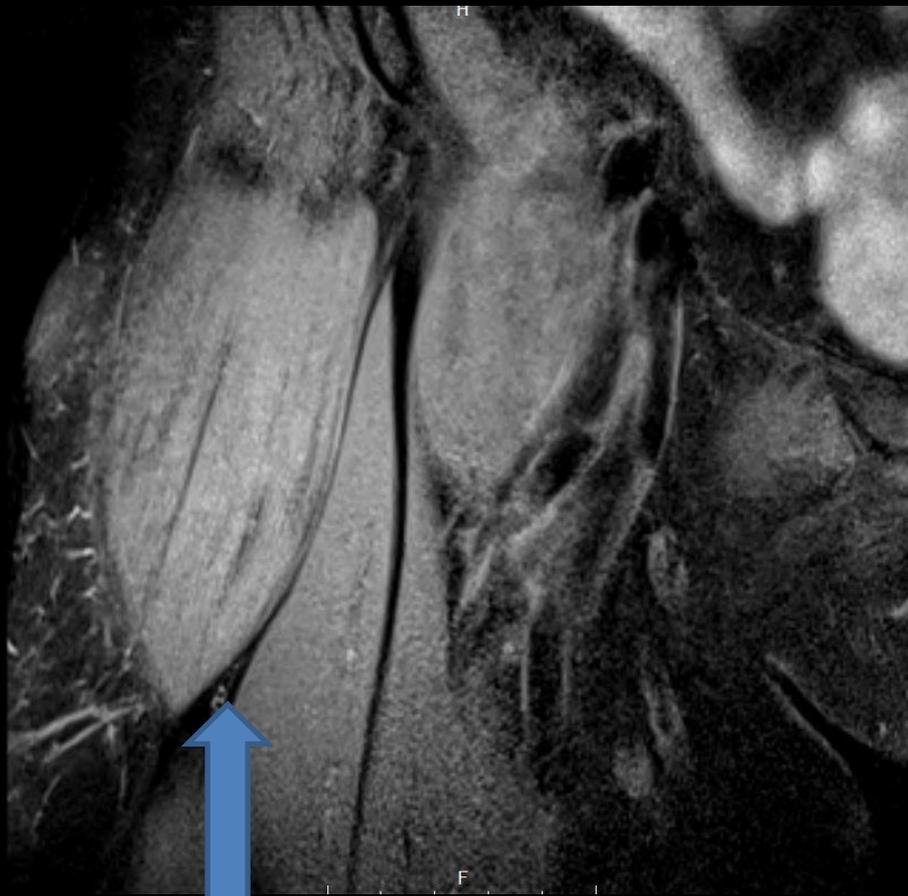




61 year-old woman
with right thigh lump

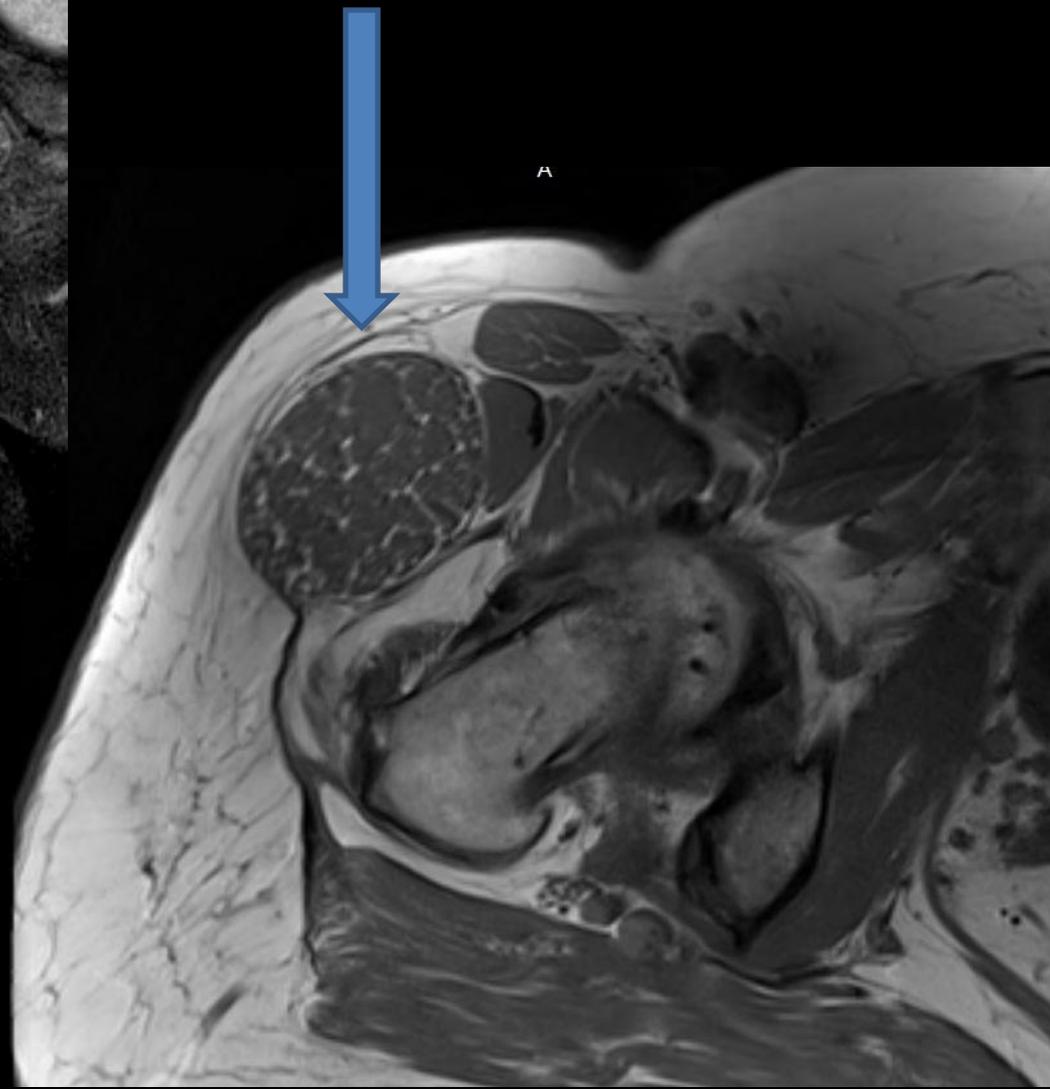
Skin marker was placed about here





TFL is enlarged

TFL is enlarged



Hypertrophy of the TFL muscle, presenting as palpable proximal anterior thigh mass

- Unilateral hypertrophy of the TFL muscle is an uncommon clinical entity which can simulate a soft tissue tumor
- Characteristic appearance on CT or MRI allows confident diagnosis of muscle hypertrophy to be made, avoiding unnecessary biopsy or surgical intervention

