Hip Muscle Power Deficits

ICD-9-CM codes: 843.8 Specified sites of hip and thigh strains

ICF codes: Activities and Participation Domain codes:
- **d4105** Bending (Tilting the back downward or to the side, at the torso, such as in bowling or reaching down for an object)
- **d4350** Pushing with lower extremities (Using the legs and feet to exert a force on an object to move it away, such as pushing a chair away with a foot)
- **d4351** Kicking (Using the legs and feet to propel something away, such as kicking a ball)
- **d4552** Running (Moving with quick steps to that both feet may be simultaneously off the ground)

Body Structure code: **s75002** Muscles of thigh
Body Functions code: **b7300** Power of isolated muscles and muscle groups

Common Historical Findings

- "Pulled" muscle during a quick, eccentric demand of muscle - or - blunt trauma to hip myofascia
- Daily activities which stretch or contract the involved muscle are painful

Common Impairment Findings - Related to the Reported Activity Limitation or Participation Restrictions:

- Pain with stretch to the involved muscle
- Pain with contraction of the involved muscle
- Pain with palpation of the injury site

Physical Examination Procedures:

Lateral Hamstring Stretch

Medial Hamstring Stretch
Performance Cues:
Flexion/adduction movement stretches the posterior lateral part of thigh
Flexion/adduction movement stretches the posterior medial part of thigh

Rectus Femoris Stretch and Resistive Test

Performance Cues:
The amount of contralateral hip flexion/posterior pelvic rotation determines the intensity of the stretch
Flex the knee (slowly) to stretch rectus femoris and vasti muscles
Monitor symptom response and strength of contraction during the resistive test
Prone knee bending also provokes symptoms in the presence of femoral nerve or anterior innominate abnormalities - muscle palpation provocation provides the differential diagnosis

Lateral Hamstring Resistive Test
Medial Hamstring Resistive Test

Performance Cues:
For lateral hamstring (biceps femoris) - externally rotate tibia, contact lateral heel, and apply force in a medial direction
For medial hamstrings (semimembranosus and semitendinosus) - internally rotate tibia, contact medial heel, and apply force in a lateral direction
A gentle force will elicit symptoms with moderate tears
Stronger force will be required to elicit symptoms in mild tears and in subacute conditions
Do not expect to be able to totally isolate the medial vs. lateral hamstring contraction – however, symptom responses vary - thus, focusing the palpation examination
Hip Adductor Stretch and Resistive Test

Performance Cues:
Stabilize opposite thigh during application of stretch and resistance
Monitor symptom response and strength during muscle contraction
Adductor tests also provokes symptoms in the presence of pubic symphysis abnormalities - muscle palpation provocation provides the differential diagnosis

Hip Muscle Power Deficits: Description, Etiology, Stages, and Intervention Strategies

The below description is consistent with descriptions of clinical patterns associated with the vernacular terms "Hamstring, Hip Adductor, or Hip Flexor Muscle Strain"

Description: Generalized weakness secondary to the damaged muscle's inability to develop tension. Damage presents itself as tears that can occur at any point along the muscle. There are three grades of muscle; Grade 1 - microtearing of the muscle fibers due to excessive tearing, Grade 2 - incomplete tear of the muscle fibers, Grade 3 - complete tear of muscle

Etiology: Sudden passive stretch or an activation of the muscle during a stretch (i.e., a forced eccentric contraction) persistent repetitive stress, improper warm-up, fatigue, previous injury and lack of flexibility have been factors correlated with hamstring injury. A slow controlled stretch that continues to an abnormally extreme position can also strain the muscle. Hamstring strains are the most common strain injury in athletes.

Differential Diagnosis for Hamstring Strains: Other conditions with similar presentations as hamstring strains are sciatic nerve mobility limitations, lumbar spine disorders (L4-S1), strained popliteus muscle, osteochondroma with bursa formation (one case reported), tendonitis at either origin of the gastocnemius, apophysitis-pain in ischial tuberosity, sprained posterior cruciate ligament, and lesions of the upper tibio-fibular joint. Resisted external or internal rotation can distinguish between a distal biceps lesion or a lesion in the medial hamstrings.
Differential Diagnosis for **Rectus Femoris Strains**: Other conditions with similar presentations as rectus femoris strains are femoral nerve or lateral femoral cutaneous nerve mobility limitations, lumbar spine disorders (L1-L4), sacroiliac joint disorders, hip disorders, and psoas trigger points.

Differential Diagnosis for **Adductor Strains**: Other conditions with similar presentations as adductor strains are pubic symphysis disorders, sacroiliac joint disorders, obturator nerve mobility limitations, lumbar spine disorders (L1-L4), hip disorders, and psoas trigger points.

