Gluteus medius tears: an under-diagnosed pathology

Tears of the gluteus medius tendon contribute to greater trochanteric pain syndrome, but they are often overlooked as a cause of lateral hip pain and tenderness. This review presents the relevant anatomy, pathophysiology, diagnostic workup, differential diagnosis and management of these tears.

The gluteus medius is the main abductor of the hip and is an essential stabilizer of the hip during the stance phase of gait. Discontinuity of the hip abductor mechanism can lead to an antalgic gait, inability to maintain pelvic neutrality and increased energy cost of ambulation (Bunker et al, 1997; Bewyer and Chen, 2005). Tears within the gluteus medius tendon were first described by Bunker et al in 1997. They called them 'rotator cuff tears of the hip' after noting them intraoperatively. This injury poses a difficult diagnostic problem for clinicians since they may be associated with other pathologies. Furthermore physical examination is not conclusive, meaning that they are under-diagnosed (Howell et al, 2001; Ozçakar et al, 2004). This article presents the anatomy and pathophysiology of this condition, then an evidence-based approach to the diagnostic workup, differential diagnosis and management needed.

Anatomy

The gluteus medius originates from the external surface of the iliac bone between the anterior and posterior gluteal lines. It inserts into the supero-posterior and the lateral facets of the greater trochanter; the former being circular in shape while the latter is rectangular (Robertson et al, 2008). The trochanteric bald spot is found anterior to the lateral facet and separates the gluteus medius from the capsular insertion of the gluteus minimus. The long head of gluteus minimus meanwhile lies inferior to this area (*Figure 1*).

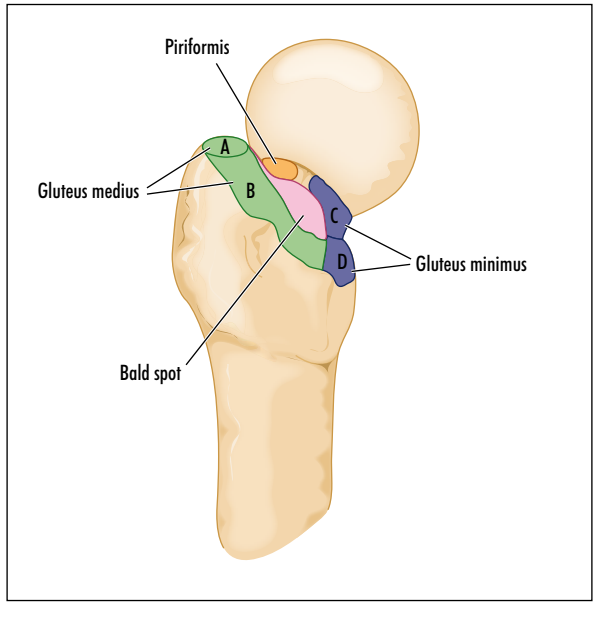
The greater trochanter is surrounded by three bursae: the subgluteus maximus bursa, subgluteus medius bursa and gluteus minimus bursa. The subgluteus maximus bursa lies lateral to the greater trochanter between the gluteus maximus and medius tendons. It is this bursa that gives rise to the clinical entity of trochanteric bursitis when it is inflamed. The other two bursae are found on the anterior surface of the greater trochanter; the subgluteus medius bursa lying deep to the minor medius tendon and the gluteus minimus bursa lying deep to the minimus tendon.

Aetiology and classification

Tears may be spontaneous or traumatic. The exact cause of spontaneous tears is unknown although they are closely linked with calcific tendonitis (Gordon, 1961). The incidence peaks between the fourth and sixth decades, with a female:male ratio of 4:1 (Bird et al, 2003). Furthermore, tears have been noted in severe osteoarthritis, occurring in 20% of patients undergoing total hip replacements for this condition (Howell et al, 2001).

Trauma may be direct or indirect. From an orthopaedic viewpoint, direct trauma can occur during intra-medullary femoral nailing while indirect trauma has been recorded in femoral neck fracture patients. McConnell et al (2003) found that the gluteus medius tendon was disrupted in 27

Figure 1. Lateral aspect of greater trochanter. A = gluteus medius insertion into the superoposterior facet; B = gluteus medius insertion into the lateral facet; C = capsular insertion of gluteus minimus; D = long head of gluteus minimus insertion.



