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Developments for the Greater Trochanteric Pain Syndrome (GTPS)

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Abstract

In this mini-review pathophysiology, diagnosis, management and new treatment options for the greater trochanteric pain syndrome (GTPS) are discussed. GTPS is caused by gluteal tendinopathies sometimes with adjacent trochanteric bursitis. Education with exercise programs perform better than corticosteroid injections (CSI) after one-year treatment. Shockwave therapy (ESWT) may be a useful additional treatment in the future. There is no hard evidence for the use of hyaluronic acid (HA), platelet-rich plasma (PRP) in patients with GTPS. Recalcitrant cases of trochanteric bursitis can be managed with minimally invasive endoscopic bursectomy.

Introduction

Lateral hip pain sometimes is called 'greater trochanteric bursitis' but the preferred term is now greater trochanteric pain syndrome (GTPS), because this disorder usually is caused by gluteal tendinopathies, sometimes with adjacent bursitis. Although, corticosteroids were often used in patients with GTPS, the best treatment is unknown [1,2]. Nevertheless, the shifting opinion to gluteal tendinopathy with sometimes a secondary trochanteric bursitis stimulated research and raised several new treatment options. In this mini-review, pathophysiology, diagnosis, management and new treatment options will be discussed.

Pathophysiology

Greater trochanteric pain syndrome (GTPS) is a common cause of lateral hip pain, seen more commonly in females between the age of 40 and 60 [3,4]. GTPS is the most common cause of patients presenting with hip pain to primary care, with an incidence of 1,8 patients per 1000/year [5]. The prevalence in a spine clinic proved to be high with 50.5% [6]. Traditionally thought to be due to trochanteric bursitis, surgical, histological and imaging studies have shown that GTPS is attributable to tendinopathy of the gluteus medius and/or minimus with or without coexisting bursal pathology [3,7,8].

Abnormal hip biomechanics are hypothesized to predispose to the development of these gluteal tendinopathies. Compressive forces cause impingement of the gluteal tendons and bursa onto the greater trochanter by the iliotibial band (ITB) as the hip moves into adduction. Compression forces are increased where there is weakness of the hip abductor muscles due to lateral pelvic tilt [9].

Diagnosis

Patients commonly present with lateral hip pain located to the greater trochanter, which is worse with weight bearing activities and side laying at night [3,7,10]. There may be associated radiation down the lateral thigh to the knee. Pain may progressively worsen over time and can be triggered or exacerbated by sudden unaccustomed exercise, falls, prolonged weight bearing, or sporting overuse, commonly long distance running [7]. This condition carries significant morbidity, pain on side laying and subsequent reduction in physical activity levels carry negative implications for general health, employment and wellbeing [9].

It is important to accurately diagnose GTPS early, as delay and mismanagement can worsen prognosis due to progression to recalcitrant symptoms.The condition can be mistaken for common causes of hip pain including osteoarthritis of the hip, lumbar spine referred pain, and pelvic pathology [7,10]. The 'ability to put shoes

and socks 'on is a useful question to differentiate. GTPS patients will have no difficulty with this task [10].

Single clinical tests for GTPS lack validity, but a combination of tests can be used to increase the diagnostic accuracy. Direct palpation of the greater trochanter, (the 'jump sign', as the person can be so tender they jump off the bed) carries a positive predictive value (PVV) of 83% for positive MRI findings [8]. If there is no pain on palpation the patient is unlikely to have GTPS. The 'single leg stance' test (pain within 30 seconds of standing on one leg) has a very high sensitivity and PVV (100%) for positive MRI findings; if positive the patient is likely to have GTPS [8].

Combining these two clinical tests with others can further increase diagnostic accuracy. The FABER test (flexion, abduction and external rotation), FADER test (flexion, adduction and external rotation) and ADD test (passive hip adduction in side laying) aim to increase tensile load on the gluteus mediums and minimums tendons, causing a replication of the patient's pain. Other associated clinical findings may include positive Ober's test, positive step up and down test, and Trendelenburg gait positive [7].

