Surgical vs Nonsurgical Approaches for Proximal Hamstring Injuries

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The Problem
- 12-15% of total injuries
- Re-injury rate is 12-41%
- Secondary injury more severe than index
  - time away from sport twice as long
- Professional athlete cannot perform for 14-27 days

1992 Barcelona

Hamstring Anatomy

Biarticular – Sciatic Nerve
- Biceps femoris
  - Long head
- Semitendinosus
- Semimembranosus

Monoarticular – Common PN
- Biceps femoris
  - Short head

Function
- Absorb kinetic energy
- Protect the hip and knee joint
  - Limit knee extension just before and during heel strike
  - Provide dynamic stability to A/P tibial translation
- The controlled extension produces an eccentric contraction – lengthening of the muscle while it fires

Hamstring Injury
- Predisposing sports
  - Sprinters - 1/3 of all injuries
  - Football, soccer, rugby - 1 in 5 injuries
  - Dancing, water skier
- Predisposing factors
  - Previous injury
  - Age
  - Weak hamstrings
  - Leg length discrepancy, cross pelvic posture
  - Flexibility, race, sex, warm up, fatigue, position?

Mechanism of Injury
- Well trained athletes and middle aged
  - Sprinting in full stride
  - Attempting to overstride
- Sudden hip flexion/knee extension causing hamstring contraction
  - “The splits” on a slippery floor
- Presentation
  - Stiff-legged gait pattern
- Posterior thigh pain
- Ecchymosis
- Difficulty sitting

**Classification**
- Type 1 - osseous avulsion fracture
- Type 2 - musculotendinous junction
- Type 3 - incomplete tendon avulsion
- Type 4 - complete avulsion, no retraction
- Type 5 - with retraction
  - a - no nerve involvement
  - b - nerve tethering

**Physical Exam**
- Ecchymosis posterior and middle thigh
  - Most common site is proximal muscle tendon junction of long head of biceps femoris
- Sciatic nerve injury
  - Neuropraxia of peroneal nerve
- Take off the Shoe Test
  - Take off shoe of the injured leg with healthy leg
- Radiographs
  - Bony avulsion
  - MRI
    - Complete versus partial tear
    - Retraction

**Take off the Shoes**

**Physical Exam**

**Radiographs**

**MRI**

**Literature Summary**

**Literature Review**
- Few patients
- Klingele and Sallay
  - Primary repair in 11 patients
  - Surgery recommended in active patients and with chronic pain caused by sciatic nerve compression
- Chakravarthty et al
  - 4 patients
  - 2 of 3 treated nonsurgically had sciatic neuralgia
  - All 4 with significant knee flexion weakness and pain

**Literature Review**
- Cross et al
  - Chronic complete in 9 patients
  - 48 months postoperative testing
- Hamstring strength – 60%
- Endurance – 57%
- Brucker and Imhoff
  - Functional assessment in 8 patients
  - Cybex dynamometer isokinetic testing of maximum hamstring torques and H-Q
peak torque at 60 degrees/s
  - F/u 20 months average
  - 4 patients (50%) reported incisional pain

**Literature Review**
- **Sallay et al**
  - 12 patients, chronic injuries, waterskiiers
  - Time to evaluation – 5.6 months
  - 5 repaired because of **persistent limitations**
- **Orava and Kujala**
  - 8 patients, 40 years of age
  - Sudden forceful hip flexion with knee extended
  - Function and strength improved in the five patients who underwent repair <2 months
  - Loss of function and strength in 3 patients with delayed repair
  - Recommended prompt repair of combined hamstring tendon to its origin

**Literature Review**
- **Cohen and Bradley**
  - Seven patients, 8 hamstring repairs
  - 5.7 days after injury
  - Return to athletics – 8.5 months average
  - All patients satisfied
  - 6/7 returned to preoperative levels

**Management**
- JAAOS- Cohen and Bradley
  - June 2007
  - Single tendon avulsion + retraction < 2 cm
- Athletes may return to high level performance
- 6 weeks after
  - Three tendon tear
- Significant retraction of 5cm
- Surgical repair
  - Two tendon - ?
- Younger, active
- Retraction > 2 cm

**Nonsurgical Management**
- Single tendon rupture
- Multiple tendon with minimal retraction
- Rest, ice, modalities
- NSAID, gentle stretching
- Therapeutic exercise and gradual return over 4-6 weeks

**Nonsurgical Management**
- Hamstring Syndrome
  - Knee flexion weakness
  - Difficulty sitting
  - Deformity
  - Pain worsens with stretching and exercise
  - If persistent
- Surgical release and sciatic nerve decompression
• 88% success rate (52 of 59 patients)

**Scarring Sciatic Nerve**

**MRI - Prognosis**

**Surgical Management**

- Bony Avulsions versus Tendinous Origin
- Prone, transverse incision at gluteal crease
  - To fascia, transverse incision
  - Posterior femoral cutaneous nerve
  - Elevate gluteus maximus superiorly
- Hamstring fascia visualized
- Longitudinal incision
- Large hematoma after loose fibrous tissue
  - Sciatic Nerve can be palpated

**Open Treatment**

**Surgical Management**

- Tendons or bony avulsion mobilized
- Ischial tuberosity identified
  - Lateral aspect cleared of soft tissue
  - Semimembranosus is most lateral
  - Semitendinosus and long head biceps medial
  - Suture anchor repair with knee flexed
- Wound closure
- Custom hip orthosis that restricts hip flexion of 15-30
- Toe touch with crutches, may consider scooter

**Operative Treatment**

**Endoscopic Hamstring Repair**

**Rehabilitation**

- Phase I
  - 10-14 days - Toe Touch WB
  - Next 3 weeks - Advancement to 25% WB
  - Week 2 - Passive ROM of knee and hip
  - Week 4 - Active ROM
  - Week 6 - Brace discontinued

**Rehabilitation**

- Phase 2
  - Week 6
- Full WB
- Progressive active and passive ROM
- Isotonic exercises with limited ROM, avoiding terminus
- Core pelvic strength training
- Closed chain exercises
  - Week 8
- Isotonic exercises progressed
  - Week 10
- Isometric strength evaluation at 60 deg flexion

**Rehabilitation**

- 10 weeks
- Dry land jogging
  - Full isokinetic evaluation at 60, 120, 180 deg/s and compared with nonsurgical side
- Allows for milestone and therapy specific planning
  - Return to sport
- When isokinetic testing 80% of unaffected side
- Typically between 6-9 months

**Bibliography**
- Delee & Dreez, Orthopedic Sports Medicine, 3rd edition, 2010