



Management of Proximal Hamstring Injuries

Oregon Association of Orthopaedic Surgeons

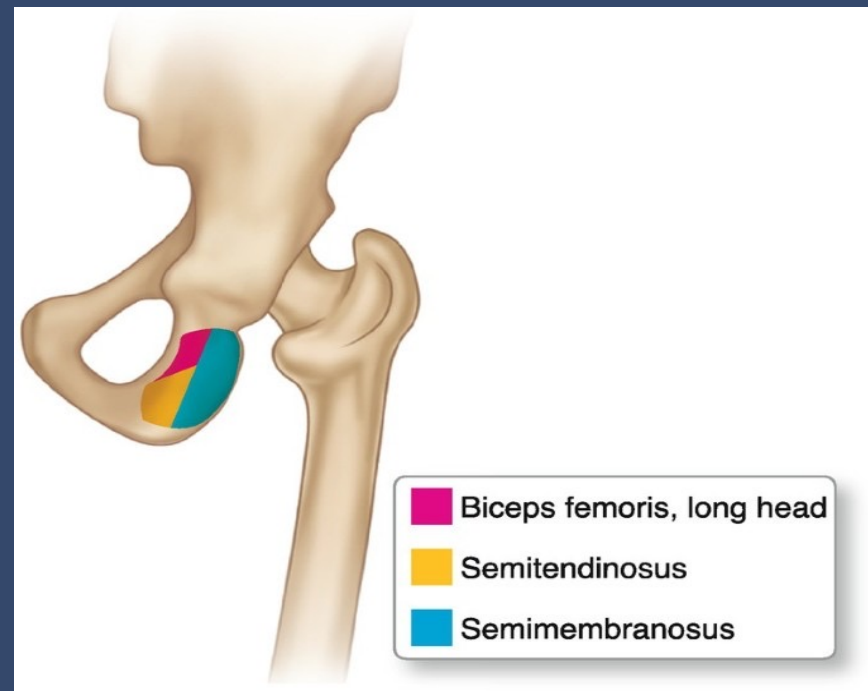
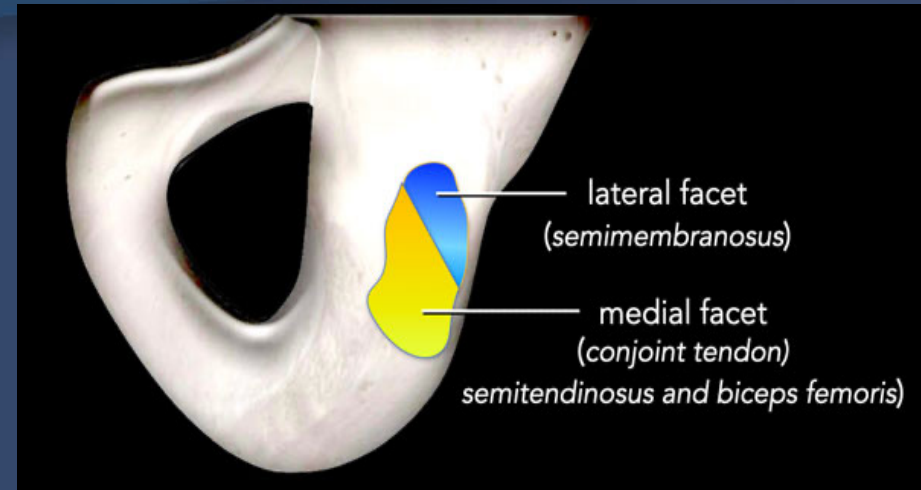
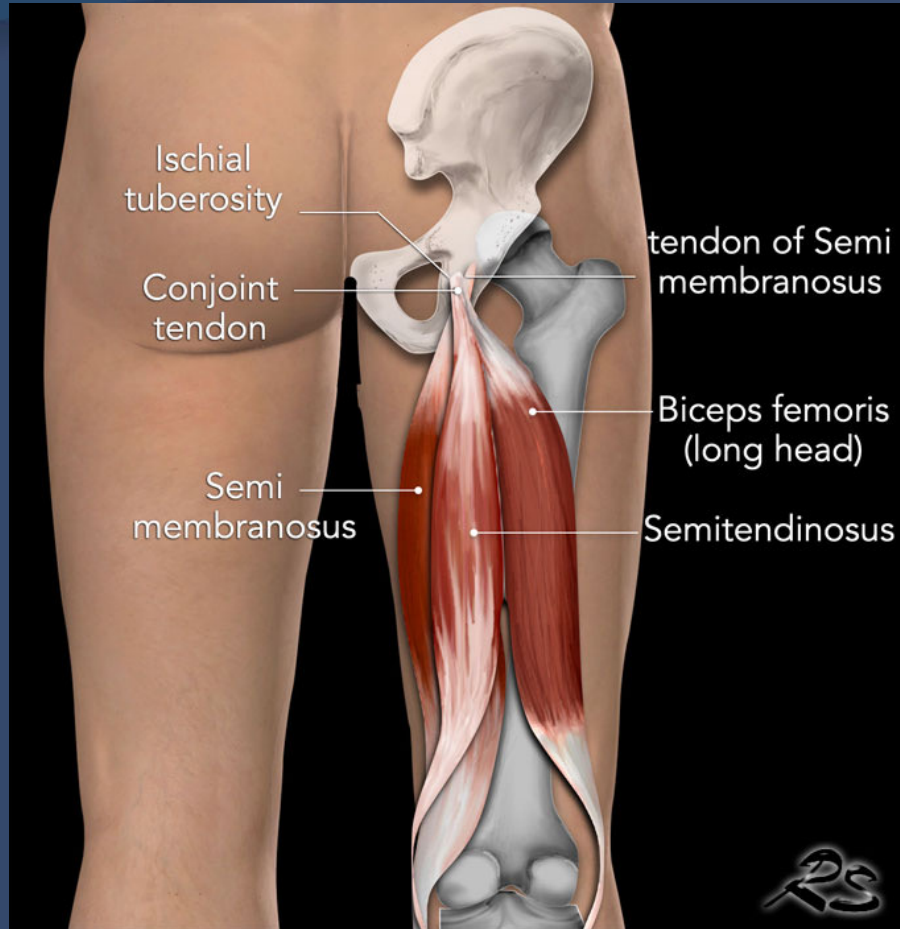
Date: 10/21/2023

Presented by: Andrea Herzka, MD

Disclosure

- None

Anatomy



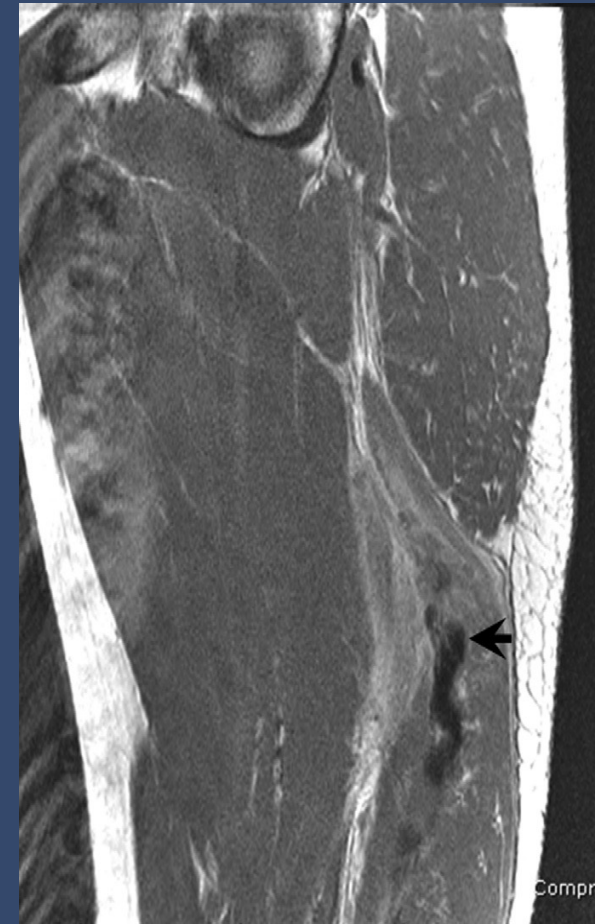
Classification

- Type 1: Osseous Avulsion (apophyseal)
- Type 2: Myotendinous Junction Avulsion
- Type 3: Incomplete Avulsion From Bone
- Type 4: Complete w/o Retraction
- Type 5: Complete with Retraction