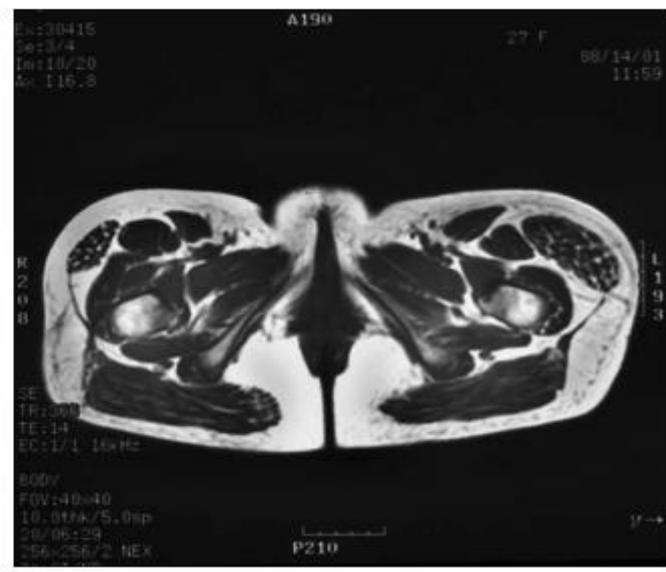
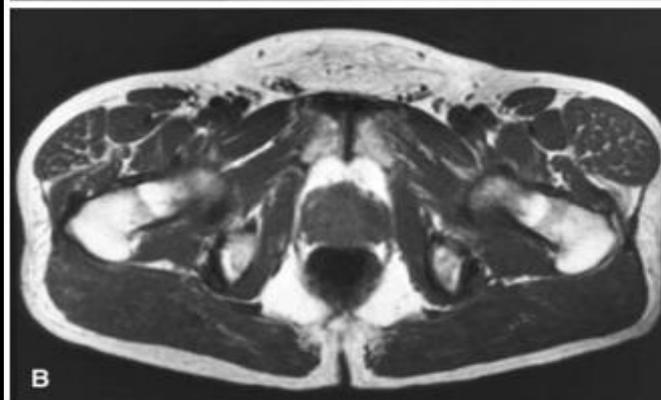


Fig. 2 Fifty-nine-year-old male with history of diabetic peripheral neuropathy and multiple surgeries of right foot, presented with left anterior thigh mass. Axial T1-weighted MR(TR:366 TE:14) image of the lower pelvis showed unilateral hypertrophy of the left TFL muscle

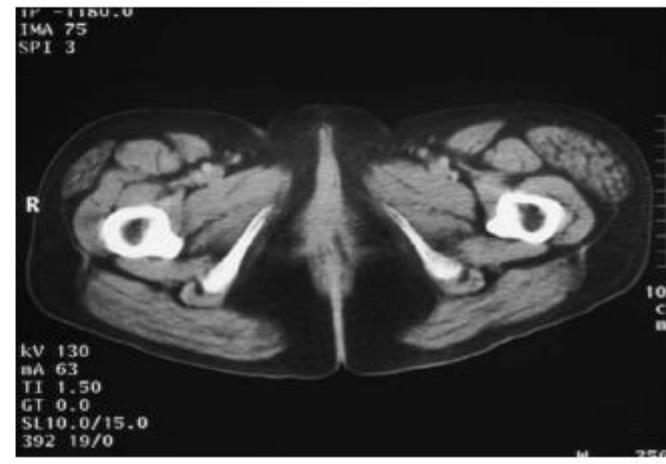


Fig. 3 Fifty-seven-year-old female with history of melanoma and long term anticoagulation, presented with a 5-week history of enlarging left anterior thigh mass. Axial CT scan through the lower pelvis revealed unilateral enlargement of the left TFL muscle

Muscle hypertrophy

- Enlargement of muscles may take two forms:
 - True hypertrophy
 - Pseudohypertrophy
- **True hypertrophy** is result of increase in size of muscle fibers
- **Pseudohypertrophy** is due to accumulation of excess fat and connective tissue (e.g. in cases of Duchenne and other muscular dystrophy)

True hypertrophy of the muscle, what causes it?



Denervation hypertrophy

UCSD articles

- **1995** Journal of Computer Assisted Tomography. Denervation Hypertrophy of Muscle: MR Features. *Petersilge, Cheryl A.; Pathria, Mini N.; Gentili, Amilcare; Recht, Michael P.; Resnick, Donald*
- Denervation hypertrophy in lumbosacral radiculopathy *D G Chang, E Magee and T Hughes. J Neurol Neurosurg Psychiatry* **2008** 79: 1170 doi: 10.1136/jnnp.2007.124768

