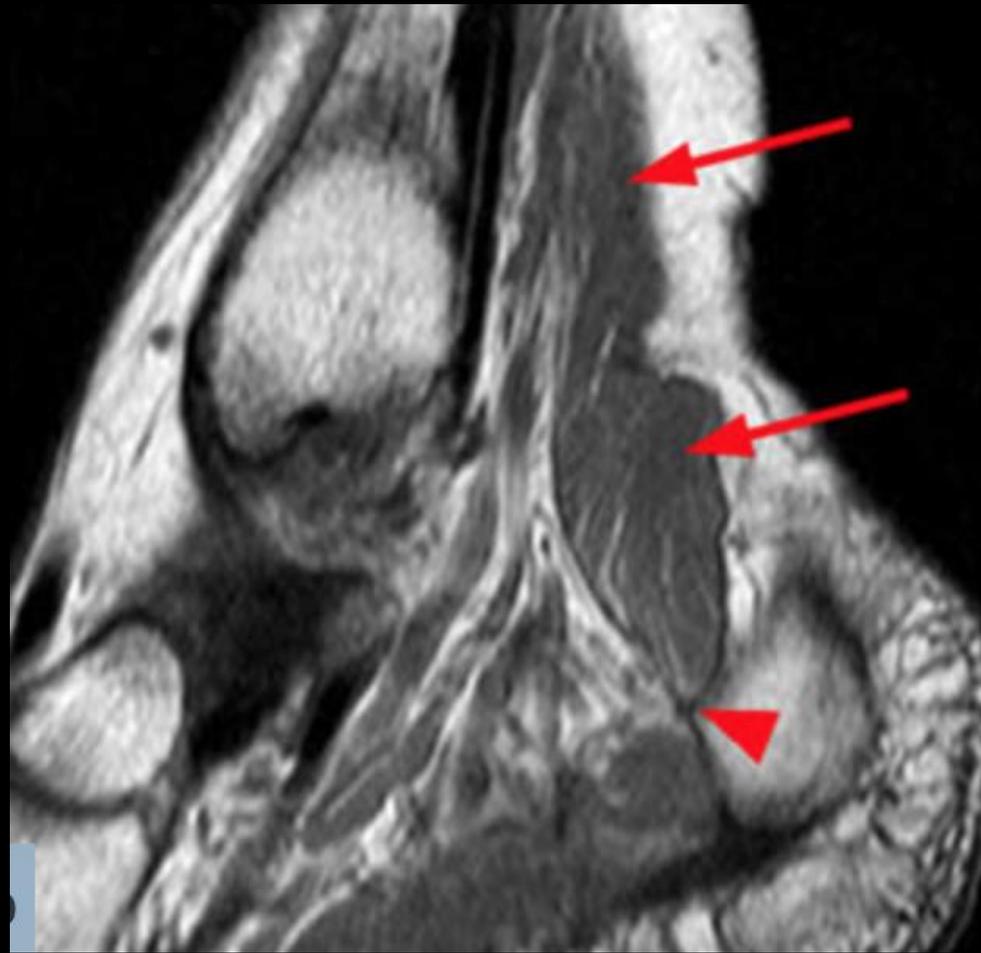
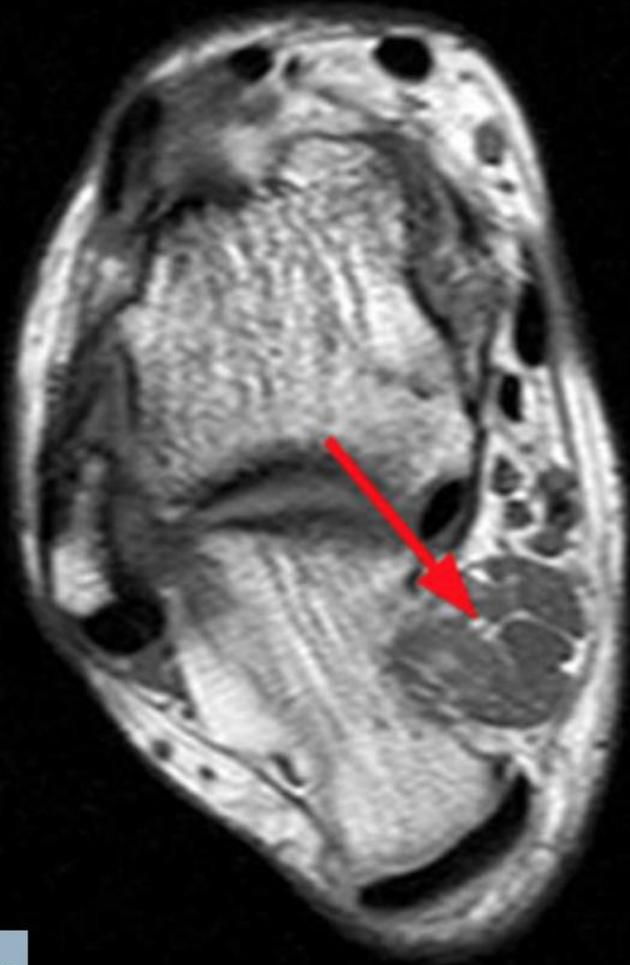
Prevalence 0.7-5.5%