GTPS is acknowledged as being a clinical diagnosis [3], but in recalcitrant cases or those with a mixed clinical picture, imaging can be used to exclude other pathologies and confirm the diagnosis. Hip X-ray is a useful first-line investigation in primary care [4]. In patients with clinical symptoms and signs of GTPS this investigation is usually normal but can exclude common differentials including osteoarthritis of the hip and fractures [4].

Ultrasound and MRI are useful second-line investigations to confirm the diagnosis. Diagnostic ultrasound is an imaging modality with a high PVV for diagnosis of GTPS [4]. Positive findings include fluid-filled and thickened trochanteric bursa with evidence of inflammation, tendinopathic echogenic findings or tears within the gluteus medius or minimus tendons [4,7]. MRI is best utilized in secondary care settings [4]. MRI changes are commonly found in asymptomatic patients so interpretation of results must be clinically correlated [10].

Management

Optimal management of GTPS remains unclear but the main goals of treatment should be to manage load and reduce compressive forces across greater trochanter, strengthen gluteal muscles, and treat comorbidities. The majority of cases of GTPS can be successfully managed in primary care with weight loss, non-steroidal anti-inflammatory drugs (NSAIDs), targeted physical therapy and load modification of biomechanics. Recalcitrant cases may require onward referral to a specialist enabling further investigations and specific therapies as e.g. corticosteroid injections (CSI), ultrasound or shockwave therapy, injections with hyaluronic acid or platelet rich plasma (or both), or finally surgery.

Corticosteroid Injections (CSI)

Small observational studies suggest that local CSI may be effective in the management of GTPS. However, the literature is inconclusive. Therefore, Nissen et al. performed the first randomized, double blind, placebo-controlled trial (GLUTEAL trial) to investigate the efficacy of CSI in the management of GTPS [11]. The trial was conducted between November 2011 and May 2015. Inclusion criteria included lateral hip pain (LHP) for greater than 1 month, a LHP score>4/10 and typical LHP reproduced by palpation of the greater trochanter. Participants were randomized in a 1:1 ratio to injection with a combination of a local an anaesthetic and glucocorticoid (GC) or injection with normal saline (placebo).

The primary outcome of interest was the difference in pain intensity at 4 weeks' post-injection between the two groups. Patients were followed for 6 months. A total of 46 patients were included. There were no significant differences between the 2 groups in terms of pain reduction at 1 month (p=0.23). When including all measures n the first 4 weeks and using multiple level regression analysis, there was a trend towards improvement in pain scores in favour of the intervention group (P=0.08). There were no significant differences in pain scores between groups at 3 and 6 months. In the management of GTPS local glucocorticoid injections are of no greater efficacy than injection of normal saline, the authors concluded. Given the lack of long-term improvement and the potential for cortisone-related side effects, this intervention is of limited benefit [11].

In the LEAP trial Mellor et al compared the effects of a programme of load management education plus exercise, corticosteroid injection use and no treatment on pain and global improvement in individuals with gluteal tendinopathy [2]. The study design was a prospective, three-arm, single-blinded, randomized clinical trial. Participants were individuals aged 35 to 70 years with lateral hip pain for more than three months, at least 4/10 on the pain numerical rating scale, and gluteal tendinopathy confirmed by clinical diagnosis and MRI, and with no GC injections in the previous 12 months, current physiotherapy, total hip replacement, or neurological conditions. Interventions included a physiotherapy led education and exercise programme of 14 sessions over 8 weeks (EDX; n=69), one CSI (n=66) and a wait and see approach (WS; n=69).

Primary outcomes were patient reported global rating of change in hip condition (on an 11-pointscale, dichitonized to success and non-success) and pain intensity in the past week (0=no pain; 10=worst pain) at 8 weeks, with long-term follow-up at 52 weeks.