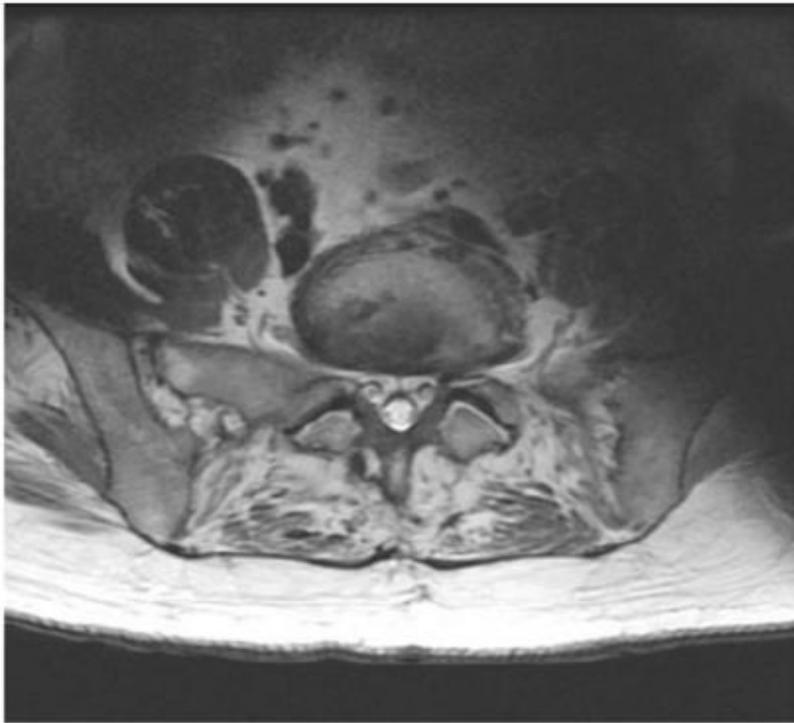
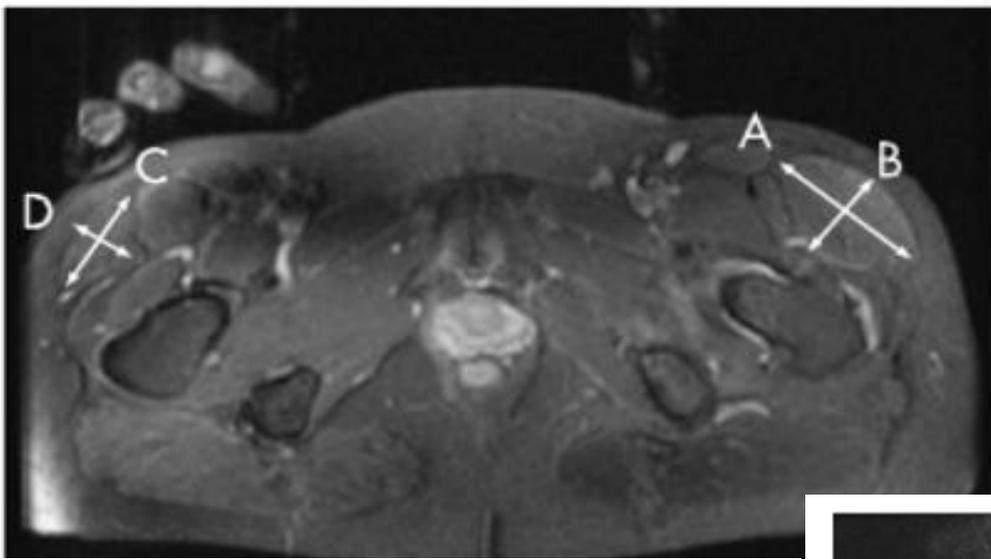


Figure 4 Sagittal T2 MRI of the lumbosacral spine at midline, showing disk space thinning and darkening worse at L4-5 and L5-S1.

UCSD
study
2008

Denervation hypertrophy in L5 radiculopathy 2011

FIGURE 1. **Left.** *Clinical – macroscopic images:* 7-8 centimetre diameter-long mass localized over the anterior and lateral portion of the left thigh, corresponding to the TFL muscle.