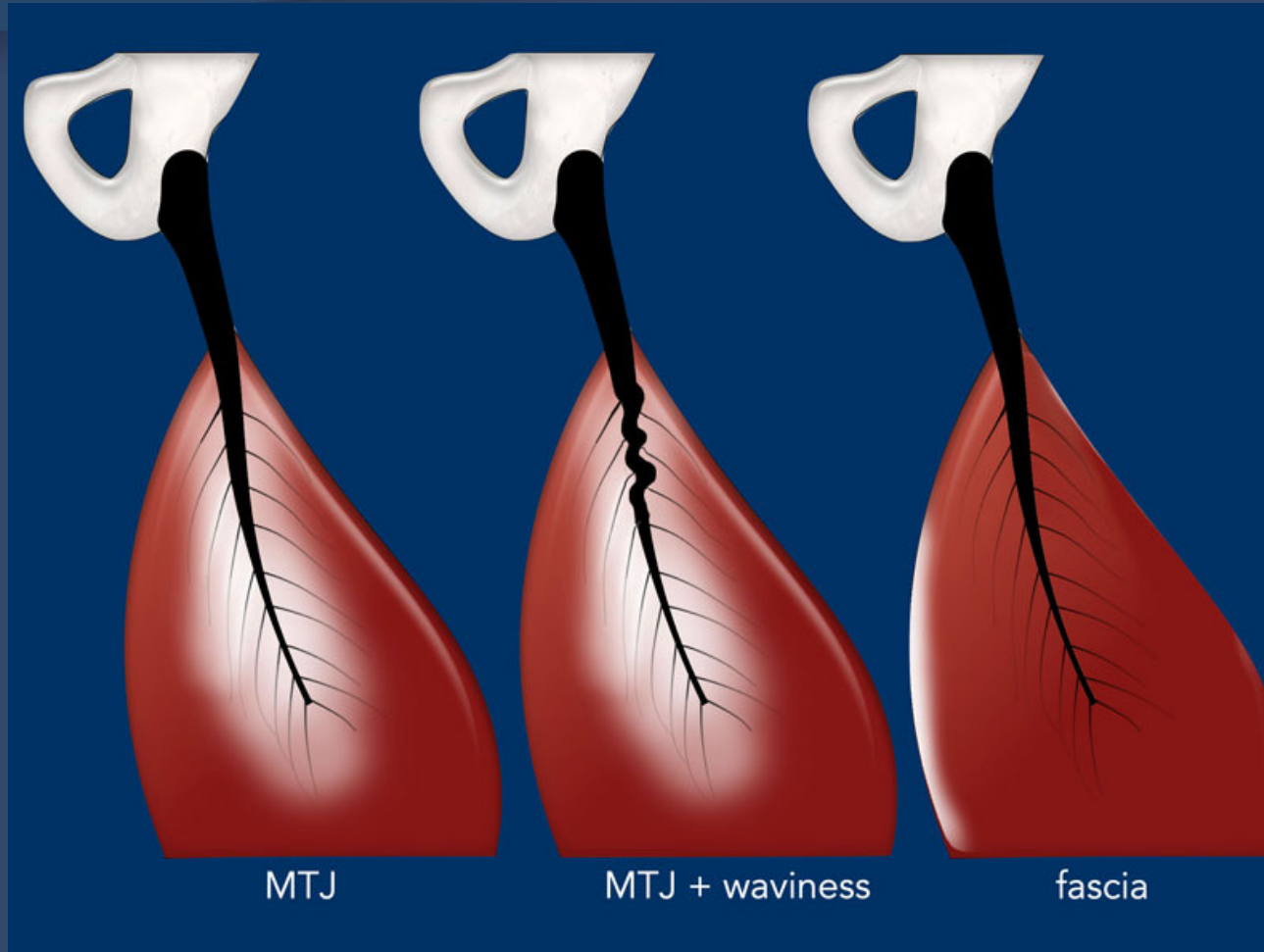
Type 1: Osseous Avulsion (apophyseal)



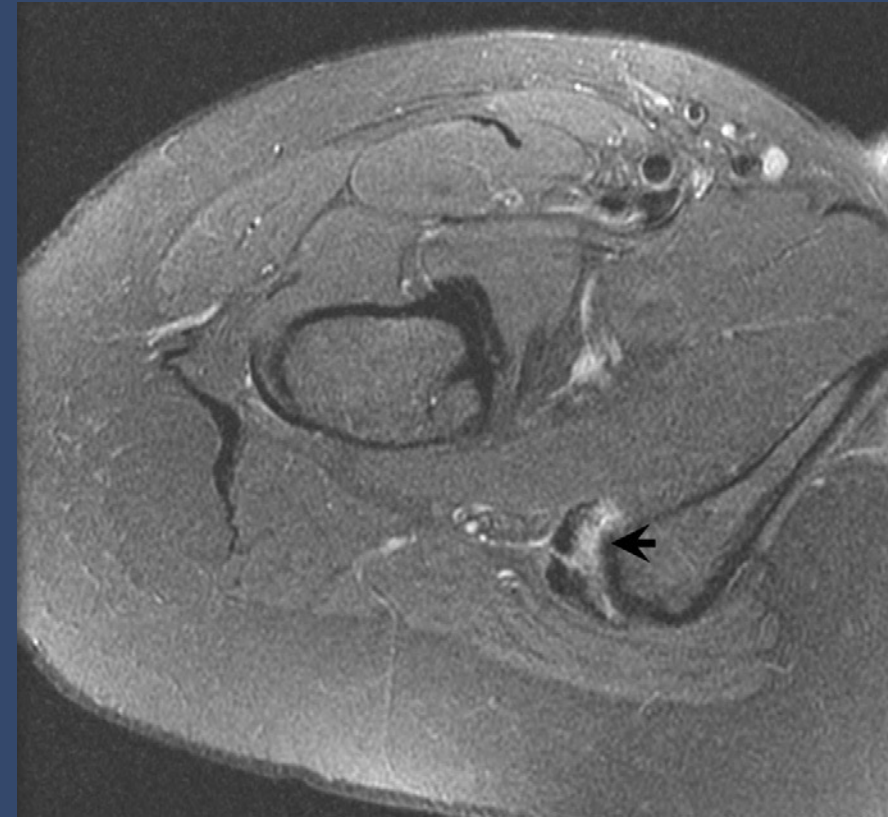
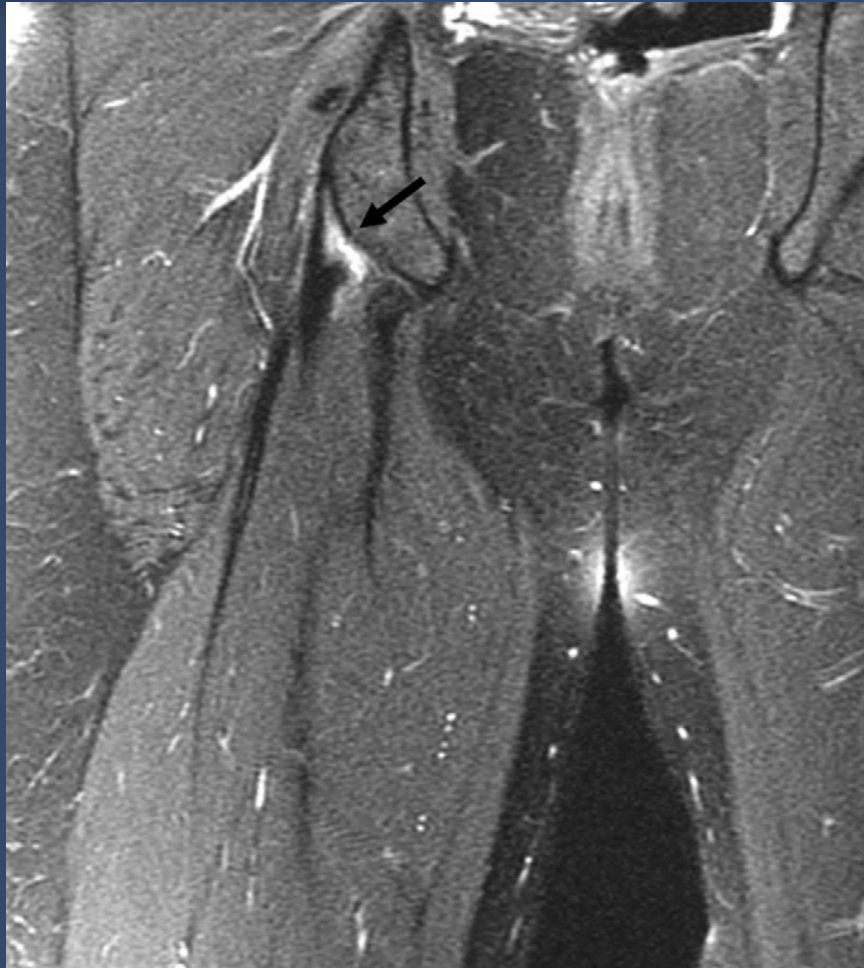
Type 2: MTJ (a,b,c)



