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BRIEF COMMUNICATION

Ilioinguinal Nerve Block in Obese Patients: Description of New Technique

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Abstract Ilioinguinal nerve blockade is an effective technique for both perioperative and chronic pain conditions in adult and pediatric practice. Ultrasound guidance can increase the success rate and reduce the complications associated with performing ilioinguinal nerve blockade. Obese patients present a particular challenge with ilioinguinal block as the overlying abdominal pannus impedes the ultrasound view by increasing the depth to target and necessitating an out-of-plane approach. We demonstrate that modification of the technique by placing the patient into the lateral decubitus position reduces the depth to target and allows an in-plane approach to be utilized.

Introduction

Ilioinguinal nerve blockade is effective for perioperative pain control for adult inguinal hernia surgery [1], cesarean delivery [2], and pediatric inguinal hernia surgery [3]. The method demonstrates superiority and cost-effectiveness when compared with both subarachnoid and general anesthesia [4]. In addition, ilioinguinal nerve block may have a place in the control of chronic pain after inguinal hernia repair [5] and a role in the treatment of chronic pelvic pain [6].

Ultrasound guidance improves the quality of ilioinguinal block with shorter hospital stays and lower pain scores [7]. Although anatomical landmark-based techniques are known and routinely implemented, these approaches are also associated with a failure rate of 10—25% [8] and a risk of injury to the intestines [9], vascular structures [10], and femoral nerve [11].

The ilioinguinal nerve arises from the first lumbar nerve. From its lumbar origin it passes by the lateral border of psoas major below the iliohypogastric nerve. It then passes obliquely across quadratus lumborum to perforate the transversus abdominis muscle above the iliac crest. It communicates with the iliohypogastric nerve between the transversus abdominis and the internal oblique muscles and

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then descends through the deep inguinal ring with the spermatic cord [12].

Discrete ultrasound visualization of the ilioinguinal nerve has been described in both pediatric [13] and adult patients [14]. However, with obese patients, an overlying pannus can impede the ultrasound view and increase the depth to the nerve target, requiring a steeper angle of approach and causing poorer needle visualization [15]. Moreover, the traditional out-of-plane approach may be difficult to apply to obese individuals. We describe a method of performing the block in the lateral decubitus position to obviate these problems.

Methods

Following informed written consent, we performed ultrasonographic scans to identify the anatomical target for ilioinguinal nerve blockade in the supine position and in the modified lateral position to demonstrate improved sonoanatomy in the lateral decubitus on a model with increased abdominal tissue mass. A Logic S8 (GE Healthcare, Little Chalfont, Buckinghamshire, UK) ultrasound machine with a 9L linear probe was used to obtain the ultrasound images. Virtual curvilinear image generation was used to give a wider field of view but was not required to perform the block.

The aim of this preliminary study was to theoretically justify the soundness of a novel method based on a comparison of ergonomic positioning and imaging obtained using traditional and alternative methodology. Photography of the transducer position relative to the corresponding ultrasound images was performed. The ultrasound images were saved and subsequently analyzed. The clinical effectiveness of the new method was not studied.

Results

In the supine position, when the ultrasound transducer is placed as described elsewhere [16], an in-plane approach is generally not feasible due to the iliac crest and anticipated steep angle of needle insertion, so an out-of-plane approach is required (Figure 1). This is particularly evident in obese individuals. With the patient in supine position, the overlying abdominal pannus lies over the ilioinguinal nerve target (Figure 2). The increased depth decreases the sonographic resolution, and a lower-frequency transducer is usually required. Traditionally, an out-of-plane approach has been recommended. Excessive abdominal adipose tissue and skin folds make this technique technically challenging and potentially unsafe. In addition, abdominal movement due to breathing and procedural discomfort may further jeopardize accuracy and safety.

To diminish skin-to-target distance and to allow an in-plane ergonomically sound approach, obese patients should be placed in the lateral decubitus position. Placing the patient into the lateral decubitus with the target side up shifts the pannus away from the target area (Figure 3) and allows an in-plane ultrasound approach to be used (Figure 4) with a shorter distance to target and a shallower approach.

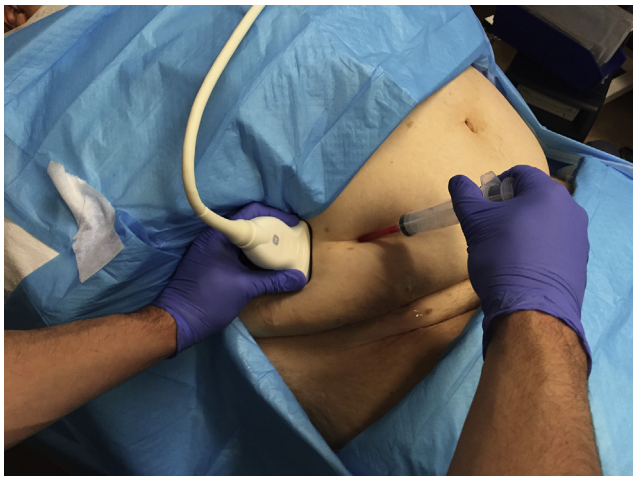

Figure 1 Traditional out-of-plane approach to the ilioinguinal nerve in the supine position with the overlying abdominal pannus.