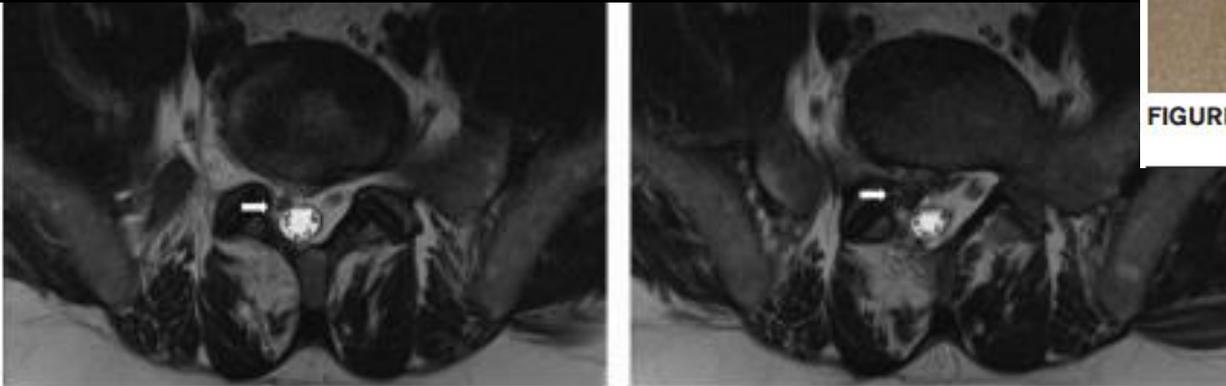
Right. *Muscle MRI:* Significant hypertrophy of the left TA. Pronounced hypertrophy of the TVF, TA, EDL and to a lesser extent AM and SM, associated with discrete hyperintensity with intramuscular deposits of fat accompanied by oedema.



Calf Enlargement S1 Radiculopathy



FIGURE 1 Patient photographs demonstrating calf asymmetry with the right calf larger than the left (white arrow).



T2 axial lumbar spine magnetic resonance image shows granulation tissue and disc extrusion contacting the traversing right S1 nerve root (white arrow).

Denervation Hypertrophy associated with myositis. Case of unilateral calf hypertrophy induced by S1 radiculopathy

serum creatine kinase was mildly elevated (506 U/L). A needle electromyography of the right

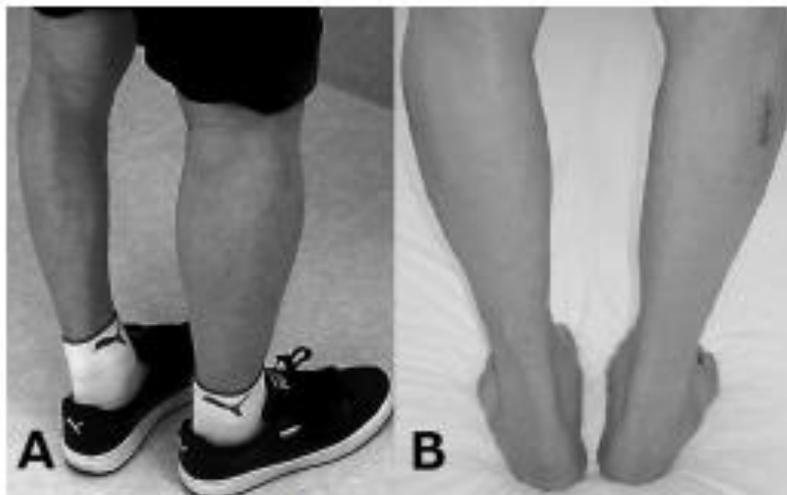


Figure 1 Unilateral calf hypertrophy (A) and after treatment with prednisone (B).

