

## Greater Trochanteric Pain Syndrome: What is this Meaning?

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### Abstract

Greater trochanteric pain syndrome (GTPS) is a common cause of lower extremity pain. This is frequently attributed to trochanteric bursitis and distension of the subgluteal bursae. Patients are suffering from pain radiating to the posterolateral aspect of the thigh, paraesthesiae in the legs, and tenderness over the iliotibial tract. Often the symptoms are mild, with the patient treating himself successfully through activity modification and other conservative measures, including relative rest, ice, compression, elevation, anti-inflammatory medication and treatment modalities such as ultrasound and electrical stimulation, combined with a structured rehabilitation program. Patients whose symptoms persist despite conservative therapy are likely to benefit from an injection of corticosteroid and anaesthetic into the inflamed bursa. More invasive surgical interventions have anecdotally been reported to provide pain relief when previous treatment modalities fail.

In this article, we review the pathogenesis, common initial symptoms, diagnostic approach, and treatment options for trochanteric bursitis.

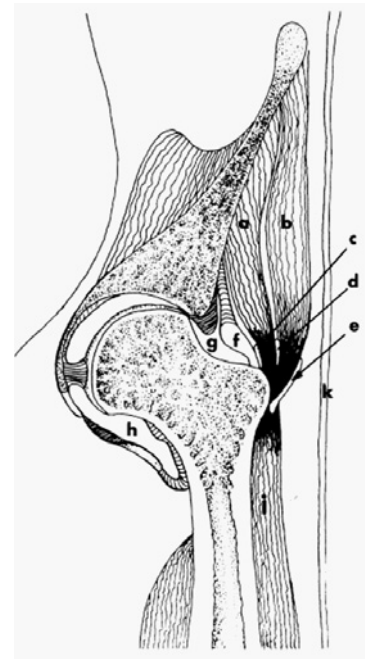
**Keywords:** Greater trochanteric pain syndrome; Bursitis; Low back pain; Subgluteal bursae

### Introduction

More than 50 years ago, Leonard proposed using the phrase "trochanteric syndrome" to refer to symptoms in the vicinity of the trochanter major [1]. Today Greater trochanteric pain syndrome (GTPS), also known as trochanteric bursitis, is defined as tenderness to palpation over the greater trochanter with the patient in the side-lying position [2,3]. This regional pain syndrome often mimics pain generated from other sources, including, but not limited to myofascial pain, degenerative joint disease, and spinal pathology [4]; in fact, GTPS may be associated with myriad causes such as tendinitis, muscle tears, trigger points, iliotibial band disorders (ITB), and general or localized pathology in surrounding tissues [5,6]. The prevalence of GTPS in adults with musculoskeletal low back pain (LBP) has been reported to be 20% to 35% [7,8]. Studies differ regarding whether GTPS may or may not be more prevalent in women than men [9,10]. The presence of LBP seems to predispose patients to hip pain. In a large, multicenter, cross-sectional studies involving 3026 middle-age to elderly adults, Segal et al. [11] found the prevalence of GTPS to be 17.6%, being higher in women and patients with coexisting LBP, osteoarthritis (OA), ITB tenderness, and obesity. A further confounding prevalence estimate is the observation that many conditions that predispose patients to GTPS can also simulate this condition.

### Anatomy

In the literature there have been described more than 20 bursae in the trochanteric region [12]. Three are certainly the most representative: the gluteus minimus bursa, the subgluteus maximus and subgluteus medius bursae. The gluteus minimus bursa lies above and slightly anterior to the proximal superior surface of the greater trochanter. The subgluteus medius bursa lies beneath the gluteus medius muscle, situated posterior and superior to the proximal edge of the greater trochanter. The subgluteus maximus bursa lies beneath the converging fibers to the tensor fasciae latae and the gluteus maximus muscle and fascia as they join to form the iliotibial tract, and it separates the converging fibers from the greater trochanter and the origin of the vastus lateralis. It is lateral to the greater trochanter and is separated from the trochanter by the gluteus medius muscle (Figure 1). The subgluteus maximus bursa is most frequently incriminated in GTPS [13].



**Figure 1:** (From AJR:1982, January 2004): Anatomy of trochanteric region. a = gluteus minimus muscle, b = gluteus medius muscle, c = subgluteus minimus bursa, d = subgluteus medius bursa, e = subgluteus maximus bursa, f = zona orbicularis of hip joint capsule, g = superior neck recess of hip joint, h = inferior neck recess of hip joint, i = vastus lateralis muscle, k = iliotibial band.