Myotendinous Variants



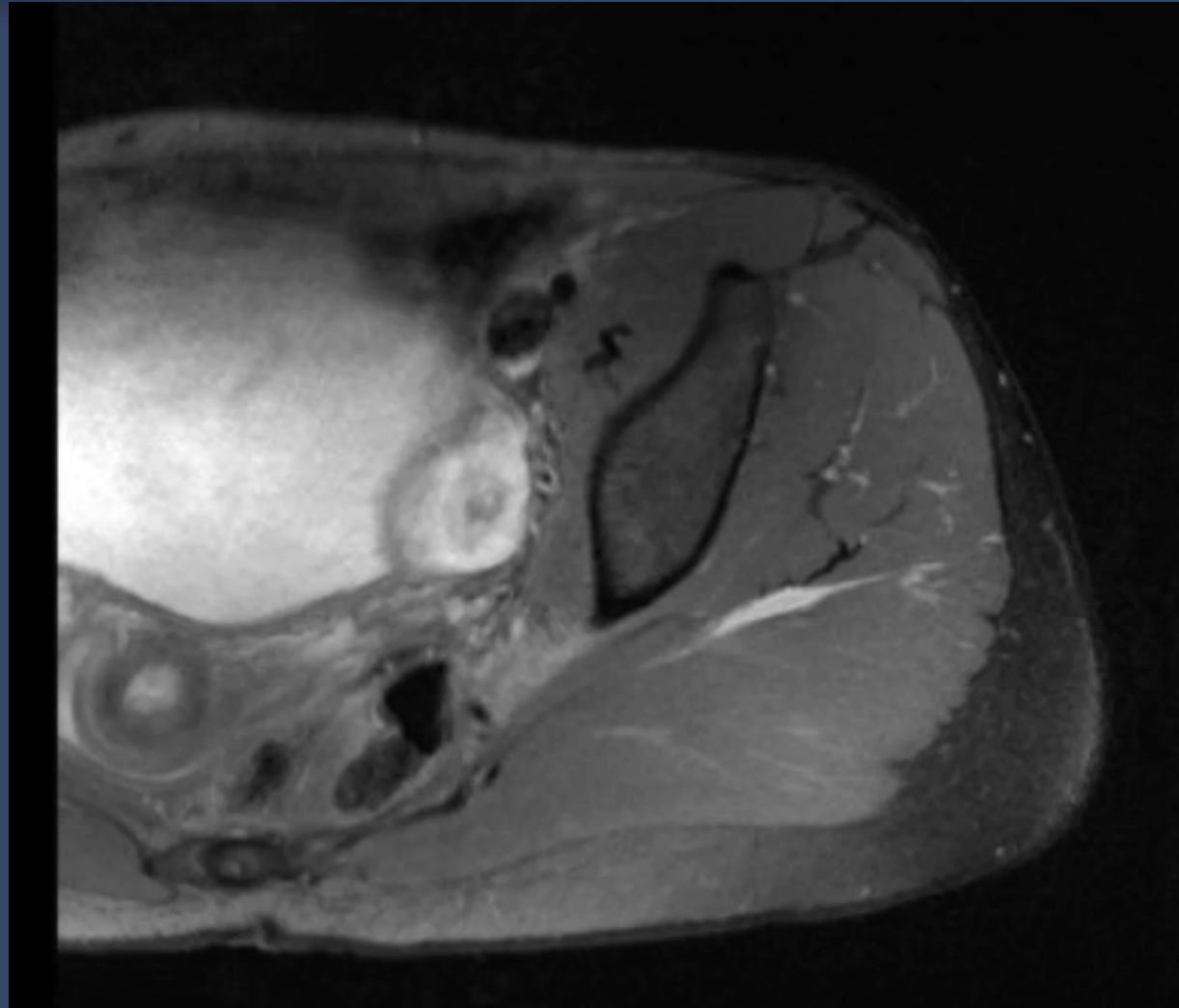
Type 3: Incomplete (1-2/3 Tendon Avulsion From Bone)



Type 3: Chronic Tendinopathy



Type 4: Full Avulsion With/ Without Retraction

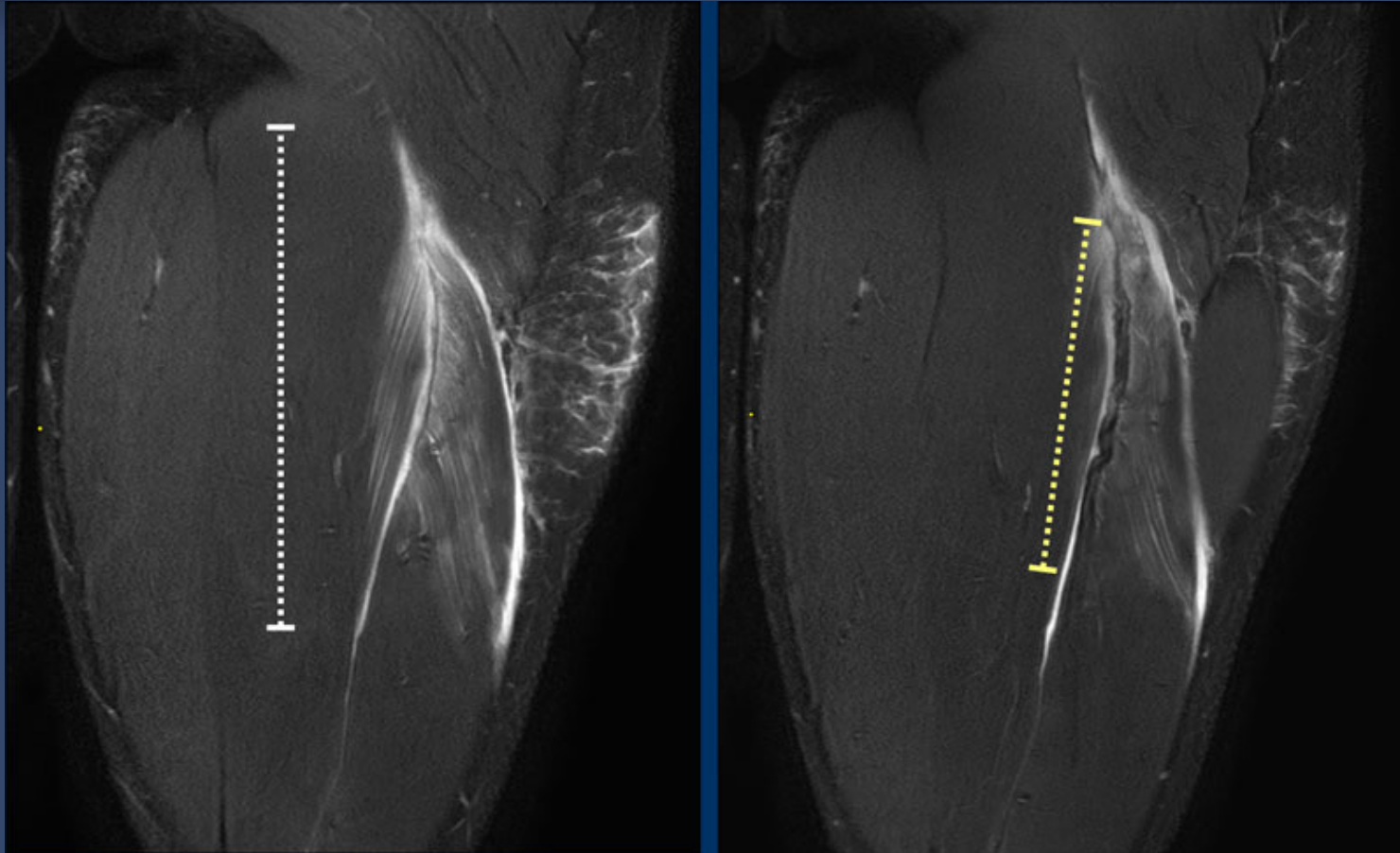


Treatments

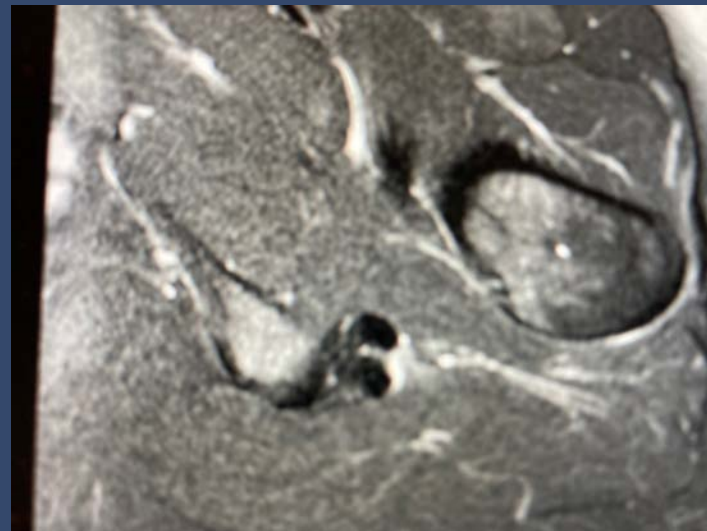
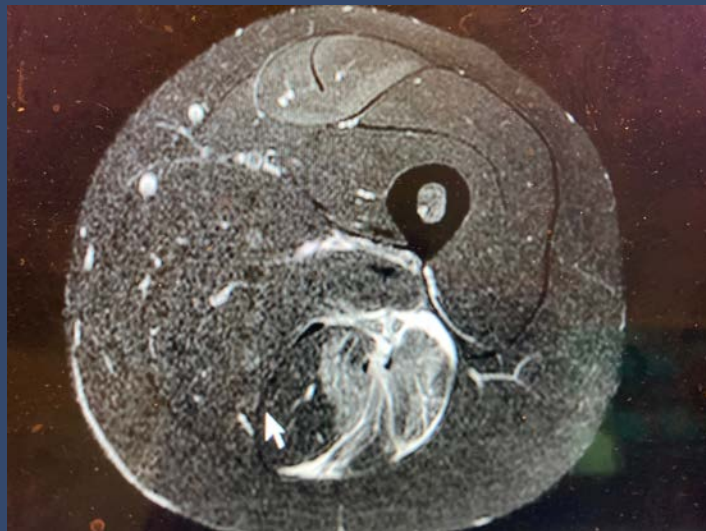
- PT
- Acupuncture
- PRP/ Injection Therapy
- Endoscopic Repair
- Open surgical repair with or without bio-inductive augment

