

Diagnosis and Management of Hip Abductor Insufficiency

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ABSTRACT

Greater Trochanteric Pain Syndrome (GTPS) is a common cause of lateral hip pain, with an incidence of 1.8 per 1000 patients, most commonly occurring between the fourth and sixth decades of life. When GTPS fails to improve with conservative management, hip abductor insufficiency should be suspected. The diagnosis of hip abductor insufficiency is made by a combination of physical exam findings and imaging studies, with Magnetic Resonance Imaging (MRI) being the diagnostic study of choice. Initial conservative management consists of activity modification, physical therapy, non-steroidal anti-inflammatories and corticosteroid injections. If conservative management fails, this may be suggestive of a hip abductor tear. Surgical intervention has been shown to provide excellent outcomes, and may be necessary if a tear is present. The purpose of this paper is to review and raise awareness of hip abductor insufficiency as an under-diagnosed and under-treated condition that can limit patient mobility and quality of life.

INTRODUCTION

Hip pain is among the most common orthopaedic complaints and represents a wide range of etiologies including osteoarthritis, inflammatory arthropathies, referred neurologic pain, and muscular or ligament injury or degeneration.¹ A common cause of lateral hip pain is Greater Trochanteric Pain Syndrome (GTPS), with an incidence of 1.8 per 1000 patients, most commonly occurring between the fourth and sixth decades of life. It is more common in females and can cause significant morbidity and chronic functional limitations.¹ This type of lateral hip pain has often been described by the blanket phrase “greater trochanteric bursitis”.¹

Tears of the hip abductor tendons, the gluteus medius and gluteus minimus, were first described in the 1990s by Bunker *et al.* and Kagan, referring to the presentation and associated symptoms as “the rotator cuff tear of the hip”.^{2,3} It has recently been recognized that greater trochanteric pain syndrome that is recalcitrant to conservative management is commonly caused by hip abductor tendon tears.^{4,5} MRI is the study of choice for diagnosing hip abductor tears, with initial management consisting of conservative measures

(activity modification, physical therapy, or steroid injections)⁶. When conservative measures no longer provide adequate symptom relief, surgical intervention has been shown to improve clinical outcomes.⁷ Hip abductor insufficiency is an under-diagnosed and under-treated condition that can limit patient mobility and quality of life.

ANATOMY

The gluteus medius muscle is a fan-shaped structure with a broad origin between the anterior superior iliac spine to the posterior edge of the iliac crest and inserts along the superior and lateral aspect of the greater trochanter (**Figure 1**). It contains fibers that are vertically oriented (thus aiding in initiation of hip abduction) and horizontally oriented (aiding in gait stabilization).⁸ The anterior portion of the muscle also contributes to pelvic rotation and the entire muscle is innervated by the superior gluteal nerve. The gluteus minimus originates from the outer surface of the ilium and inserts on the anterior aspect of the greater trochanter, also aiding in hip abduction^{8,9} (**Figure 2**).

Figure 1. Hip abductor musculature

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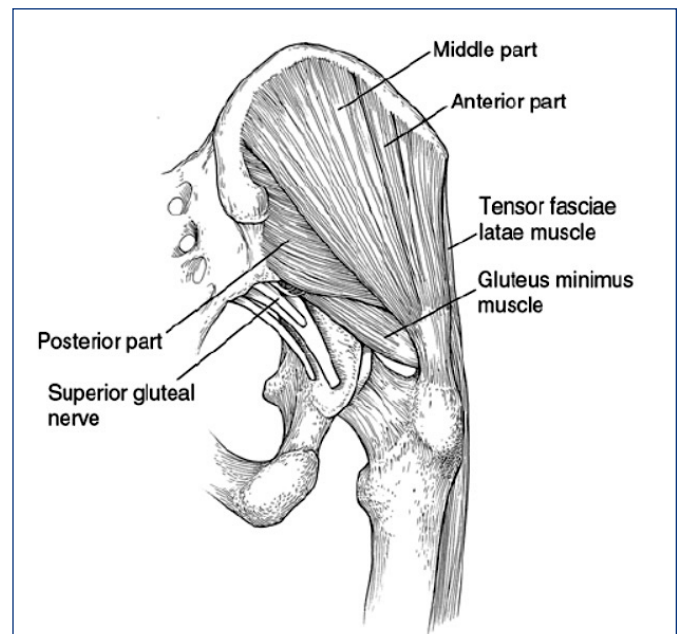