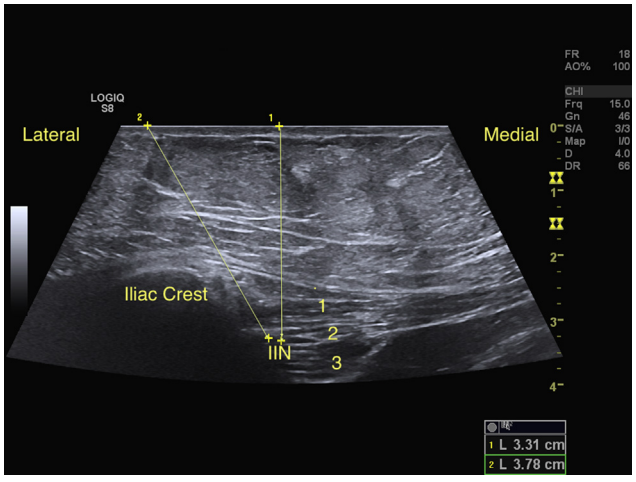

Figure 2 Supine ultrasound image of the ilioinguinal nerve target with out-of-plane (Line 1) and in-plane (Line 2) approaches. Note the steep angle of the in-plane approach and the obstruction presented by the iliac crest. IIN = ilioinguinal nerve; 1 = external oblique muscle; 2 = internal oblique muscle; 3 = transversus abdominis muscle.

This simple positional modification reduces the skin-to-target distance, allowing the use of a linear transducer, even on obese patients. With the ultrasound transducer placed at the level of the iliac crest and gently pressed at its distal end ("toeing"), an in-plane approach with a less than 45° angle is enabled. This technique often requires the liberal use of ultrasound conductive gel as the proximal edge is often raised off the skin to allow adequate visualization. This method can be used on nonobese patients also.

In summary, the advantages of this approach include:

1. Ergonomically sound in-plane needle placement
2. Diminished skin-to-target distance
3. The use of a linear transducer

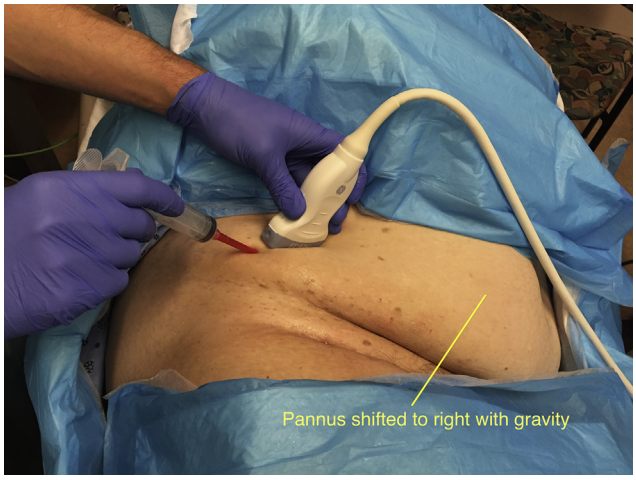

Figure 3 In-plane ultrasound imaging and "toeing" of the ultrasound transducer with the patient in the left lateral decubitus. The abdominal pannus has been shifted medially away from the target area.

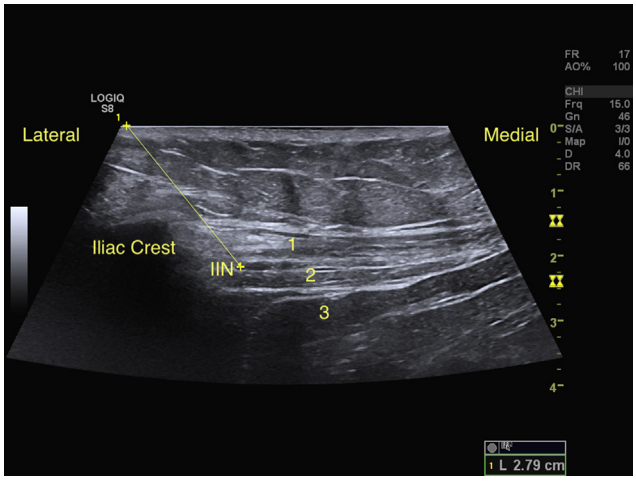

Figure 4 Lateral decubitus ultrasound image with in-plane target line demonstrated. Note the shallower angle compared with that in the supine position and the reduced depth to target. IIN = ilioinguinal nerve; 1 = external oblique muscle; 2 = internal oblique muscle; 3 = transversus abdominis muscle.

4. No interference with abdominal wall movements
5. Less procedural discomfort (injection at the flank is less distressing than that at the lower abdominal quadrant)

Discussion

Ilioinguinal nerve block remains a useful therapeutic and diagnostic technique for a wide variety of procedures and diagnoses [1—7,13—14]. Obesity represents a global crisis with data from the World Health Organization in 2008 showing that over 35% of adults over 20 years are overweight [body mass index (BMI) $\geq$ 25 kg/m^2)] and 10% of men and 14% of women are obese (BMI $\geq$ 30 kg/m^2) [17]. This prevalence of obesity is not static but rising [18], and as such we must adapt our techniques to best meet the demands of this patient group.

Ultrasound guidance for ilioinguinal nerve block removes reliance on anatomy alone, which can be difficult for the obese patient, as well as the requirement of feeling for a pop or click to confirm passage through individual fascial layers, which is often unreliable [19]. Ultrasound performs best when the depth to target is shallow and the approach of the needle is as perpendicular to the sound beam as possible to minimize attenuation of the sound waves and maximize sound reflection, respectively [15]. While we cannot change the underlying abdominal structures within which the ilioinguinal nerve lies, laterally displacing the abdominal pannus can markedly improve the ultrasound view and potentially enable the use of an in-plane approach.

Positioning the patient into the lateral decubitus position is a simple, painless maneuver that markedly improves the sonoanatomy for ilioinguinal nerve blockade and maintains the ability to use an in-plane approach in the obese patient. This should, in turn, increase the success rate for ilioinguinal nerve block.

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