Best Practice & Research Clinical Anaesthesiology 33 (2019) 539–551

Contents lists available at ScienceDirect

Best Practice & Research Clinical Anaesthesiology

journal homepage: www.elsevier.com/locate/bean

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Novel utilization of fascial layer blocks in hip and knee procedures

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Keywords:
motor-sparing
obturator nerve block
lateral femoral cutaneous nerve block
quadratus lumborum block
hip
knee

Purpose: of review: Novel motor-sparing peripheral nerve blocks in hip and knee procedures are desirable.
Recent findings: The application of ultrasound (US) in fascial plane blocks has improved the efficacy and effectiveness of obturator nerve block, lateral femoral cutaneous nerve block, and quadratus lumborum block. The improved performance of these fascial plane blocks has led to additional clinical applications to the hip and knee procedures.
Summary: Recent advancements in US have transformed the clinical performance of fascial layer blocks, evidenced in their novel indications in hip, knee, and spine analgesia. The combination of various motor-sparing fascial plane blocks providing different areas of innervation is particularly useful in fast-track hip and knee surgeries.

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https://doi.org/10.1016/j.bpa.2019.07.010
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Introduction

Traditional lower extremity nerve plexus or nerve blocks such as lumbar plexus block, sacral plexus block, femoral nerve block, or sciatic nerve block are effective in hip and knee analgesia but are also associated with significant motor weakness. The current trend of early recovery after surgery calls for alterative nerve blockade techniques that can offer motor-sparing analgesia to facilitate early ambulation and faster recovery. Several fascial plane blocks including obturator nerve (ON) block, lateral femoral cutaneous nerve (LFCN) block, and quadratus lumborum (QL) block are increasingly utilized in hip and knee surgeries.

Obturator nerve block

Anatomy and history

The ON is a mixed motor and sensory nerve that forms part of the lumbar plexus. The ON arises from the ventral rami of the second, third, and fourth lumbar spinal nerves. These fibers fuse within the psoas major muscle and descend through the pelvis, staying medial and posterior, until they reach the superior pubic ramus; they pass through the obturator foramen to enter the medial compartment of the thigh and then divide into two terminal branches: the anterior and posterior branches.

1) The anterior branch: It passes over the obturator externus superficially and continues to travel down the thigh between the adductor brevis and adductor longus, finally terminating in the gracilis muscle. The anterior branch innervates the for-mentioned muscles as well as the skin covering the medial thigh. It is also involved in hip joint innervation through articular branches to the hip joint and cutaneous branches.
2) The posterior branch: It travels through the thigh between the fascial planes of the adductor brevis and adductor magnus and innervates these muscles and the skin superficial to these muscles. It is also involved in knee joint innervation through articular branches to the knee joint and cutaneous branches.

The ON provides motor and sensory innervation to the thigh adductors (adductor magnus, adductor brevis, and adductor longus) and is needed for hip adduction, flexion, and extension. It also provides sensory innervation to the skin over the medial surface of the thigh up to the posterior-medial knee.

ONB was first described by Gaston Labat in 1922; a traditional pubic tubercle approach of obturator nerve block (ONB) was based on surface landmarks and primarily used for certain types of femoral herniotomies. However, Labat's classical technique was largely forgotten for many years owing to its inconsistent efficacy, lack of clear anatomical landmarks, and the general complexity of the procedure. In 1967, the ONB was modified by Colby Parks with focus on obturator foremen palpitation [1]. Alon Winnie described the concept of a “3-in-1 block” in 1973 with an attempt to simultaneously block the femoral nerve, lateral cutaneous nerve, and ON. In 1993, Medhat Wassef described a nerve stimulation-assisted inter-adductor approach [2]. A nerve stimulation-assisted inguinal approach was described in 2005 by Choquet et al. with demonstrated better patient comfort and higher block efficacy than the pubic tubercle approach [3]. Taha subsequently reported in 2012 an ultrasound (US)-guided proximal approach to block both the anterior and posterior branches at the same time by injecting local anesthetics interfascially between the pectineus and obturator externus muscles [4]. With technological advances, including nerve stimulators and US-guided imaging, the ONB has become a safer and more reliable application of regional anesthesia.