Figure 2. Hip abductor musculature insertion on the greater trochanter (Reprinted with permission from Lachiewicz – Citation 11)

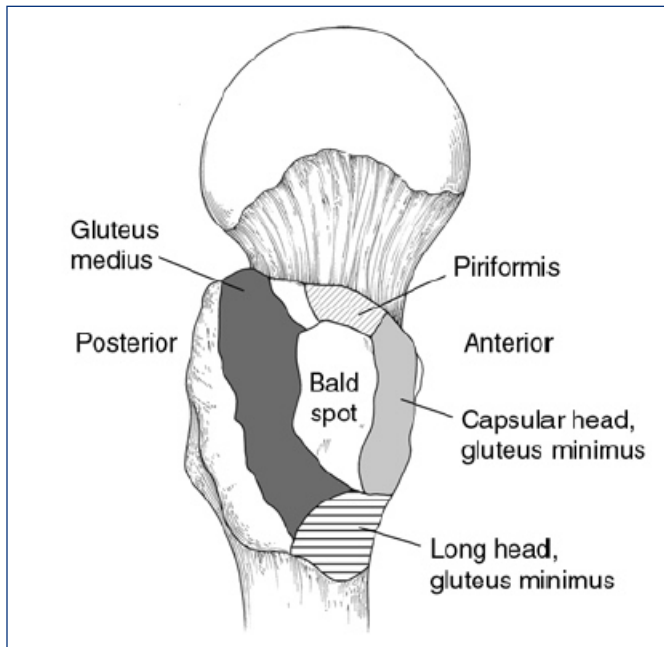
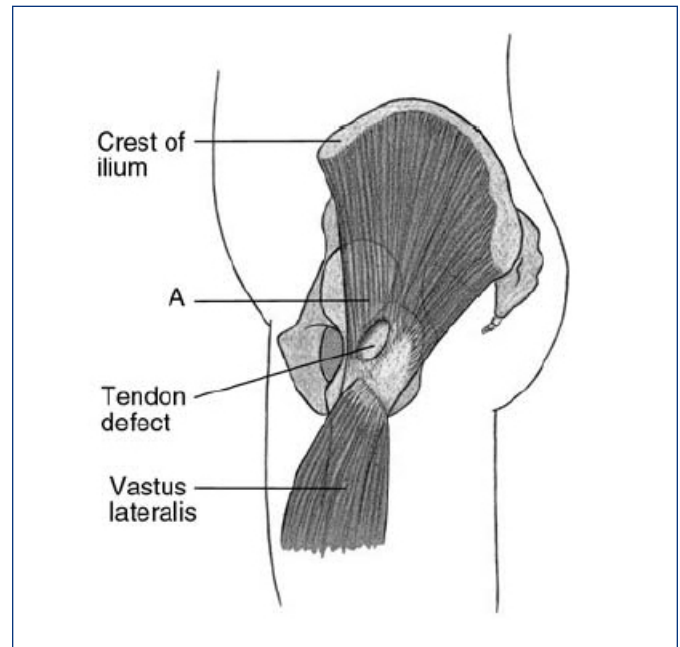


Figure 3. Defect in hip abductor musculature (Reprinted with permission from Lachiewicz – Citation 11)



CLINICAL PRESENTATION

Abductor tears can be classified into three categories: chronic degenerative tears (the most common – **Figure 3**), traumatic tears, and iatrogenic tears that can occur from disruption of the abductors during total hip arthroplasty and fracture fixation of the hip. Gluteus medius tears typically present as GTPS; patients describe an atraumatic and insidious onset of aching and dull pain on the lateral aspect of the hip that is worsened with weight-bearing, palpation of the lateral hip, and laying on the affected side.¹⁰