MRI Muscular Strain Grading Scale

Grade	MRI
Grade 0	<ul style="list-style-type: none">- MRI normal or- Patchy high signal in one or more muscles.
Grade 1 <i>small tear</i>	<ul style="list-style-type: none">- High signal cross section <10%- Length < 5 cm- Fibre architectural disruption < 1cm
Grade 2 <i>moderate tear</i>	<ul style="list-style-type: none">- High signal cross section 10% - 50%- Length 5 -15cm- Fibre architectural disruption < 5cm
Grade 3 <i>extensive tear</i>	<ul style="list-style-type: none">- High signal cross section > 50%- Length >15cm- Fibre architectural disruption > 5cm
Grade 4 <i>full-thickness tear</i>	<ul style="list-style-type: none">- Complete discontinuity of tendon or muscle with retraction

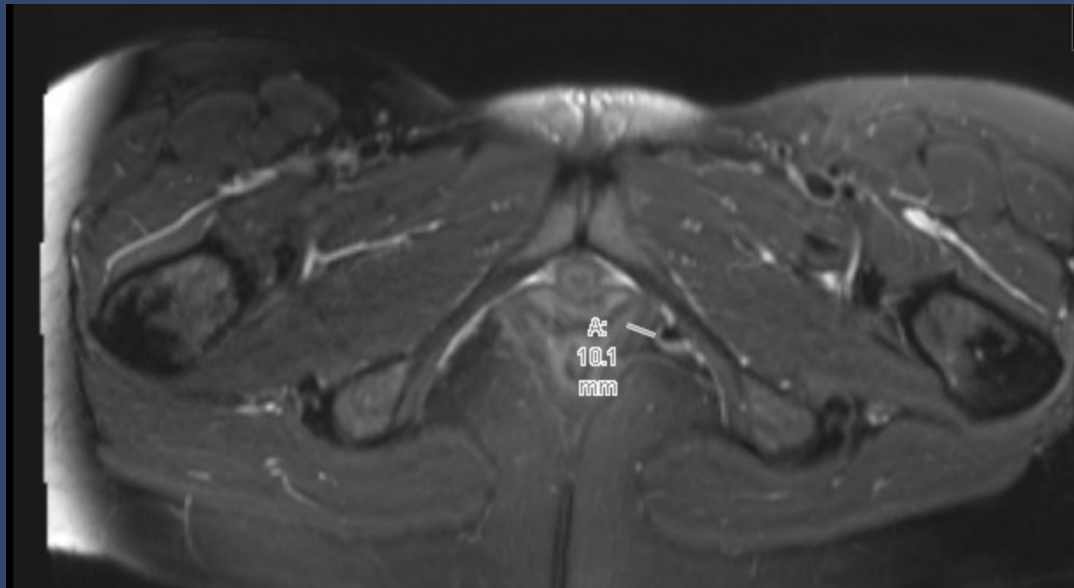
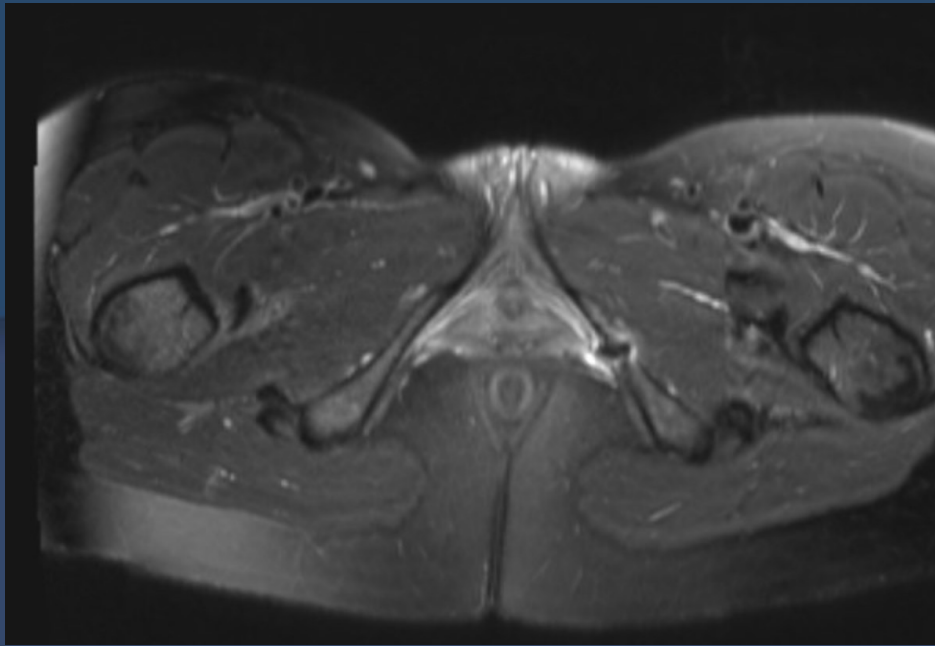


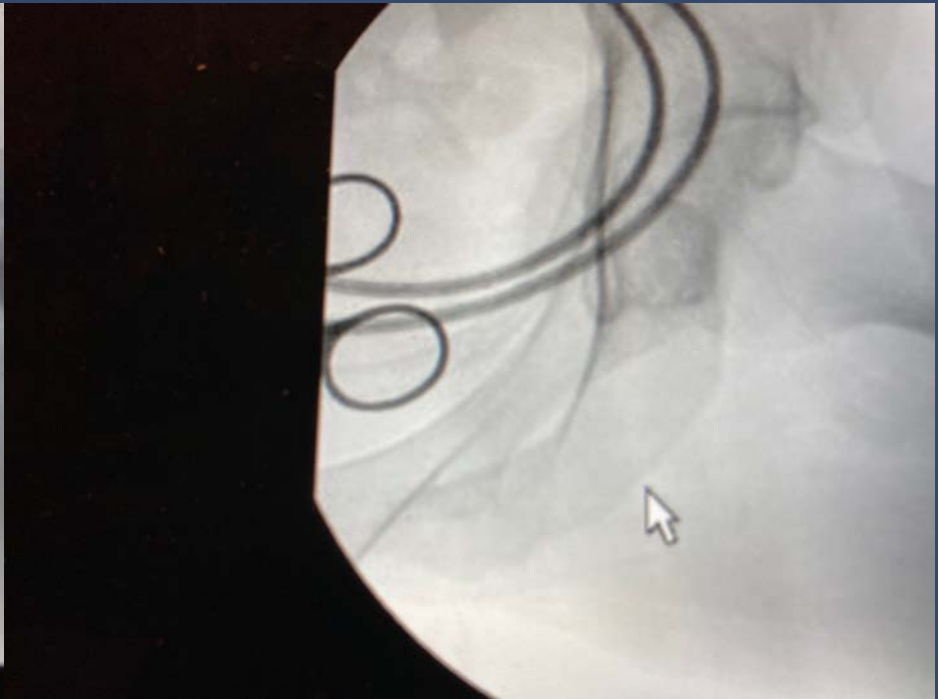
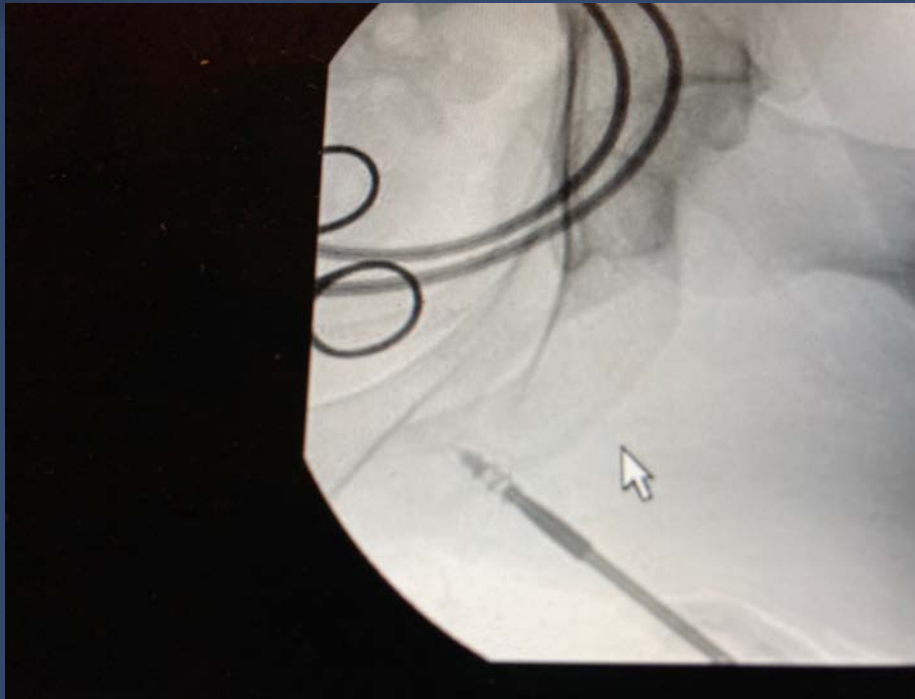
Myotendinous Confusion



