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CASE REPORT

Imaging

# Ultrasound-guided trigger point injection for piriformis syndrome in the emergency department

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At the time of the case series, Victor M. Aquino-Jose, MD, was affiliated with the Department of Emergency Medicine at North Shore University Hospital–Northwell Health, and Tatiana Havryliuk, MD, was affiliated with the Donald and Barbara Zucker School of Medicine at Hofstra/Northwell and the Department of Emergency Medicine at Long Island Jewish Medical Center–Northwell Health.

## Abstract

Piriformis syndrome, a myofascial pain disorder characterized by deep gluteal pain that radiates to the ipsilateral lower back and/or posterior thigh, is an underreported cause of low back pain frequently misdiagnosed in the emergency department (ED). Often refractory to oral pain medications, this syndrome can be debilitating. Ultrasound-guided trigger point injection of the piriformis muscle can treat piriformis syndrome, but no previous reports exist in the emergency medicine literature. This case series describes 2 patients who presented to our emergency department with low back pain and were diagnosed with piriformis syndrome. Both patients received an ultrasound-guided trigger point injection of the affected piriformis muscle with a significant reduction of pain at 15 minutes and 48 hours after the procedure.

**KEYWORDS**
piriformis syndrome, ultrasound-guided trigger point injection, ultrasound, piriformis muscle, trigger point injection, myofascial pain syndrome

## 1 | INTRODUCTION

Piriformis syndrome is a common cause of musculoskeletal back pain frequently misdiagnosed in both the ED and outpatient setting. This may occur because emergency physicians are generally not trained in diagnosing and treating piriformis syndrome and other myofascial pain syndromes.[1] The piriformis muscle originates at the anterolateral aspect of the sacrum and inserts onto the superior medial aspect of the greater trochanter. It acts as an external hip rotator when the hip is in extension and as a hip abductor when the hip is in flexion. Piriformis syndrome occurs when there is an irritation of this muscle, causing pain in the buttock, hip, and lower back. The sciatic nerve is

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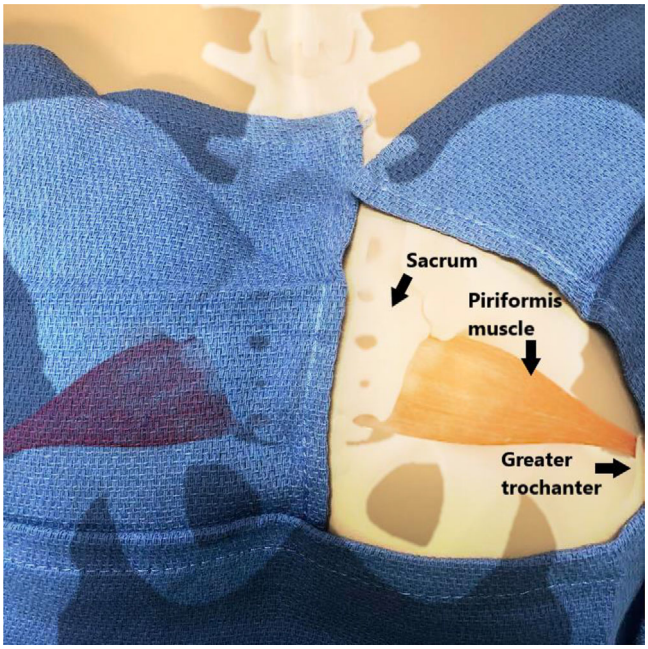


**FIGURE 1** Location of the piriformis muscle on the lower back. The piriformis muscle originates from the lateral border of the sacrum and inserts on the superior border of the greater trochanter of the ipsilateral femur

located deep to the piriformis muscle. Thus, the patient may exhibit symptoms of sciatica when the muscle is inflamed.[2] This syndrome can be challenging to diagnose and treat because it is often refractory to conservative pain management. In this case series, we present 2 patients who arrived in our ED with pain refractory to non-steroidal anti-inflammatory drugs who we diagnosed with piriformis syndrome. Both patients were successfully treated with an ultrasound-guided trigger point injection (TPI).

### 1.1 | Technique description

The patient is placed in a prone position on the stretcher. A sterile drape is placed over the affected upper gluteal area (Figure 1). The operator stands ipsilateral to the patient's affected side, and the ultrasound machine is set up on the contralateral side. A curvilinear probe is placed in a transverse position between the patient's sacrum and the greater trochanter. The probe marker should be pointing toward the patient's sacrum. On the screen, the piriformis muscle is visualized in the long view and is located inferior to the gluteus maximus muscle and superior to the sciatic nerve (Figure 2). The piriformis muscle appears more hypoechoic when compared with the gluteus maximus muscle.