Physical exam often involves point tenderness at the posterolateral portion of the greater trochanter. Pain can typically be reproduced with resisted hip abduction or external rotation.¹ Of note, pain with flexion and extension of the hip, which is often found in patients with intra-articular disease, is rarely present in patients with GTPS.¹ Patients may also present with gait abnormalities such as a Trendelenburg gait. Patients with GTPS often walk with an “abductor lurch”, this type of gait pattern is a compensatory mechanism for weak or damaged hip abductors and is characterized by tilting of the pelvis towards the unaffected side during the stance phase of gait. Further, the trunk then “lurches” towards the affected side in attempt to keep the pelvis level during the gait cycle.¹ This gait pattern as well as abductor weakness can also be the result of a lumbar compressive radiculopathy, specifically of the L5 nerve root which innervates the hip abductor musculature. To differentiate this patient from the patient with GTPS, the motor/sensory exam as well as the remainder of the neurologic exam should be normal for the latter. Leg length

asymmetry has been historically suggested as a risk factor for GTPS; however, this has recently been dispelled by a large cross-sectional analysis.¹¹

While GTPS is often responsive to physical therapy, non-steroidal anti-inflammatory drugs (NSAIDs), and occasionally steroid injections, gluteus medius tears can prove refractory to conservative management.¹⁰ Studies have shown that gluteus medius tears are far more common than gluteus minimus tears and are most often found to be partial thickness rather than full thickness or interstitial (occurring in line with tendon fibers).⁶

The differential diagnosis for these symptoms is diverse and includes osteoarthritis of the hip, trochanteric bursitis, spinal pathology including lumbar spinal stenosis, neurologic injury to the superior gluteal nerve, or occult fractures involving the proximal femur, greater trochanter or occasionally the pubic ramus.¹²

IMAGING

Imaging of the hip should typically be pursued for patients with GTPS. Though often unremarkable, plain radiographs of the pelvis or the affected hip should be obtained first to rule out osteoarthritis, nondisplaced fractures, or other bony abnormalities.¹⁰ For patients with GTPS that has been refractory to conservative management, ultrasound is a cost-effective and easily performed tool for diagnosis of hip abductor insufficiency. However, it has significant limitations as it is difficult to characterize the size, location, and orientation of the tear within the muscle and has variable accessibility.¹³

Figure 4. A T2 fat-saturated coronal MRI cut of the patient's left hip with the patient supine with bilateral legs internally rotated 15 degrees. This shows a large high-grade undersurface tear of the gluteus medius tendon off of the lateral facet of the greater trochanter with retraction (yellow asterisk).

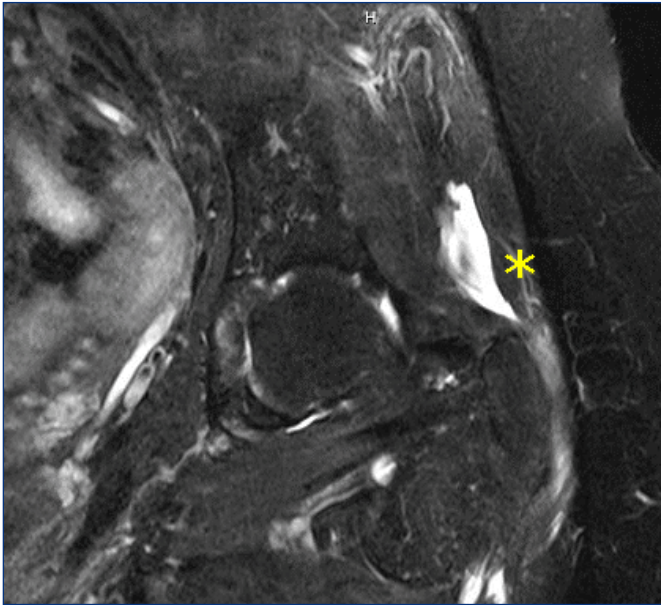
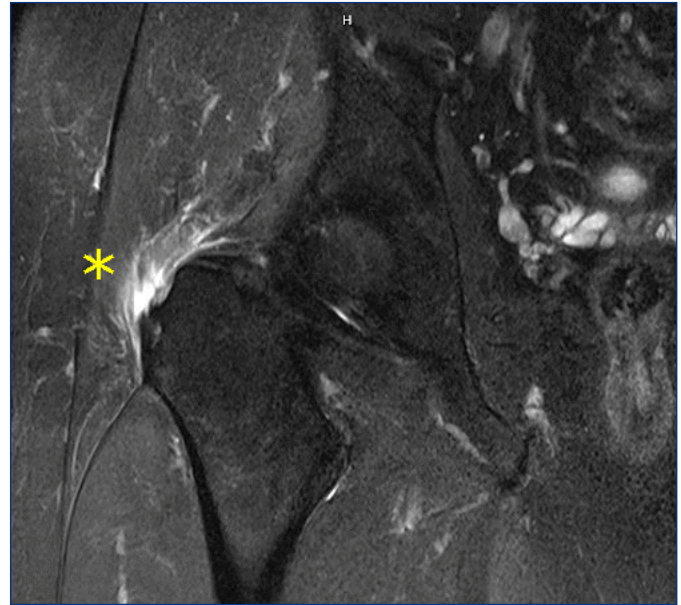