Of 204 randomized participants (including 167 women, mean age 54.8 years (SD 8.8), 189 (92.6%) completed 52 weeks' follow-up. Success on the global rating of change was reported at 8 weeks by 51/66 EDX; 38/65 CSI, and 20/68 WS participants. EDX and CSI had better global improvement scores than WS (risk difference 49.1%; 95%CI; 34.6% to 63.5%), number need to treat 2.0 (95%CI; 1.6-2.9); 29.2% (13.2% to 45.2%), 3.4 (2.2 to 7.6); respectively.

EDX had better global improvement scores than CSI (19.9% (4.7% to 35.0%); 5.0 (2.9 to 21.1). At 8 weeks, reported pain on the numerical scale was mean score 1.5 (SD 1.5) for EDX, 2.7 (2.4) for CSI and 3.8 (2.0) for WS. EDX and CSI participants reported less pain than WS (mean difference -2.2; 95%CI -2.89 to -1.54); -1.2 (-1.85 to -0.50), respectively) and EDX participants reported less pain than CSI (-1.04; -1.72 to -0.37). Success at the global rating scale of change was reported at 52 weeks by 51/65 EDX, 36/63 CSI and 31/60 WS participants. EDX was better than

CSI (20.4% (4.9% to 35.9%); 4.9(2.8 to 20.6) and WS (28.6% (11.3% to 42.3%); 3.7 (2.4 to 8.8). Reported pain at 52 weeks was 2.1 (2.2) for EDX, 2.3 (1.9) for CSI, and 3.2 (2.6) for WS; EDX did not differ from CSI (-0.26 (-1.06 to 0.55), but both treatments did better than WS (1.13 (-1.93 to -0.33); 0.87 (-1.68 to -0.07), respectively.

The authors conclude that for gluteal tendinopathy education plus exercise and corticosteroid injection use result in higher rates of global improvement and lower pain intensity than no treatment at 8 weeks. Education plus exercise performed better than corticosteroid injection at 52 wees follow-up, education plus exercise led to better global improvement than corticosteroid injection, but no difference in pain intensity. These results support EDX as an effective management approach for gluteal tendinopathy.

Ultrasound therapy

While ultrasound is widely used in GTPS as a diagnostic imaging modality or in ultrasound guided CSI, there is a paucity of information about its use as a therapeutic modality. Xiu et al, performed a systematic review and meta-analysis of several databases on the effectiveness of ultrasound on patients with myofascial pain syndrome on pain and range of motion [12]. The results showed that ultrasound significantly reduced pain intensity and improved pain thresholds, but has no effect on the range of motion. The risk of bias in the reviewed studies was high. These results don't support a role for ultrasound therapy in the treatment of GTPS.

Shockwave therapy (ESWT)

Several studies reported extracorporeal shockwave therapy (ESWT) as a suitable alternative treatment option for refractory GTPS with satisfactory long-term maintenance [13-16]. However, these studies included clinically diagnosed GTPS. Seo et al, investigated 38 patients with MRI-documented GTPS, who underwent low-energy ESWT once per week and followed Numeric Rating Scale (NRS) before and 1 week and 27 months' follow-up. Success rates were 83.3% (immediate) and 53.3% long-term, respectively. Study design was bad, however and no ESWT energy levels were given.

Uncertainties about frequency and energy levels of ESWT for GTPS lead to the start of the ESTATE trial in which the dose-related effect of focalized shockwave treatment at different total energy influx in patients with chronic GTPS will be studied, as prior studies showed favorable results [13-17]. Shockwave has been widely recognized in the literature as a biologic regulator. Currently, the biological effects of shockwaves can be obtained using lower energy than in the past [18].

While the intensity of the delivered energy is considered by some researchers to be a key factor for successful treatment, debate over the appropriate energy and the total delivered energy that could be applied to the tissue, continues. Higher intensity treatments usually require local anesthesia, which is known to reduce the efficacy of treatment. Furthermore, some animal tests reported that an influx of energy of over 0.60mJ/mm^2 can cause permanent damage on the tendon. On the other hand, low-intensity energy is safer but has the disadvantage of lower treatment effects. The ESTATE investigators hypothesize that a very low intensity protocol of ESWT has different effects on pain and function than a conventional protocol in patients with GTPS [19].

