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Pain in Rheumatology (M Harth, Section Editor)

The Greater Trochanteric Pain Syndrome: Clinical Presentation, Diagnosis, and Management

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Abstract

Purpose of Review This review describes the greater trochanteric pain syndrome in terms of its clinical presentation, diagnosis, and management.
Recent Findings We emphasized recent studies including emerging therapies such as radiofrequency ablation of the trochanteric branches of the femoral nerve and new surgical therapies such as minimal invasive surgery and gluteal reconstruction.
Summary We describe conservative therapies, such as lifestyle modifications and physical therapy and pharmacological approaches including local injections, as well as surgical procedures. Until recently, local injections involved the use of only local anesthetic and/or corticosteroid; however, recent studies have suggested a potential role for platelet-rich plasma or hyaluronic acid. In the absence of a gluteal tear or rupture, management is initially focused on the use of analgesics to control pain, lifestyle measures, and prolonged physical therapy to improve local muscle strength, followed by the addition of local extracorporeal shock wave therapy. If symptoms persist, a new approach involves an injection of local anesthetic, potentially followed by a corticosteroid or platelet-rich plasma injection, based on the response to the initial anesthetic injection. In the case of refractory pain or tendon rupture, surgical treatment may be indicated, depending on the age of the patient and the degree of local muscle atrophy and fatty infiltration.

Introduction

The greater trochanteric pain syndrome (GTPS) is also known as lateral hip pain, hip periarthritis, gluteal tendinopathy, or trochanteric bursitis. Trochanteric bursitis is no longer the preferred term due to the relatively rare occurrence of bursitis on imaging [1]. GTPS is common and characterized either by tendinopathy or rupture of the gluteus (G.) medius and/or G. minimus, bursitis, and/or ilio-tibial band pathology. The prevalence of the GTPS ranges from 15 to 35% among people over 50 years of age and affects women four times more often than men [2•]. Like many tendinopathies, it is often a chronic condition, with 36% of patients remaining symptomatic at 1 year and 29% after 5 years [2•]. GTPS is frequently associated with chronic lower back pain, hip or knee arthropathies (especially osteoarthritis), leg length inequality, flat feet, obesity, fibromyalgia, and following surgical procedures, such as lower limb joint replacement or spine surgery [3, 4]. Imaging modalities for the initial diagnosis include standard radiography, ultrasound (US), and magnetic resonance imaging (MRI), although imaging is not necessarily required as the diagnosis remains largely clinical. Initial management for the GTPS involves exercise and physical therapy, in combination with simple analgesic therapy. Further options include extra-corporeal shock wave therapy (ESWT) and other pharmacological approaches such as use of stronger analgesics, non-steroidal anti-inflammatory drugs (NSAID), and local injections of anesthetic, corticosteroid (CCS) (also known as glucocorticoid), or platelet-rich plasma (PRP). Surgical evaluation may be an option in the case of refractory symptoms after a long period of treatment or in the case of a tear of the gluteus muscles confirmed by MRI.

Clinical presentation

Although there is no consensus on the definition of GTPS, it is commonly defined as pain and tenderness in the region of the greater trochanter, typically reproduced on palpation of the lateral hip, which may radiate down the lateral or posterior part of the thigh. The pain classically increases with walking, especially with stairs, prolonged standing, and rising from a seated position (such as getting out of a car) or lying on the affected side—commonly resulting in waking at night.

Diagnosis

The physical examination may demonstrate a limp or a Trendelenburg gait, and reproduction of the pain on palpation of the greater trochanter. Several clinical tests have been associated with GTPS. The FABER (Flexion, ABduction, and External Rotation) test appears to be the most clinically useful with a 90% specificity and 83% sensitivity [5•]. Other clinical tests include the external derotation test, which is performed with the hip flexed at 90° and in external rotation, followed by internal rotation against resistance at the ankle; the single leg standing test (for 30 s), and the resisted abduction test with the patient laying on the contralateral side, which are also commonly utilized for the diagnosis [5, 6].

