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Case Report

Sonoanatomy and Injection Technique of the Iliolumbar Ligament

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Background: The iliolumbar ligament plays an important biomechanic role in anchoring the spine to the pelvic ring and stabilizing the sacroiliac joint. Iliolumbar syndrome is a back pain condition caused by pathology of the iliolumbar ligament. History and physical examination are important in the assessment of back pain, but they lack sufficient specificity. Injection of small volumes of local anesthetic into the structure considered to be the source of the pain (i.e. the iliolumbar ligament) increases the specificity of the diagnostic workup.

Objective: To describe an ultrasound - guided technique for injecting the iliolumbar ligament.

Study design: Case report based on knowledge of topographic anatomy and sonoanatomy.

Setting: Outpatient clinic.

Methods: A patient with a clinical picture suggestive of iliolumbar syndrome was selected. An ultrasound-guided injection of the iliolumbar ligament with local anesthetic was performed. We recorded the patient's subjective assessment of pain and the change in range of movement and pain scores during provocative tests.

Results: Following the injection, the patient's pain score decreased, provocation tests became negative, and the range of movement increased.

Limitations: Case report. Target specificity and dispersion of local anesthetic spread not confirmed with an independent technique (i.e. magnetic resonance imaging).

Conclusions: Ultrasound guidance allows the selective deposition of small volumes of local anesthetic into structures believed to cause soft tissue back pain and thus to confirm or exclude the working diagnosis. Further studies are needed to confirm our conclusions and to prove the clinical feasibility of this technique.

Key words: Technique, visualization, real-time, ultrasound, iliolumbar ligament, iliolumbar syndrome, diagnostic injection, low back pain, groin pain.

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Chronic low back pain is one of the most common types of chronic pain suffered with high prevalence and a significant socioeconomic impact (1-3). Kuslich et al (4) identified intervertebral discs, facet joints, ligaments, fascia, muscles, and nerve root dura as tissues capable of transmitting pain in the low back. Multiple diagnostic techniques with accuracy and validity have been described to identify the pain generating from the disc, facet joints, and sacroiliac joint (3,5-8). However, the pain generating

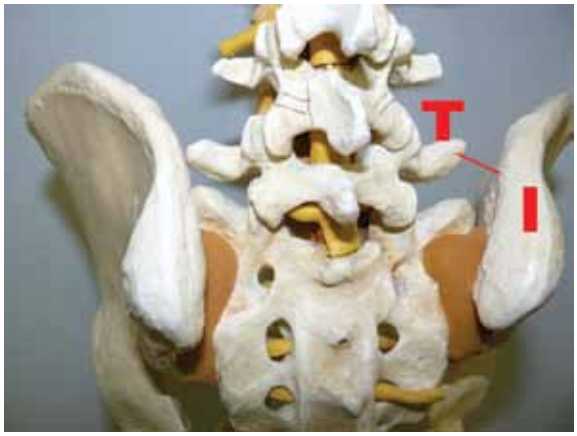

Fig 1. *Attachments of the iliolumbar ligament. T = right transverse process of L5; I=iliac crest; red line – course of the iliolumbar ligament.*

from multiple ligaments including iliolumbar ligament is difficult to diagnose (9-12). The iliolumbar ligament is one of the common sources of low back pain. The iliolumbar ligament runs between the transverse process of L5 and the medial deep iliac crest (Fig. 1). It plays an important biomechanical role in anchoring the spine to the pelvic ring and stabilizing the sacroiliac joint (11). Iliolumbar syndrome is a painful condition caused by the pathology of the iliolumbar ligament. It occurs in people who are lifting heavy loads while rotating laterally (manual workers, golf players, etc). The pathology is believed to be ligament strain. The pain is localized to the posterior/medial portion of the iliac crest, might be constant, and is aggravated by activity (especially bending to the contralateral side). Pain may refer to different areas (hip, groin and perineal structures). There is tenderness on palpation of the posterior/ medial aspect of the iliac crest. Pain is provoked by lateral bending to the opposite side (Fig. 2). One has to consider other sources of pain (quadratus lumborum muscle, erector spinae muscle, the facet joints, the sacroiliac joint, the hip, etc) and a combination of history and physical exam, plus imaging and appropriate diagnostic injections can lead to the correct diagnosis. The iliolumbar ligament lies deep to the following structures: skin, subcutaneous tissue and the erector spinae muscle. The diagnosis of iliolumbar syndrome is difficult without image-guided injection. Ultrasound offers many advantages in this setting.