Hyaluronic acid

Hyaluronic acid (HA) is believed to be chondroprotective, increase proteoglycan and glycosaminoglycan synthesis and act as an anti-inflammatory agent. These effects are thought to be caused by HA binding to a cluster of differentiation CD44 receptors [20]. HA has been used predominantly in knee and hip osteoarthritis [21-23]. Results suggest favorable outcomes in pain scores in small heterogeneous studies with smaller treatment effects in higher quality studies [22,23].

Pereira et al, compared the safety and efficacy of HA injections to CSI for the treatment of GTPS in a two-arm, prospective trial of 47 GTPS patients. No significant differences in improvements of pain scores were found after 1, 3 and 6 months in both treatment groups [24].

Gorelick et al. assessed the efficacy and safety of single HA injections in 92 diabetic patients (74 females, 18 male) in an uncontrolled study [25] Pain scores improved at 6 months and one year and they concluded these results were similar to those of HA injections in the general population. Large RCTs studying HA injections in GTPS are lacking, as is the rational for injecting unstandardized viscosupplemental therapy in the bursa of a tendinopathy.

Platelet-rich plasma (PRP)

PRP is a volume of autologous plasma that exhibits a platelet concentration above baseline levels and is rich in platelet-derived growth factors (PDGFs) [26-28]. PRP is prepared by centrifugation [28] or apheresis [29].

Lately, PRP has become very popular among the orthopedic community as a minimally invasive way of enhancing tissue repair in different conditions including rotator cuff repair [30,31] patellar tendinopathy [32,33], knee osteoarthritis [34] and lateral epicondylitis [35]. It is not surprising PPR has also been used in the treatment of GTPS.

Ali et al, performed a search of NICE healthcare database until April 2018 [36]. Five full text articles were included for analysis consisting of three RCTs and two case series. Also, 4 conference abstracts were selected. In total this survey consisted of 209 patients. The mean age was 58.4 years (range 48-76.2 years) the majority of patients were females and the minimum duration of symptoms was three months. Diagnosis was made using ultrasound or MRI. Included studies used a variety of outcome measures. Improvement was observed during the first 3 months after injection. Significant improvement was also noted when patients were followed up till 12 months.

This review highlights the lack of adequately powered studies providing high-quality evidence, especially when the global pathology of GTPS is considered. Quite often the pathology may be in the gluteus medius and minimus and not in the bursa. Therefore, the site of injection needs to be considered. In addition,

the use of different PRP systems, concentrations and volumes causes heterogeneity of the studies. Due to these limitations, the definite role for PRP in GTPS is still open for debate. Further large-sample, high-quality RCTs are needed to provide evidence of the efficacy of PRP in GTPS.

Surgery

Sometimes gluteal loading exercise may not improve GTPS [37,38].In these cases, surgery may be an option. In patients with chronic recalcitrant trochanteric bursitis, endoscopic bursectomy is an effective and viable alternative to open bursectomy [39].

Conclusion

GTPS is caused by gluteal tendinopathies sometimes with adjacent trochanteric bursitis. Optimal management of GTPS remains unclear, but education plus exercise performs better than corticosteroid injections after 1-year follow-up [2]. Shockwave therapy (ESWT) shows favorable results in small studies, but larger studies should define low-intensity energy levels and its effect on pain and function in e.g. the ESTATE trial [19]. There is no hard evidence for the use of injections with hyaluronic acid (HA), platelet-rich plasma (PRP), or both, in patients with GTPS [36]. In cases of chronic recalcitrant trochanteric bursitis endoscopic bursectomy is an effective and viable alternative to open bursectomy [39]. At this time, most cases of GTPS will be well managed with exercise and education [2]. Looking for the future, shockwave therapy seems the most promising additional treatment.

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