**Prognosis**: Complete recover from pain is sometimes difficult. Untreated condition may lead to scaring, fibrosis and shortening of the related myofascia. If effusion occurs close to the adjacent nerve, residual symptoms of nerve tension may be present. A hematoma that is contained within a thigh compartment may lead to a compartment syndrome. The sites affected, in order of incidence, are: injuries muscle belly (most on the musculotendinous junction MTJ), proximal tendon-bone injuries (avulsions) and distal tendon injuries. Ultrasongraphy may be able to detect only half of injuries compared to MRI.

**Risk/Predisposing factors**: Persistent repetitive stress, improper warm-up, fatigue, lack of muscle strength, previous injury, lack of flexibility, enthesopathy, involvement in high acceleration/deceleration sport activities such as water skating, soccer, rugby or dance.

**Prevention**: Warm up stretching exercises are frequently recommended. Strengthening exercises tends to alter viscoelasticity and gains in muscle strength may mean losses in flexibility. However progressive eccentric loading exercises are preventive (Askling).

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**Acute Stage / Severe Condition**: Physical Examinations Findings (Key Impairments)

*ICF Body Functions codes:* **b7300.3** SEVERE impairments of muscle power

- Pain with weight bearing on the involved limb
- Bleeding/ecchymosis (i.e., black and blue appearance) if grade 2
- Balled up muscle if grade 3 (which is rare)
- Pain with stretch of the involved muscle (i.e., during a SLR or prone knee bend)
- Pain and weakness with active contraction of the involved hamstring(s)
- Palpable tenderness (i.e., hematoma) at the injury site

**Sub Acute / Moderate Condition**: Physical Examinations Findings (Key Impairments)

*ICF Body Functions codes:* **b7300.2** MODERATE impairments of muscle power

- Painful, but strong contraction of the involved muscle(s)
- Palpable soft tissue restrictions at the injury site
Settled Stage / Mild Condition: Physical Examinations Findings (Key Impairments)

*ICF Body Functions codes: b7300.1 MILD impairments of muscle power*

- Strong and painfree contraction of the involved muscle(s)
- Potential muscle flexibility deficits of the involved muscle(s)
- Less palpable soft tissue restrictions at the injury site

Intervention Approaches / Strategies

Acute Stage / Severe Condition

Goals: Prevent further injury - protect muscle integrity
Reduce pain

- Immediate Measures: First 24 hours
  Compression taping used with an elastic bandage for 10 minutes followed by mild
  compression to reduce blood flow
  Ice bandage
  Immobilization
  Crutch use

After the first 24 hours

- Physical Agents
  Non-thermal ultrasound

- Therapeutic Exercises
  Painfree active mobility exercises of the affected muscle (and hip and knee) – consider the use of aqua therapy (i.e., pain free mobility exercises and walking in a pool)

- Re-injury Prevention Instruction
  Perform no movements that cause pain (e.g., stretching producing pain should be avoided)
  Crutch training if walking is painful.
  Paresthesias and numbness while exercising should be avoided as well as any numbness produced by the compressive taping or shorts

- External Devices (Taping/Splinting/Orthotics)
  Compression taping using with an elastic bandage – or – wearing compressor shorts
Sub Acute Stage / Moderate Condition

Goals: As above
Optimize tissue regeneration
Restore flexibility, strength, and endurance the involved hamstring

- Manual Therapy
  Soft tissue mobilization to area of soft tissue restrictions (that may have resulted from excessive scar formation during the fibroplasia phase of tissue healing)
  Very early intense massage in completely diagnosed cases may contribute to problems such as heterotropic bone formation

- Therapeutic Exercises
  Utilize stationary bike, walking on treadmill, and active knee flexion in standing for mobility exercises
  Gentle passive stretching if tolerated without pain and does not worsen the symptoms
  Painfree submaximal isometric contractions
  Painfree strengthening exercises, such as low resistance, low load against gravity, prone hip extension, heel slides, scooting with rolling chair

- Re-injury Prevention Instruction
  Be extremely cautious to proceed exercises and stretching slowly and without pain

Settled Stage / Mild Condition

Goals: Painfree, unlimited walking or long distance running

- Physical Agents
  Consider applying heat before exercise, and cold after exercise

- Therapeutic Exercises
  End-range passive stretching if tolerated without pain and does not worsen the symptoms
  Sciatic or femoral nerve mobility exercises
  Dural (i.e., slump) mobility exercises
  Progress strengthening exercises, such as partial curl ups, dead bug progression, wall slides, single knee to chest, double knee to chest, increase resistance, increase speed as able, eccentric exercises, seated theraband, modified standing theraband knee extensions

- Re-injury Prevention Instruction
  Muscles need to be stretched before and after exercise.
Intervention for High Performance / High Demand Functioning in Workers or Athletes

Goal: Return to desired sport or occupation demands

- Approaches / Strategies listed above
- Re-injury Prevention Instruction
  Before returning to sports the patient should be entirely painfree and all additional contributory factors eliminated.
  Grade 2 strains take longer recovery time – 3-4 weeks
  Grade 3 strains may require surgical intervention

Selected References


