

Low back pain caused by iliopsoas tendinopathy treated with ultrasound-guided local injection of anesthetic and steroid: a retrospective study

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Abstract

Background Low back pain is a prevalent symptom that occur in all age of people, whereas the pathogenesis is unknown. Iliopsoas tendinopathy is an increasingly recognized hip disorder that may contribute to low back pain. Our purpose is to reveal the relationship of iliopsoas tendinopathy with low back pain and to evaluate the effect of ultrasound-guided local injection of anesthetic and steroid into iliopsoas tendon in treating low back pain. **Methods** This retrospective study reviewed 45 patients diagnosed with iliopsoas tendinopathy treated by B-ultrasound guided injection of lidocaine and triamcinolone into the iliopsoas tendon from March 2016 to June 2016. Medical records were collected to analyze the clinical presentation. Visual Analogue scale (VAS) and Harris Hip score (HHS) were administered to determine patient outcomes. Telephone follow-up was conducted, and the mean follow-up was 11 months. **Results** We observed that most patients with iliopsoas tendinopathy also complain chronic low back pain except for groin pain. After injection of anesthetic and corticosteroid into the iliopsoas tendon, the VAS fell from 7.82 ± 1.35 to 2.73 ± 1.24 immediately after the injection, and 0.8 ± 0.75 at follow-up. The HHS improved from 41.09 ± 17.67 to 97.89 ± 2.79 at follow-up. Statistically significant difference ($P < 0.001$) was observed. All patients returned to their original level of function and only seven patients (15%) presented with mild pain at the follow-up. **Conclusions** Low back pain is a prevalent presentation for iliopsoas tendinopathy. Diagnosis of iliopsoas tendinopathy should be considered in patients with low back pain with tenderness over the iliopsoas tendon. Ultrasound-guided local injection of anesthetic and steroid lead to satisfactory effect in relieving low back and groin pain and improving joint function.

Background

Low back pain is a prevalent symptom that occur in all age groups. It is the number one cause of lived with disability in 2017 according to Global Burden of Disease Study (GBD)(1). However, rarely can a specific cause of low back pain be identified, offering a diagnostic challenge for clinical doctors.

There is emerging evidence that low back pain coexists with hip disorder(2-4). According to a systematic review, patients with low back pain frequently have limited hip range of motion, and significant improvement of low back pain was observed after intervention for hip disease(5). The iliopsoas muscle is regarded as the main flexor of the hip which is a confluence of the psoas and iliacus muscle. It originates from the lumbar vertebrae and pelvis, and lies beneath the inguinal ligament to inserts on the lesser trochanter(6). The iliopsoas tendon overlies directly the femoral head. When a tight iliopsoas tendon impinges on the femoral head and anterior hip capsule repetitively, resulting in chronic injury to the iliopsoas tendon, namely, iliopsoas tendinopathy. Iliopsoas tendinopathy is a poorly unrecognized cause of groin pain. Over use injury, acute trauma, and rheumatoid arthritis are the 3 main causes of iliopsoas tendinopathy(7). Currently, the diagnosis is largely made on the basis of the patient history, physical examination, and radiographs. Therapeutic injection of anesthetic and corticosteroid into the iliopsoas tendon sheath can help to confirm the diagnosis(8, 9) as well as alleviating the symptom of iliopsoas

tendinopathy(10, 11). Not exactly as previous reported, we observed that patients with iliopsoas tendinopathy often accompany low back pain.

In this study, our purpose is to (1) analyze the relationship between iliopsoas tendinopathy and low back pain (2) determine if ultrasound-guided local injection of anesthetic with corticosteroid into the iliopsoas tendon can improve low back pain and function outcomes.

Methods

We reviewed all patients with a diagnosis of iliopsoas tendinopathy and referred for an iliopsoas injection from March 2016 to June 2016 at our Hospital. The study protocol was approved by the Ethics Committee and all patients were informed about the study and gave their consent to be enrolled. We considered the diagnosis in patients who had sustained groin pain, focal tenderness over the iliopsoas tendon exaggerated on active straight leg raise with or without positive impingement test(12, 13). Confirmation of the diagnosis was determined by the immediate improvement of pain and focal tenderness over the iliopsoas tendon after injection. Hip and lumber plain radiograph, CT, MRI were conducted, and the following conditions were excluded: malignant tumor, severe hepatic and renal dysfunction, rheumatoid diseases, recent (less than 6 months) lumber trauma, carried out lumber or hip surgery before or within follow-up, femoral acetabular impingement, labral tear, hip osteoarthritis, ankylosing spondylitis, concomitant infection.