After cleaning the area with an antiseptic solution, the injection is performed with a 20-gauge or 22-gauge 3.5-inch spinal needle. The needle is inserted using an in-plane approach by entering the skin at the lateral side of the probe and aiming medially toward the piriformis at an angle between 45° and 60° (Figure 3). Throughout the procedure, it is important to visualize the needle and the piriformis muscle on the

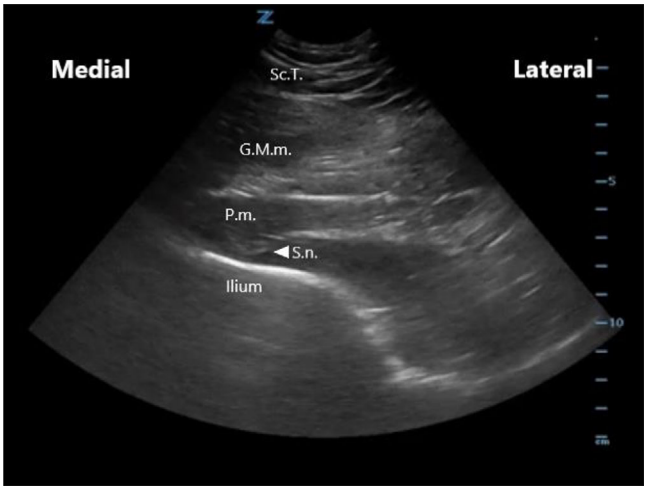


**FIGURE 2** Anatomy of the piriformis muscle on ultrasound. Sc.T., subcutaneous tissue; G.M.m., gluteus maximus muscle; P.m., piriformis muscle; S.n., sciatic nerve

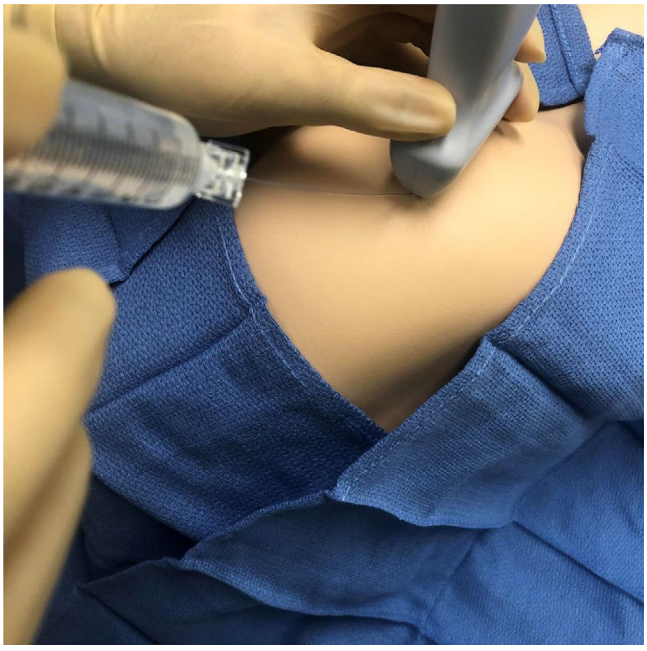

**FIGURE 3** Injecting the piriformis muscle under ultrasound guidance using an in-plane approach

screen to prevent injection of the sciatic nerve. Once the needle tip reaches the piriformis muscle, a total of 5 mL of 2% lidocaine solution is injected into the muscle at the area of maximal tenderness (Figure 4).[3]

## 2 | CASE SERIES

### 2.1 | Case 1

A 36-year-old man with no medical history presented to the ED with atraumatic low back pain for 1 week that worsened 3 days before

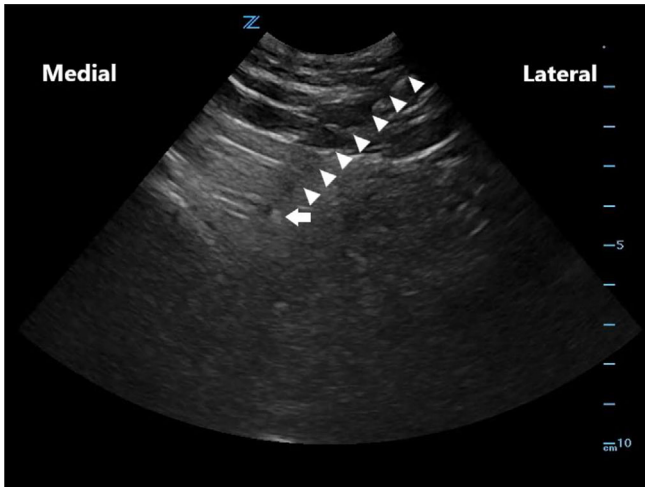


**FIGURE 4** Needle visualization under ultrasound guidance. The needle is seen as it tracks through the tissues (white arrowheads) until the needle tip (white arrow) reaches the piriformis muscle

evaluation. He stated that he first noticed the pain after waking up. He described the pain at his left lower back as constant and sharp and radiating to his left leg, with an intensity of 10/10 on the Visual Analog Scale (VAS) when walking or flexing his hip. He visited 3 EDs within 1 week and was prescribed ibuprofen, diazepam, and oxycodone/acetaminophen, which provided only mild relief. He denied urinary retention or incontinence, perineal anesthesia, fever, abdominal pain, or trauma.