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out of 34 cadaveric specimens who had undergone intramedullary femoral nail insertion. They concluded that this damage was unavoidable and should be recognized as a postoperative morbidity. It is likely that the quality of soft tissues in patients who sustain a femoral neck fracture is poor. This, as well as haematoma formation that occurs with the fracture, may allow stretching and subsequent disruption of the gluteus medius tendon. Gluteus medius tendon disruptions have been reported in 22% of patients sustaining this fracture (Bunker et al, 1997).

Tears involving the gluteus medius tendon may occur within the main body of the tendon and also at its insertion whereby an avulsion fracture occurs. Although not strictly a tendon injury, the overlap of features and similar treatment means that this condition should be included under the banner of gluteus medius tendon tears.

Intrasubstance tendinous tears are classified as interstitial, partial or full thickness tears (Kagan, 1999) with partial thickness tears being the most common (Connell et al, 2003). An avulsion injury or a tear of the component that inserts into the lateral facet is more common than at the postero-superior facet.

Gluteus medius tears may be precipitated by tendinitis within the tendon. This usually occurs from repetitive micro-trauma, genetic or local hypoxia within the tendon. This leads to degeneration within the collagen fibres and ultimately partial or complete tears. Macrotrauma in the form of direct blows to the hip has also been reported as a cause of gluteal tendinopathy (Connell et al, 2003). These histopathological changes are akin to those occurring in the patella and Achilles tendons.

Clinical features

Tears of the gluteus medius are included in a group of conditions known as greater trochanteric pain syndrome that also includes trochanteric bursitis, coxa saltans and gluteus minimus tears. Of these, trochanteric bursitis is by far the most well known and this is the condition which gluteus medius tears are most commonly misdiagnosed as (Ozçakar et al, 2004; Fisher et al, 2007). A survey of French orthopaedic surgeons found that 45% of the 84 participants were unaware that gluteal tendon tears could occur, 58% admitted to missing the diagnosis in a substantial number of patients and only 13% had repaired gluteus tears diagnosed before surgery (Cormier et al, 2006). Differential diagnoses are listed in *Table 1*.

The reason for such misdiagnosis is that the history and examination findings within the conditions that make up greater trochanteric pain syndrome are similar. Typically patients present with moderate to severe disabling localized lateral hip pain that is worse with activity, sitting, climbing stairs and lying on the hip. There may be a history of repetitive physical activity of lifting although this is not always the case. Patients with gluteus medius tears are likely to have received conservative treatment in the form of painkillers, several corticosteroid injections and physiotherapy as a result of an earlier misdiagnosis.

Table 1. Differential diagnosis of lateral hip pain

Avascular necrosis
Femoral nerve irritation
Fibromyalgia
Gluteal tears
Heterotopic calcification
Iliotibial band and abductor tendonitis
Lumbar spine disease
Metastases
Osteoarthritis
Stress fracture
Trochanteric bursitis

Examination typically reveals an antalgic gait, which in the absence of other pathology is accompanied by a normal spine, an even pelvis and no leg length discrepancy. The weakness in the abductor mechanism leads to a positive Trendelenburg's test. As with all greater trochanteric pain syndrome condition, there is marked localized tenderness over the greater trochanter. However, there is likely to also be pain on active internal rotation and weakness over resisted hip abduction and flexion. Of note, the combination of a positive Trendelenburg's sign, pain on resisted hip abduction and pain on resisted hip internal rotation raises the specificity and sensitivity for diagnosing an abductor tear to 70% (Bird et al, 2003; Fisher et al, 2007). Pain on internal rotation is a positive finding in both acetabular labral tears and hip osteoarthritis, although neither of these conditions would be expected to give lateral hip pain (Birrell et al, 2001; Suenaga et al, 2002).

Investigations

Diagnostic imaging has now become a mandatory tool in the workup of suspected gluteus tendon tears, and may often give the diagnosis when it has not been previously suspected.

While plain radiographs do not show soft tissue lesions, there may be evidence of associated pathology such as calcific deposits adjacent to the greater trochanter or osteoarthritic changes within the hip. Plain radiographs are still required as part of the primary investigation, however, since they can show an avulsion fracture.