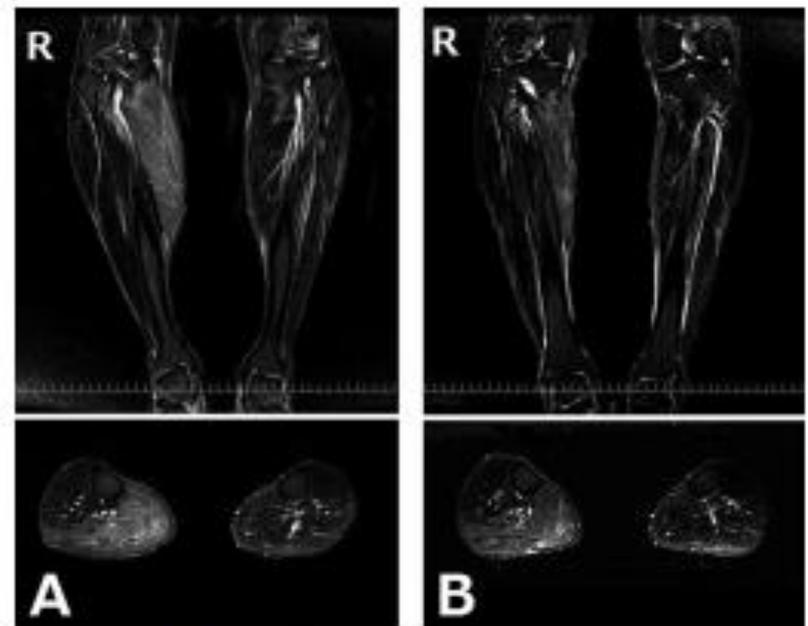


Figure 2 Short tau inversion recovery images showing hypertrophy and hypersignal of the right gastrocnemius and soleus (A) and after treatment with prednisone (B).

Another case of Unilateral calf hypertrophy associated with radiculopathy



Figure 1 Enlarged right calf.

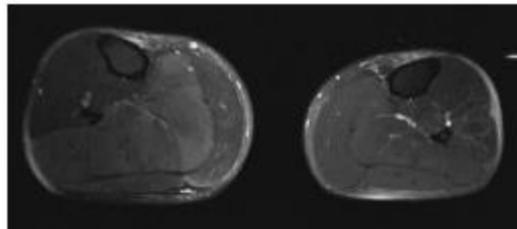


Figure 2 Increased volume of right soleus and gastrocnemius muscles with hyperintense signal on T2 compatible with focal myositis.



Figure 4 Disc herniation at L5/S1 level. Calcification of the posterior longitudinal ligament in L5 and S1, forming exuberant bone bridge.