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Received October 19, 2011; Accepted November 21, 2011; Published November 28, 2011

Citation: Geraci A, Sanfilippo A, D'Arienzo M (2011) Greater Trochanteric Pain Syndrome: What is this Meaning?. Orthopedic Muscul Sys 1:101. doi:10.4172/2161-0533.1000101

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## Causes and pathogenesis

The causes of GTPS can be traumatic and nontraumatic (Table 1). Risk factors are various and variously described, including age, female gender, ipsilateral ITB pain, knee OA, obesity, and LBP [14,15]. Overuse of the Trochanteric bursa and or an inflammation of the bursa may cause trochanteric bursitis. Because Trochanteric bursitis can result from friction between the bursae and GT, bursal inflammation may result from either chronic microtrauma, regional muscle dysfunction, overuse or acute injury [16,17]. The main tendon of the gluteus medius muscle attaches to the postero-superior aspect of the GT, with the lateral tendon inserting into the lateral aspect. The gluteus minimus muscle attaches to the anterior facet of the GT. Consequently,

**Table 1:** Conditions associated with greater trochanteric pain syndrome.

Obesity
Ipsilateral and/or contralateral hip arthritis
Radiculopathy or other neurologic sequelae
Repetitive activity
Acute trauma
Rheumatoid arthritis
Chronic mechanical low-back pain
Leg length discrepancy
Lateral hip surgery
Lumbar spine degenerative osteoarthritis
Lumbar spine degenerative disk disease
Post surgical lumbar disk disease
Fibromyalgia
Iliotibial band (snapping hip) syndrome
Total hip arthroplasty
Lower limb amputation

**Table 2:** Clinical features of greater trochanteric pain syndrome.

Pain on lateral aspect of hip over greater trochanter.
Pain may radiate down lateral aspect of thigh but not below knee.
External rotation of hip with abduction may exacerbate the pain.
Pain may be exacerbated by physical activity (walking, climbing stairs, running)
More common in women than men.
Peak incidence 40–60 years of age but can occur in adult of any age.
Sleep disturbance may be common when patient turns to lie on affected side.
Classic feature is point tenderness on palpation directly over greater trochanter which reproduces the pain.

**Table 3:** Criteria for Diagnosis of Great Trochanteric Pain Syndrome.

Lateral hip pain
Pinpoint tenderness over the greater trochanter area
Distinct tenderness about the greater trochanter
Pain at the extreme of rotation, abduction, or adduction
Pain on hip abduction against resistance
Tender over gluteus medius muscle
Positive Patrick-Fabere's test
Pseudoradiculopathy (pain radiating down the lateral aspect of the thigh)

inflammation and tears of either the gluteus medius or minimus muscles, or their tendinous insertions, from tension imposed by the ITB and/or frictional trauma from overuse, may result in GTPS [18]. Specific etiologies of GTPS include repetitive activity, acute trauma, crystal deposition and infection, especially tuberculosis [19,20]. When an inciting event can be identified, the initial pathology usually occurs at the tendinous attachments to the GT, with secondary involvement of adjacent bursae. Acute trauma includes contusions from falls, contact sports, and other sources of impact. Repetitive trauma includes bursal irritation resulting from friction by the iliotibial band (ITB), which is an extension of the tensor fascia lata muscle. Such repetitive, cumulative irritation often occurs in runners but can also be seen in less active individuals. Other predisposing factors include a leg-length discrepancy and lateral hip surgery [21,22].

## Symptoms

GTPS is characterized by chronic, intermittent aching pain at the greater trochanteric region at the lateral hip (Table 2) [23]. The pain can radiate into the lower buttocks and the lateral aspect of the thigh, but it rarely extends into the posterior aspect of the thigh or below the knee. Occasionally, patients experience numbness in the upper thigh with no specific dermatomal pattern. Patients report pain from greater trochanteric bursitis with a variety of activities or movements. The pain is exacerbated by lying on the affected side, with prolonged standing position, sitting with the affected leg crossed and with climbing stairs, running or other high impact activities. Any movement of the affected hip can reproduce the pain of greater trochanteric bursitis, but external rotation and abduction of the hip are most common. Pain extending to the groin or down the lateral thigh that mimics lumbar disk herniation may be reported by some individuals [24]. The most common disability is exercise limitations to include walking. It is also associated with broken sleep patterns secondary to the inability to lie on the affected side because of pain. In addition, a large number of patients have bilateral bursitis, further sleep interrupting patterns.