Ultrasound is helpful in detecting gluteal injuries by identifying any thickening and fluid consistent with tendinosis or presence of partial or full thickness tears. On ultrasound imaging of 75 patients with lateral hip pain, Connell et al (2003) found that 84% had gluteal muscle tendinopathy and 33% had tears.

The availability of magnetic resonance imaging means that it is perhaps the easiest way to confirm the diagnosis. Like ultrasound, it can differentiate between partial and full thickness tears and demonstrate fatty atrophy within the muscle.

Tendinosis is included within the differential diagnosis of this condition and will appear as increased signal intensity on T2-weighted images (*Figure 2*). A partial thickness tear is diagnosed when the tendon is thickened and there is increased signal intensity on T2-weighted and short inversion time inversion recovery images (*Figure 3*). Focal discontinuity of the tendon with tendon retraction represents a complete tear (Chung et al, 1999) (*Figure 4*). Bone marrow oedema, which is commonly found in this pathology, is visualized as focal intramedullary signal abnormality in the greater trochanter consisting of decreased T1-weighted and increased T2-weighted signals. The accuracy of this imaging modality is high at 91% for this condition with a specificity of 95% (Cvitanic et al, 2004).

Management

The goals of management depend upon a patient's premorbid function and expectation levels. Treatment ranges from conservative measures to surgical repair.

Figure 2. Magnetic resonance imaging of the pelvis – coronal section. Arrow pointing to gluteus medius tendinosis.

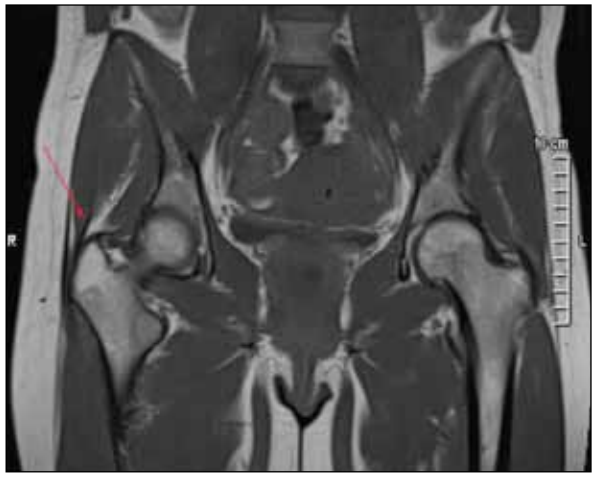


Figure 3. Magnetic resonance imaging of the pelvis – coronal section. Arrow pointing to partial tear within the gluteus medius tendon.

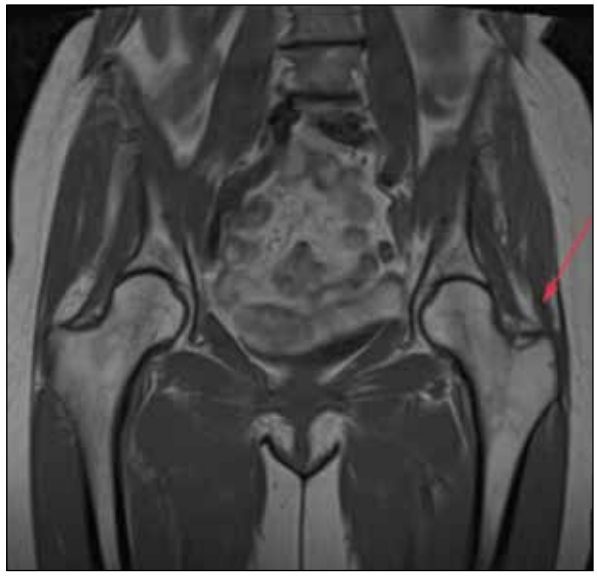


Table 2 summarizes the management and outcomes of gluteus medius tears in a collective series of studies.

Non-operative

In the first instance, a combination of physiotherapy, functional adjustment and medications is advised. Using a crutch on the unaffected side can protect the hip abductors as does keeping legs abducted with pillows and avoiding crossing legs. Physiotherapy in the form of a low-level exercise programme can strengthen the gluteus medius.

Non-steroidal anti-inflammatory medications are useful in settling pain. Steroid injections is controversial since they can lead to tendon attrition and may adversely affect the quality of an already injured tendon. However, in the presence of an associated condition such as calcific tendonitis or trochanteric bursitis, there is a role for such therapy if only to determine where symptoms are coming from. New medical therapies such as plasma rich platelets, autologous blood and high volume saline injections have been tried in and around tendons, but there is minimal evidence to support their use (Maffulli et al, 2010).