Unilateral muscle hypertrophy and focal myositis following S1 radiculopathy

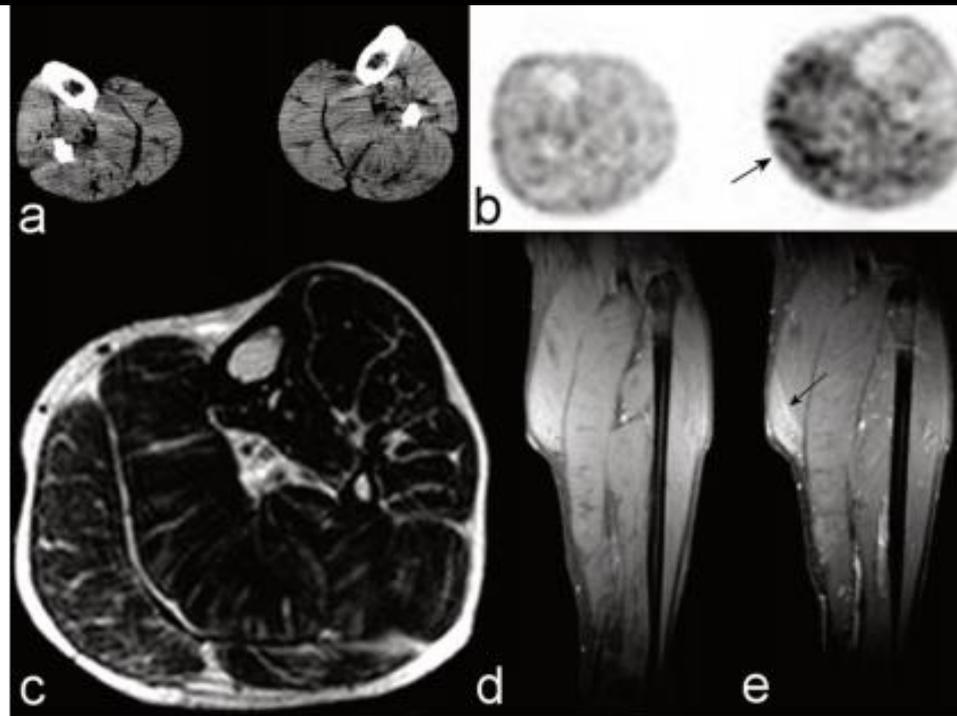


Figure 1. (a) CT of the left calf showed hypertrophy and diffuse-low density of the muscles of the posterior compartment; (b) PET/CT revealed ¹⁸F-FDG uptake fusing to hypertrophic muscles, especially to the medial head of the gastrocnemius muscle (arrow); (c) MRI of left calf on axial T2 weighted image (TR 3700 ms, TE 86 ms) shows enlargement of soleus, tibialis posterior, flexor digitorum longus, and of gastrocnemius muscles; T1 weighted images with fat saturation (TR 532 ms, TE 10 ms) before (d) and after (e) iv administration of gadopentate dimeglumine shows slight enhancement of the medial head of the left gastrocnemius muscle (arrow).

Theories behind denervation hypertrophy

- DH is not well understood; theories include:
 - **Complex repetitive discharges**
 - Spontaneous muscular activity
 - Neurotrophic growth factors
 - Stretch-induced growth

Compensatory Hypertrophy of TFL

- Abductor tendon tears (i.e. gluteus medius or minimus) is associated with TFL hypertrophy
- Altered weight bearing mechanics lead to overload of TFL?
 - Asymmetric osteoarthritis
 - Unilateral surgery, e.g. THA
 - Developmental dysplasia