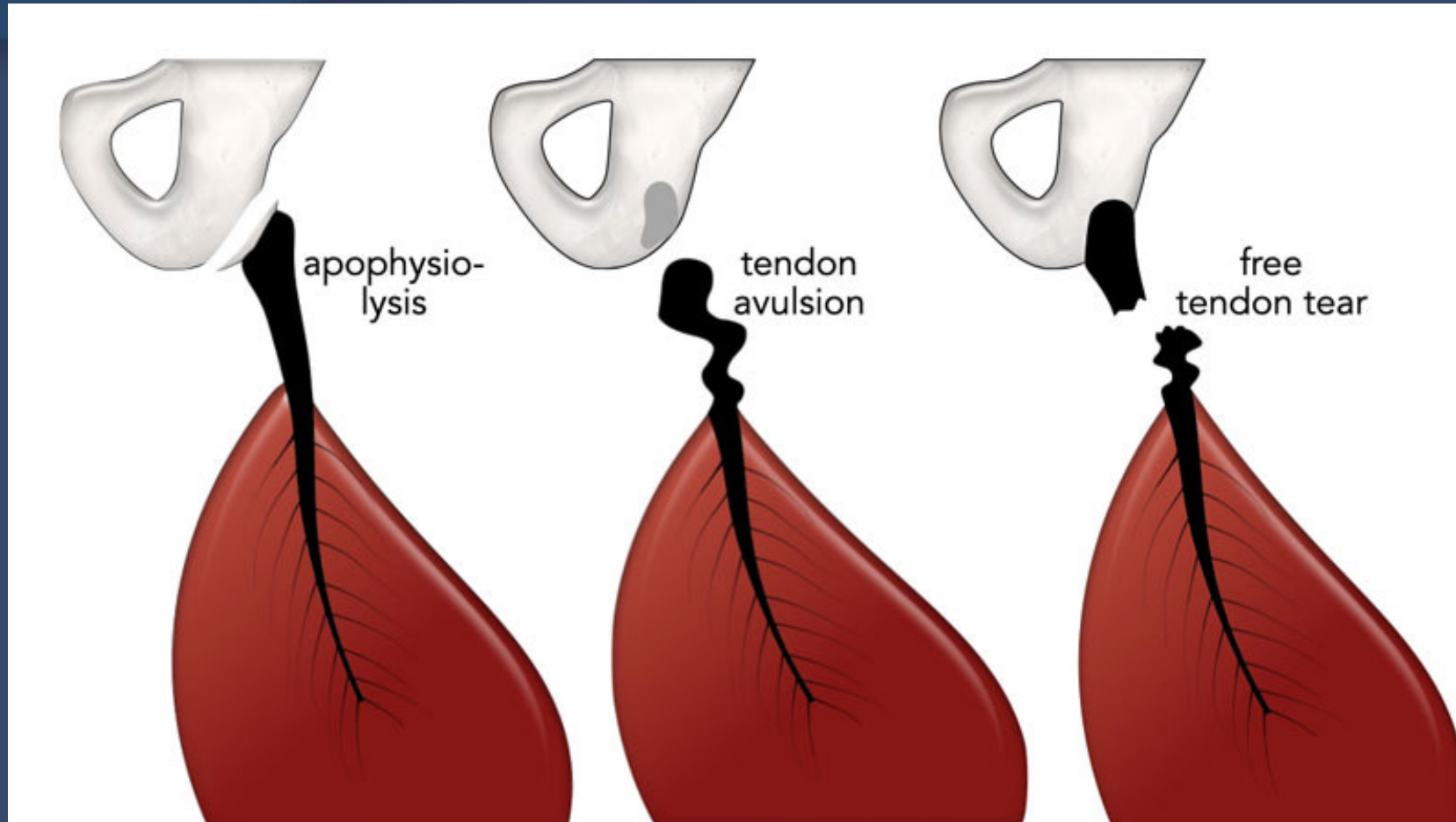
Presentation







Avulsion Variants



Free Tendon vs. Clean Tendon Avulsion

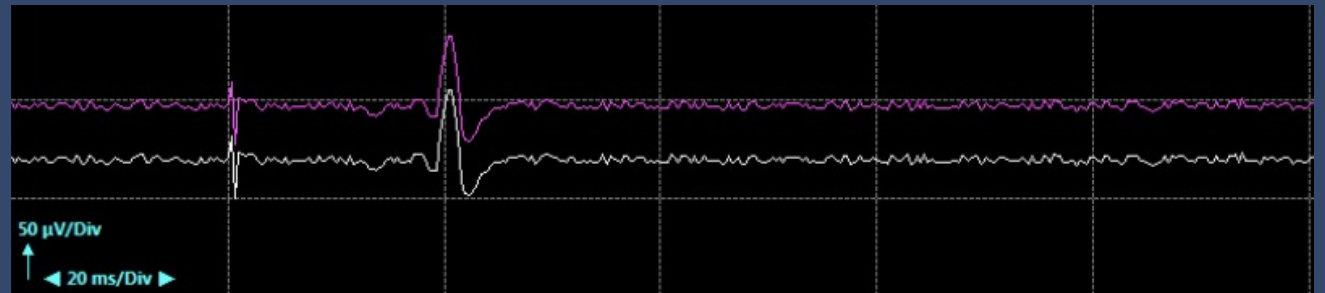
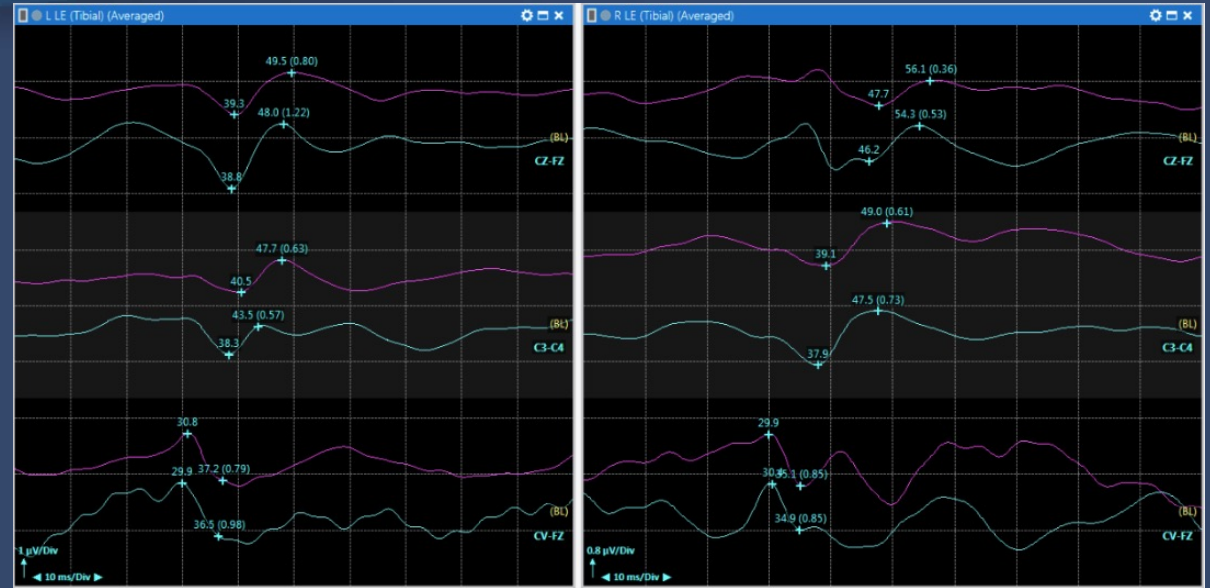


Surgical Repair Preparation

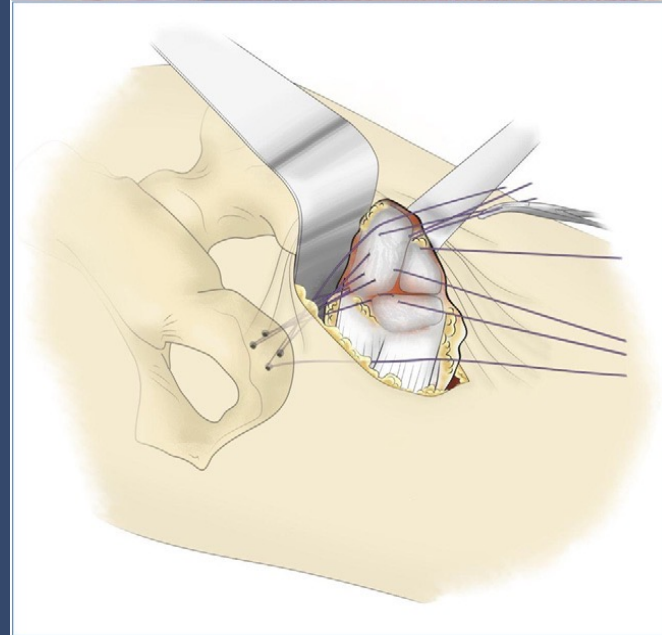
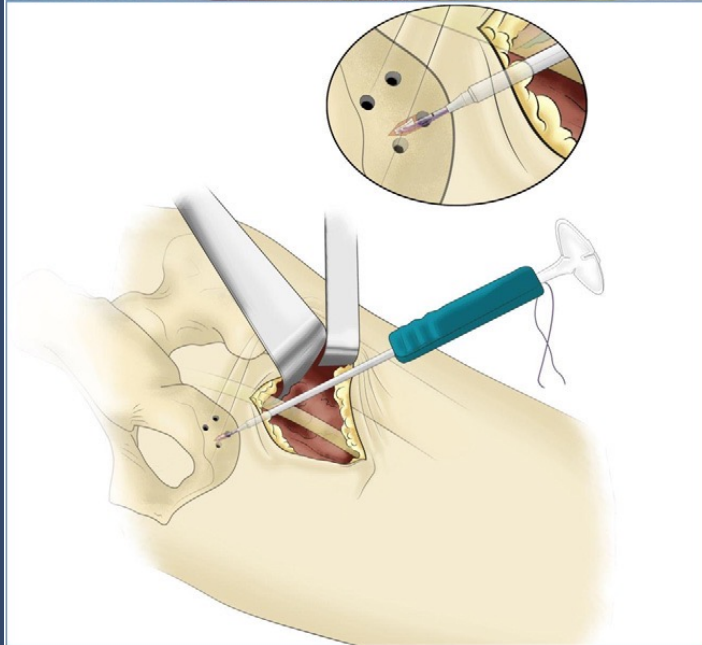
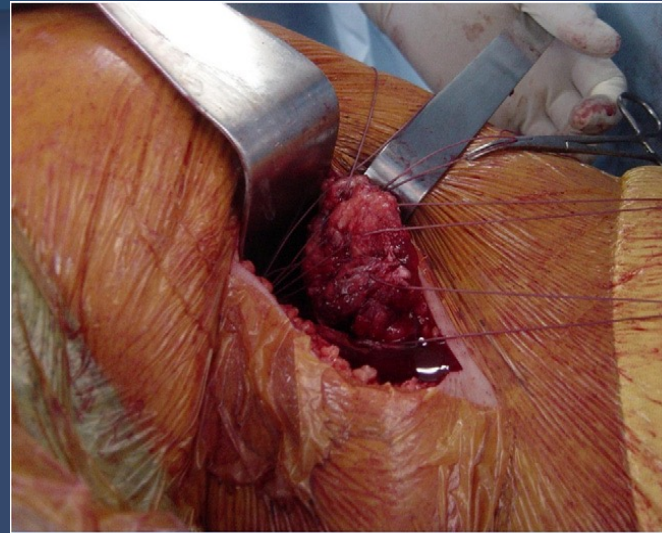
- Rule out preop DVT
- Document nerve fxn preop