Surgery

Surgical treatment is reserved for those who have not responded to the measures outlined above. One caveat of surgery is that both gluteus medius and minimus tendons must be free of severe fatty degeneration and retraction, which can be checked using ultrasound or magnetic resonance imaging. Their presence is related to long-standing lesions and is thus associated with failure (Lequesne, 2006).

The standard surgical approach to access the gluteus medius tendon is the anterolateral approach (*Figure 5*). The greater trochanter will be seen after the iliotibial band is incised and the trochanteric bursa (which is usually inflamed) is excised. Gluteus minimus exposure is essential and should be done even with a partial tear of the medius. A partial thickness tear can be distinguished from a full thickness tear at this point.

Figure 4. Magnetic resonance imaging of the right hip – coronal section. Arrow pointing to complete tear of gluteus medius.

Table 2. Studies of management of gluteus medius tears

Reference	Study type	Radiology	Treatment	Outcome	Comments
Bunker et al (1997)	Prospective study of 50 patients with neck of femur fractures	X-rays: osteoarthritic changes on the trochanter	11 patients who had gluteus medius tear had surgical repair	Not mentioned	Functional outcome was not mentioned in the patients who had repair
Lequesne et al (2008)	Case-controlled study of eight patients	MRI: gluteus medius tear in the eight patients who underwent surgical repair	Eight patients had surgical repair	Complete remission in seven patients. One patient had a partial relapse	Non-randomized, interpretations were not made by independent readers
Chung et al (1999)	Retrospective case-controlled study of six patients	MRI: avulsion tendon in four, partial thickness tear in one, and tendon rupture in one	Three patients had intensive physiotherapy and three underwent surgery	Amelioration of symptoms of surgically treated patients. Outcome of conservatively treated patients not mentioned	No comparison between both groups were done in outcome. No scoring was done for surgically treated patients
Kandemir et al (2003)	Case report of 63-year-old female. Symptom duration 2 years	X-rays: calcification superior to greater trochanter	Debridement of tendons; removal of calcific deposits and bony overgrowth	Asymptomatic and return to normal activities at 3 months	Favourable outcome of surgical repair
Berthelot et al (2001)	Case report of 51-year-old female. Symptom duration 11 months	MRI: tendinopathy of medius and minimus	Failed conservative management and local steroid injection. Surgical repair of full thickness tear	Asymptomatic 4 months post surgery	Favourable outcome of surgical repair
LaBan et al (2004)	Case report of 66-year-old female	MRI: trochanteric bursitis, effusion of the hip and a full thickness tear of gluteus medius	Conservative treatment: rest, cane-assisted ambulation and NSAIDs	Not mentioned	Clinical outcome not recorded
Howell et al (2001)	Prospective study of 34 patients with gluteal tendon pathologies found during THRs	Not mentioned	Surgical repair of tear done at end of THR	Not mentioned	No treatment or follow-up mentioned
Fisher et al (2007)	Case report of 42-year-old female. Symptom duration 7 months of right hip pain. Five years later, presented with 4 months of atraumatic left-sided hip pain	MRI: right hip showed focal oedema at insertion of gluteus medius and partial tear of gluteus medius. MRI: Left hip (5 years later): rupture of gluteus medius and minimus	Right hip: gluteus medius and minimus repaired by interosseous sutures and augmented by an orthobiological patch. Left hip: she had same procedure	Right hip: by 4 months, she was symptom free and walking for 3 km. Left hip: was asymptomatic by 6 months	Favourable outcome with surgical treatment
Bewyer and Chen (2005)	Case report of 67-year-old female. Symptom duration 4 years	MRI: strain injury to gluteus medius muscle and large tear gluteus medius at musculoskeletal junction	Conservative treatment: using stick, cold packs and low-level exercise programme to strengthen gluteus medius	At 4 months, she was asymptomatic. Motor power was 4/5. Follow up MRI showed healed strain injury	Pain free with conservative treatment
Ozçakar et al (2004)	Case series of two patients: 50-year-old female, symptom duration 1 year. 22-year-old male atraumatic hip pain 3 weeks	MRI: Case 1: partial tear of gluteus medius, herniated nucleosus pulposus at L4–5, L5–S1. Case 2: partial tear gluteus medius	Conservative treatment: NSAIDs, cane and strengthening exercises	Pain free after 18 months follow up	Favourable outcome with conservative treatment
Chebil et al (2007)	Case report of 42-year-old female. Symptom duration 7 months	MRI showed gluteus rupture and atrophy of the muscle with no marked fat degeneration	Surgical repair	Excellent with return to previous activity in 8 months	Favourable outcome of surgical repair
Kagan (1999)	Case controlled study of seven patients. Symptom duration 1 month–10 years	MRI done in six patients showing calcific deposits, gluteus tear, abnormal thickening, fluid collection between medius and minimis	All patients had surgical repair, five had fascia lata left open after repair	All patients were pain free at mean follow-up of 45 months (range 21–60 months)	Six patients returned to full activities. One had persistent weakness of the gluteus, caused by lumbar radiculopathy
Cormier et al (2006)	Survey of French surgeons' experience, 29 patients with gluteus tear were declared and treated	Not mentioned	All patients had surgical repair	12 had excellent results, six had good and 11 had poor	Of 84 surgeons 34 had repaired gluteus tear, and 49 had no experience or were unaware of such tears

