

Congress of Soccer Medicine
SvFF / Stockholm, Sweden

22.-23.th Jan., 2010

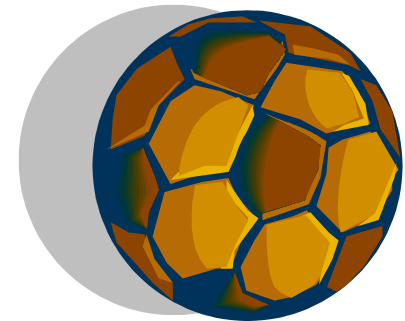
Hamstring injuries – differential diagnosis and treatment options



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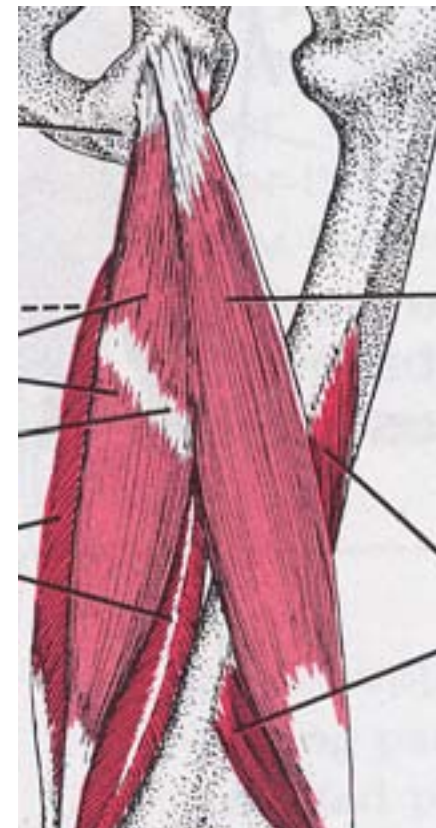
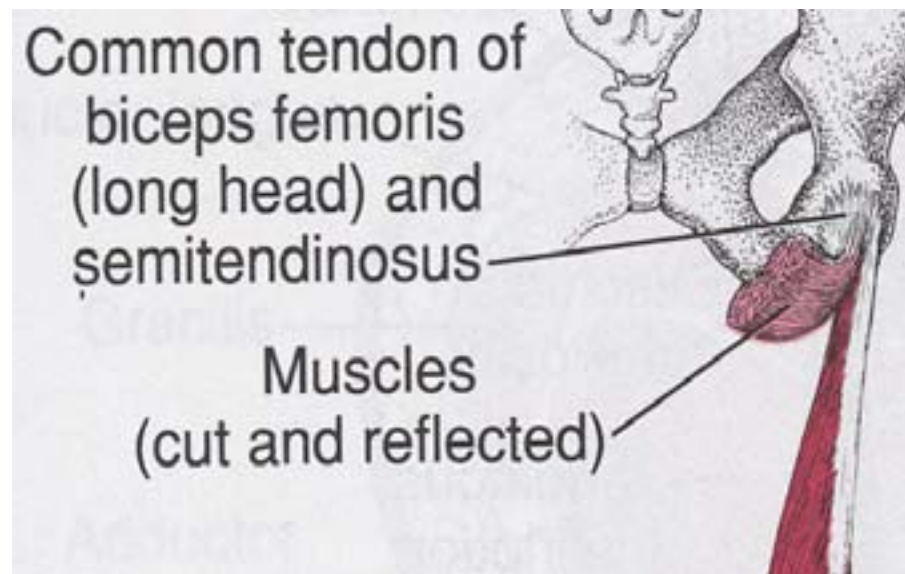
Hamstring strains

- Most common muscle injury in soccer players (both males and females)

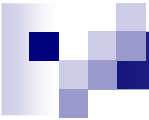
(Häggglund, Walden and Ekstrand, Scand J Med Sci Sports 19, 819-829, 2009)

Hamstring muscles

- over two big joints
- pelvic stabilizers
- hip extensors
- anatomical variations



**biceps
femoris**



Causes of hamstring area pain

- **lumbar disc prolapse or protrusion**
- **disc degeneration – internal tear**
- **spinal stenosis – nerve root canal stenosis**
- **spondylolysis, -olisthesis**
- **vertebral apophyseal ring fracture**
- **vertebral anomalies**
- **other radicular and pseudoradicular pains**
- **neurological diseases**
- **neuritis of sciatic nerve**
- **neurinoma of sciatic nerve**
- **”tight hamstrings” - anomaly**



Hamstring / gluteal pains and injuries in athletes

- **piriformis syndrome**
- **posttraumatic piriformis sdr – contusion of sciatic nerve**
- **hamstring syndrome**
- **avulsion fracture of ischium**
- **apophysitis of ischium**
- **total and partial proximal muscle / tendon tears**
- **mid-muscle (partial tears)**
- **distal hamstring tears and avulsions**
- **posterior compartment syndrome of thigh**
- **posterior hip rotator injuries**



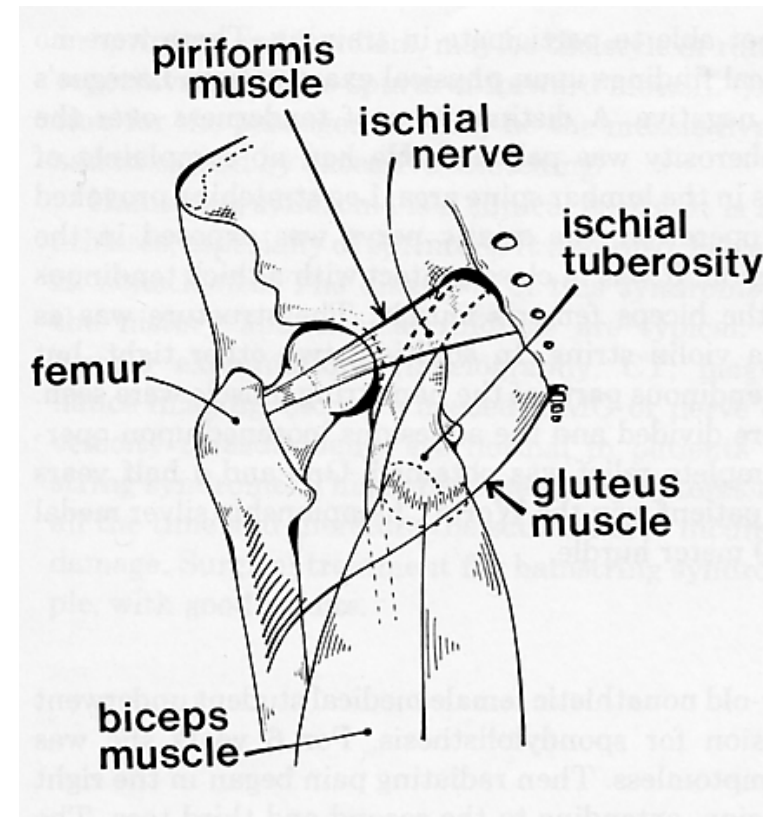
Piriformis syndrome

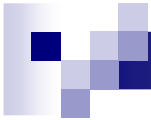
- first reported by Yeoman (1928)
- first liberation of sciatic nerve at gluteal area by Freiberg & Winke (1934)

