



Proximal Hamstring Avulsion: a case report

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CASE DESCRIPTION

DIFFERENTIAL DIAGNOSIS

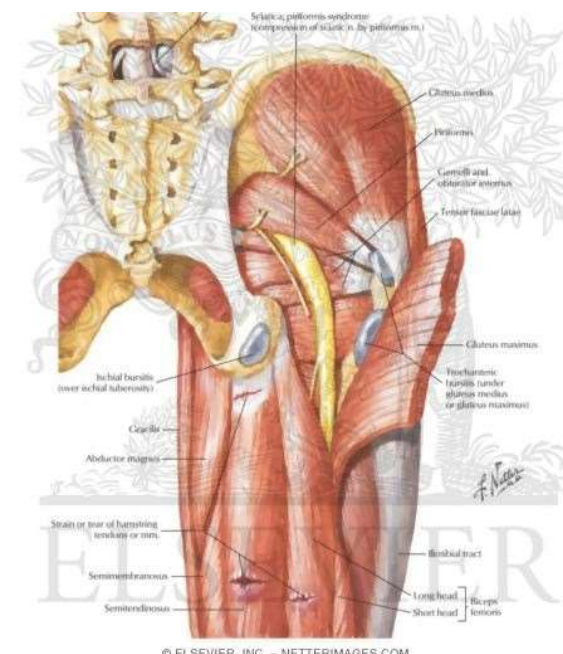
40 year old, female, fall from mountainbike after taking a drop of 1,5m

Symptoms:

- **sharp pain at the posterior thigh** at the moment of fall, but rapidly decreasing pain in stance. Pain while sitting at posterior thigh and buttock.
- difficulty with walking (loss of function): straight leg gait
- transient neurologic symptoms in the posterior thigh (tingling, sciatica like pain)

DD: Proximal posterior thigh pain / buttock pain

- Neurologic: radiculopathy, sciatica, piriformis syndrome
- Vascular: arterial pathology i.e. endofibrosis, venous pathology i.e. pelvic deep vein thrombosis
- Myotendinous: hamstring strain or tear, gluteal muscle tears
- Traumatic/Bony: bruising, ischiogluteal bursitis, stress reaction or fracture of the pelvis or femur, apophysitis, avulsion fracture of the ischial tuberosity, SI joint pathology





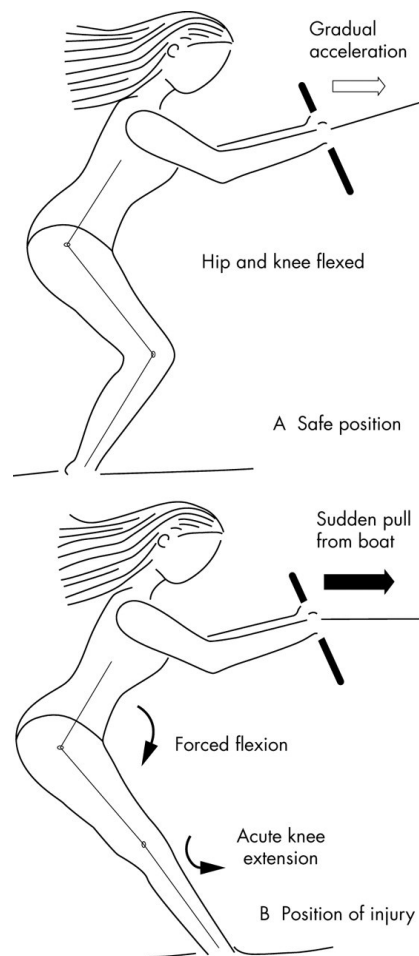
PHYSICAL EXAMINATION

- **Neurovascular examination** (DD): intact
- **Inspection:** no ecchymosis; visible gap at proximal posterior thigh; yellowish shine posterior leg
- **Palpation** of maximum tenderness point and soft tissue defects: palpable gap, pain ischial tuberosity and along the hamstrings
- Palpation of ischial tuberosity for possible fracture or tendon avulsion, comparison contralateral side: avulsion can be felt as a difference in hardness of the tuberosity.
- **Assessment of motor strength:** very little strength
 - knee flexion against resistance (kneeflexion 90, 45 and 10°): not possible
 - bowstring sign: no palpable tension of the distal portion of the hamstring
 - standing heel drag test: not possible, painful
 - reverse plank test (figure): not possible, painful
 - pain or discomfort at ischial tuberosity = pos. test





IMAGING & INJURY MECHANISM



- **X-ray & US** at 48hrs after trauma: no avulsion fracture, complete rupture of tendon m.biceps femoris, maybe more tendons, but difficult to see due to swelling.
- **MRI** 6 days after trauma: **avulsion of the common hamstring tendon insertion with 4cm retraction of muscle belly**. Fluid collection (60x37x15mm) and infiltration along the muscle bellies
- **Injury mechanism:** sudden flexion of the hip, extended knee, foot fixed (waterski-injury): this causes acute and/or uncontrolled stretch of the hamstrings (**figure**)
→ hamstrings are biarticular muscles making them more vulnerable to elongation lesions and tendon ruptures
- **Function of hamstrings:** deceleration of hip flexion and knee extension prior to ground contact + control of stability of the knee
 - SemiM and SemiT: deceleration of external rotation of the knee
 - Biceps: deceleration of internal rotation of the knee→ loss of function: straight leg gait

WATERSKI-INJURY



TREATMENT: PHYSIOTHERAPY! +- SURGERY?