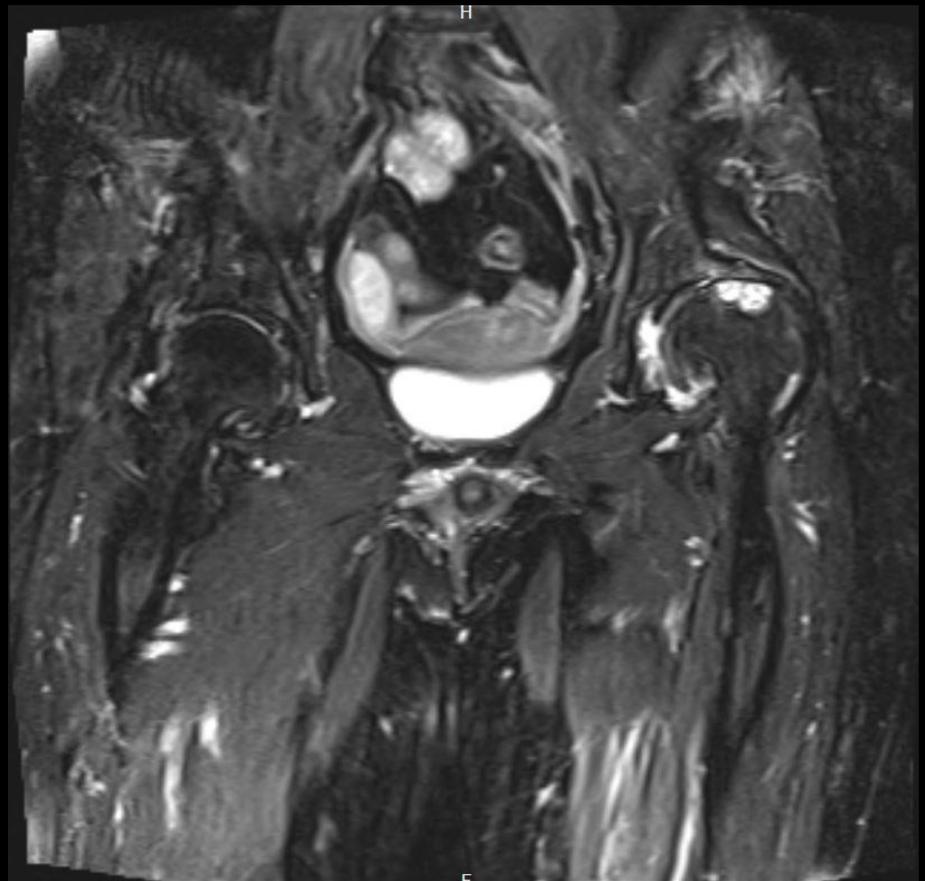
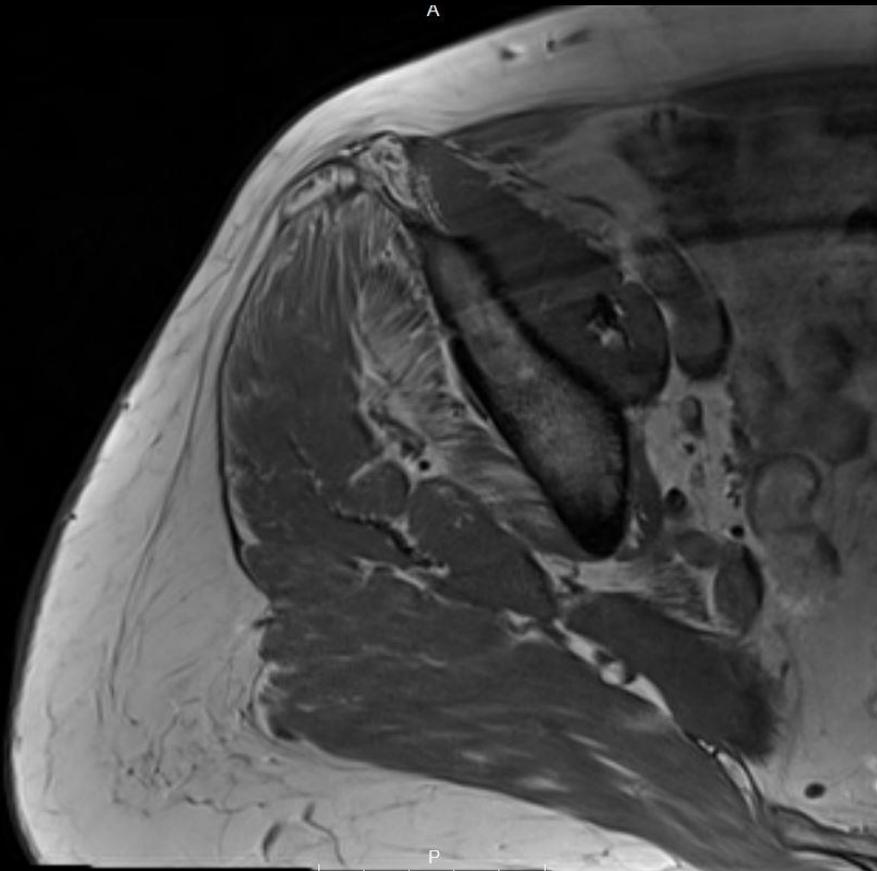
77 yo M w/ R hip px 2/2 abductor tendon tear; avulsion of glut medius



Proposed pathophysiology of TFL compensatory hypertrophy

- Tensor fascia lata is a secondary hip flexor, abductor, and internal rotator
- Tensor fascia lata may adopt a compensatory function in patients with impaired abduction due to a gluteal tendon tear, and/or weakness of the primary hip flexors, abductors and internal rotators

Original case, showing atrophy of the right gluteus minimus and severe contralateral OA of the left hip



Take home points

- When evaluating a “palpable mass,” **include muscle hypertrophy in the differential**
- Symmetry is your friend. Look for asymmetry of muscle size, particularly when no mass is otherwise identified
- If the study does not allow for comparison with the contralateral side, consider reviewing an anatomy reference, such as e-anatomy
- Accumulating decades of experience doesn't hurt

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