Piriformis syndrome

- symptoms

- pain at upper gluteal area
- radiation to posterior thigh and down the leg
- postexercise and night pain
- leg held in semiflexion and in outward rotation in bed
- sitting usually OK, long time difficult





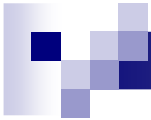
Piriformis syndrome

Clinical findings

- gluteal palpation pain over the muscle/nerve
- resisted abduction – external rotation (Pace's sign) usually +
- forced internal rotation of extended thigh (Freiberg's sign) may be +
- piriformis stretching +
- neurological status –
- local anesthetic injection test +

Examinations

- Clinical (most important)
- radiographs -
- ultrasound echo (?) - +
- MRI+ -
- ENMG+ -
- ***there is no specific test or examination to diagnose piriformis sdr***



Piriformis syndrome – clinical entities

- 1.piriformis syndrome caused by contraction of piriform muscle (from **overuse**)
- 2.piriformis sdr from muscle / nerve **anomaly**
- 3.posttraumatic piriformis syndrome (**direct trauma** - contusion of sciatic nerve)
- 4.**radicular** syndromes from lumbar spine causing piriformis tightness

Piriformis syndrome

- in 6.2 % part of sciatic nerve goes through piriformis muscle (Pecina, 1979)
- muscle may be hypertrophic or its tendon anteriorly thick
- vascular anomalies around the nerve
- usually no abnormality seen in surgery



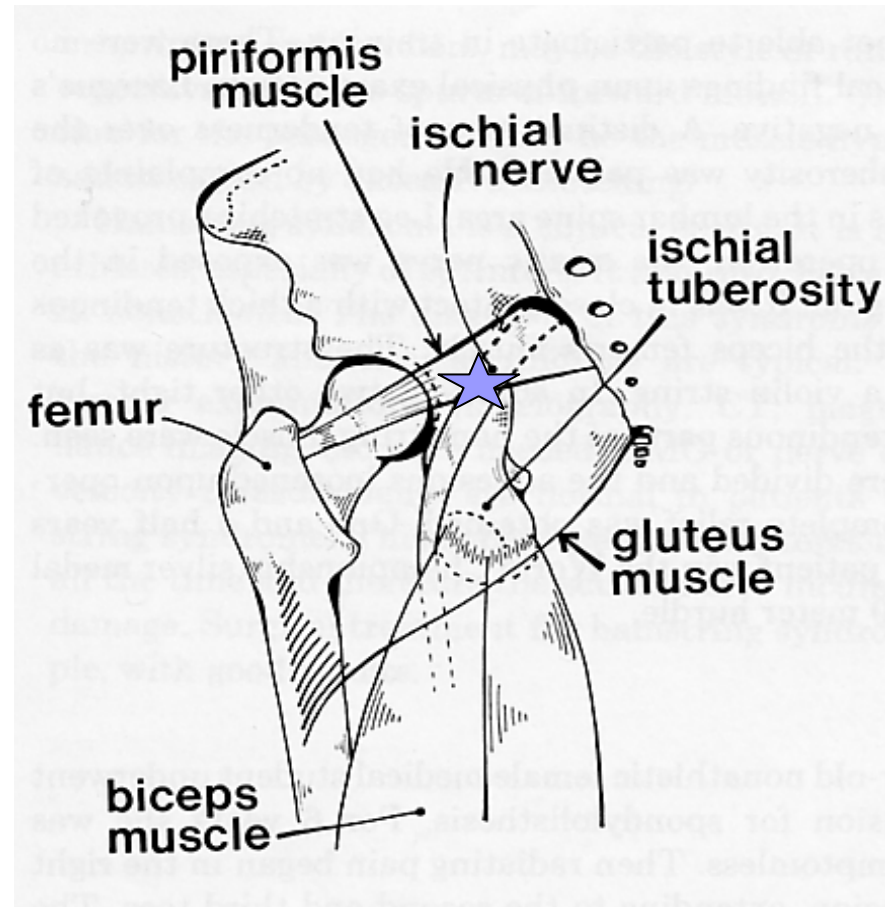


Conservative treatment of piriformis syndrome

- **rest from physical exercise causing symptoms**
- **piriformis stretching**
- **hip mobility exercises**
- **pelvis (core) stability exercises**
- **relaxation, masage physiotherapy, manual treatment**
- **corticosteroid injections**

Surgery for piriformis syndrome

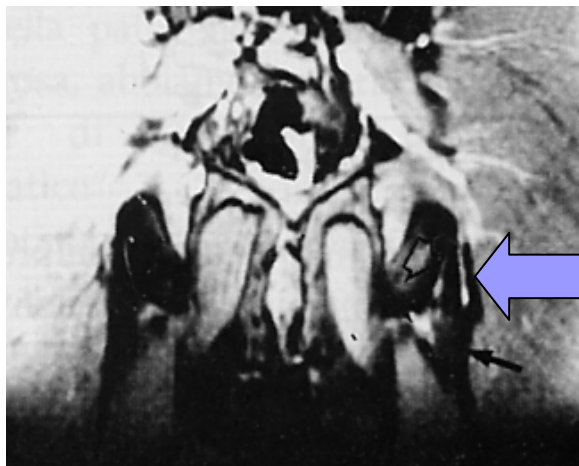
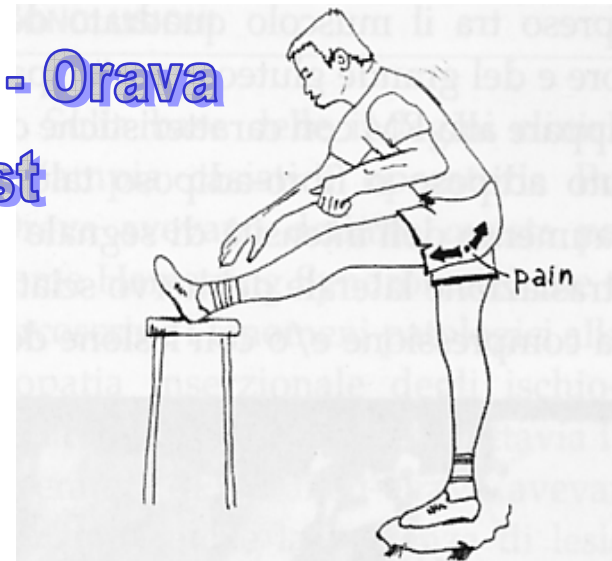
- division of piriformis muscle (proximally)
- liberation of sciatic nerve from adhesions, muscular anomalies or compressive vascular anomalies