Origin: deep surface of soleus or the fibula and soleal line of tibia

Insertion: Achilles tendon, superior surface of calcaneus, medial aspect of calcaneus







Key points

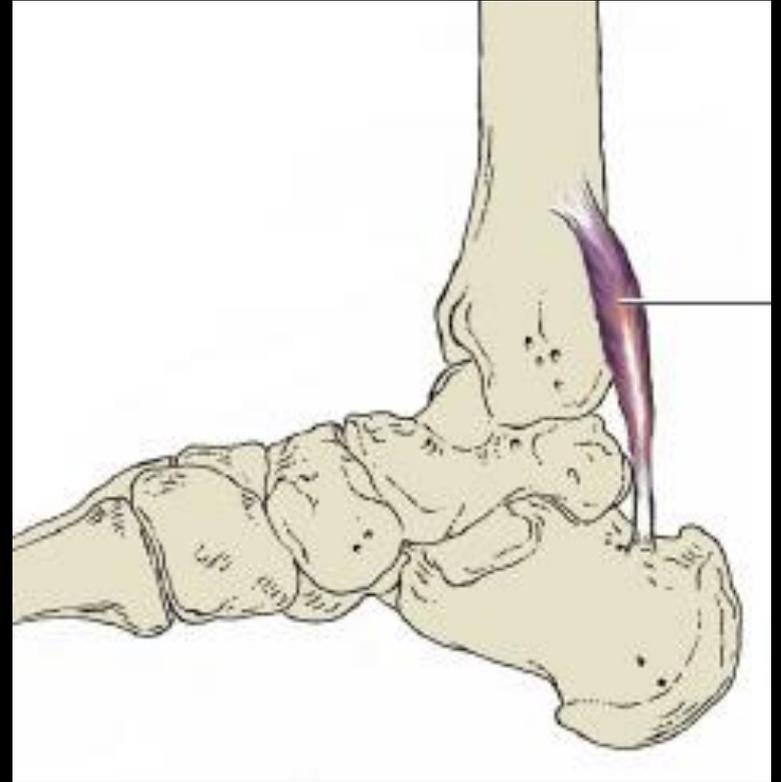
May cause exertional pain

Hypertrophy can compress posterior tibial nerve

Tibiocalcaneus internus

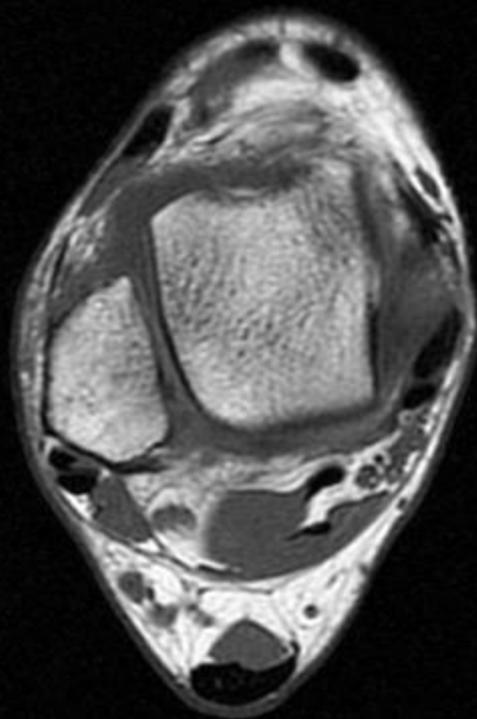
Origin: medial crest of tibia

Insertion: medial surface of calcaneus, 1-2cm anterior to Achilles tendon insertion

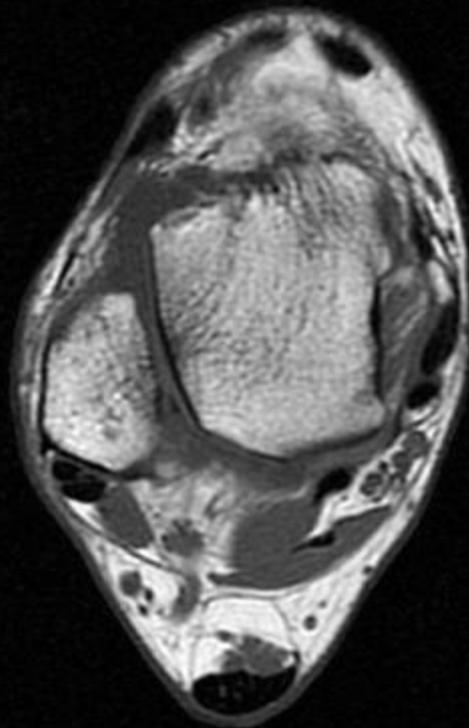


Al-Himdani S, et al. Accessory muscles around the foot and ankle presenting as chronic undiagnosed pain. *The Foot* 2013