Indications

A traditional indication is the prevention of abrupt thigh adduction during transurethral resection of bladder tumor (TURBT) procedures. Because of its close proximity to the lateral bladder wall, the ON can easily by stimulated during TURBT procedures, which can result in sudden adductor muscle spasm, therefore increasing the risk of surgical complications including vessel laceration, bladder wall perforation, incomplete bladder tumor resection, and obturator hematoma. In 2015, Bolat reported that bladder perforation as a result of sudden thigh movement occurred in 40% of patients in the absence of ONB versus 5.7% of those who received preoperative ONB [5]. Moreover, the use of ONB during TURBT can prolong the mean time to bladder tumor recurrence (7.8 months with ONB vs. 15 months without ONB), suggesting that ONB facilitates complete lateral bladder wall tumor resection by surgical field immobilization [6]. Other classic indications for ONB is the relief of chronic hip pain due to adductor muscle contractions in patients with hemiplegia/paraplegia, multiple sclerosis, and cerebral palsy [7,8], as well as diagnosis and treatment of chronic hip joint pain [9].

Emerging indications of ONB are hip and knee surgery-related acute pain management perioperatively. ONB is used in acute pain management after several types of knee surgeries, such as total knee replacement [10] and anterior cruciate ligament repair [11], where it has been shown to improve postoperative analgesia [12,13]. Addition of an ONB to both sciatic and femoral nerve blocks may reduce intraoperative discomfort and improve tourniquet tolerance, and when added to a tibial nerve block, it can improve time to postoperative ambulation [14]. In addition, ONB has been shown to be effective in acute pain management after hip fracture surgery in conjunction with LFCN block, likely due to the blockade effect of the articular branch of the ON that innervates the anteromedial hip joint capsule [15]. In total hip arthroplasty, however, ONB alone was found not effective for postoperative acute pain control [16].

Block-specific contraindications to the ON block include pre-existing obturator neuropathy, inguinal lymphadenopathy, perineal infection, and hematoma at the needle insertion site and coagulopathy.

Techniques

ONB can be performed with surface landmark in conjunction with a nerve stimulator through the proximal/classic/pubic approach or the distal/inguinal approach. These approaches use different anatomical landmarks, that is, pubic tubercle in pubic approach and femoral artery/adductor longus tendon in inguinal approach, respectively, to guide the needle insertion. With a stimulating nerve block needle, the adductor muscle motor response is elicited when the needle is close enough to the ON. The success rate of nerve stimulator-assisted ONB varies between 70% and 97%, with the inguinal approach associated with easier performance, less needle pass, better patient comfort, and higher success rate [17,18].

The use of US-guided ONB has gained popularity in large part owing to its ease of performance and theoretical greater reliability than surface landmark-based techniques [6]. US-guided ONB includes distal/public and proximal/inguinal approaches, which rely on identifying the facial planes where the ON and its anterior/posterior branches lie, respectively.

In the distal US-guided approach, the patient is positioned supine with the ipsilateral hip joint slightly abducted and externally rotated. The US probe, linear or curvy linear depending on the patient's body habitus, is placed at the inguinal grease (Fig. 1). It is important to identify the adductor muscle and the fascial boundaries, as the branches of the ON travel within the fascial plane between the adductor muscles. When attempting to block the anterior branch, the local anesthetic can be injected into the interfascial space between the pectineus/adductor longus and adductor brevis muscles, whereas for posterior branch blockage, a local anesthetic is injected between the adductor brevis and adductor magnus muscles [13,19–21].

In the proximal US-guided approach, the ON is blocked before it bifurcates into the anterior and posterior branches (Fig. 2). There are several approaches described thus far based on variations in patient position, probe location/orientation, needle trajectory, and need for nerve stimulation assistance. Nonetheless, all involves a single injection of a local anesthetic into the interfascial plane between the pectineus and obturator externus muscles with the intention to simultaneously block the anterior and posterior branches of the ON [4]. The patient can be positioned supine with slight hip joint abduction and external rotation as mentioned above, and the US probe placed at the inguinal grease and tilted cephalad [4,22,23], or the patient supine with a straight leg and the US probe in the public area [24], or the patient in the lithotomy position with the US probe placed at the medial thigh [25].