Diagnosis of hamstring syndrome

- Running, sitting and car driving difficult
- local pain at hamstring origin
- MRI +, US +-, ENMG -

Puranen - Orava
test

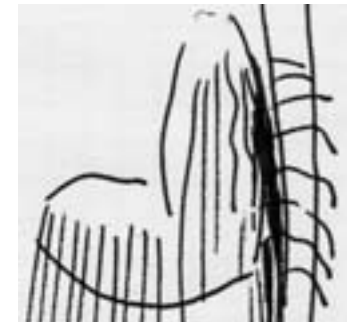
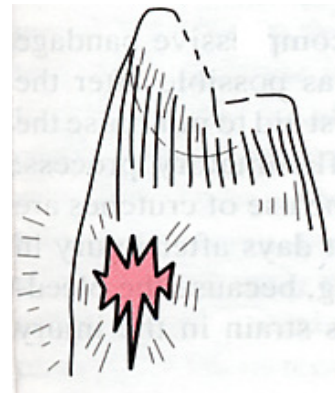
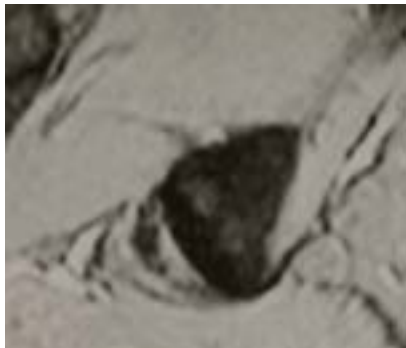


tendinosis of
hamstring
insertion

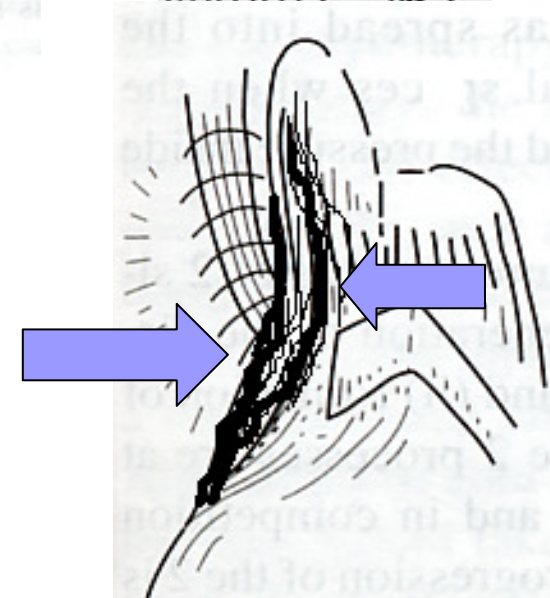


Pathophysiology of hamstring syndrome = tendinosis (+ sciatic nerve irritation)

- stress, small tears, thickening, tendinosis
- semimembranosus tendon mostly affected (= "fibrous band")
- biceps femoris sometimes, too

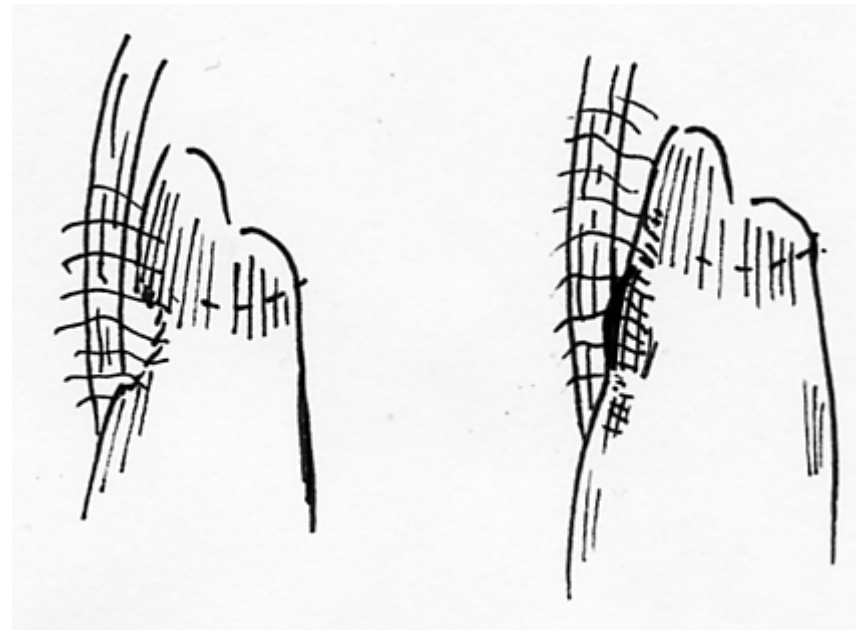


semimebr.
anteriorly to
biceps



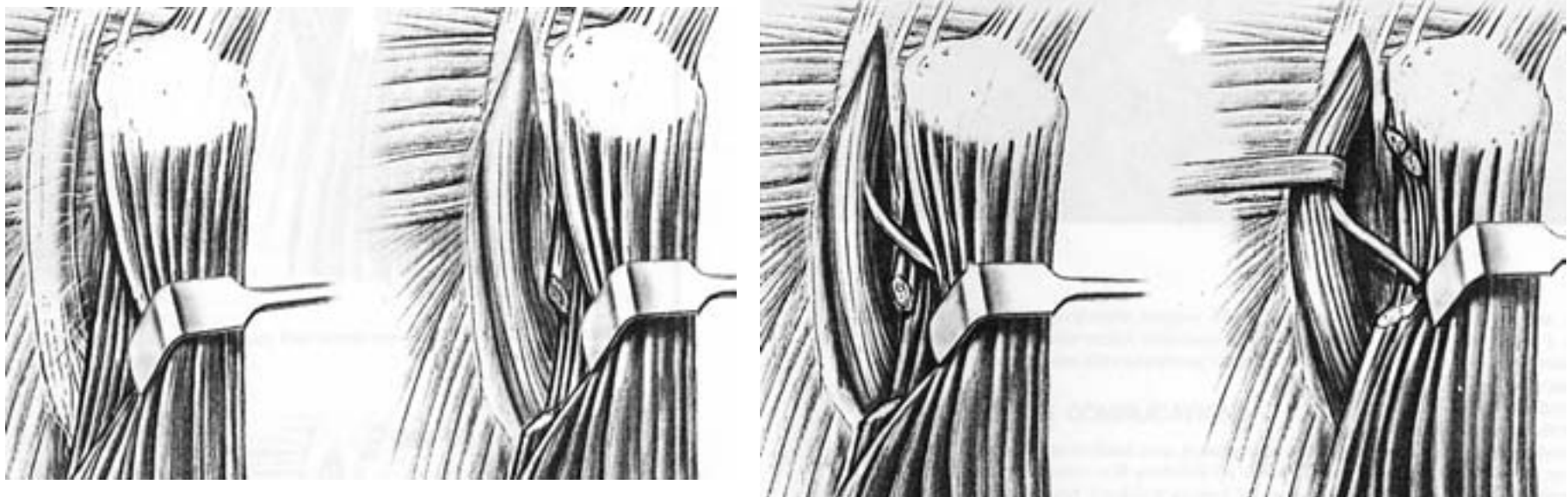
”Posttraumatic” hamstring syndrome

- **after partial tear or
after recurrent
small tears scarring,
fibrosis and
tendinosis occurs
to semimembr.- bic.fem**