## Physical examination

Structuring the examination by beginning centrally and working out from the hip joint helps to identify the contributing factors of the patient's complaint (Table 3) [25]. Pinpoint tenderness over the greater trochanter area is the hallmark physical finding in all symptomatic patients. Tenderness may extend into the lower buttock and lateral thigh but not to a significant degree. While the patient is standing, palpate the lateral hip area in a cephalic direction beginning below the greater trochanter eminence until the area of maximal tenderness is identified ("jump sign") [26]. Pain can also be reproduced by resisted abduction and external rotation. To perform resisted abduction, place the patient in a sitting position with knees flexed. The examiner places his or her hand on the lateral aspect of the upper thigh and instructs the patient to move the thigh laterally against the resistance. External rotation of the hip is obtained by placing the patient in a sitting position with the knees flexed and adducting the lower leg (shin). Pain on flexion and extension of the hip is indicative of intra-articular hip disease and not usually of a greater trochanteric bursitis [27]. Objective swelling is rare because of the bulky muscles overlying the deep structures of the trochanter bursa. More than half of the patients with GTPS have pain on Patrick-Fabere testing of the affected hip while flexing the ipsilateral knee [28]. In most patients with limitation of range of motion of the affected hip, the underlying cause is arthritis. Other physical findings such as limited lumbar range of motion and muscle atrophy may reveal other associated conditions such as lumbar spondylosis and nerve

**Table 4:** Common Tests Utilized in Evaluation of Lateral Hip Pain.

- *Point tenderness at greater trochanter:* The patient is in standing or supine position. Point tenderness is elicited at the ipsilateral greater trochanter. If lateral hip pain is elicited Greater trochanteric pain syndrome may be present.
- *Resisted internal rotation test:* The patient is in the supine position and the affected hip at 45° flexion and maximal external rotation. The test result is as positive if the patient indicates replication of symptoms over the greater trochanter on resisted active internal rotation. If lateral hip pain is elicited, Greater trochanteric pain syndrome may be present.
- *Resisted active abduction:* The patient is in the supine position with the affected hip at 45° abduction. A positive test results if the patient indicates replication of symptoms over the greater trochanter on resisted active abduction. If lateral hip pain is elicited, Greater trochanteric pain syndrome may be present.
- *Ober's testing:* The patient is in the lateral position with the unaffected side down. The affected leg is passively extended and lowered to the table. If lateral hip pain is elicited or iliotibial band tightness, Iliotibial band syndrome may be present.
- *Patrick (Fabere) testing:* The patient is in the supine position with the affected leg flexed, abducted, and externally rotated with the ankle resting on the thigh of the unaffected leg. One hand is placed on the anterior superior iliac spine of the unaffected side, while the other hand applies downward pressure on the affected leg. The test result is positive if the patient indicates pain about the affected hip. Pain may also be elicited at or about the sacroiliac joint indicating sacroiliac joint dysfunction.
- *Gillet's test:* The patient stands with the feet apart and the clinician places one thumb on the posterior superior iliac spine (PSIS) of the side to be tested and the other thumb on the sacral base. The patient flexes the hip and knee to 90° on the side being tested. The test result is positive if the PSIS moves superiorly, Sacroiliac joint dysfunction may be present.
- *Thomas test:* The patient lies supine and flexes the unaffected hip, holding the knee to the chest. The test result is positive if the patient's other leg will rise off the table, Sacroiliac joint dysfunction may be present.
- *Trendelenburg's testing:* The patient stands on the affected leg and raises the unaffected leg to 30–90°. A pelvic tilt below the level of the stance side indicates a positive test, Gluteus medius muscle dysfunction may be present.
- *Straight leg raise:* The patient lies supine and the affected extremity raised straight up. The test result is positive if the patient complains of pain in the extremity (not the back) typically in a specific nerve root distribution, Lumbar radiculopathy may be present.

root compression. In severe cases of bursitis the presence of soft tissue crepitus can be found (Table 4) [29].

### Diagnostic studies

No specific radiographic findings are of diagnostic value for a trochanteric bursitis [30]. X-rays of the hip, pelvis, and lower spine may show evidence of one or more of the associated musculoskeletal conditions.