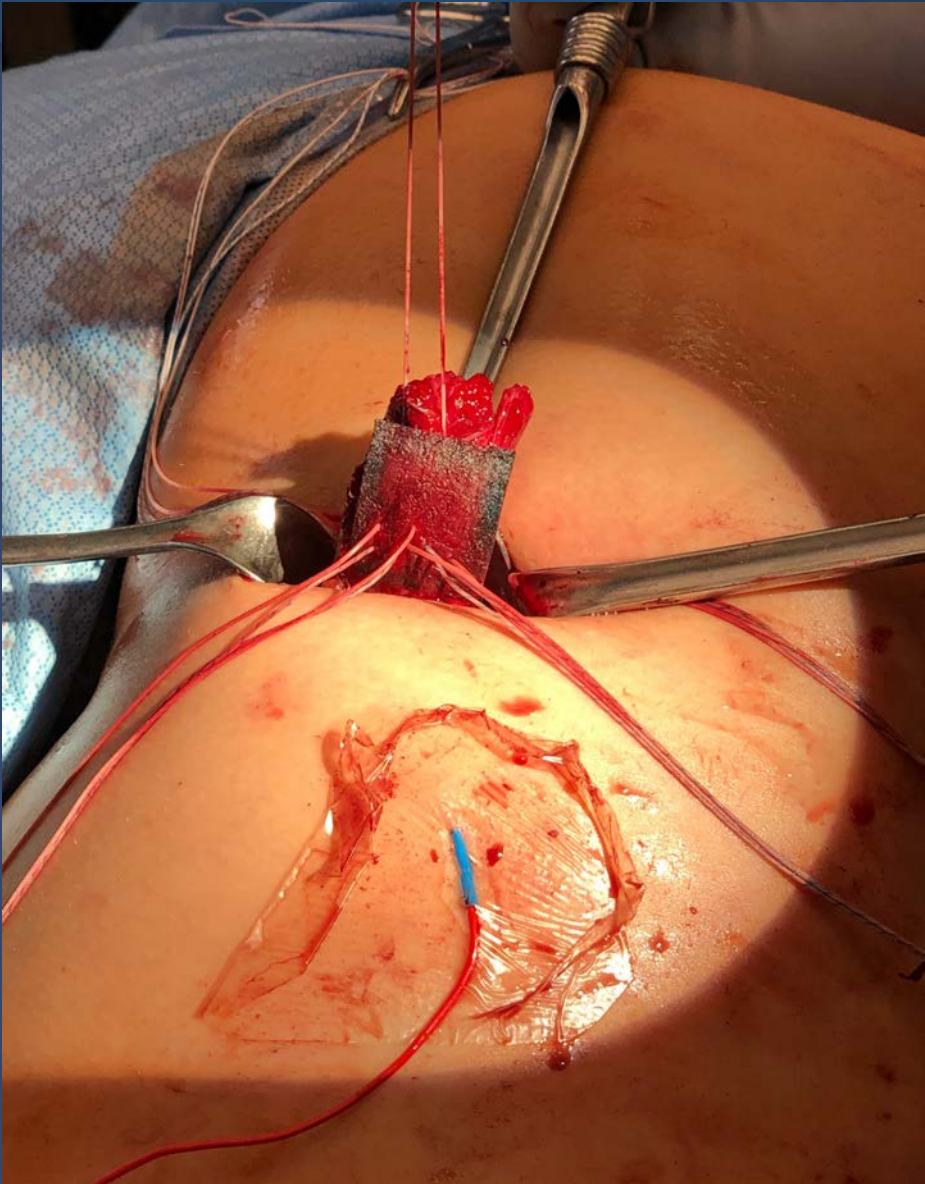
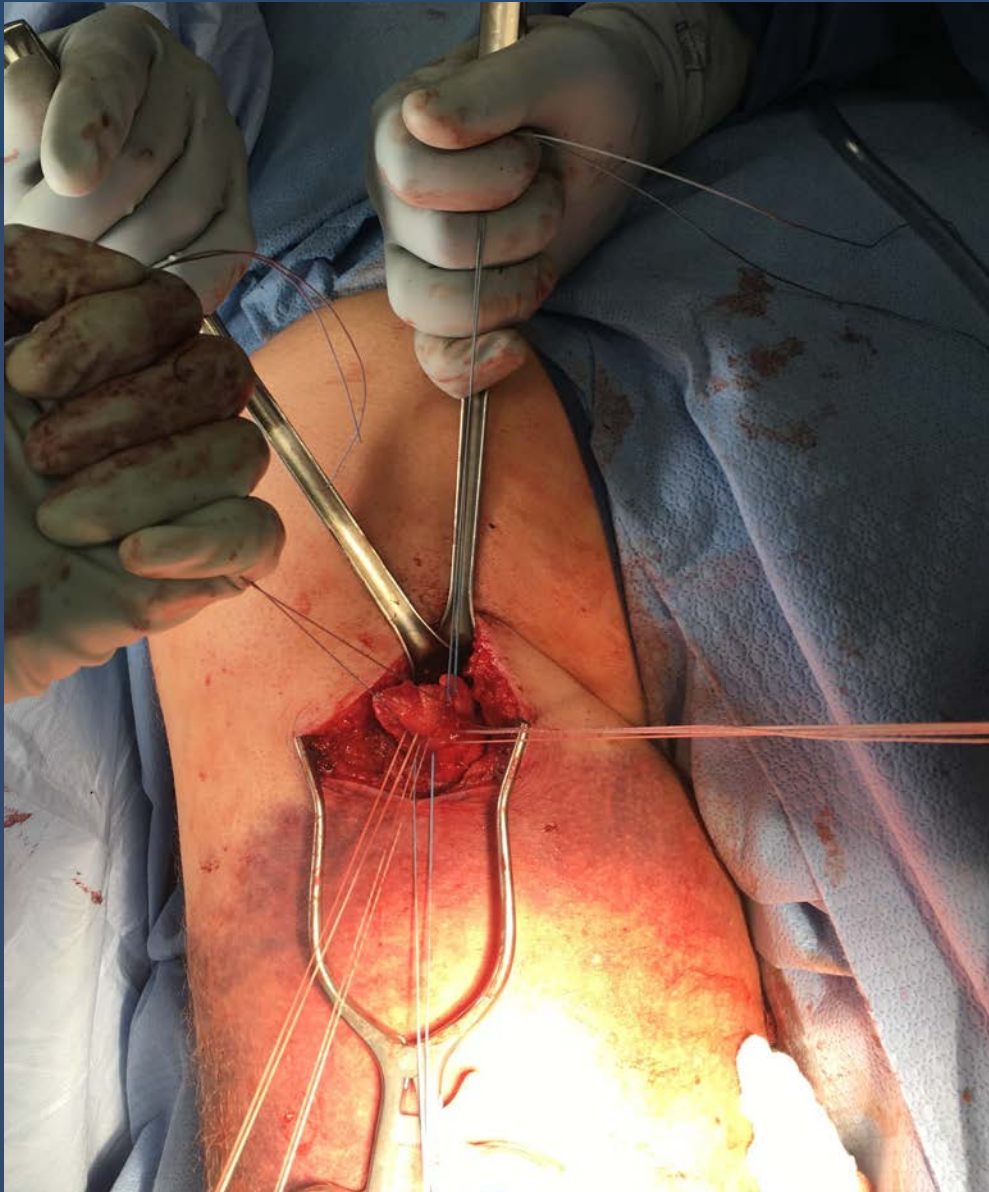
Neuromonitoring