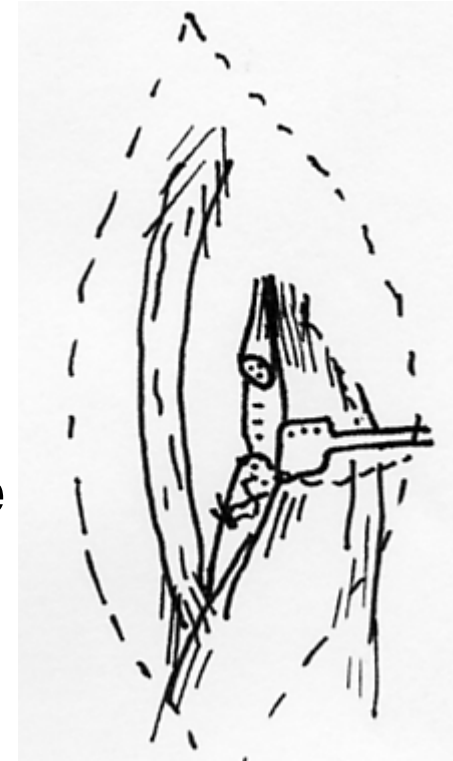
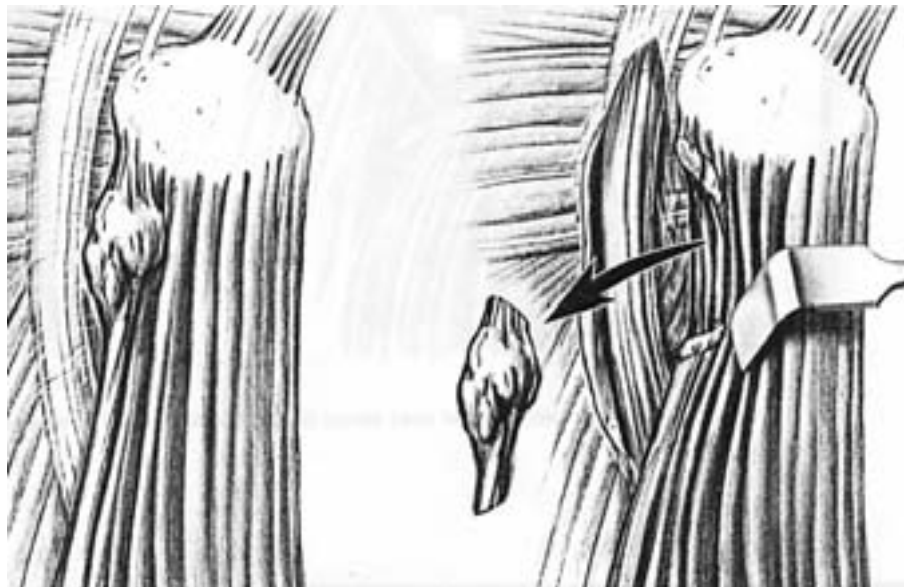
Surgical treatment of hamstring syndrome (from overuse)

- division of semimembr. band, liberation of sciatic nerve, proximal fasciotomy
- Only tendon divided, muscle part left intact



Surgery for posttraumatic hamstring syndrome

- division of fibrous tendinosis tendon
- excision of scar clump
- fixation of distal stump to other tendons or with suture anchor to bone

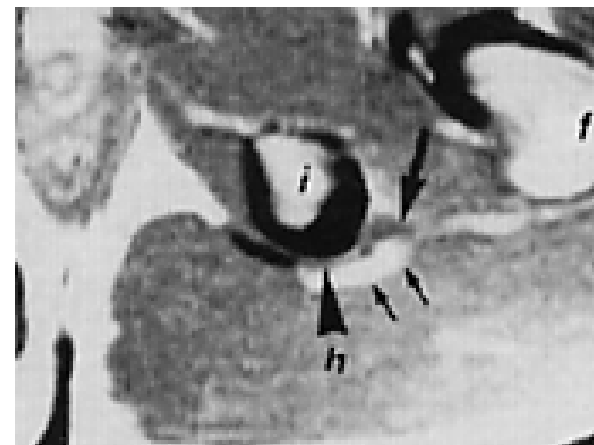


Diff. diagnosis of piriformis and hamstring syndrome

- m. quadratus femoris tear on right side

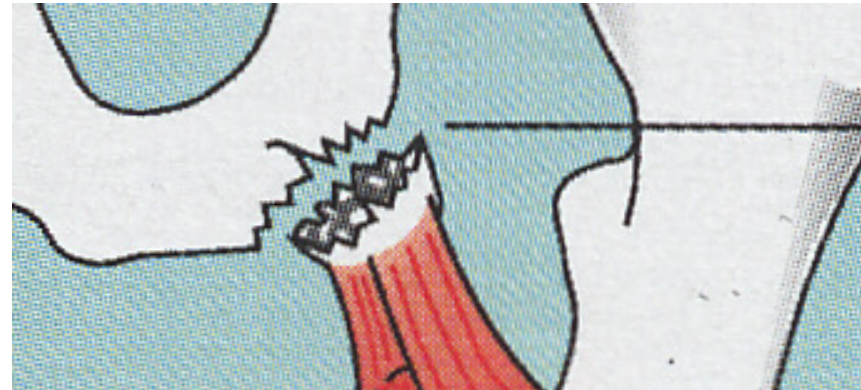


- ischiogluteal bursitis



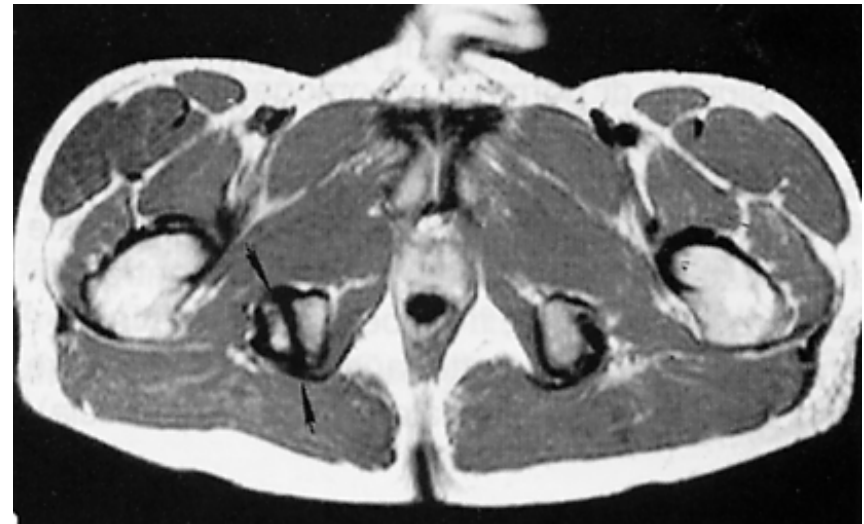
Avulsion fractures of ischial tuberosity