MRI = magnetic resonance imaging; NSAID = non-steroidal anti-inflammatory drug; THR = total hip replacement

The edges of a partial thickness tear can be opposed and repaired with a non-absorbable suture. A full thickness tear with no discernible cuff on which to approximate requires reattachment to the greater trochanter, either through interosseous drill holes or through re-attachment with between three and five bone anchors. An avulsion fracture involving the gluteus medius tendon can be reattached in a similar manner. However, sclerotic bone surfaces should be excised and decorticated to allow the repair to heal to a good bleeding surface (Bunker et al, 1997).

Closure of the iliotibial band is optional, with proponents arguing that leaving it relieves the friction created from gliding the iliotibial band over the greater trochanter (Kagan, 1999).

Rehabilitation after surgery involves only allowing partial weight bearing on the affected leg for 6–8 weeks to allow healing, then graduated strength exercises are started.

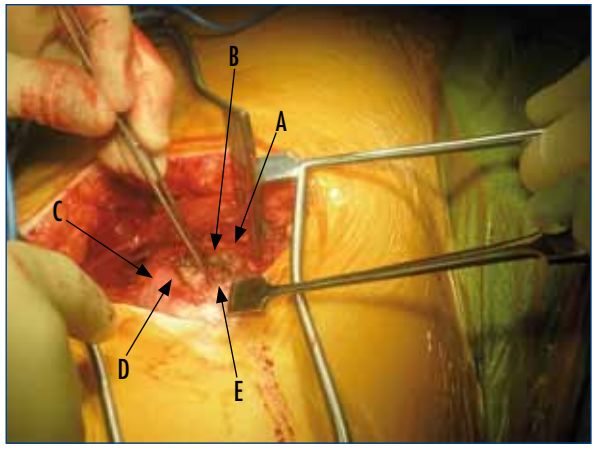
Outcomes

No large series have been reported for this condition, so the results of treatments are open to bias. Nonetheless, the collective series of studies (*Table 2*) suggest that most patients will respond favourably if managed as described in this article. The invariable rarity of the condition coupled with a lack of clinician awareness means that firmer conclusions on outcome are unlikely in the foreseeable future.

Conclusions

Gluteus medius tendon tears are a debilitating cause of lateral hip pain. They are under-recognized although this may change with availability of more sophisticated imaging modalities. Meticulous history taking, physical examination and imaging are a prerequisite to diagnosis. Management meanwhile will go the familiar route of conservative treatment initially. However, in refractory cases, operative management has proven to be a successful option. **BJHM**

Figure 5. Surgical approach to gluteus medius tendon repair. A = gluteus medius muscle; B = torn gluteus medius tendon; C = greater trochanter; D = gluteus medius insertion; E = bare spot.



KEY POINTS

- Gluteus medius tendon tears are a debilitating cause of lateral hip pain.
- Use of magnetic resonance imaging has increased diagnosis of this pathology.
- Operative management is a successful option for refractory cases of gluteus medius tendon tears.

Conflict of interest: none.

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