Plain radiographs, preferentially with an anteroposterior view of the pelvis, may demonstrate calcifications, enthesophytes, or exostosis and are useful to exclude differential diagnoses such as hip osteoarthritis,

osteonecrosis, or femoroacetabular impingement. Other imaging modalities that are potentially useful include ultrasound or MRI. MRI has a sensitivity and specificity for gluteal tendon tears of 73% and 95%, respectively, and may also demonstrate tendinopathy or trochanteric bursitis [7]. However, pelvic MRI is associated with a significant number of false-positive signals, probably because of the high incidence of peritrochanteric abnormalities in asymptomatic patients and the complex anatomical arrangement of tendons and bursae around the greater trochanter [8•]. However, MRI can be very useful to exclude alternative diagnoses such as osteoarthritis, osteonecrosis, labral lesions, sacroiliac pathology, and other inflammatory or neoplastic bone lesions. The differential diagnoses to be considered when GTPS is suspected, based on the localisation of the pain, are listed in Table 1.

Management

The management of GTPS includes several different modalities, depending on disease severity and chronicity, as well as the presence of tendon rupture and/or trochanteric bursitis. Generally, more conservative therapeutic modalities such as physical therapy, NSAID, and ESWT are used in the initial stages (see Fig. 1). Subsequently, local injections with agents such as CCS or PRP may be suggested. Finally, in a minority of cases, surgical treatment led by the orthopedic surgeon and guided by MRI may be required.

Table 1. Differential diagnoses of GTPS

Posterior pain	Lateral pain	Anterior pain
GTPS	GTPS (most common)	GTPS (rarely)
Lower back pain	Ilio-tibial band pathology	Coxo-femoral pathology (osteoarthritis, osteonecrosis, inflammatory arthritis, fracture, labrum, etc.)
Maigne syndrome*	Maigne syndrome*	Maigne syndrome*
Sacroiliac pathology (inflammation, dysfunction, etc.)	Meralgia paresthetica	Iliopsoas pathology (e.g., bursitis)
L5 or S1 radiculopathy	L3 or L4 radiculopathy	L1, L2, or L3 radiculopathy
Piriformis syndrome		Muscle lesion or tendinopathy (e.g., sartorius, rectus femoris)
		Abdominal hernia (femoral or inguinal)

Adapted from Nissen et al. [3]

*A clinical condition in which pain arises from the thoraco-lumbar zygapophyseal (facet) joints, with referral of pain to the lower back, pelvis, and gluteal and/or hip regions [9]

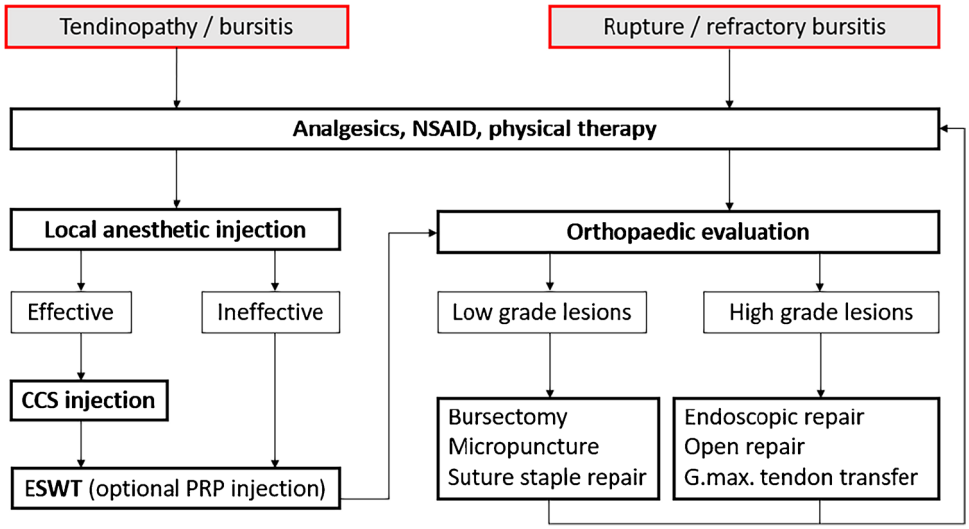

Fig. 1 Management of GTPS. GTPS greater trochanteric pain syndrome, NSAID non-steroidal anti-inflammatory drugs, CCS corticosteroid, ESWT extra-corporeal shock wave therapy, PRP platelet-rich plasma, G-max gluteus maximus. Adapted from Nissen et al. [3] and Lall et al. [10••].