Figure 5. A T2 fat-saturated coronal MRI cut of the patient's right hip with the patient supine with bilateral legs internally rotated 15 degrees. This shows a full thickness partial width tear of the gluteus medius tendon off of the lateral facet of the greater trochanter with retraction (yellow asterisk)



MRI without contrast of the affected hip is the gold standard for the diagnosis and characterization of hip abductor tears and typically provides the greatest visualization of soft tissue structures. T2-weighted images with fat saturation can reliably identify tendon tears or insertional detachment (**Figures 4 and 5**). Notably, MRI of the pelvis is much less sensitive for diagnosing hip abductor tears due to the reduced visualization of the abductors.¹⁴

Hartigan *et al.* proposed an algorithmic approach to evaluate the gluteus medius on MRI with a goal of guiding surgical management (open versus endoscopic techniques).¹⁴ The authors utilized this protocol to identify the type of tear that is present, size of the tear, and overall health of the tissue, such as fatty atrophy of the muscles or muscle retraction from its insertion on the greater trochanter. It was also noted that a hypertrophied tensor fascia lata (TFL) muscle is often found on MRI of chronic abductor tears, which has been further identified in recent literature.¹⁵ This hypertrophy is due to the compensation the TFL provides in the absence of a functional abductor. In addition to providing a noninvasive method to diagnose hip abductor insufficiency, MRI can also guide surgical management based on the assessment of associated tissues that influence repair strength and technique.¹⁴

MANAGEMENT

The management of gluteus medius or minimus tears ranges from conservative measures to surgical intervention depending on the severity of the symptoms, overall patient

functional level and health status, and response to conservative management. Conservative management for acute symptoms typically begins with a short course of rest, activity modification, physical therapy and NSAIDs.¹⁶ Activity modification should emphasize avoiding actions that would potentiate pain including laying on the affected hip and repetitive hip motions. Further, correction of hip abduction weakness through home exercise programs or formal physical therapy programs can help improve gait and reduce pain.¹⁶ A typical exercise regimen includes piriformis and TFL stretching, straight leg raises, and wall squats multiple times a day.¹⁰ Other treatment strategies focus on correcting other “kinetic chain abnormalities” such as knee or ankle pathology that may have resulted from a compensatory gait to reduce hip pain.

If these initial measures are ineffective, administration of a corticosteroid injection into the region of muscular insertion on the greater trochanter (using ultrasound for optimal accuracy) is warranted.¹⁰ The location of this injection is anatomically different than that of the trochanteric bursa which is administered to the center of the greater trochanter. Extra-corporeal shock wave therapy (ESWT) is another treatment modality that has been shown to be safe and effective; it uses pressure waves to deliver a mechanical force to the abductor tissues¹⁷. Newer medical therapies have been proposed including injections of high volumes of saline, platelet-rich plasma, and autologous blood, but there has been little evidence to support consistent success.¹⁶ Torres *et al.* conducted a review of 76 studies that compared

different types of conservative management of hip abductor insufficiency and found that while all techniques led to clinical improvement, corticosteroid injections and ESWT were the most effective in improving functional outcomes.¹⁸