2.1 Patients

Forty-five patients who met the inclusion criteria were reviewed. Of these patients, there were 26 males and 19 females with a mean age of 44.5 (range, 18-75 years) (Table 1). All patients included underwent an ultrasound-guided iliopsoas injection by the same surgeon using the same treatment protocol. The ultrasound-guided injection was performed with the patient supine on the table. B-ultrasound showed that the iliopsoas tendon crossed normally over the bony acetabulum. Under the sonographic guidance, a combination of 2ml 2% lidocaine and 1ml (5mg) triamcinolone acetonide was injected into the iliopsoas tendon where tenderness is the most obvious with a 22-gauge spinal needle (Fig. 1). The patients were asked to walk to determine if there was any difference from the original symptoms 10 to 15 minutes after the treatment. Confirmation of the diagnosis was determined by the immediate improvement of pain and focal tenderness over the iliopsoas tendon after injection. After the injection, all patients were asked to rest for 15 minutes in case of adverse reaction and no shower within 5 hours.

2.2 Outcomes

The primary outcomes analyzed were Visual Analogue scale (VAS) and Harris Hip score (HHS) [9]. VAS score ranges from 0 (no pain) to 10 (worst pain possible) and HHS ranges from 0 to 100 (a total score of <70 is considered a poor result). Secondary outcomes included complications (e.g. infection, vascular injury).

We retrospectively reviewed the medical record for every patient and recorded their HHS and VAS before and after treatment, the clinical presentations were also acquired. We presented telephone follow-up an average of 11 months (range, 10-13 months) after the treatment by one senior-level resident independent of the treating surgeon. We contacted all the 45 patients included by telephone at the follow-up.

2.3 Statistical methods

Post-treatment VAS and HHS were compared with pre-treatment values using Wilcoxon signed rank test and a two-tailed, paired Student *t*-test separately. A *p*-value<0.05 was considered to be significant.

Results

In our study, 14 patients had left hip pathology, 14 had right hip pathology and 17 had both hip pathology (Table 1). The chief complaint of these patients were chronic (more than one year) groin pain that increased with hip flexion and had difficulty wearing socks and mostly accompanied by claudication. 41 of the 45 patients (91%) complained of low back pain with groin pain, only 4 of them have pain only in the groin area. 5 patients (11%) complained mostly pain in the buttock and may radiate down to the thigh. 36 patients (80%) described the pain as paroxysmal, often induced by physical exercise or sedentariness. Half of the patients have difficulty turning over at the bed and the pain can be exaggerated when sleeping supine in 15 cases. 31 patients (69%) complained of accompany with limited hip flexion (have difficulty wearing socks or squatting). 11 patients (24%) complained of pain accompanied with snapping hip. 26 patients (58%) tried oral NSAIDs drugs to alleviate pain, nevertheless, all of them complaint of temporary and limited effect. On physical examination, however, all the 45 patients presented focal tenderness over the iliopsoas tendon, exaggerated when resistance and accompanied with poor muscle strength. Impingement test were observed in 8 cases. After the treatment, all the 45 patients attended telephone follow-up, up to the 1-year post-treatment assessment.

The VAS for groin with or without low back pain before treatment was 7.82 ± 1.35 . This fell to 2.73 ± 1.24 ten minutes after the injection. At 1-year post-treatment, the VAS was 0.8 ± 0.75 . Statistically significant difference ($P < 0.001$) was observed. The pre-treatment Harris hip score was 41.09 ± 17.67 . It improved to 97.89 ± 2.79 at one year after the injection, significantly improved compared with pre-treatment value ($P < 0.001$). (Table 2)

Six patients (13%) complaint dizziness after the injection due to anesthesia and all recovered after resting for 10 to 20 minutes. No patient had infection, vascular injury or any major complication. Most patients had a single injection, five patients (11%) were given a second injection 1 month after the first injection. Although alleviated focal tenderness was observed immediately after the first injection, these 5 patients still had severe groin with or without low back pain and focal tenderness over the iliopsoas tendon, exaggerated when resistance 1 month after the first injection. According to their symptoms and lack of signs for other possible diagnosis, iliopsoas tendinopathy is still at the first consideration, so the second injection was given. Ultimately, all patients returned to their original level of function after the injection, only seven patients (15%) still presented with mild pain (VAS range, 2-3) at last follow-up.