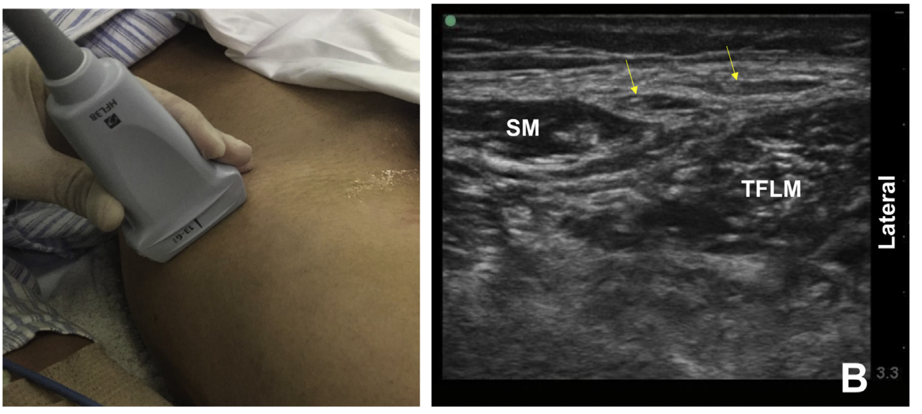

Fig. 1. Ultrasonographic presentations of a lateral femoral cutaneous nerve block. Panel A shows patient and probe positioning. Panel B is a sonographic image that corresponds to panel A. TFLM: tensor fasciae latae muscle, SM: sartorius muscle. The yellow arrows depict lateral femoral cutaneous nerve.

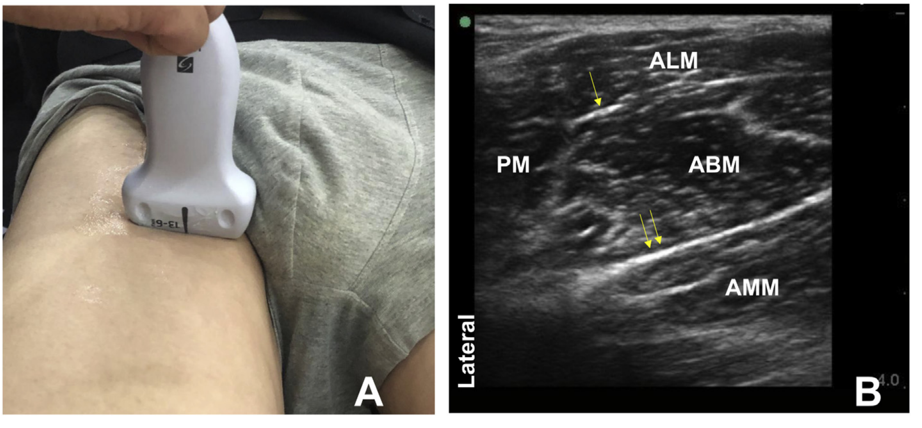

Fig. 2. Ultrasonographic presentations of an obturator nerve block (distal approach). Panel A shows patient and probe positioning. Panel B is a sonographic image that corresponds to panel A. ALM: adductor longus muscle, ABM: adductor brevis muscle, AMM: adductor magnus muscle. The yellow arrows depict the fascial compartment where obturator nerves are located, single arrow the anterior branch, and double arrow the posterior branch.

Outcomes

ONB efficacy can be assessed with demonstrated weakness of the adductor muscles. This can be performed by having the patient adduct the blocked leg from an abducted position against resistance. There are well-documented variations in the ON formation, course, and distribution, which can affect the efficacy and assessment of the block as well as complications of the procedure. For example, the most powerful adductor muscle, the adductor magnus, also receives innervation from the femoral and sciatic nerve; thus, a pure ONB does not necessarily fully inhibit adduction movement of the leg. Because of significant variability in cutaneous innervation of the medial thigh, decreased sensation to this area is not a reliable means for assessing ONB block efficacy either. This makes baseline neurological exam before ONB placement important.

Either the distal or the proximal US-guided approach is sufficient and effective to have the ON blocked, but the efficacy of the distal vs. proximal US-guided approach has not been systemically studied. In the distal approach, the anterior and posterior branches of the ON need to be blocked separately; therefore, they may have a higher volume of local anesthetic requirement because of two injections. The success rate of the five different proximal ONB techniques has not been established, and the superiority of one technique over another has yet to be validated with a comparative study. In addition, direct comparative studies on the efficacy of landmark/nerve stimulation-assisted vs. US-guided ONB are difficult to design with inherent operator-dependent bias. The combination of the nerve stimulation and US technique is superior to US guidance alone in terms of success rate and block onset time in some studies [26,27] but have similar efficacy as that of US alone in another study [28].

Block-specific complications

Penetration of the pelvic cavity and subsequent perforation of the bladder or rectum, as well as perforation of other surrounding structures such the obturator vessels, resulting in visceral organ injury or hematoma formation, are important considerations of ONB. Corona mortis, a retropubic anastomosis between the external iliac and obturator arteries, is present in 10% of individuals and, if perforated, can cause difficulty in controlling bleeding [29]. It is also prudent to pay attention to the medial circumflex femoral vessels that travel along the obturator branches between pectineus, obturator externus, adductor brevis, and adductor magnus during the needle path [30].