On occasion, calcifications around the greater trochanter may be seen (approximately 40% of patients with greater trochanteric bursitis) [31] (Figure 2). These calcifications varies in size and shape from a few millimeters to 3 to 4 cm in diameter. They appear as linear or small, rounded masses that are separated or grouped together. Irregularities can also be seen on the surface of the greater trochanter. Often on CT the distended bursa is noted as a septated low attenuation lesion at the site of insertion of the gluteus medius and minimus muscles on the greater trochanter (Figure 3) [32]. Bone scans may show increased uptake in the area of the greater trochanter, and magnetic resonance imaging (MRI) scans or sonography may show a high-intensity signal in the greater trochanter area, but all of these findings may not always have actual clinical significance and vice versa. The MRI appearance of tendinosis and tear of the abductor tendons of the hip is the same as in other locations and includes alterations in tendon signal and caliber [33]. Partial thickness and complete tears of the gluteus minimus or medius tendons are visible with MRI (Figure 4). Muscle atrophy is frequent with chronic large tears [34]. If a larger field of view is utilized to incorporate both hips, tendon visualization is often limited and secondary signs become critical in detecting abductor tendon tears. The most frequently encountered secondary sign is a greater than 1 cm in diameter localized area of high signal superior to the greater trochanter (Figure 4) [33,34].

### Treatments

Initially, treatment of trochanteric bursitis involves ice, over-the-counter nonsteroidal anti-inflammatory drugs (NSAIDs) to reduce pain and inflammation, and activity modification (e.g., avoiding stairs,

reducing repetitive sit-to-stand movements) [35]. The individual is instructed to avoid placing direct pressure on the bursa by sleeping on the unaffected side and using a pillow between the knees (adductor pillow) to minimize indirect bursal compression from overlying tight musculature. Patients whose symptoms persist despite conservative therapy are likely to benefit from an injection of 24 mg betamethasone and 1% lidocaine (or equivalent) into the inflamed bursa. This therapy has been shown to provide pain relief, with response rates ranging from 60% to 100% [36,37,38]. There is no conclusive evidence that these injections are effective, although small observational studies suggest that injections with corticosteroids are effective in the short-term follow-up [39,40]. The purpose of rehabilitation for GPTS is



**Figure 2:** X-rays of the hip of patient with Great trochanteric Pain Syndrome, demonstrating irregularity of the greater trochanter and calcification in the region of subgluteus medius bursa.



to restore normal flexibility, strength, and functional mobility with a mobile, painless hip; Transcutaneous electrical neuromuscular stimulation (TENS), ionophoresis and therapeutic ultrasound may be helpful in some cases for pain relief [41]. The physical therapist focuses on stretching exercises to improve hip range of motion, especially external rotation, and to increase the extensibility of adjacent tight soft tissues (e.g., gluteus medius, iliotibial band, tensor fascia lata) that may be causing friction on the inflamed bursa. Soft tissue mobilization and myofascial release may help to lengthen tight musculature of the tensor fascia lata and iliotibial band [42]. Strengthening exercises can be progressed as tolerated, with emphasis on hip abductor, extensor, and external rotator muscles, to enhance the return to function. If the individual has developed an altered gait pattern to reduce pain (antalgic gait pattern), gait training may be necessary to restore normal movement patterns with ambulation. In severe cases, temporary use of an assistive device (cane, crutch) may be necessary. In patients who fail conservative treatment, surgical intervention has been advocated. Several types of surgical procedures are available to treat trochanteric

bursitis [43]. The primary goal of all procedures designed to treat this condition is to remove the thickened bursa, to remove any bone spurs that may have formed on the greater trochanter, and to relax the large tendon of the gluteus maximus. The open surgical procedure consisted of simple longitudinal release of the iliotibial band over the greater trochanter and excision of the subgluteal bursa. Dumbar et al. [44] reported that bursectomy and Z-lengthening has been shown to be an effective and long-term operative solution for the treatment of refractory trochanteric bursitis when conservative measures have failed.

The recalcitrant TB can sometimes be addressed with arthroscopic bursectomy and/or ITB release. The use of arthroscopy to treat recalcitrant trochanteric bursitis is reported and its role in treating this common clinical entity is discussed. Fox et al. [45] showed that arthroscopically performed trochanteric bursectomy is a minimally invasive technique that appears to be both safe and effective for treating recalcitrant pain syndromes. Farr et al. [46] believe that the iliotibial band must be addressed and is the main cause of pain, inflammation, and trochanteric impingement leading to the development of bursitis and report a new technique for arthroscopic trochanteric bursectomy with iliotibial band release.

Septic bursitis is unusual in the hip bursa but does occur. The bursal fluid can be examined in the laboratory for the microorganisms causing the infection [47]. Septic bursitis is caused by the *staphylococcus aureus*. This is confirmed by antibiogram from the fluid in the bursa and requires antibiotic treatment. When a patient has such a serious infection, there may be underlying causes. There could be undiscovered diabetes, or an inefficient immune system caused by human immunodeficiency virus infection (HIV) [48]. Repeated aspiration of the infected fluid may be required. Surgical drainage and removal of the infected bursa may also be necessary [49].

