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A Target Crosshair Method for Fluoroscopic-Guided Greater Trochanteric Bursa Injections

Trishul Kapoor, MD, Richard Rosenquist, MD, and Jijun Xu, MD, PhD

Background: Trochanteric bursitis is one of the most common causes of lateral hip pain. Although fluoroscopic-guided greater trochanteric bursa injections (FGTBIs) are commonly performed, literature describing techniques and methods focused on accuracy and precision is scarce.

Objectives: In this case report, we describe an innovative target crosshair method (TCM) to help improve FGTBI procedural accuracy and precision under fluoroscopic guidance.

Study Design: The design of this study is a retrospective chart review in the form of a technical methodology report.

Setting: This study was completed at a large tertiary academic medical center.

Methods: The TCM utilizes anteroposterior (AP) and lateral fluoroscopic views of the proximal femur in order to draw a vertical line (AP) at the level of the junction of the femoral neck, trochanteric fossa, and greater trochanter (GT), and a horizontal line (craniocaudal) along the lateral hip designating the posterior half of the GT.

Results: Three patients with body mass indexes ranging from 35-40 successfully underwent FGTBI using the TCM for greater trochanteric syndrome causing lateral hip pain. All patients experienced > 70% analgesic relief for 4 to 6 months. There were no adverse events reported by any of the patients.

Limitations: The limitations of this study include the inability to generalize results due to a small sample size and the inherent nature of the study design as a retrospective chart review. The primary intention of this study is to describe a novel technical method.

Conclusions: The TCM results in an accurate path for skin and subcutaneous tissue local anesthetic injection and a final needle tip landing site for corticosteroid injection regardless of patient body habitus.

Key words: Trochanteric bursitis, injection, techniques, case report

BACKGROUND

Trochanteric bursitis (TB) is one of the most common causes of lateral hip pain and affects roughly 15% of middle-aged women and 8% of middle-aged men in the United States (1,2). TB is also referred to as greater TB (GTB) or greater trochanteric pain syndrome (GTPS)

From: Pain Management, Cleveland Clinic, Cleveland, OH

Corresponding Author: Trishul Kapoor, MD, E-mail: kapoort@ccf.org
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Institutional Review Board: As the brief report is devoid of patient identifiable information, it is exempt from Institutional Review Board review requirements as per Cleveland Clinic policy. A retrospective chart review of 3 patients was conducted in 2023.
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(1,2). The trochanteric bursa is a small fluid-filled sac that is located on the proximal-lateral side of the femur and serves as a lubricating medium between the gluteal tendons (gluteus maximus, medius, minimus, and tensor fascia lata) and the greater trochanter (GT) of the femur (1,2). Inflammation of the trochanteric bursa is a result of repetitive motion-associated trauma (i.e., running, exercise), tendinopathy, gross trauma with direct compression of bursa, and idiopathic causes (1,2). Although conservative management (i.e., medications, activity modifications, physical therapy, weight loss) can help reduce patients' significant pain and functional impairment, the most effective mechanism of treatment is corticosteroid injections of the trochanteric bursa (1,2). Although fluoroscopic-guided greater trochanteric bursa injections (FGTBIs) are commonly performed, literature describing techniques and methods focused on accuracy and precision is scarce (3).

OBJECTIVES

In this case report, we describe an innovative target crosshair method (TCM) to help improve FGTBI procedural accuracy and precision under fluoroscopic guidance.

STUDY DESIGN

The design of this study is a retrospective chart review in the form of a technical methodology report.

SETTING

This study was completed at a large tertiary academic medical center.

METHODS

A retrospective chart review of 3 patients was conducted in 2023. This study was determined to be exempt from the Institutional Review Board at the Cleveland Clinic as it is devoid of patient-identifiable information per Cleveland Clinic policy. The patients described in this study provided informed consent to be included in this case series. Some illustrative images utilized within this brief technical report were made out of, or made from, content published in a BodyParts3D/Anatomography web site. The content of their web site is published under the Creative Commons Attribution 2.1 Japan License and is free to share and remix.

In order to facilitate accuracy, precision, and patient comfort, we designed an innovative procedural technique for FGTBI. As demonstrated in Fig. 1, the TCM utilizes an anteroposterior (AP) fluoroscopic view of the proximal femur, and a skin marker is used to draw a vertical line (AP) along the lateral hip at the level designating the junction of the femoral neck, trochanteric fossa, and GT. Subsequently, a lateral fluoroscopic view of the proximal femur is obtained and a skin marker is used to draw a horizontal line (craniocaudal) along the posterior half of the GT. This results in a target crosshair that defines an accurate path for skin and subcutaneous tissue local anesthetic injection and a final needle tip landing site for corticosteroid injection. The FGTBI can be performed with precision with this methodology as demonstrated in Fig. 2.