- usually in young athletes (13-18 years)
 1. apophyseal "tug" lesion
 2. apophyseal partial separation
 3. periosteal avulsion with later "pseudotumor"
 4. bony avulsions



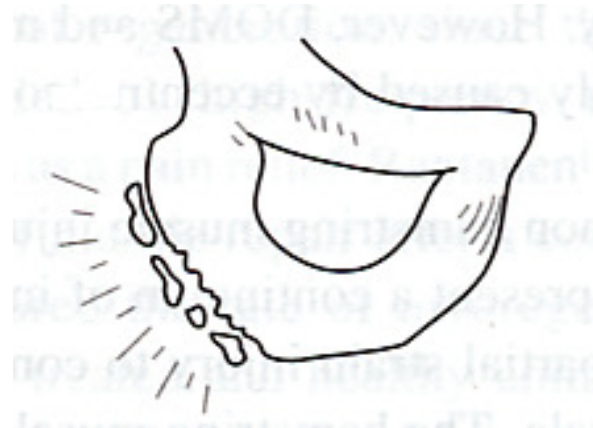
Avulsion / apophysitis of ischial tuberosity

- avulsion / fracture line oblique – difficult to see in native radiographs
- side views, CT, MRI +
- surgery if separation more than 2 cm, individual decisions



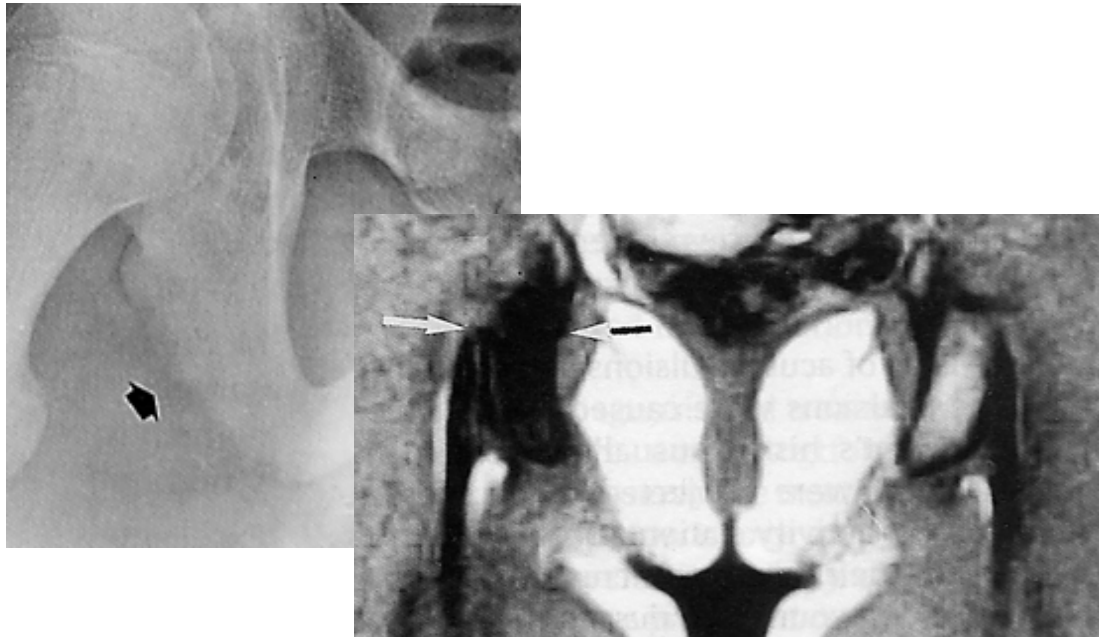
Apophysitis of ischial tuberosity

- in young athletes (11- 17 years)
- radiographs positive late
- MRI+, isotope scan +
- may last long
- **Treatment:** rest from activity, drilling



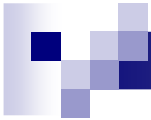
Apophysitis of ischial bone

■ symptoms 4 weeks



after 4 months



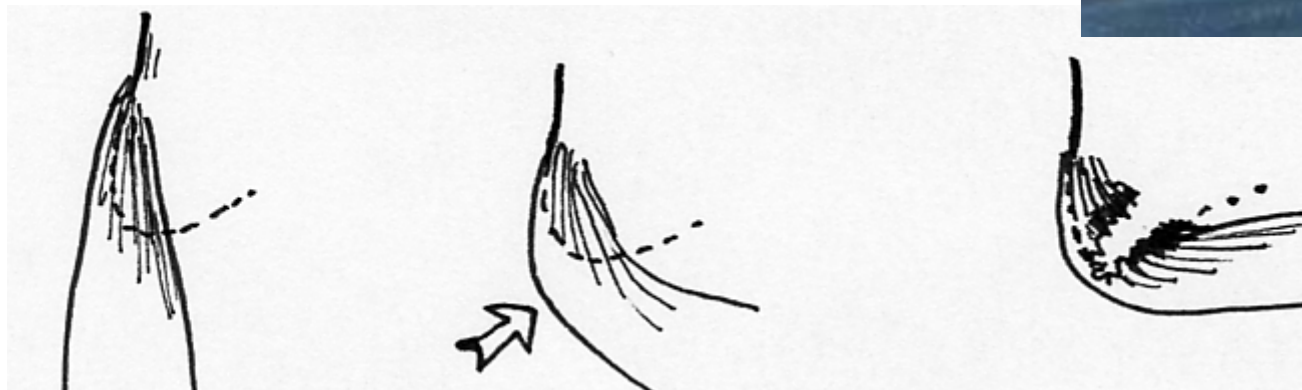


Surgery for apophysitis of ischium

- Holmstrom et al , Amer J Sports Med 2003
- "Transapophyseal drilling to effect "apophysiodesis" — 16 year old female gymnast suffered from chronic apophysitis and was treated surgically 9 months after the onset of the symptoms with good result
- we have done drilling procedures and screw fixations