Surgical intervention for a confirmed gluteus medius tear by MRI is indicated when there is failure with 6 months of conservative management (consisting of physical therapy, corticosteroid injections, activity modifications, NSAIDs) with ongoing pain, abductor dysfunction manifesting as a Trendelenburg gait, and compromised quality of life and daily function. Fatty degeneration of the gluteus medius muscle suggests a chronic tear and is a poor prognostic indicator of surgical outcome.¹⁴ Each patient's functional goals should be taken into consideration on a case-by-case basis when considering surgical intervention. Surgical repair techniques include open and endoscopic procedures.¹⁹

To compare techniques, Alpaugh *et al.* conducted a systemic review of eight studies that assessed outcomes following open and endoscopic repair of gluteus medius tears.²⁰ The authors evaluated over 130 patients undergoing either open or endoscopic repair of gluteus medius tears and compared postoperative functional outcomes and complication rates between the two techniques. This study found that while both techniques produced excellent functional results post-operatively (all outcome scores ranged from good to excellent, with no difference between techniques), the open repair technique showed a significantly higher rate of re-tear (9% open vs 0% endoscopically). While this study presented the first comparison between open and endoscopic techniques for repair of the gluteus medius, it is clear that higher level, randomized studies would benefit the surgical decision-making process.

RECOMMENDATIONS

The following is our recommended treatment algorithm for patients with hip abductor insufficiency. When history and physical exam are suggestive of hip abductor insufficiency, a trial of conservative management consisting of activity modification, NSAID therapy, and physical therapy targeting core and pelvic stabilizers should be initiated. If an 8- to 10-week trial fails, MRI of the affected hip should be obtained. Pending imaging results, orthopaedic consultation and corticosteroid injection can be pursued. We recommend a maximum of two injections (spaced a minimum of 3 months apart) to provide relief. Frequent injections impart the risk of further tendon degeneration. Finally, if conservative management continues to be inadequate in the setting of a confirmed tear by MRI, surgical intervention should be considered for primary repair. These authors prefer a "mini-open" surgical technique to allow for optimal visualization of the affected structures, better mobilization of the surrounding tissues, and a more secure repair. If found to be irreparable, gluteus maximus muscle transfer can be pursued.

CONCLUSION

Hip abductor insufficiency should be suspected in cases of chronic greater trochanteric pain syndrome that is refractory to dedicated conservative management. MRI of the hip is most effective in diagnosing and guiding surgical management if appropriate. Patients and providers should be aware that there are a variety of conservative options that are clinically proven to improve outcomes. Operative intervention has also been shown to improve pain and functionality when conservative measures are inadequate. A greater understanding and awareness of this clinical entity will ensure patients are provided with appropriate treatment and optimal outcomes.