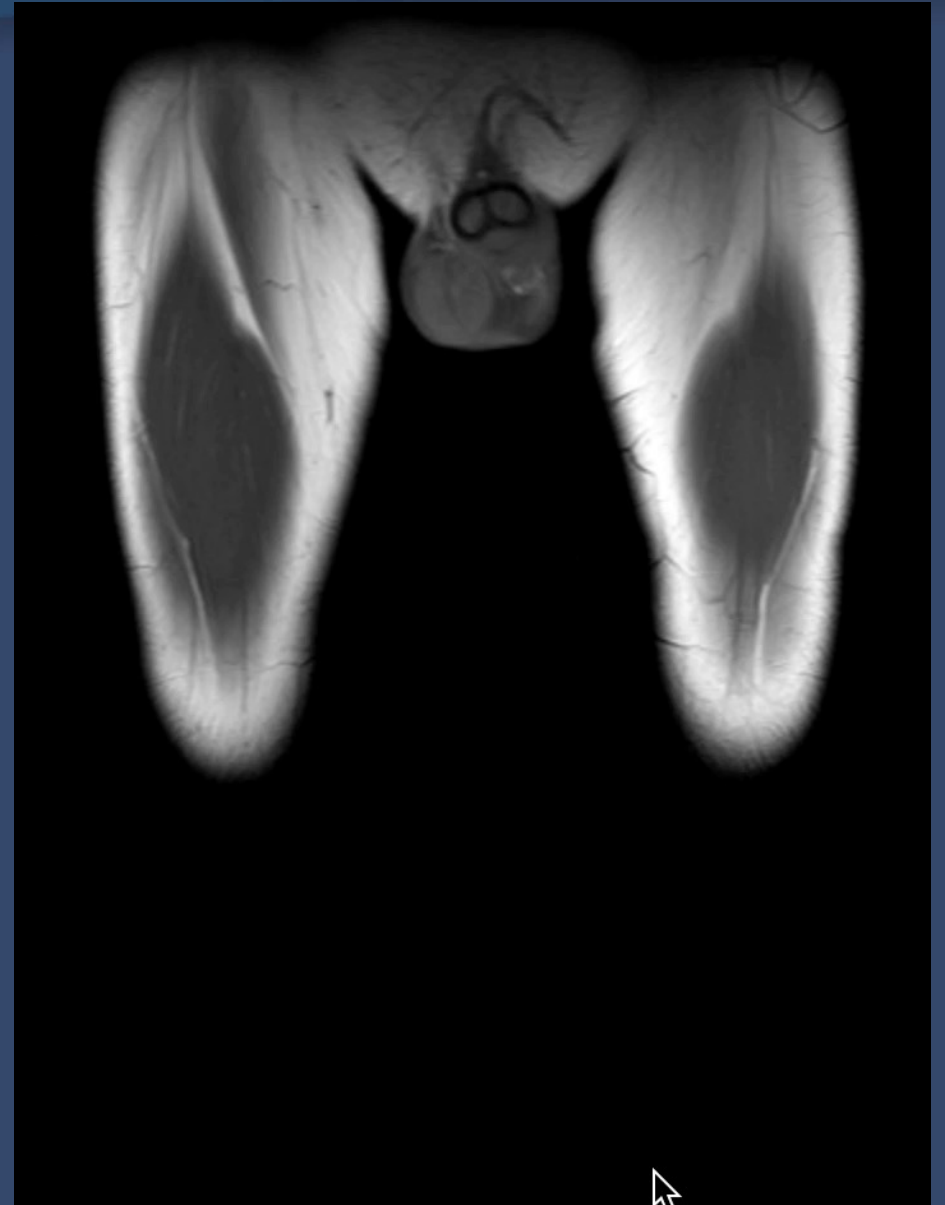
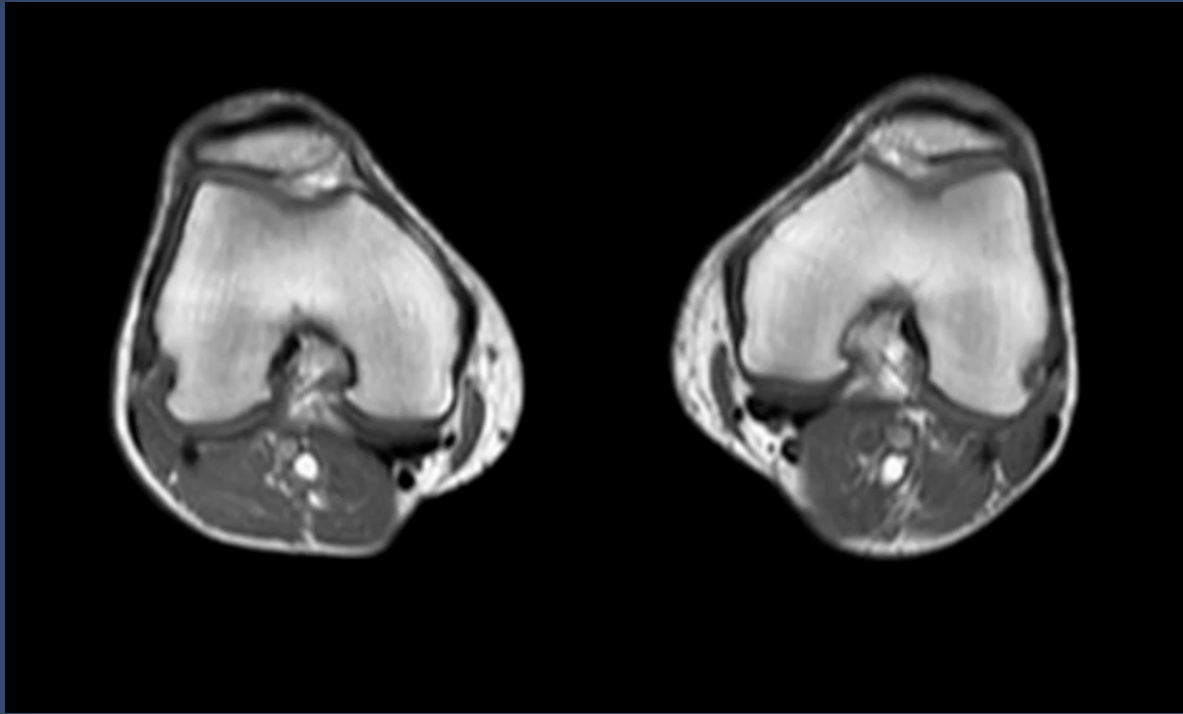
Suture Anchors into Ischium

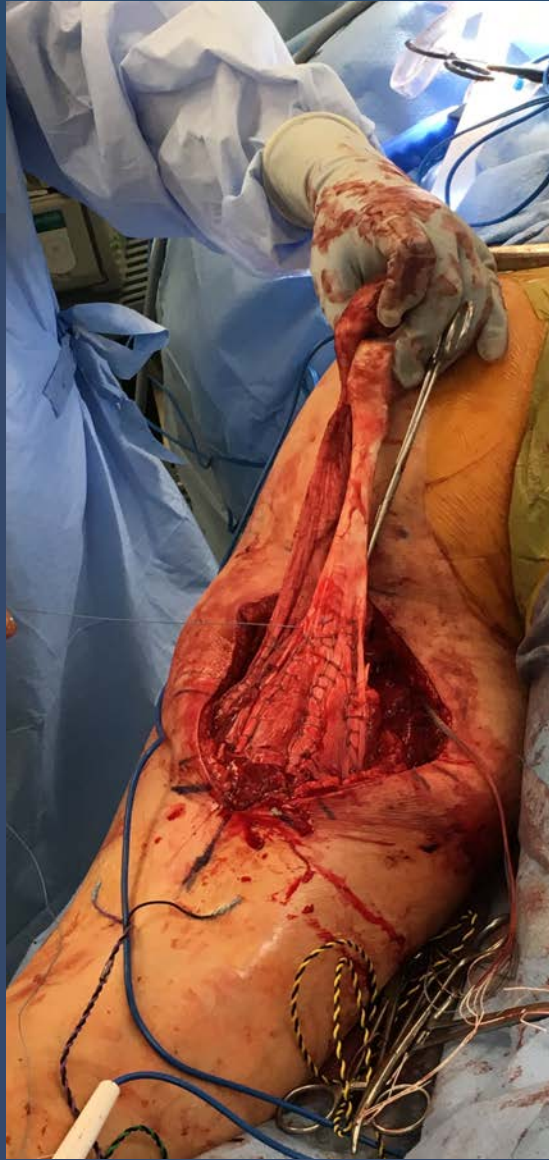


Pass Sutures



Vascular Occlusion







REVIEW ARTICLE

 OPEN ACCESS 

A systematic review of surgical intervention in the treatment of hamstring tendon ruptures: current evidence on the impact on patient outcomes

Aleksi Jokela^a, Antti Stenroos^b, Jussi Kosola^c, Xavier Valle^d and Lasse Lempainen^e

^aFaculty of Medicine, University of Turku, Turku, Finland; ^bDepartment of Orthopedics and Traumatology, Helsinki University Central Hospital, Helsinki, Finland; ^cDepartment of Surgery, Kanta-Häme Central Hospital, Hämeenlinna, Finland; ^dMedical Department, FC Barcelona, Barcelona, Spain; ^eFinnOrthopaedics/Hospital Mehiläinen NEO, Turku, Finland

- 24 Articles Included
- Acute/Chronic/Partial/Full
- 96%open, 4% endoscopic
- 24/1600 used allograft or other augment

Satisfaction (50%)/ Return to Sport (62%)

- 89% pts Satisfied
- 80% returned to sports at the same level
- 15.69% complication rate

Table 3. Complications for operatively treated hamstring avulsions.