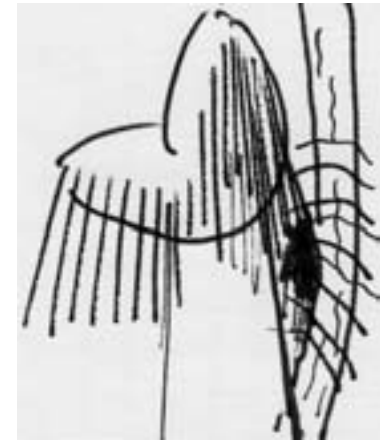
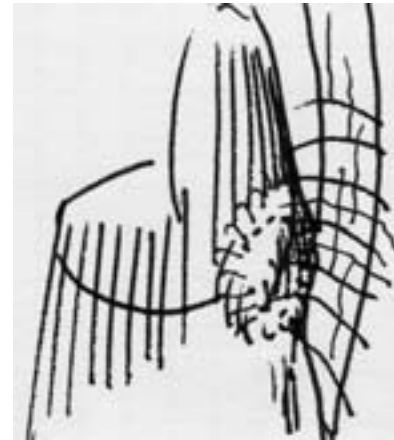
Hamstring muscle and tendon tears – Mechanism of hamstring tears

- forceful flexion of hip joint with knee extended – hamstrings contracted
- recurrent injuries often
- partial of total tear



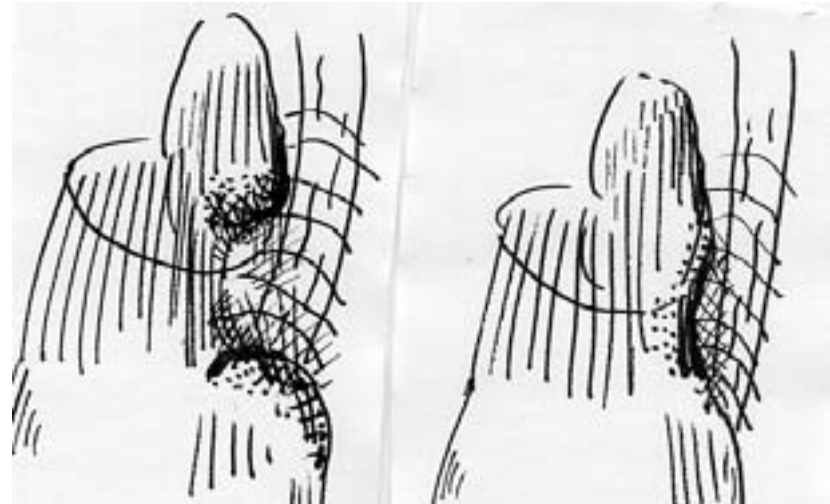
Partial hamstring tendon tears

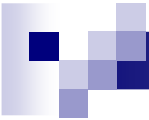
- partial tear
- recurrent tears
- scar
- tendinosis
- adhesions
- nerve irritation
- --- *"postraumatic hamstring syndrome"*



Partial insertional hamstring tears

- painful scar
- muscle atrophy
- poor healing in active athletes
- different types
- myotendinous tears



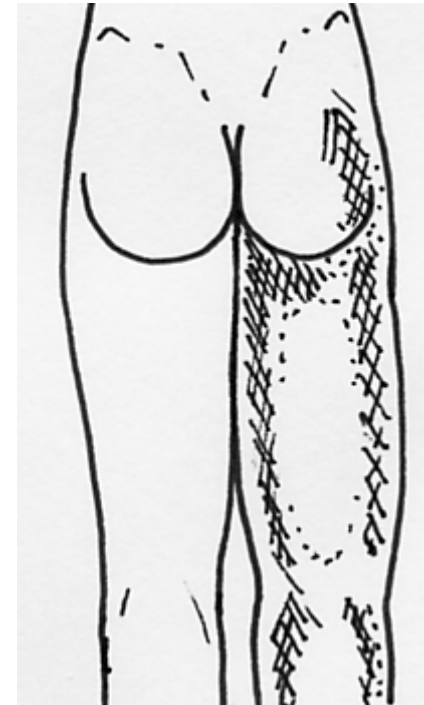


Treatment of partial proximal hamstring tears

- rest, rehabilitation, physiotherapy
- if posttraumatic hamstring syndrome occurs, corticosteroid injections
- if recurrent injuries, long rest periods, inability to train, MRI +, hamstring syndrome symptoms --- surgical treatment
- **surgery:** liberation, fasciotomy, division of tight scar bands, refixation to other insertions or to bone with suture anchors

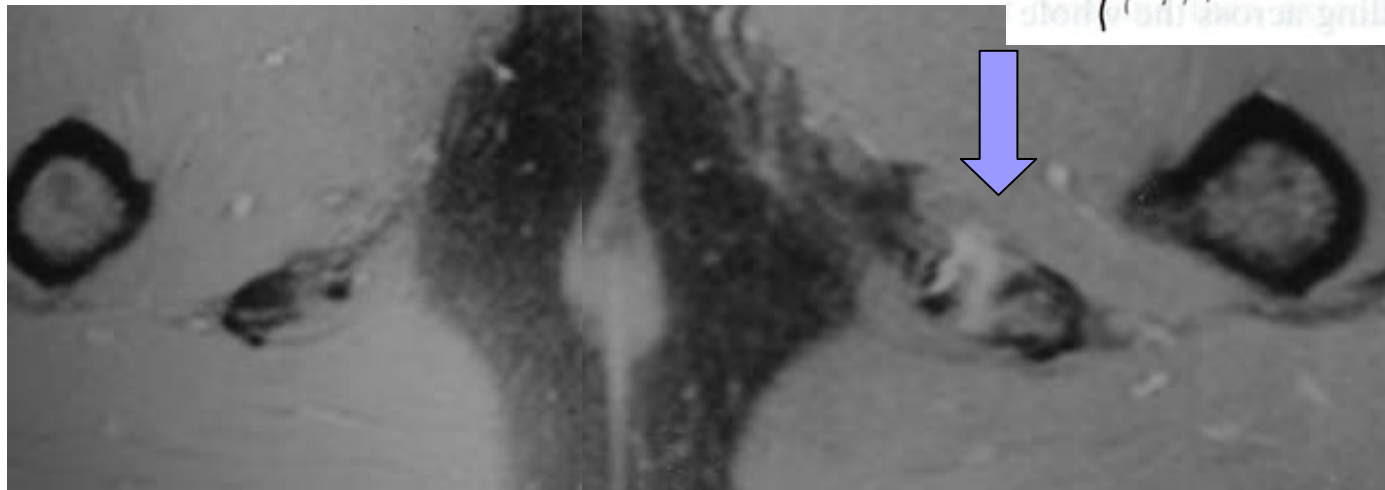
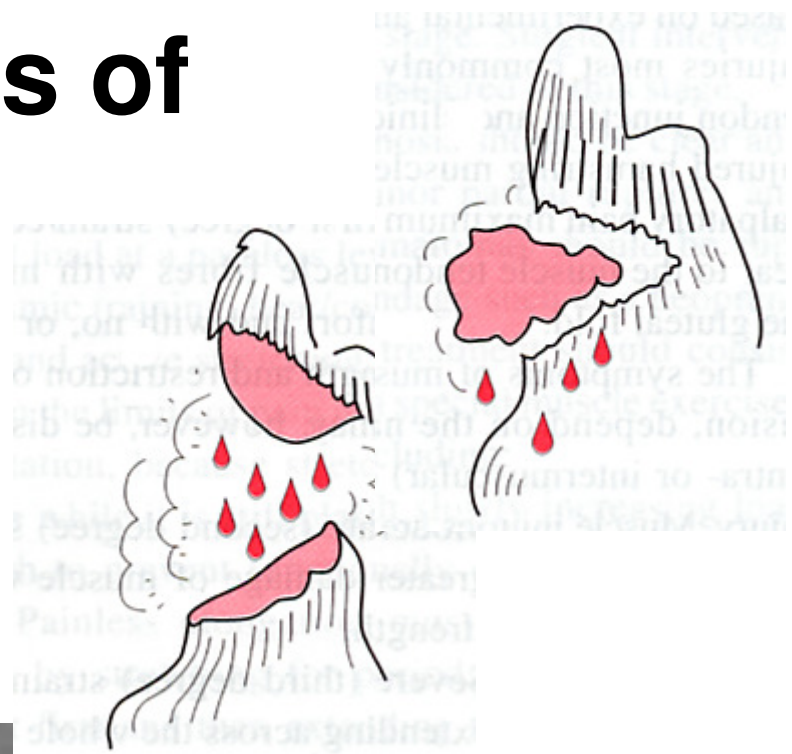
Total hamstring muscle tears