References

1. Williams BS, Cohen SP. Greater Trochanteric Pain Syndrome: A Review of Anatomy, Diagnosis and Treatment. *Anesth Analg.* 2009;108(5):1662-1670. doi:10.1213/ane.0b013e31819d6562
2. Bunker TD, Esler CN, Leach WJ. Rotator-cuff tear of the hip. *J Bone Joint Surg Br.* 1997;79(4):618-620. <http://www.ncbi.nlm.nih.gov/pubmed/9250749>. Accessed June 10, 2018.
3. Kagan A. Rotator cuff tears of the hip. *Clin Orthop Relat Res.* 1999;368:135-140. <http://www.ncbi.nlm.nih.gov/pubmed/10613161>. Accessed June 10, 2018.
4. Ozçakar L, Erol O, Kaymak B, Aydemir N. An underdiagnosed hip pathology: apropos of two cases with gluteus medius tendon tears. *Clin Rheumatol.* 2004;23(5):464-466. doi:10.1007/s10067-004-0917-4
5. Bewyer D, Chen J. Gluteus medius tendon rupture as a source for back, buttock and leg pain: case report. *Iowa Orthop J.* 2005;25:187-189. <http://www.ncbi.nlm.nih.gov/pubmed/16089095>. Accessed June 10, 2018.
6. Lindner D, Shohat N, Botser I, Agar G, Domb BG. Clinical presentation and imaging results of patients with symptomatic gluteus medius tears. *J Hip Preserv Surg.* 2015;2(3):310-315. doi:10.1093/jhps/hnv035
7. Davies JF, Stiehl JB, Davies JA, Geiger PB. Surgical Treatment of Hip Abductor Tendon Tears. *J Bone Jt Surgery-American Vol.* 2013;95(15):1420-1425. doi:10.2106/JBJS.L.00709
8. Gottschalk F, Kourosh S, Leveau B. The functional anatomy of tensor fasciae latae and gluteus medius and minimus. *J Anat.* 1989;166:179-189. <http://www.ncbi.nlm.nih.gov/pubmed/2621137>. Accessed June 10, 2018.
9. Robertson WJ, Gardner MJ, Barker JU, Boraiah S, Lorich DG, Kelly BT. Anatomy and Dimensions of the Gluteus Medius Tendon Insertion. *Arthrosc J Arthrosc Relat Surg.* 2008;24(2):130-136. doi:10.1016/j.arthro.2007.11.015
10. Lachiewicz PF. Abductor tendon tears of the hip: evaluation and management. *J Am Acad Orthop Surg.* 2011;19(7):385-391. <http://www.ncbi.nlm.nih.gov/pubmed/21724917>. Accessed June 7, 2018.
11. Segal NA, Harvey W, Felson DT, Yang M, Torner JC, Curtis JR, Nevitt MC. Leg-length inequality is not associated with greater trochanteric pain syndrome. *Arthritis Research and Therapy.* 2008;10(3):62.
12. LaBan MM, Weir SK, Taylor RS. "Bald trochanter" spontaneous rupture of the conjoined tendons of the gluteus medius and minimus presenting as a trochanteric bursitis. *Am J Phys Med Rehabil.* 2004;83(10):806-809. <http://www.ncbi.nlm.nih.gov/pubmed/15385792>. Accessed June 10, 2018.
13. Thaunat M, Noël E, Nové-Josserand L, Murphy CG, Sbiyaa M, Sonnery-Cottet B. Endoscopic Management of Gluteus Medius Tendon Tears. *Sports Med Arthrosc.* 2016;24(1):11-18. doi:10.1097/JSA.0000000000000082

14. Hartigan DE, Perets I, Walsh JP, Domb BG. Imaging of Abductor Tears: Stepwise Technique for Accurate Diagnosis. *Arthrosc Tech*. 2017;6(5):e1523-e1527. doi:10.1016/j.eats.2017.06.032
15. Sutter R, Kalberer F, Binkert CA, Graf N, Pfirrmann CWA, Gutzeit A. Abductor tendon tears are associated with hypertrophy of the tensor fasciae latae muscle. *Skeletal Radiol*. 2013;42(5):627-633. doi:10.1007/s00256-012-1514-2
16. Mallow M, Nazarian LN. Greater trochanteric pain syndrome diagnosis and treatment. *Phys Med Rehabil Clin N Am*. 2014;25(2):279-289. doi:10.1016/j.pmr.2014.01.009
17. Furia JP, Rompe JD, Maffulli N. Low-Energy Extracorporeal Shock Wave Therapy as a Treatment for Greater Trochanteric Pain Syndrome. *Am J Sports Med*. 2009;37(9):1806-1813. doi:10.1177/0363546509333014
18. Torres A, Fernández-Fairen M, Sueiro-Fernández J. Greater trochanteric pain syndrome and gluteus medius and minimus tendinosis: nonsurgical treatment. *Pain Manag*. 2018;8(1):45-55. doi:10.2217/pmt-2017-0033
19. Voos JE, Shindle MK, Pruett A, Asnis PD, Kelly BT. Endoscopic Repair of Gluteus Medius Tendon Tears of the Hip. *Am J Sports Med*. 2009;37(4):743-747. doi:10.1177/0363546508328412
20. Alpaugh K, Chilelli BJ, Xu S, Martin SD. Outcomes After Primary Open or Endoscopic Abductor Tendon Repair in the Hip: A Systematic Review of the Literature. *Arthrosc J Arthrosc Relat Surg*. 2015;31(3):530-540. doi:10.1016/j.arthro.2014.09.001

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