Our objective was to perform an ultrasound-guided diagnostic injection of the iliolumbar ligament in a patient with working diagnosis of iliolumbar syndrome. We planned to assess the patient pre and post injection by recording pain scores at rest, pain scores with range of motion and pain scores on provocation.

Fig 2. *Lateral bending to the opposite side can provoke pain from the iliolumbar ligament.*

Case report

A 46-year-old male patient (BMI 28) presented with persistent, debilitating right-sided lower back pain. The onset of pain was associated with lifting a heavy weight 12 months previously. His pain averaged 7 out of 10 (numerical rating scale). The pain was centered on the right iliac crest, and was associated with tenderness to palpation in this region. There was pain also in the right lateral hip region and the medial aspect of the right groin. Lumbar lateral flexion to the left exacerbated the pain. Neurological exam was normal. X-ray and magnetic resonance imaging (MRI) of the lumbar spine were normal.

Conservative measures of anti-inflammatory drugs and physical therapy had failed to resolve symptoms. As a result, the patient was unable to fulfill all of his work commitments. He had to opt for light duties and decreased hours in his work as a warehouse general operative.

Fig 3. *In the ultrasound guided iliolumbar injection technique the ultrasound transducer is initially placed over the iliac crest in a sagittal plane.*

The patient gave consent for an ultrasound-guided right iliolumbar ligament injection. He was placed in the prone position. A pillow was placed under the abdomen to straighten the lumbar lordosis. The operator and the ultrasound screen were positioned on the side to be injected. The skin was disinfected with antiseptic solution and draped. A low frequency (2-5 MHz), curvilinear ultrasound transducer (Sonosite®, Micromaxx, Bothwell, WA, USA) was inserted into a sterile sheath (CIVCO Medical Instruments, Kalona, IA, USA) containing ultrasound gel. Sterile ultrasound gel was placed between the patient and the transducer.

The ultrasound transducer was placed over the right iliac crest and oriented in the caudad - cephalad direction (Fig. 3). The iliac crest was identified (Fig. 4). The transducer was moved medially and caudad while the orientation was changed to oblique (Fig. 5). This allowed visualization of the erector spinae muscle (Fig. 6). The hyperechoic structure below this muscle is the iliolumbar ligament. Moving the transducer medially and caudally and the rotation to a transverse orientation allows visualization of the transverse and spinous process of L5. An aseptic injection technique was used. After infiltrating the skin with 1% Lidocaine a 25-gauge

Fig 4. *Sagittal ultrasound image of the iliac crest. I=iliac crest.*

spinal needle (Becton Dickinson S.A, Madrid, Spain) was used to perform the iliolumbar ligament injection. We used an in-line approach from the medial side of the transducer, i.e. the needle was advanced laterally and cephalad (Fig. 5). Real time imaging was used to advance the needle tip deep to the erector spinae muscle and confirm local anesthetic spread along the iliolumbar ligament (Fig. 6). Three mLs of local anesthetic was injected.

The patients' pain intensity decreased to 2 out of 10 (numerical rating scale). When asked to perform the contralateral lumbar flexion test, the patient demonstrated increased range of movement and a decreased pain score. A diagnosis of iliolumbar syndrome was made. The patient was referred to physiotherapy with this diagnosis. Subsequently the patient underwent ultrasound-guided prolotherapy to the right iliolumbar ligament. He obtained persistent pain relief and returned to full work duties.