- massive hematoma
- relaxed muscle mass
- weakness
- invalidity

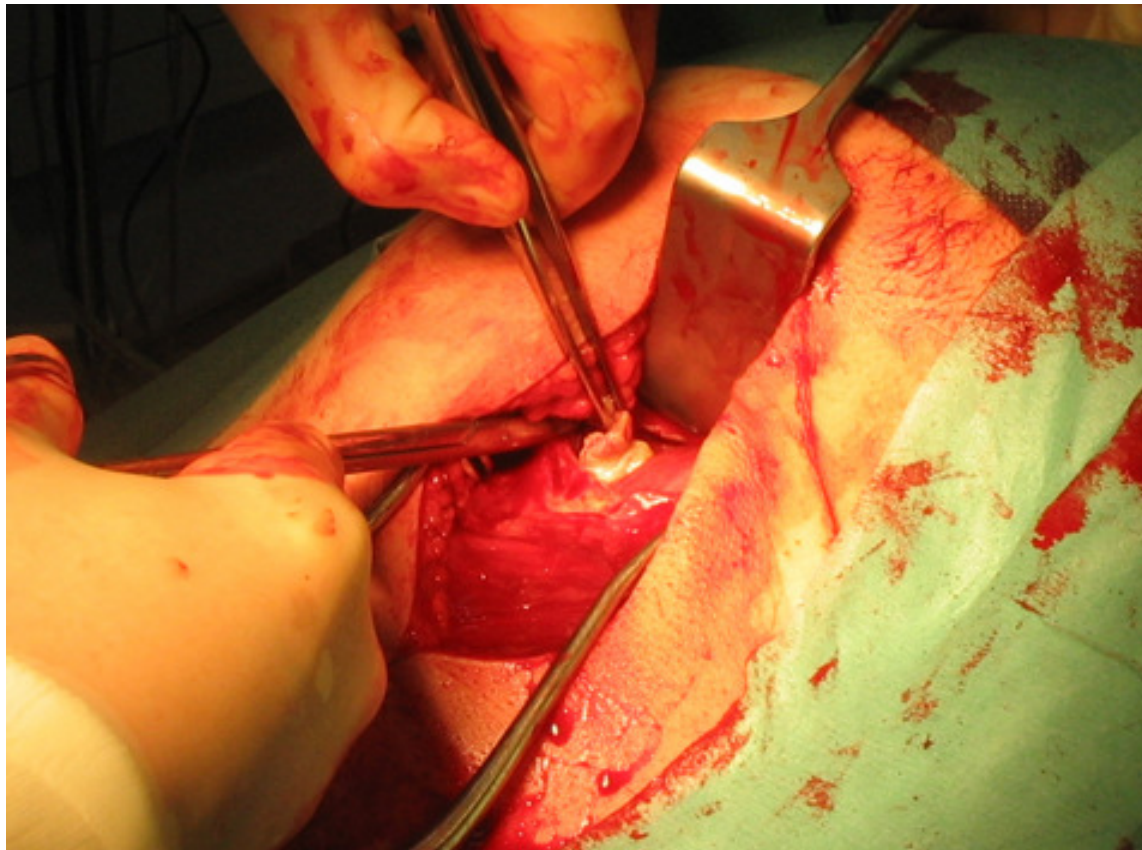


Total / subtotal tears of hamstring muscles

- avulsed tendons inside hematoma /seroma cavity
- massive hematoma



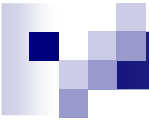
Surgery for total proximal hamstring origin tear



Hamstring tears

- rupture / lesion of sciatic nerve branches to hamstrings leads to: denervated proximal muscle, neuromas, elongation of repaired muscle...
- 1-,2-,3- tendon tears proximally



