Hamstring Tears

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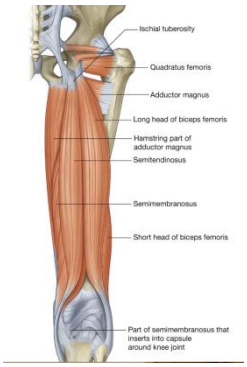
Concord Sport & Spine Physiotherapy

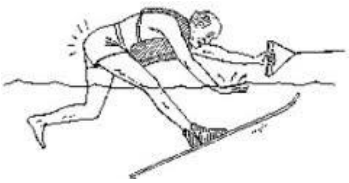
Avulsion of the Hamstring Origin

An injury that I see with surprising frequency, is a complete rupture of the hamstring origin at the ischial tuberosity. While said to be common in certain sports, particularly waterskiing, the injury often occurs in middle-aged recreational individuals who experience a slip or fall. Rupture of the hamstring origin is said to account for up to 9% of all hamstring injuries (Koulouris & Connell 2003, cited in Wood et al 2008).



Injury mechanism:
The most common mechanism of injury is a sudden fall forward over a flexed hip, with the knee extended [1,2,6]. This leads to rapid over-stretching, often with an eccentric muscle contraction, and concentration of force at the posterior hip. The injury usually involves all 3 hamstring tendons. In contrast, the common hamstring muscle strain involves 1 of the 3 muscle groups and typically occurs during sprinting.

Sports related injuries:
Apart from waterskiing, other sports associated with this injury include football, rugby, tennis, basketball, horse riding, sprinting, volleyball, martial arts, jet-skiing and snow skiing. In waterskiing, the injury typically occurs as the skier falls forward, attempts a jump, or is pulled forcefully out of the water at take-off



However in up to 50% of cases reported in the literature, the injury occurred during a recreational activity [7]. In the reviewed studies, the average age of subjects was 40-46 years [2,7,8].

In adolescents, apophyseal hamstring avulsions are occasionally seen, and can be treated non-operatively unless the avulsed fragment is displaced 1-2cm or more.[8] Avulsions of the tendon from the bone are more likely in older teenagers & adults, with physeal plate closure occurring between 16-25 years[1]. While considered rare, this injury is often missed on initial presentation, so cases are probably under-reported. In approximately 120 cases reported across two studies, the injury was missed by the primary physician, or the severity of the injury was not recognized [7,8].

Signs & Symptoms:
The mechanism & description of injury give important clues, as examination findings can be unreliable. On initial presentation the patient walks with a stiff-legged gait, minimizing hip extension combined with knee flexion [1]. There may be gross swelling and ecchymosis, however this can be delayed for several days. The patient will usually describe initial severe pain, often with a pop or tearing sensation, followed by difficulty walking, painful cramping, difficulty sitting and weakness ascending stairs [2,6,7,8]. However I have seen cases where there has been minimal pain and dysfunction, and no obvious bruising. There may be a palpable defect but swelling can mask this. There will often be tenderness over the ischial tuberosity [1]. There is usually a marked decrease in strength on resisted hip extension and knee flexion. Hip extension strength should be tested in prone. Knee flexion strength is tested supine with the hip and knee at 90°. As the patient contracts (knee flexion against resistance) palpate relative tension in semitendinosus and/or biceps femoris. This

tension can also be tested on passive stretch. Certain authors have described the 'bowstring sign', where there is a loss of tension in the distal hamstring tendons, either in prone with the knee 90°, or in supine with the hip & knee at 90° [2,6]. However this test has not been validated by research [1]. In chronic cases the proximal muscular defect often becomes more apparent [6]. Patients often complain of weakness and poor leg control, cramping, and difficulty running [1]. There may be sciatic-type symptoms due to adhesions around the sciatic nerve. There have also been reports of sciatic compression resulting in altered sensation and/or foot-drop[1].