Discussion

For the vast majority of patients with low back pain, the pathoanatomical cause cannot be currently determined(14). Malignancy, vertebral fracture, or axial spondyloarthritis are serious causes for low back pain, but only account for a very small proportion of cases(15). It has been investigated that intervertebral disc, facet joint, and vertebral endplates contributing to low back pain is not possible. Among asymptomatic individuals, imaging findings of spine degeneration (disc bulge, disc protrusion) is prevalent(16). What is more, the rate of spontaneous regression was found to be 96% for disc sequestration, 70% for disc extrusion, 41% for disc protrusion and 13% for disc bulging(17). Thus, identifying the pathoanatomical basis of low back pain is in urgent need to open up new approaches for people with disabling low back pain worldwide.

Disorder of hip and lumber have overlapping presentation and symptoms. Heidi et al. found that positive hip physical examination is prevalent in patients with low back pain, patients with low back pain and positive hip examination findings have more pain and worse function compared with patients without hip examination findings(18). It is estimated that about 60.4% patients with hip osteoarthritis also complain of low back pain, and after total hip arthroplasty, significant improvement of low back pain can be observed one-year postoperative(19). According to a systematic review of John et al., patients with low back pain frequently accompany limited hip range of motion, and these patients routinely improve after surgical intervention for hip diseases(5). Hip diseases may closely relate with low back pain, but by what means are they related is still unknown. The iliopsoas musculotendinous unit is a powerful hip flexor which has important function in femoral external rotation and with lateral bending, flexion, and stabilizing the spine in the frontal plane(20, 21). It originates from the outer surfaces of the vertebral bodies of T12-L5 and inserts on the lesser trochanter of the femur (Fig. 2). We hypothesis that the pathology of iliopsoas musculotendinous unit may contributes to low back pain caused by hip disorders.

Iliopsoas tendinopathy is closely related with the repetitive pathologic movement of the tendon. In our study, we found that iliopsoas tendinopathy can be observed in most patients with low back pain and significant relieved low back pain was observed after local injection of anesthetic and steroid into the iliopsoas tendon, indicating iliopsoas tendinopathy is a plausible source of low back pain. Altogether, we believe that iliopsoas tendon is a structure closely related with the generation of low back pain. But further investigation is needed to further confirm the relation between iliopsoas tendinopathy and low back pain. Besides, why does iliopsoas tendinopathy generate low back pain and how does intraarticular pathologies correlate with iliopsoas tendinopathy and contribute to low back pain is still unknown.

To our knowledge, our study is the first study to report low back pain as a major presentation for iliopsoas tendinopathy and investigate the clinical effect of ultrasound-guided local injection on it. Our results showed that ultrasound-guided injection of anesthetic and steroid into the iliopsoas tendon can improve low back and groin pain significantly for patients with iliopsoas tendinopathy. Significant mid-term outcome was also observed in our study. 84% (38 of 45 patients) presented absolute pain relief and an improved HHS. In patients with low back pain and/or groin pain and local tenderness over the iliopsoas

tendon, iliopsoas tendinopathy should be considered. CT and MRI can be helpful in excluding other diagnosis including osteoarthritis and femoral acetabular impingement. Local injection of anesthetic and steroid can be applied as both therapy and a way of confirming the diagnosis.

In consistent with previous researches, our result also demonstrated that local injection has therapeutic effect on iliopsoas pathology. In patients with painful snapping hip, injection can be beneficial, 16 of 18 patients in the study had a good response at an average of 4 months(22). Adler et al. performed sonography-guided for the presumed diagnosis of iliopsoas tendinosis, 44% of these patients had continued relief at 1 year(10). Agten et al. reported an improvement at 1 month of the patients with iliopsoas tendinopathy after fluoroscopy-guided iliopsoas bursa injection(11). For patients with iliopsoas impingement after total hip arthroplasty, nonoperative management is reported to lead to groin pain resolution in 50% of patients(23). Nevertheless, a systematic review showed that nonsurgical treatment including injection was only successful in 39% patients with iliopsoas impingement after total hip arthroplasty(24).