## Conclusions

Trochanteric bursitis is a common cause of hip and leg pain. Hip pain brings patients to health care providers, including both primary care and specialty providers. Causes of hip pain often are attributed to disorders in the lower back or hip joint. Risk factors for this disorder include obesity, female gender, overuse and altered gait mechanics.

MR imaging and plain radiographs provide detailed information about the anatomy of tendinous attachments of the abductor muscles and the bursal complex of the greater trochanter.

In most cases the disorder is self-limiting, with treatment consisting of conservative measures such as behaviour modification, physical therapy, weight loss, and nonsteroidal anti-inflammatory drugs. When these interventions fail, bursa injections with local administration of a mixture of corticosteroid and local anaesthetic have been shown to provide good pain relief. A specific and goal-directed rehabilitation program often seems quite reasonable. Physical therapy can be incorporated to teach the patient a home exercise program, emphasizing stretching of the ITB, tensor fascia lata (TFL), external hip rotators, quadriceps, and hip flexors.

Arthroscopic bursectomy appears to be an effective option for recalcitrant trochanteric bursitis and is a viable alternative to open bursectomy. Greater trochanteric bursitis is often under diagnosed as a cause of hip pain despite its characteristic symptoms of diffuse pain in the buttocks and lateral thigh. Because greater trochanteric bursitis is so common and fairly responsive to treatment, it is important for

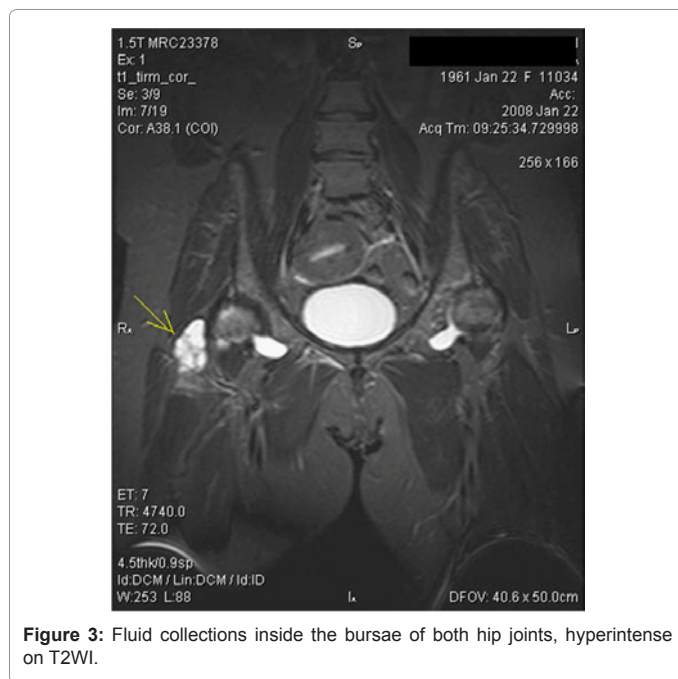


Figure 3: Fluid collections inside the bursae of both hip joints, hyperintense on T2WI.

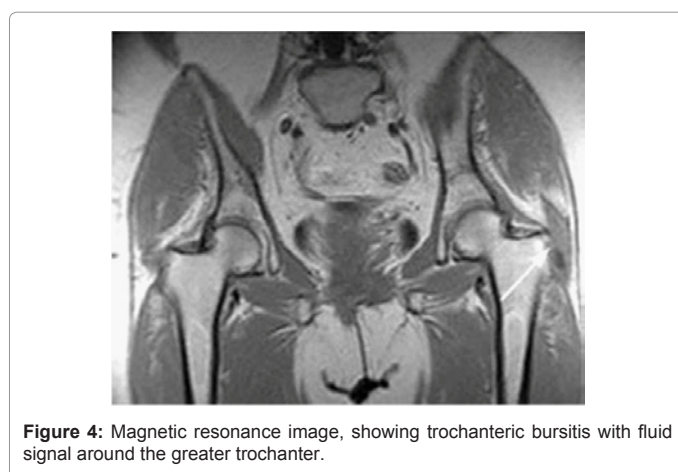


Figure 4: Magnetic resonance image, showing trochanteric bursitis with fluid signal around the greater trochanter.

health care providers to include this diagnosis in their differential diagnosis when evaluating hip pain.

### Acknowledgments

It is a great pleasure to thank my supervisor, Dr. Renzo Bianchi.

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