RESULTS

Three patients with a common pertinent history of morbid obesity presented with chronic unilateral or bilateral hip pain. None of the patients had any surgical history of femoroacetabular joint interventions or surgeries. Upon initial evaluation, all patients had unilateral or bilateral hip pain exacerbated by sitting, standing, walking, and laying on the symptomatic side. None of the patients could identify any alleviating factors. On physical examination, all 3 patients had severe pain to palpation of unilateral or bilateral GTs of the femur and provocative tests of the femoroacetabular joints bilaterally were negative. All patients demonstrated symmetric right and left, upper and lower extremity sensation and strength. None of the patients had any opioid prescriptions at the time of evaluation. All 3 patients underwent successful, and uncomplicated unilateral or bilateral FGTBI (2.5 mL of 0.5% bupivacaine with 20 mg of triamcinolone per side). All patients only required a single needle entry site per injection and the needle tip was advanced to the final target bursa site with little or no readjustment of the needle trajectory. One month following the procedural intervention(s), all patients reported 90% to 100% analgesic relief. None of the patients reported any adverse events or complications.

DISCUSSION

The GT of the femur is the lateral quadrangular projection at the neck of the femur and serves as the primary site of attachment for tendons of the hip abductor muscles (1-6). The anatomic presentation of the trochanteric bursa varies due to a complex of bursal structures surrounding the GT (1-6). Typically, there is a complex of 4 bursal structures surrounding the GT – trochanteric bursa, subgluteus maximus bursa, subgluteus medius

bursa, and subgluteus minimus bursa (3-6). Of these bursal structures, the trochanteric bursa is the largest structure with a 4 cm craniocaudal-mediolateral dimension, and is innervated by the inferior gluteal nerve (3-6). However, greater trochanteric pain is not always associated with bursitis and can be caused by gluteal tendinosis, gluteal tendinopathy, and iliotibial band abnormalities (3,4). However, true TB can be caused by gluteal muscle overuse, obesity, leg-length discrepancy, or direct trauma (1-4).

Patients will usually present with unilateral hip pain, but can present with bilateral symptoms (1-3). The onset of pain is generally insidious and gradual (1-3). Patients will often continue to ambulate and express marked analgesic relief with anti-inflammatory medications (1-3). The prevalence of GTB, or GTPS, is the highest amongst middle-aged women (1-3). However, young female athletes are also at significant risk when engaging in repetitive exercise routines involving running, jumping, or cycling (1-3). On physical exam, patients will generally exhibit marked tenderness to localized palpation over the lateral aspect of the femur targeting the GT (1-3). Furthermore, patients should have negative straight leg raise testing and negative intraarticular provocative maneuvers (1-3). The localized pain should worsen with maneuvers that require stabilization of the pelvis (i.e., standing on one leg) or increased tension of the iliotibial band (i.e., adduction of the femur) (1-3). Evaluation on plain film radiographs will be unremarkable with GTB, or GTPS, but is used specifically to rule out osseous pathophysiology (i.e., fractures) (1-3). However, although rarely utilized as part of standard evaluation, GTB, or GTPS, will demonstrate an area of increased signal on T2-weighted magnetic resonance imagining and increased fluid signal on ultrasound imaging (1-3).

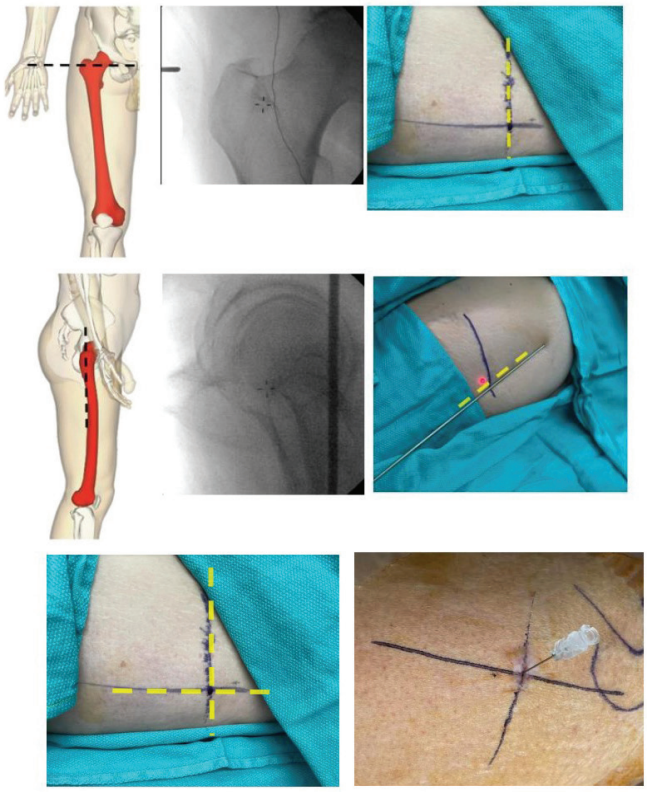

Fig. 1. Ideal final needle tip placement should be localized through a TCM initially in the AP view with a line drawn at the level of the junction of the GT, trochanteric fossa, and the neck of the femur. Subsequently, a lateral view should be obtained and another line drawn at level of the posterior half of the GT or close to the posterior tip of the GT of the femur. The 2 lines should create a target crosshair and the intersection will serve as the point of needle insertion. The needle can then be driven in an accurate and precise fashion within the 2 planes to the target landing site for the needle tip. TCM, target crosshair method; AP, anteroposterior; GT, greater trochanter.