Diet and lifestyle

In addition to physical therapy (physiotherapy) which will be discussed subsequently, there is some evidence to suggest that modifications of daily physical activities in order to reduce stress on the G. medius and G. minimus tendons by minimizing stair climbing and walking up hills, avoiding important hip adduction, lying on the symptomatic side, avoiding crossing legs while sitting, and standing with equal weight distribution on both lower limbs may be beneficial [11]. GTPS can also be successfully managed with weight loss [12].

Physical therapy and exercise

A survey from Stephens et al. [13] published in 2019 reported that the physical therapy strategies most commonly utilized in the UK for GTPS were education on load management and self-management strategies. Strengthening exercises, specifically targeting to the hip abductors, were generally preferred by therapists, using a combination of a home exercise program and one-to-one exercise sessions. Rompe et al. compared the benefit of repetitive exercises with piriformis muscle and fascia lata tensor stretching and iliopsoas and gluteal muscle strengthening, versus ESWT and CCS injections [14••]. Despite the lack of a placebo group, they found a longer duration of efficacy with home training and shockwave therapy compared to CCS injection alone, lasting up to 15 months after randomization. In a randomized controlled trial (RCT) by Mellor et al. comparing an education and exercise program, including load modification with functional retraining, and targeted muscle strengthening, with a particular focus on the hip abductor muscles and dynamic control

of adduction, versus local CCS injections, [15•] they found a better global improvement with education and physical therapy compared with CCS injection at 52 weeks, but no differences in pain intensity between the 2 groups.

Pharmacologic treatment

The goal of pharmacologic treatment is to relieve pain, facilitate physical therapy, and prevent disability. It should be reserved for patients with important discomfort, especially at night.

Oral NSAIDs (e.g., ibuprofen, diclofenac, celecoxib, naproxen)

The use of NSAID specifically for GTPS has not been studied in clinical trials, and their indication is therefore based on their use in other rheumatological indications. Consequently, we recommend NSAIDs at the lowest effective dose and ideally for a short duration, particularly for acute pain after activity or to relieve night pain. The choice of agent is based on multiple factors, such as patient comorbidities, duration of effect, and frequency of administration. Usual contraindications include gastrointestinal comorbidities, ischemic heart disease, and renal impairment. The principal drug interactions of NSAIDs include concomitant use of anticoagulants (such as vitamin K antagonists) which require gastric protection with a proton pump inhibitor. Epigastric pain and gastroesophageal reflux are the most common side effects. If longer duration therapy with NSAIDs is required, we recommend selective cyclooxygenase-2 (COX-2) inhibitors in order to minimize gastric toxicity. The primary limitation of oral NSAIDs is the risk of side effects, as these agents are generally relatively inexpensive.

Topical NSAID (e.g., diclofenac)

As with oral NSAIDs, there is also a lack of clinical trial data regarding topical NSAID for GTPS. A small retrospective case study with 25 patients found a similar benefit in pain reduction with a 6-week regimen of topical diclofenac 3% two to three times a day compared to oral etodolac 400 mg twice a day, with an improvement in the numerical pain rating scale (/10) from 6.6 to 3.2 and from 6.4 to 3.0 respectively at 6 weeks [16]. We recommend their use in patients for whom oral NSAIDs are contraindicated and as long as they lead to pain reduction without complications, such as skin rash, which is their predominant side effect. Topical therapies may be less effective in the case of greater adipose tissue thickness.

Systemic analgesics (salicylates, acetaminophen)

We recommend oral analgesics in combination with an oral NSAID to potentiate their effect in the case of important discomfort, or alone when there is a contraindication to NSAID use. Their potential hepatotoxicity requires periodic monitoring of liver function tests in the setting of long-term use.