	Incidence, %	No.
Rerupture	0.69	11
Reoperation	0.50	8
Infection/wound complications	2.21	35
Neurologic complications	3.91	62
Peri-incisional numbness	2.65	42
DVT/PE	0.57	9
Miscellaneous	5.17	82
Total	15.69	249

Acute vs Chronic

- 502 Acute/313 Chronic

	Acute	Chronic
Satisfaction	95%	77%
Return to Sport	92%	85%

Table 4. Complications for operatively treated acute and chronic hamstring avulsions.

	Acute, %	No.	Chronic, %	No.
Rerupture			1.06	2
Reoperation	0.33	1		
Infection/wound complications	1.99	6	1.06	2
Neurologic complications	1.66	5	9.04	17
Peri-incisional numbness	5.32	16	2.13	4
DVT/PE	0.66	2	1.06	2
Miscellaneous	3.99	12	10.64	20
Total	13.95	42	25.00	47

Partial vs Complete

	Partial	Complete
Satisfaction	87%	92%
Pain Score VAS	3.76	1.87
Return to Sports	78%	81%
Strength testing	89%	88%

Summary

- Generally good results with proximal hamstring repair surgery
- Few studies quantified strength outcomes
- Peri-incisional numbness and discomfort with prolonged sitting were most likely residual findings

Operative Rehab

- **Phase I (weeks 1-4)**
- Goals:
 - -Protection of repair
 - -Pain control
- Precautions:
 - -TTWB 10-14 days
 - -Begin 25% weightbearing at 14 days and increase 25% a week until full weightbearing at week 5
 - -Wear brace for 28 days at degrees to be set by surgeon
 - -Avoid hip flexion coupled with knee extension, NO stretching of the hamstring
- Exercises:
 - -Quad set, ankle pump, transverse abdominal activation, passive knee motion with the hip in neutral, scar mobilization
 -

Phase II (weeks 4-8)

Goals:

- Normalize gait and wean assistive device
- Good control and no pain with functional movements

Precautions:

- Avoid dynamic stretches
- Avoid static hamstring stretching and long sitting until 6 weeks

Exercises:

- Initiate aquatic walking and ROM
- Closed chain exercises with limited ROM: balance and proprioception, heel raises, hip extension, quadruped rocking
- Begin single joint hamstring activation in a limited ROM – avoid combined hip flexion and knee extension. Progress from isometric hamstring sets to heel slide, DL bridge, and begin sidelying active knee flexion at week 6
- Core and pelvis strengthening: clamshells, planks, standing hip adduction and abduction
- Stationary bike with no resistance
- Begin Alter-G at 50% weightbearing when out of brace week 4

- **Progression criteria; Normal gait with no assistive device**
-5/5 hamstring strength in prone (or dynamometer at % uninjured side)

- **Phase III (weeks 8-12)**

- **Goals:**

- -Progress strength for motor control and pain control with return to activity

- **Precautions:**

- -No pain with strength training

- **Exercises:**

- -Progress strength training for HS curls and hip extension in antigravity with focus on low weight and high reps until able to complete 10 lbs with adding weight in 1 pound increments
 - - Initiate SLR, wall slides, partial squats, partial lunges (0-60), SAQ, hip strengthening
 - -Gentle HS stretching
 - -Dynamic walking activities: resisted side stepping, grapevine

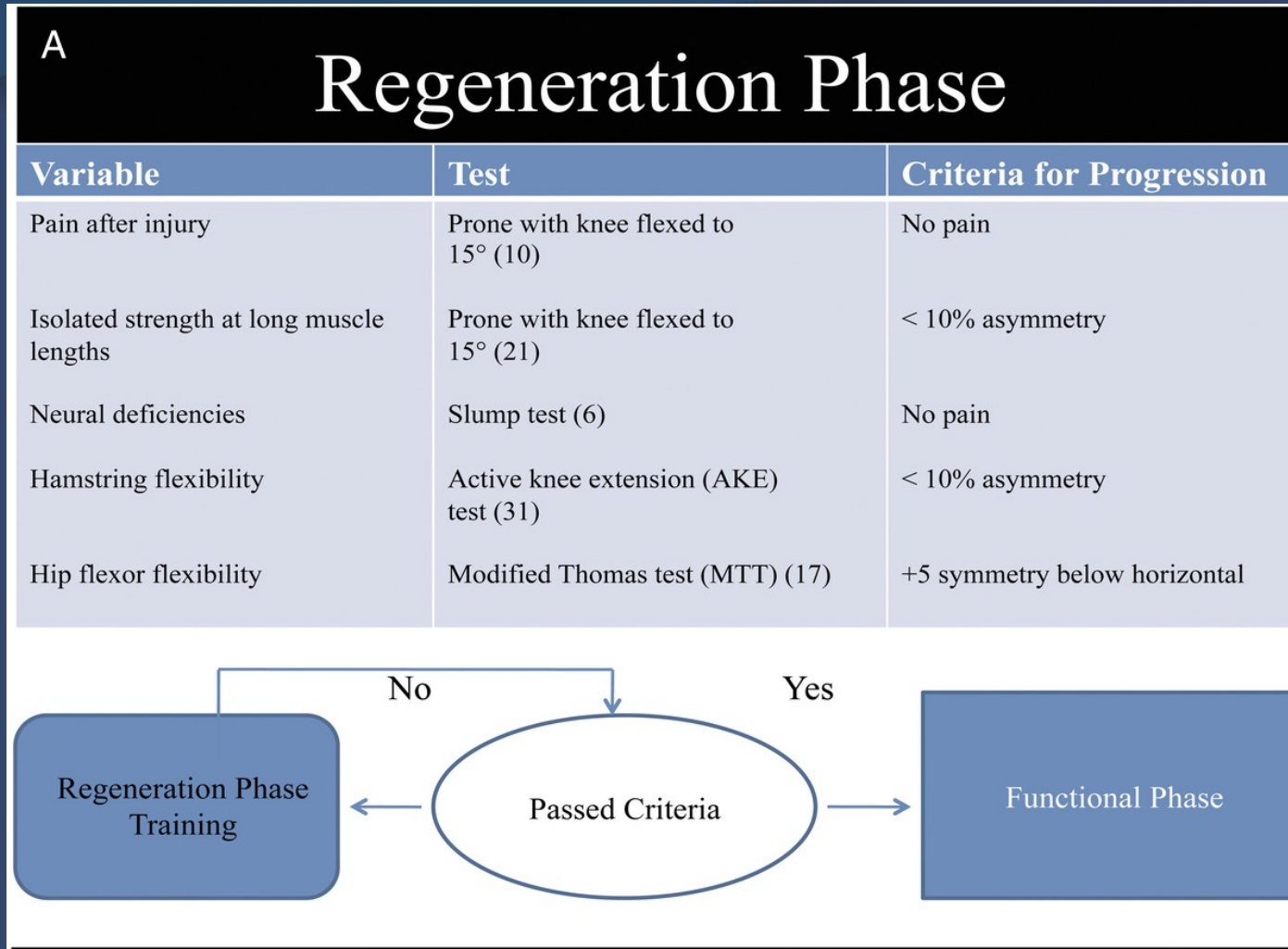
Take Home Points

- Proximal Hamstring Injuries are often missed acutely
- Not everyone bruises
- DVT due to swelling/bleeding can happen
- Early Surgery has lower complication rate
- Chronic Tears can still benefit from surgery if nonop tx fails

Thank You



Rehab Protocols- FB Player Study



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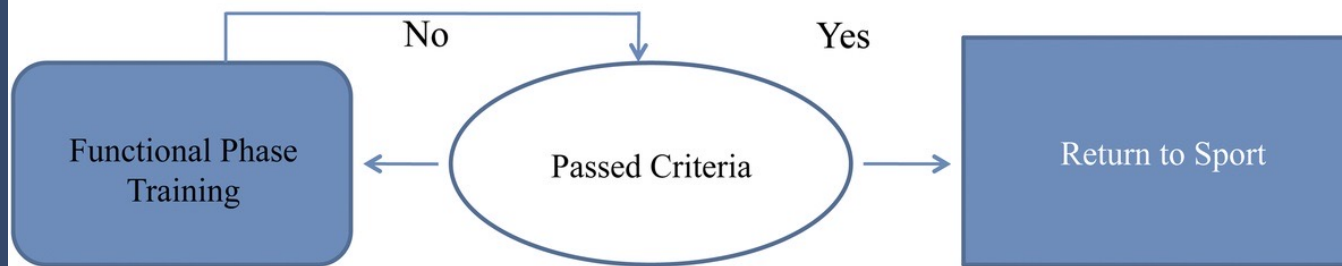
Regen Phase Rehab



B

Functional Phase

Variable	Test	Criteria for Progression
Pain	Palpation (10)	No pain
Peak torque (H/H) and conventional ratio (H/Q)	Isokinetic knee flexion/extension at $60^{\circ}\cdot s^{-1}$ (8)	$< 10\%$ H/H and $H/Q > 0.45$ (Biodex) or > 0.47 (Cybex)
Hip extension strength	Prone hip extension (37)	$< 10\%$ asymmetry between legs
Distance	Triple hop test (16)	$< 10\%$ asymmetry between legs
Endurance (Repetition number)	Single leg bridge test (13)	> 25 and $< 10\%$ asymmetry between legs
Torsion capabilities	ASLR test (22)	No compensations
Insecurity and Pain	Askling H-test (2, 3)	No pain and insecurity



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Functional Phase Rehab