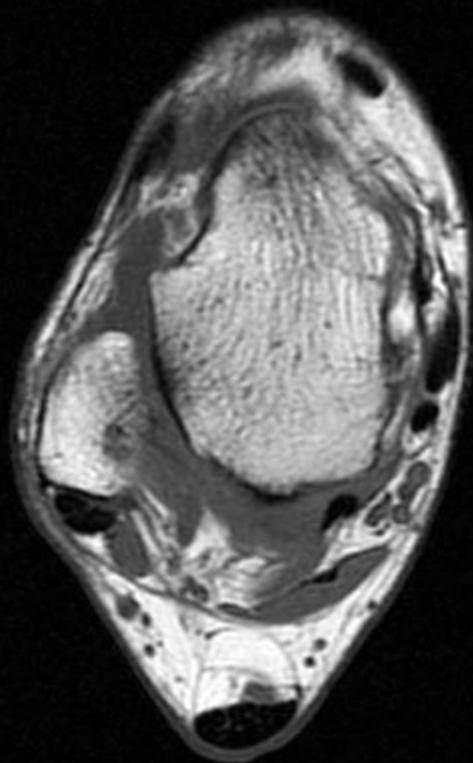
Lossy Compression 6:1



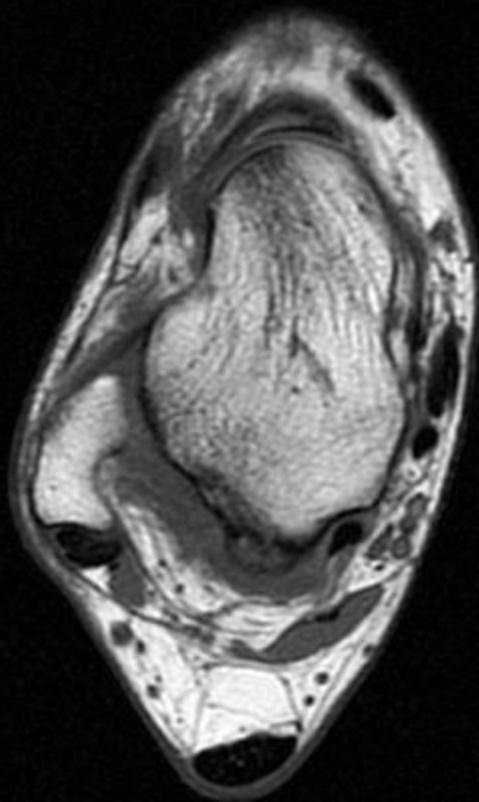
Lossy Compression 6:1



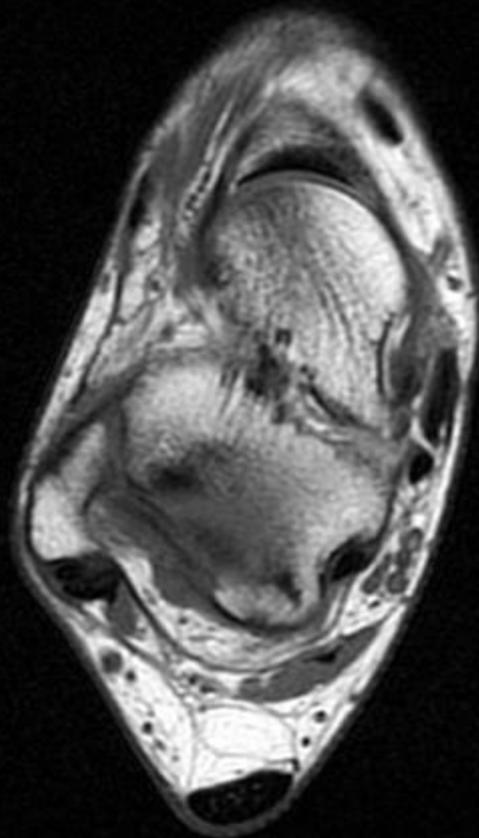
Lossy Compression 6:1



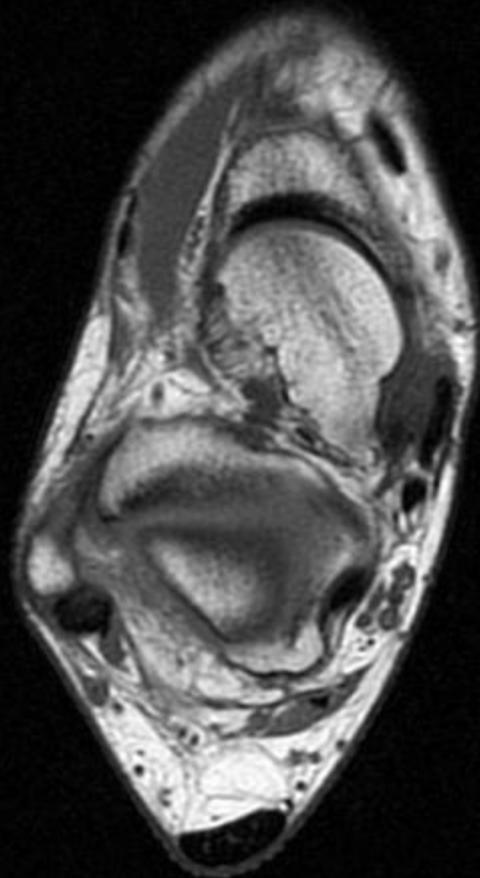
Lossy Compression 6:1



Lossy Compression 6:1



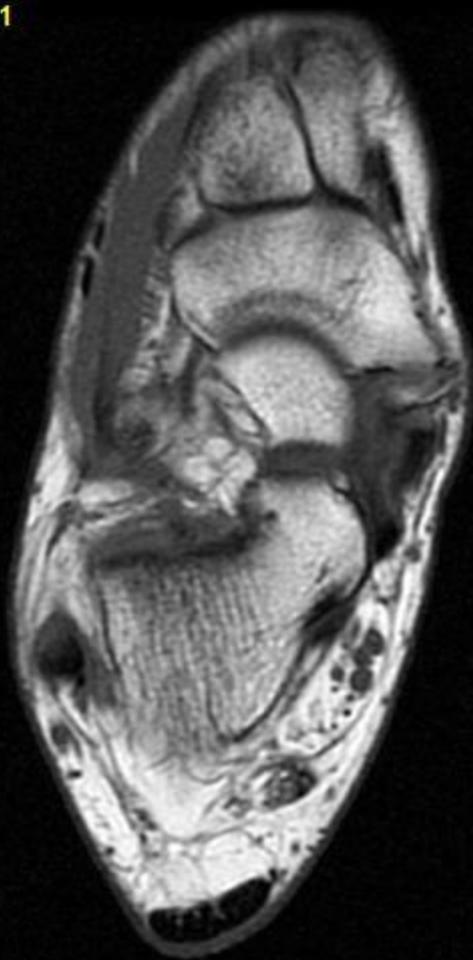
Lossy Compression 6:1



Lossy Compression 6:1