Topical analgesics (salicylates, lidocaine, cannabidiol)

There are no studies evaluating the effectiveness of topical analgesics in GTPS, although they might provide temporary pain reduction. Topical cannabidiol has shown efficacy in animal models of neuropathic and inflammatory pain [17] but has not been well-studied in human models regarding its efficacy and safety [18].

Interventional procedures

Despite a lack of high-quality evidence, local injections represent a treatment alternative and could be helpful in terms of rapid pain relief. Given the chronicity of GTPS and a frequent suboptimal response to typical analgesics, a local injection of CCS in combination with local anesthetic (LA) is often suggested.

Local anesthetic and corticosteroid injection

Several small RCTs of patients with GTPS demonstrated short-term improvements in pain with local CCS injection [19•,20–22], while in comparison, a RCT with a true placebo arm showed no greater efficacy of CCS injections performed under US control compared with injection of normal saline solution [23••]. A recent meta-analysis reported that CCS injection may be superior to a "wait and see" approach in short-term and medium-term pain relief and medium-term functional improvements, but may be not superior to exercise, ESWT, or PRP injection in long-term pain relief and function improvement [24]. It appears that there is no difference in pain relief between fluoroscopically guided or blinded injections [21], while there may be a greater benefit with ultrasound-guided injection when it comes to the patient's general perception and intrabursitis injection or when a tendon rupture is suspected [23••]. A rapid decrease in pain following injection at the greater trochanter with LA alone appears to be a good predictor of the probability that the patient will respond to a subsequent injection with CCS (+/– anesthetic) [25]. Major (but rare) complications include local infection, allergic reaction, and local bleeding. The CCS-related side effects include facial flushing, skin or fat changes at the injection site, tendon rupture, or systemic effects, such as hyperglycemia. For the above reasons, we recommend to initially evaluate the effect of a LA injection alone, prior to injection with a CCS.

Platelet-rich plasma injection

The wide range of PRP formulations, which vary enormously based on factors such as the kit used and the concentration of leucocytes, as well as the outcome measures utilized, such as Harris Hip Score (HHS) or measure of pain and function with a visual analog scale, makes it very difficult to compare studies. Two small randomized studies demonstrated no significant difference between a single PRP injection and placebo [26, 27]. Conversely, when compared with CCS injection, PRP has demonstrated a greater improvement in the modified HHS and in a composite pain and function outcome measure at 3 months [28•, 29••], without any differences

at two- and 6-week follow-up between the two groups. More studies are required with longer follow-up to establish the potential for a long-term benefit of PRP injection in GTPS. Consequently, we recommend the option of a local PRP injection when there is a contraindication to local CCS injection or with refractory tendinopathy.

Hyaluronic acid injection

A small randomized control trial (without a placebo group) of 47 patients confirmed non-inferiority of an injection of hyaluronic acid (HA) in the trochanteric bursa, compared with CCS injection, regarding the VAS pain at three and 6 months [30]. A second study with a retrospective methodology using the hip disability and osteoarthritis outcome score suggested that HA combined with CCS injection might be more effective than CCS alone at six and 12 months [31].

Dry needling

Dry needling, which leads to stimulation of sensitive loci within the muscle, has also been studied in GTPS. According to one study, dry needling was comparable to CCS injection regarding short-term pain relief and function improvements [20]. Major limitations of this study include a lack of blinding, a high variation in the dry-needling intervention technique, and a short follow up of only 6 weeks.

Extracorporeal shock wave therapy (ESWT)

ESWT produces acoustic shockwaves which pass through the skin to the affected area (e.g., tendon) using a non-invasive device. Despite a lower efficacy on short-term pain relief, ESWT demonstrated significant improvement with regard to pain control after 4 months, compared with CCS injection, with sustainable effects lasting up to 15 months [14••].