Summary

The classic indications of ONB are based on blockade effects on adductor muscles. Emerging newer indications focus on the effects of ON's articular and cutaneous branches on the hip and knee joints. Despite its use in clinical practice for nearly a century, many questions remain unanswered regarding ONB. To date, there is no prospective clinical trial that addresses the efficacy of US-guided techniques versus landmark-based/nerve stimulator-assisted techniques. However, theoretically and anecdotally, US-based techniques offer the ease of performance and may increase safety profile given the ability to view surrounding structures and needle advancement. A large-scale randomized clinical trial that addresses approach success and complication rates, performance time, patient comfort, block duration, and anatomical visibility under ultrasonography would be beneficial for best practice recommendations and future standardization of ONB.

Lateral femoral cutaneous nerve block

Anatomy and history

The LFCN is a purely sensory nerve of the lumbar plexus that originates from the dorsal branches of the L2 and L3 ventral rami. It stems from the lateral aspect of psoas major and travels caudal and lateral over the iliacus muscle toward the anterior superior iliac spine (ASIS). Typically, the LFCN exits the pelvis deep into the inguinal ligament and travels into the thigh. Distal to the inguinal ligament, the LFCN divides into the anterior and posterior divisions.

1) The anterior division: It contains the L3 fibers of the nerve and terminal branches, provides sensation to the anterolateral part of the distal thigh, from the mid-thigh to the knee. Along with the anterior division of the femoral nerve and infrapatellar branch of the saphenous nerve, the anterior division makes up the peripatellar plexus.
2) The posterior division: It contains L2 fibers of the nerve and terminal branches, provides sensation to the posterolateral aspect of the proximal thigh, from above the greater trochanter to the mid-thigh.

Indications

Despite providing sensory-only innervation to a relatively small area, there are a number of indications for an LFCN block. Classic indications for the block are inguinal hernia repair and surgeries involving the lateral thigh, such as muscle biopsy and skin grafting procedures [31,32]. Another traditional indication for LFCN block is as a diagnostic tool for meralgia paresthetica (Bernhardt-Roth syndrome). This syndrome, the most common pathology involving the LFCN [33], manifests as paresthesia or dysesthesia in the LFCN distribution due to entrapment of the nerve. Although both divisions may be impacted by the entrapment, the anterior division is more commonly affected [33]. The etiology can stem from trauma, obesity, diabetes, pregnancy, or tight-fitting clothing [34].

Emerging indications for the LFCN block include analgesia for a number of hip procedures such as hip fracture repair and anterior approach of total hip arthroplasty [35]. It was shown that LFCN block, in conjunction with femoral nerve block, is associated with lower pain scores and less analgesic consumption in the acute management for total hip arthroplasty [36]. LFCN block alone was shown be associated with decreased pain scores during hip flexion [37] but with no effects on opioid consumption or length of stay in the posterior approach of total hip arthroplasty [38]. The combination of LFCN block with other blocks such as QL block may provide a larger area of cutaneous coverage and better analgesia after various hip procedures [39,40].

Block-specific contraindications to the LFCN block include pre-existing LFCN neuropathy, local infection/bleeding, and coagulopathy.

Techniques

Like many peripheral nerve blocks, the LFCN block can be performed by a landmark approach or with an US. The landmark technique is based on the relatively fixed anatomical relationship between the ASIS and the LFCN, as 90% of the time, the LFCN is located less than 2 cm medially from the ASIS [41]. The patient is positioned supine with the leg neutral, and ASIS is identified. In a sterile manner, a needle is inserted 2 cm distal and 2 cm medial to the ASIS until the fascia lata is pierced. This technique is typically described as a tactile “pop” sensation by the operator. Following the loss of resistance, a local anesthetic is then injected from medial to lateral in a fanwise fashion. If localized properly, the local anesthetic should enter the space between the tensor fascia lata (TFL) and sartorius muscles, and between fascia lata and fascia iliaca [42–44]. Additionally, a nerve stimulator can be utilized to elicit a paresthesia in the lateral thigh to improve efficacy.

By utilizing an US, the alternative approach begins with the patient in supine position and the leg once again in a neutral position. The ASIS is palpated, and a linear US probe is placed below the ASIS and parallel to the inguinal ligament. At this point, the TFL and sartorius muscles should be visible. The LFCN appears in the plane between the two muscles as a hypoechoic oval with a hyperechoic ring around it (Fig. 3). Although the location may vary between patients, the nerve is usually at 0.5–1 cm depth in the skin and superficial to both TFL and sartorius muscles. A needle is inserted from lateral to medial (in plane) through the skin, the fascia lata (“the pop”), and into the aforementioned plane. The nerve stimulator can also be employed in the US technique to assist in nerve localization.