What is usually advised:

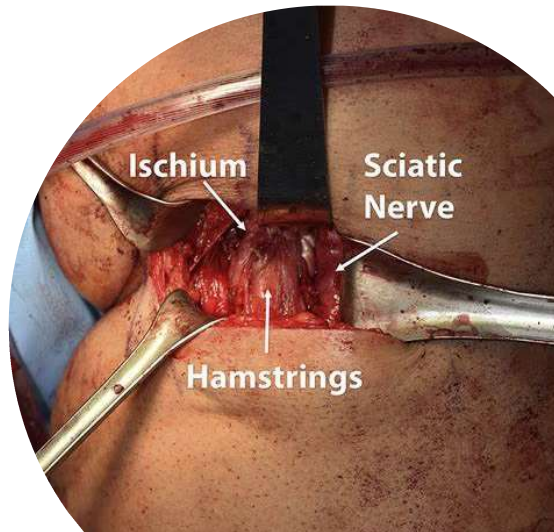
- single tendon avulsion (with retraction 1-2cm): nonoperative
- two-tendon rupture: controversial and dependent on patient characteristics
 - * nonoperative treatment for older and low-demand patients
 - * surgery for young patients (<50) or athletically active patients or tendon retraction > 2cm
- three-tendon avulsion: surgical repair, and preferably within one month. → our case

Evidence based???

- published studies are of low methodological quality:
- publication bias: very little nonoperative cases, although conservative treatment is often advised by physicians (cfr worldwide survey)
- published meta-analyses are biased by indication and by selection
→ randomised controlled non-inferiority trial of operative vs non-operative treatment started in the Scandinavian countries in 2019: results are expected in 2024 (PHACT study)

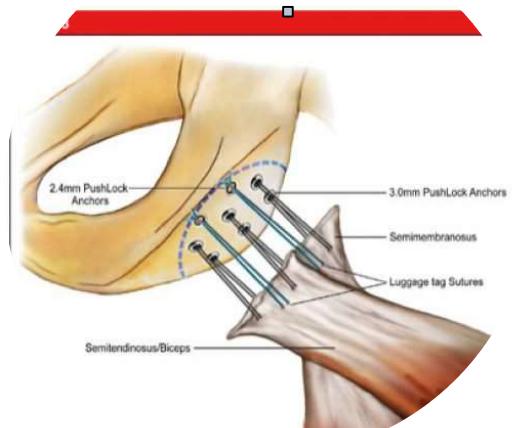


SURGERY



PROCEDURE

- Patient in prone position
- Incision in gluteal fold (esthetics)
- Dissection of the gluteus maximus muscle!
- Protection of ischial nerve / sometimes removal of scar tissue around this nerve
- Preparation of ischial tuberosity
- Placement of two to five anchors
- Repair with two to five suture anchors.



CUMULATIVE COMPLICATION RATE of 23%
(rerupture, reoperation, infection, neurological complications, peri-incisional numbness, DVT/PE, sitting pain)
Our case: peri-incisional numbness (1 yr postop)



REHABILITATION



- Different strategies, but **usually consisting of 4 phases** (operative and nonoperative):
- **Phase 1: hamstring protection to allow healing:** relative immobilization, limiting hip flexion (20-60°) + non- or partial weight bearing. Period dependent on treatment choice and postoperative findings.
- **Phase 2:** Treatment of **scar tissue, stretching** with progressive hip flexion, progressive active knee flexion and hip extension, walking pattern, stationary bike
- **Phase 3:** FROM, **increasing strength training:** isometric - closed chain - eccentric exercises. Preparing for and **start to run** (4 months postop). No speed work.
- **Phase 4:** FROM, strength training with weights (open chain, concentric). **Progressive run/speed/agility.** Jump training after 6 months postop.
- Attention for gluteal muscles (see surgery) and SI-joint internal derangements



PROGNOSIS

Based on largest meta-analysis:

	Operative	Nonoperative
Satisfaction (%)	90%	53%
Return to pre-injury activity level (%)	79%	71%
Strength testing (%)	85%	64%
LEFS (lower extremity functional scale)	72/80	70/80
Sitting pain	7%	Not reported



CAVE: selection bias, publication bias: very small number of patients in the nonoperative group, treatment bias, rehabilitation bias? (surgery group will be more motivated for rehabilitation)



CONCLUSIONS

- The proximal hamstring avulsion can result from an acute or progressive stretching of the hamstrings caused by flexion of the hip on an extended knee and fixed foot (waterski injury).
- The decision for nonoperative vs operative treatment is usually based on the extent of the injury and patient characteristics. Surgery can be performed in the acute phase, but also after conservative management.
- Surgery is a reasonable option for the properly indicated patient, but is not without risk.
- Rehabilitation is always long and starts with a period (2 tot 6 weeks) of relative immobilization to allow healing of the tissue.
- The majority of injured persons will return to pre-injury activity levels.
- Studies comparing the operative and nonoperative treatment has been of low methodological quality, but a high quality study is ongoing (PHACT).



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