Although we demonstrated promising therapeutic effect of local injection on low back pain caused by iliopsoas tendinopathy, however, there are several limitations of our study. We included a relatively small number of patients with iliopsoas tendinopathy, and long-term follow-up is needed to further confirm our results. Additionally, we had no control group for comparison, and we present our study in a single center. We will further amplify the sample size and put randomized controlled trials into practice to confirm our study. Another limitation of our study is that the use of VAS and HHS to assess the outcome are subjective, the sense of pain can vary from person to person.

Conclusions

In conclusion, iliopsoas tendinopathy closely correlate with low back pain. Most patients with iliopsoas tendinopathy complain of low back pain. The diagnosis of iliopsoas tendinopathy should also be considered in patients with low back pain and local tenderness over the iliopsoas tendon. Ultrasound-guided local injection of anesthetic and steroid into the iliopsoas tendon is easy to conduct and can significantly improve low back pain and joint function. It can be used as a routine treatment for iliopsoas tendinopathy.

Declarations

Ethics approval and consent to participate

The study protocol was approved by the Ethics Committee of Shanghai Sixth People's Hospital and all patients were informed about the study and gave their consent to be enrolled.

Consent for publication

Not applicable

Availability of data and materials

All data generated or analysed during this study are included in this published article.

Competing interests

The authors declare that they have no competing interests

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Authors' contributions

ZZ: Analyzed the data and wrote the manuscript. JZ: Analyzed the data and performed the follow-up. JS: Technical support and conceptual advice. CZ: Designed the study and edited the manuscript. ZX: Supervised the study, designed the study and edited the manuscript. All authors read and approved the final manuscript.

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Not applicable.

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Tables

Table 1 Demographic features in the 45 study patients.

n=45	
Gender, n (%)	
Male	26 (58%)
Female	19 (42%)
Age, years, mean±SD (range)	45±12 (18-75)
Affected side, n (%)	
Left	14 (31%)
Right	14 (31%)
Both	17 (38%)
Follow-up time, months (range)	11 (10-13)

Table 2 Clinical outcomes in the patients

	Before treatment	Ten minutes after injection	P Value	Last follow-up	P Value
Visual Analogue scale	7.82±1.35	2.73±1.24	<0.0001	0.8±0.75	<0.0001
Harris Hip score	41.09±17.67			97.89±2.79	<0.0001

Values are expressed as mean±SD (range) unless otherwise indicated.

Figures

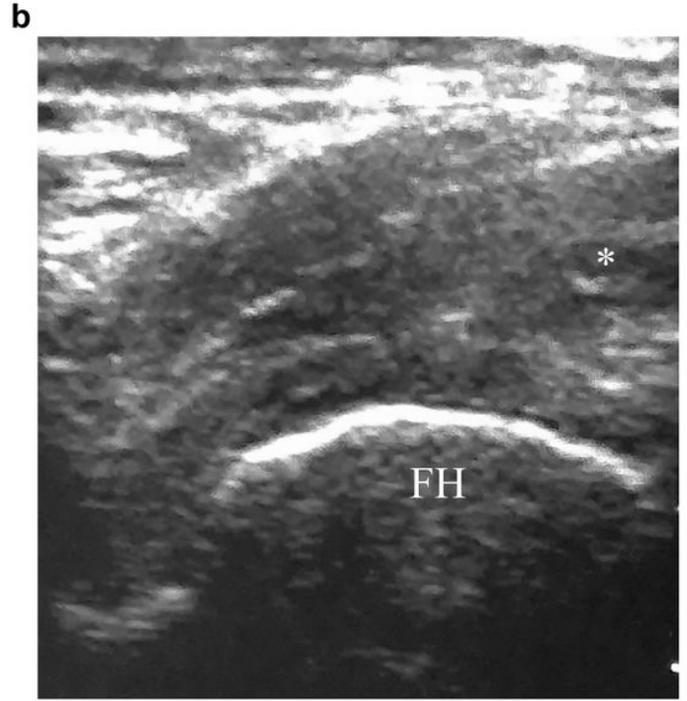


Figure 1

1a-b (a) The position of transducer and needle for iliopsoas injection. (b) Anterior view of the hip joint with iliopsoas tendon indicated by the asterisk. FH: Femoral head.