Discussion

Back pain is a significant cause of disability (1-3). While there might be many pain sources, soft tissue injury (i.e. related to muscles, ligaments, etc.) and consequent pain are believed to be very common (12). History and physical examination are important in the assessment of back pain, but they lack sufficient specificity (3,8,9). Injection of small volumes of local anesthetic into the structure considered to be the source of the pain (i.e. facet or sacroiliac joint injections, and indeed the iliolumbar ligament) increases the specificity of the diagnostic workup (3,8,9).

Our findings suggest that an ultrasound-guided iliolumbar ligament injection is a viable option compared to the classic blind injection technique (13). The topographic anatomy of the iliolumbar ligament is well described (14). There are multiple anatomical structures in close proximity to the medial iliac crest. The specificity of the blind injection technique must thus be questioned. This might also explain why the blind injection technique or the diagnosis of this syndrome has not become more popular.

As compared with other imaging modalities (fluoroscopy, CT, MRI) ultrasound has significant advantages in terms of accessibility, ease of use, safety, cost and quality of visualization of the soft tissues in real time.

Fig 5. *The orientation of the ultrasound transducer is oblique, over the course of the iliolumbar ligament from the L5 transverse process to the deep aspect of the medial iliac crest. The needle is introduced from the medial side aspect of transducer using an in-line approach.*

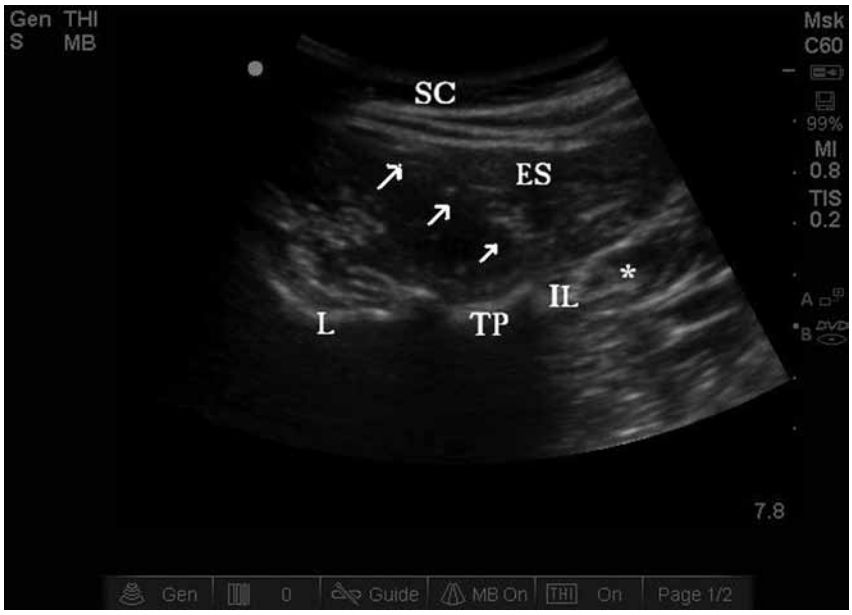

Fig 6. *Ultrasound image of iliolumbar ligament injection. The needle (arrows) is seen traversing the subcutaneous tissue and erector spinae muscle (ES). Note the hypoechoic area depicting the spread of local anaesthetic (*) between the erector spinae and the iliolumbar ligament. SC=subcutaneous tissue, ES=Erector spinae muscle, IL=iliolumbar ligament, TP=transverse process, L=vertebral lamina.*

While it is believed soft-tissue back pain is very common, the true frequency is not well defined. However, the procedure may be performed under fluoroscopy, specifically when fluoroscopy is being utilized for other techniques. Fluoroscopy does not visualise the ligament.

This is a case report of a new technique based of knowledge of the topographic anatomy and of sonoanatomy of the area injected. Further study confirming the spread of injectate and a clinical feasibility study are needed.

There is also a possibility that the technique may be abused or overused.

Conclusions

In this article, we describe a technique of using real-time, ultrasound guidance to facilitate iliolumbar ligament injection. Our patient showed a response consistent with ilioulumbar syndrome. Injection techniques have a significant role in the diagnosis and treatment of back pain.

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