Rompe et al. conducted an international study in 5 countries comparing the short-term and long-term effectiveness of one initial CCS injection, ESWT, and "home training" (HT) which consisted of stretching and strengthening exercises of pelvic and lower limb muscles and ligaments [14••]. HT was performed for 12 weeks. EWST was given once weekly for 3 weeks. A total of 229 patients participated and were divided into 3 groups. The patients were entered into each treatment group sequentially rather than by randomization. Improvement of symptoms or complete recovery occurred in 75% of the CCS group at 1 month. However, that percentage decreased to 51% and 48% respectively at 4 and 15 months. The improvement at the same period for HT was 7%, 41%, and 80%; ESWT showed a pattern similar to HT with improvements of 13%, 68%, and 80% at the above time intervals [14••].

According to the National Institute for Health and Clinical Excellence (NICE) in the UK, ESWT may be applied either in a single or several sessions and local anesthetic may be useful if the procedure is painful [32].

Surgery

Orthopedic evaluation for potential surgical repair should be reserved for refractory cases with persistent symptoms for more than 6 months and after well-conducted conservative treatment, in the case of significant tendon ruptures, or for refractory bursitis following failed CCS injection under ultrasound guidance, as long as the degree of local muscle atrophy and fatty infiltration is minimal [33, 34•].

The intraoperative endoscopic classification by Lall et al. [10••] describes five types of lesions that further guide the surgical techniques. For low-grade lesions, with bursitis (type I), gluteus tendinosis (type II), or a low-grade partial tear (type IIIA), bursectomy, micropuncture, and/or suture staple repair are recommended. A high-grade tear (type IIIB) or full-thickness tear (types IV and V) will generally require either an endoscopic repair, an open trans-tendinous repair, or a gluteus maximus tendon transfer. Contraindications for surgical repair include severe local muscle atrophy with fatty infiltration, visualized on preoperative MRI using a predefined fatty degeneration index, of both the G. medius and G. minimus muscles, because of the negative clinical outcomes of endoscopic repair in this setting [35].

A recent literature review reported very few cases of infections or new tears following surgical therapy for GTPS [34•]. The surgical treatment should always be followed by additional physical therapy, starting with passive range of motion and followed by muscle strengthening (see "Physical therapy and exercise").

Assistive devices

In a recent study of 53 women with chronic GTPS, foot orthotics did not immediately alter gait biomechanics or provide a clinically meaningful reduction in pain [36].

Emerging therapies

Surgical procedures such as gluteal reconstruction, using Achilles tendon allograft, are emerging as new options [37] and could provide a new therapeutic option when there is important tendon loss or atrophy following a chronic detachment. Despite being a more invasive and open technique with an increased risk of infection, the duration of the surgical intervention is shorter compared with endoscopic procedures and is the preferred option in the setting of significant muscular and tendon atrophy. Finally, a single case study reported a short-term improvement in pain relief following radiofrequency ablation of the trochanteric branches of the femoral nerve [38].

Conclusion

In this review of the literature, we summarize the clinical aspects and diagnosis of GTPS, as well as provide an up-to-date approach to the management of this condition, based on the most recent publications. Patients with GTPS generally require efficient analgesic control with a combination of an oral medication such as a NSAID and physical therapy. In refractory cases, short-term improvement following an injection of local anesthetic into the region of the greater trochanter suggests a potential role for a local CCS injection. ESWT appears to be a useful adjunct to the preceding therapies. An injection of PRP or HA may be suggested in the case of a contraindication to CCS injection, although the evidence remains limited. Orthopedic evaluation may be indicated if the conservative approach is ineffective or if a significant tendon rupture is confirmed on imaging. Surgical treatment will then be guided by the grade of lesion, leading to bursectomy and/or micropuncture for low-grade lesions or tendon repair or transfer for high-grade lesions. Further research and studies are required regarding emerging therapies, such as gluteal reconstruction with the Achilles tendon or radiofrequency ablation of the femoral nerves.

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Compliance with Ethical Standards

Conflict of Interest
Romain Guemara declares that he has no conflict of interest. Michael John Nissen declares that he has no conflict of interest.

Human and Animal Rights and Informed Consent
This article does not contain any studies with human or animal subjects performed by any of the authors.

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- •• Of major importance

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