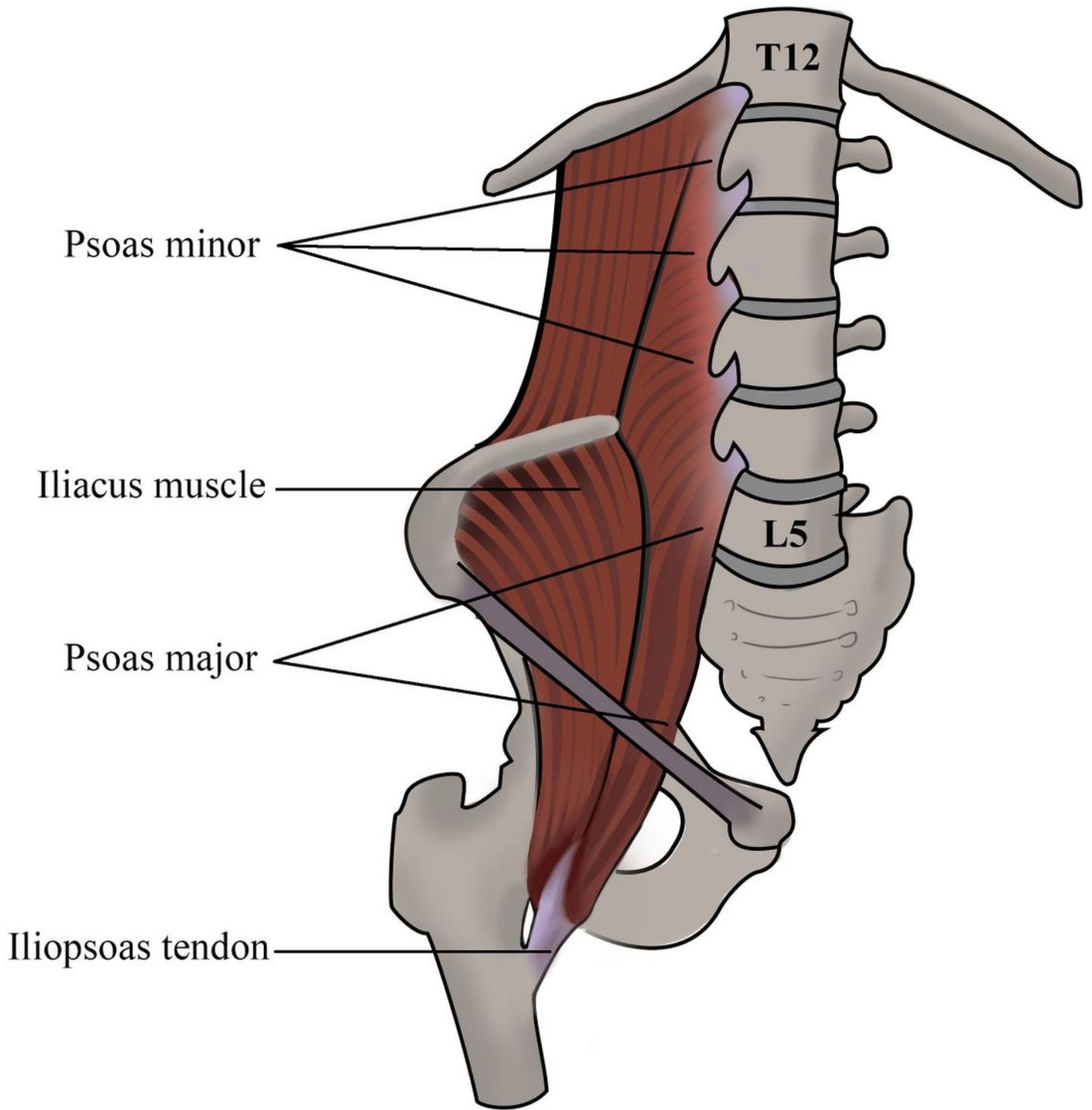


Figure 2

The anatomic relation of iliopsoas and the spine