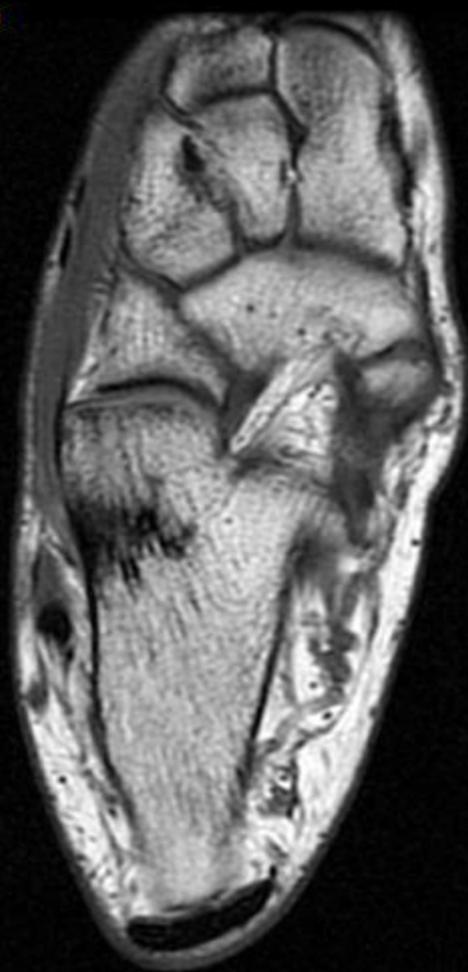
Lossy Compression 6:1



Lossy Compression 6:1



Lossy Compression 6:1



Lossy Compression 6:1



Lossy Compression 6:1



Lossy Compression 6:1



Key points

Distinct from accessory soleus- look at flexor retinaculum

Distinct from FDAL- look at distal insertion

That's all Folks!



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