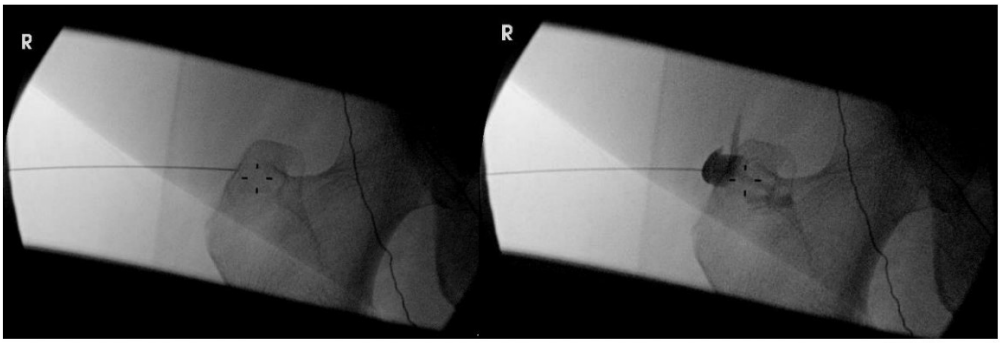

Fig. 2. Fluoroscopic image of the right GT of the femur demonstrating ideal needle placement in the right GTB with confirmation through contrast enhancement. GT, greater trochanter; GTB, greater trochanteric bursitis.

The GT consists of 4 facets – anterior, lateral, posterior, and superoposterior (4,5). The trochanteric bursa primarily covers the posterior and lateral facets of the GT, which serves as the site of the tendinous insertion of the gluteus medius muscle (4,5). The needle tip should always remain lateral to the quadrate tubercle of the femur. The ideal final needle tip position for an FGTBI is on the lateral osseous border of the GT of the femur at the level of the femoral neck and near the posterior tip of the GT of the femur. A final needle tip position in the neck of the femur will result in a femoroacetabular joint capsule injection. Furthermore, a final needle tip position medial to the quadrate tubercle or in the trochanteric fossa of the femur will result in a potential intramuscular injection of the sartorius muscle, femoroacetabular joint capsule injection, or potentially intraarterial injection into the branches of the lateral circumflex femoral artery.

Limitations

The limitations of this study include the inability to generalize results due to a small sample size and the inherent nature of the study design as a retrospective chart review. The primary intention of this study is to describe a novel technical method.

CONCLUSIONS

Overall, the TCM maximizes the accuracy and precision of the FGTBI while reducing overall radiation exposure. Especially in morbidly obese patients, there is a significantly larger surface area and distance to the GT from the skin. This, in turn, drastically increases the odds of missing the needle tip target on the first attempt. With repeated attempts, there are numerous needle path trajectories created that can ultimately lead to significant traumatic injury to the vastus lateralis muscle and the iliotibial tract. Hence, the TCM is a simple and reproducible technique that could significantly decrease procedural risk in this specific patient population.

REFERENCES

1. Seidman AJ, Taqi M, Varacallo M. Trochanteric bursitis. In: *StatPearls [Internet]*. StatPearls Publishing, Treasure Island, FL 2023. www.ncbi.nlm.nih.gov/books/NBK538503/
2. Le DT, Shah S. Greater trochanteric bursa injection. In: *StatPearls [Internet]*. StatPearls Publishing, Treasure Island, FL 2023. www.ncbi.nlm.nih.gov/books/NBK573083/
3. Dunn T, Heller CA, McCarthy SW, Dos Remedios C. Anatomical study of the "trochanteric bursa". *Clin Anat* 2003; 16:233-240.
4. Long SS, Surrey DE, Nazarian LN. Sonography of greater trochanteric pain syndrome and the rarity of primary bursitis. *AJR Am J Roentgenol* 2013; 201:1083-1086.
5. Pfirrmann CW, Chung CB, Theumann NH, Trudell DJ, Resnick D. Greater trochanter of the hip: Attachment of the abductor mechanism and a complex of three bursae--MR imaging and MR bursography in cadavers and MR imaging in asymptomatic volunteers. *Radiology* 2001; 221:469-477.
6. Woodley SJ, Mercer SR, Nicholson HD. Morphology of the bursae associated with the greater trochanter of the femur. *J Bone Joint Surg Am* 2008; 90:284-294.