Upon physical examination, the patient appeared to be uncomfortable on the stretcher as a result of pain. There was mild tenderness to palpation on his left lower back and posterior thigh, but no midline tenderness was present. The patient reported exquisite tenderness on palpation at the left upper buttock with radiation of pain to his lower back and left posterior thigh. The pain was exacerbated with left hip flexion and adduction as well as with a straight-leg raise to 30°.

After it was determined that the patient presented with signs and symptoms of piriformis syndrome, an ultrasound-guided TPI of his left piriformis muscle was performed at the bedside. Fifteen minutes post-injection, the patient reported marked pain improvement, with a pain reduction from a 10/10 VAS to a 2/10 VAS. At 45 minutes, he rated the pain as a 2/10 VAS and reported that it was subsiding. The patient was discharged home with non-steroidal anti-inflammatory drugs and a follow-up with his primary physician. At a 2-day phone follow-up, he reported his pain was at a 1/10 VAS, he was able to walk more comfortably, and ibuprofen was controlling his pain better.

### 2.2 | Case 2

A 29-year-old man with no medical history presented to the ED with atraumatic low back pain that started after waking up 2 weeks prior and had worsened during the past 4 days. The pain was located in his left lower back and radiated to his left hip and left posterior thigh. He described the pain as sharp and constant with an intensity of a 9/10 VAS and worsened with movement of his left leg. The patient also reported a tingling sensation in his left hip. He denied any urinary incontinence or retention, bowel incontinence, focal weakness, trauma, or fever.

The patient was evaluated in the ED earlier that day and was diagnosed with musculoskeletal pain. He received ibuprofen 600 mg orally and diazepam 5 mg orally but continued with pain. He later received a TPI at his left paraspinal muscle but continued with pain of 9/10 VAS. Upon reevaluation, he had mild left paraspinal tenderness without vertebral tenderness. He had marked tenderness to palpation of his left upper gluteal area. The pain at his left buttock and hip increased with hip flexion and adduction. On straight-leg raise of his left leg to 30°, he reported increased pain at his left lower back that radiated down his left leg.

The patient received an ultrasound-guided TPI into his left piriformis muscle after being diagnosed with piriformis syndrome. At 15 minutes post-injection, the patient stated that his pain was a 2/10 VAS. At 45 minutes post-injection, he stated that his pain diminished to a 1/10 VAS and he was able to walk, although he felt "sore" at the injection site. At 2 days post-injection, he stated that he no longer had any pain but still felt discomfort near the injection site, which was different from his original pain. He was able to walk normally and return to work.

## 3 | DISCUSSION

This case series illustrates how piriformis syndrome presents in the ED and how it may be misdiagnosed. Although our first patient was diagnosed correctly with the syndrome, the second patient was initially misdiagnosed. This led to a delay in treatment, causing the patient to persist with pain. This is not an uncommon occurrence, as myofascial pain syndromes are not commonly taught in emergency medicine residencies because they do not represent a life-threatening emergency.[1] A diagnosis of piriformis syndrome is best done with the hip flexion, adduction, internal rotation (FAIR) test, which was found to have a sensitivity and specificity of 88% and 83%, respectively.[4] Many patients with this syndrome may present to the ED with low back pain instead of gluteal or hip pain, thus making the diagnosis challenging. Although not life threatening, improper pain control may cause chronic pain and lead to high morbidity and decreased quality of life for affected patients. Previous studies examining the prevalence of piriformis syndrome in patients with chronic low back pain indicate that it may be as high as 17%.[5] With the increased trend of patients using the ED as their primary means of health care, diagnosing and effectively treating piriformis syndrome and other myofascial pain syndromes in the ED can greatly improve a patient's quality of life.[6]

The treatment for piriformis syndrome consists of non-steroidal anti-inflammatory drugs and physical therapy. Conservative management has a high failure rate, as occurred in our patients.[7] In patients with refractory pain, an intramuscular injection of local anesthetic into the piriformis muscle is recommended. Although corticosteroids have been used in the past, recent studies show that they have no added benefit compared with using local anesthetic alone or even dry needling.[8,9]

Ultrasound guidance increases the success rate of injection directly into the muscle compared with performing a blind injection or using fluoroscopy.[10] This technique has been used by physiatrists and pain physicians with good results.[11,12] Both of our patients had a significant reduction of pain after receiving the ultrasound-guided TPI, and this persisted at 48 hours after being discharged from the ED. In our second case, the patient had received a blind injection into his paraspinal muscles without relief of symptoms before receiving the ultrasound-guided TPI into the piriformis muscle. This illustrates the importance of correctly diagnosing this syndrome and of ultrasound-guided TPI for the treatment of piriformis syndrome. Previous research on TPI indicates that it can be very effective if the diagnosis was made correctly.

## 4 | CONCLUSION

To our knowledge, this is the first reported case series describing the ultrasound-guided TPI technique for piriformis syndrome in the emergency medicine literature. Our patients showed marked pain relief with a single injection of local anesthetic and continued having pain relief after 48 hours post-injection. We believe this technique can be beneficial to patients presenting with piriformis syndrome refractory to pharmacologic therapy in the ED both as a diagnostic procedure and therapeutic modality.

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