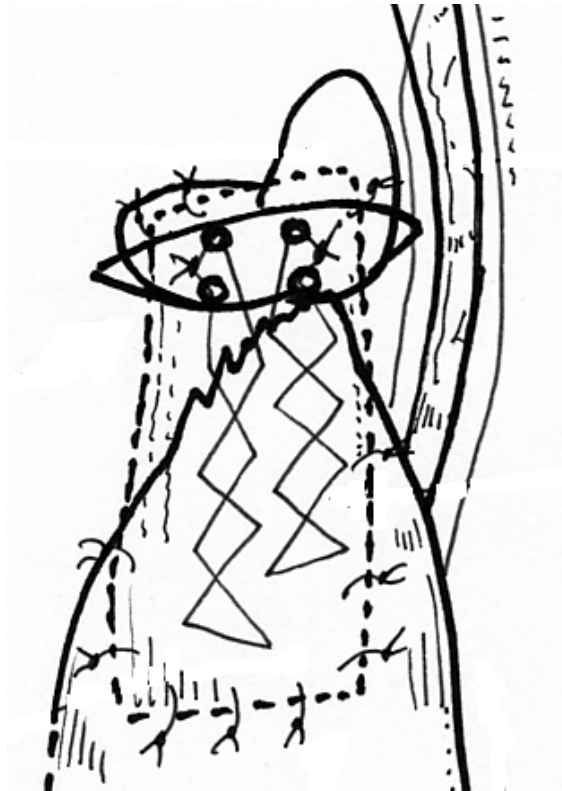


Total hamstring avulsions / tears

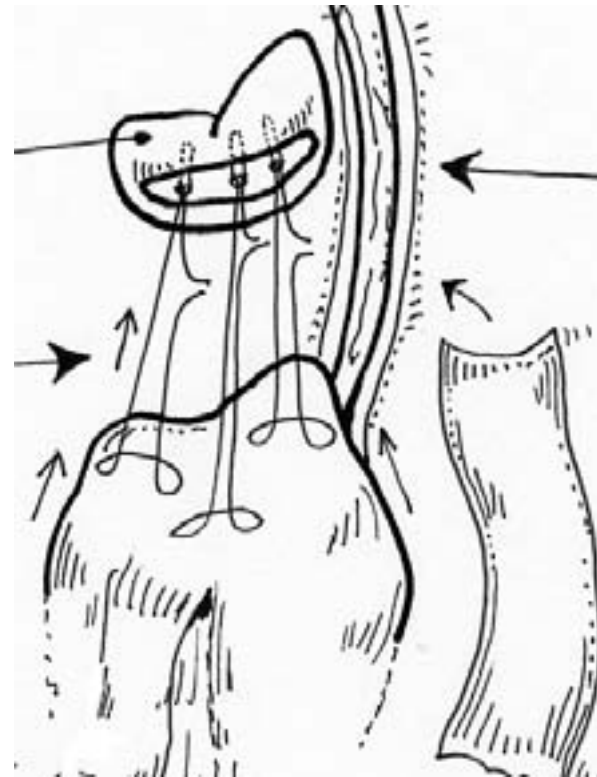
- surgical treatment at early phase best treatment
- fixation of avulsed tendons to ischial bone with suture anchors
- in old / neglected cases: anchor fixation and augmentation, "bridge" with fascia lata or semitendinosus tendon
- results usually good, if no denervation or neuromas

Total ruptures of hamstrings late repair with augmentation

■ suture anchors



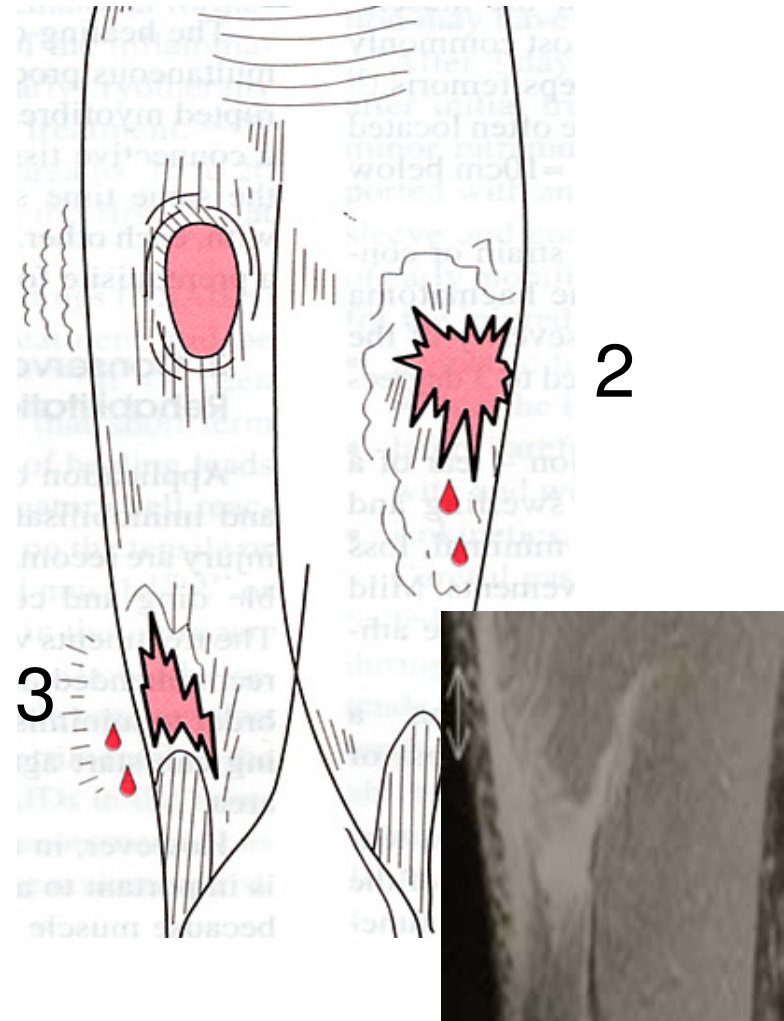
fascial augmentation

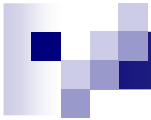


Mid- and distal hamstring tears

1. seroma cavity from intramuscular tear
2. superficial mid-muscle tear
3. distal myotendinous tear of biceps femoris
4. Distal avulsion of biceps tendon

SURGERY SOMETIMES





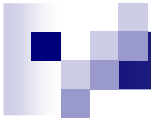
Posterior femoral compartment syndrome

- one of endurance athletes' pain syndromes
- may occur after hamstring muscle tears and recurrent injuries
- is treated with fasciotomy



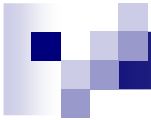
Hamstring injuries – pain syndromes

- our experiences are based on
 - 250 hamstring syndrome operation
 - 200 total and partial hamstring tear operations
 - 100 other operations at gluteal – hamstring area



Primary / posttraumatic complications of gluteal / hamstring operations

- lesion of sciatic nerve from direct trauma
- lesion(s) of sciatic nerve branches to hamstring muscles
- neuromas of healing nerves
- elongation of denervated proximal hamstrings
- contractures, recurrent spasms
- muscle atrophy, weakness
- adhesions



Secondary / postoperative complications of gluteal / hamstring operations

- postoperative bleeding / hematoma
- lesions to posterior cutaneous femoral nerve
- lesions to muscular branches of sciatic nerve
- lesions to perineal nerve branches
- postoperative neuromas
- postoperative infection, fistulae
- scar problem (keloid, transversal fissurae)
- rerupture

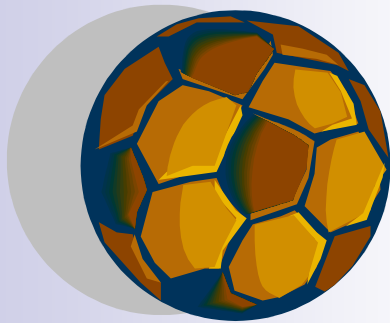


Hamstring injury in athletes

- hamstring injuries common in athletes
- usually healing well
- delayed healing may occur
- uncommon pain syndromes develop
- difficult to make right diagnosis
- difficult to make decision for surgical treatment
- usually possible to treat surgically with good result

Many thanks

**Lempainen Lasse:
PhD Thesis on "hamstring
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2010**



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