Investigation:

Plain X-rays are typically negative in adults as there is no bony avulsion. In children the avulsed fragment is sometimes not visible on X-ray. Ultrasound examination has been shown to be only 58% accurate, and is very much user dependent. MRI is the investigation of choice to confirm the diagnosis, identify the muscle(s) involved, the amount of tendon retraction and the amount of distal muscle injury [6]. In the image on right, the white arrow shows swelling due to the injury compared to the normal side (black arrow). Bilateral coronal MRI from pelvis to knee is recommended [6].

Classification of injuries:

Wood et al (2008) described a classification system of hamstring avulsion injuries, based on site and type of injury, the degree of tendon retraction, and whether there is any sciatic nerve involvement [8]. The classifications are:

Type 1 – osseous avulsion - apophyseal injuries in skeletally immature patients.

Type 2 – Avulsions at the musculotendinous junction rather than at the muscle origin.

Type 3 – Partial tears at the origin

Type 4 – Complete avulsion with minimal / no tendon retraction. Typically seen in acute cases.

Type 5a – Complete avulsion, also with tendon retraction.

Type 5b – Complete avulsion, with tendon retraction and sciatic nerve tethering.

Type 5a & 5b injuries tend to be seen in subacute (beyond 4 weeks) & chronic cases.

Management:

In the past, these injuries were often treated conservatively, unless there was significant tendon retraction or complete rupture of all three tendons. While two-joint quadriceps (rectus femoris) ruptures were found to do well conservatively[5], recent evidence suggests the same is not the case for the hamstrings. Conservative management has been consistently associated with poor results [6,8]. Even partial hamstring origin tears will sometimes lead to long-term weakness and loss of function. Complications such as chronic sciatica, appreciable weakness, inability to return to sport, & ischiofemoral impingement are more likely with conservative management [1,2,6,8].

Surgical Management:

Indications for surgery include complete rupture (all 3 components of the hamstrings), tear with retraction greater than 2 cm, biceps femoris rupture (as it has no agonist in the lateral thigh) [1], persistent weakness or loss of function, sciatic nerve symptoms, or any rupture in a professional or high demand athlete, Where possible, early surgery is preferable (within the first 2-4 weeks) as restoration of the anatomy is considerably easier. In as little as 4 weeks, scar tissue can develop around the closely associated sciatic nerve, and the free ends of the tendon can become tethered to surrounding tissues [1,6]. Evidence suggests that tendon retraction is likely to increase with longer-term delay in surgery [6]. The sciatic nerve often needs to be relieved from surrounding scar tissue (neurolysis) in chronic cases.

While chronic pain and loss of function were said to be common, even after surgical repair [1], several authors have reported excellent post-operative results [2,3,6,7,8] . Most patients (around 80-90%) are able to return to their pre-injury activity levels post-operatively [1,6,8], with return to sport at approximately 6-9 months [2,8] . Even chronic cases have a good prognosis for return to pre-operative function. In the reviewed studies, the average time between injury and surgery was from 4 months[2] to over 18 months [2,7,8]. Good to excellent results are possible even years after the injury.[2,3,8], however all the authors agree that early repair yields superior results. Hamstring strength & endurance will return to between 80% & 90% of normal [2,8], and patient age did not appear to affect outcome [2].

Rehabilitation:

In some cases after hamstring origin repair, a brace will be worn to protect the healing tissues. This will often be necessary when delayed repair has resulted in increased tendon retraction. The timing of when post-operative exercises begin will be influenced by the degree & chronicity of injury, brace use, and surgeon preference. This may be as little as a few weeks [2] or up to 3 months post-operatively [8]. Generally the patient will partially-weight-bear on crutches for 6 weeks, and be allowed full-weight-bearing after 6 weeks. When physiotherapy commences there is initially no hamstring stretching or direct muscle resistance loading. Maintenance of core and general leg strength (particularly quadriceps and calf) is encouraged. Short range neural slider stretches are allowed. Gluteal & general hip strengthening is introduced cautiously soon after. Hamstring strengthening & stretching commences at around 12 weeks but is initially gentle, and gradually progressed. Exercises are then advanced over the following 3 months, with gradual

introduction of sport specific training, and possible return to sport at 6 months post-operatively.

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