Outcomes

Because of the erratic proximal branching and anatomic variants, the success of the LFCN block was questionable and inconsistent. The accuracy of identifying LFCN through landmark and US was 1/19 and 16/19, respectively, in a cadaveric study, and 0/20 and 16/20, respectively, in a healthy volunteer study [45]. In an attempt to address the irregularity and to produce a more complete LFCN block, Nielsen et al. described a novel US-guided approach. Their technique focused on the fat-filled flat tunnel (FFFT), an area formed by a duplication of the fascia lata between the sartorius and TFL. While prior studies have shown that the LFCN can be consistently found in the FFFT and the LFCN is more easily visualized in that plane, Neilsen's novel approach significantly increased the chances of achieving more proximal blockade effects (up to several centimeters proximal to the greater trochanter), in addition to the routine distal blockage effect (from several centimeters distal to the greater trochanter to the tibiofemoral joint line at the knee) [39]. With either landmark or US-guided technique chosen, the efficacy of the block could be tested with change in pinprick sensation and/or temperature over the LFCN region. However, as previously mentioned, many anatomical variants of the

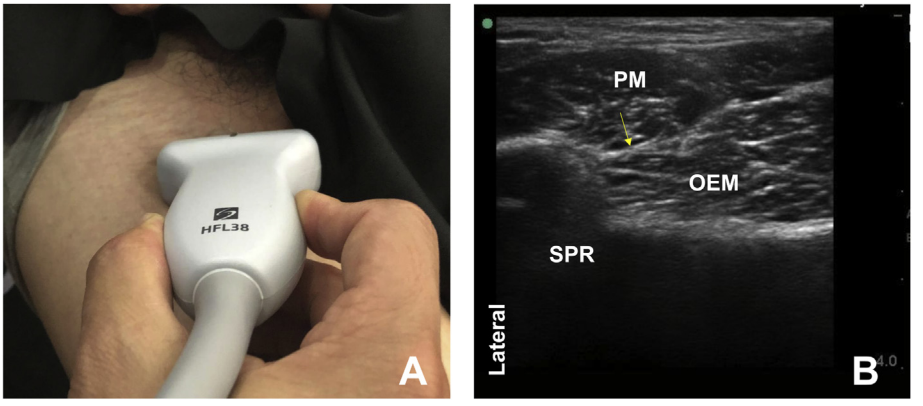

Fig. 3. Ultrasonographic presentations of an obturator nerve block (proximal approach). Panel A shows patient and probe positioning. Panel B is a sonographic image that corresponds to panel A. PM: pectineus muscle, OEM: obturator externus muscle, SPR: superior pubic ramus. The yellow arrows depict the fascial compartment where the obturator nerve is located.

LFCN have been reported, and therefore, the exact region and block efficacy could be difficult to predict at times [39].

Block-specific complications

Because of the lack of major vascular structures and organs in the LFCN region, it is considered a safe block with minimal risk involved. Some potential issues can arise with either technique chosen. When targeting the LFCN deep into the inguinal ligament, there is possibility for concomitant spread to the femoral nerve. This could be problematic if quadriceps muscle weakness is a concern [39] and/or when early ambulation is desired. Additionally, even with the US approach, visualization of the LFCN can be difficult and variable [39].

Summary

Overall, the LFCN block is a relatively easy and low-risk way to anesthetize the lateral thigh. In many instances, it is used in conjunction with other lower extremity blocks to provide comprehensive coverage. Future studies are needed to elucidate the most effective modality of targeting and anesthetizing the LFCN.

Quadratus lumborum block

Anatomy and history

The QL block is a deep interfascial block between the posterior abdominal wall muscles and a novel US-guided regional anesthesia technique initially used for perioperative pain management in all patients (pediatric, adults, and pregnant) undergoing abdominal procedures. The QL muscle is an irregularly shaped quadrilateral muscle of the posterior abdominal wall, commonly referred to as a "back muscle" due to its depth, and thus a common source of low back pain. It originates from the posterior border of the iliac crest with fibers running superiorly to the twelfth rib, medially to L1-L4 transverse processes, and inferiorly to the iliolumbar ligament and internal lip of the iliac crest. It is bordered anteriorly by the colon, kidneys, psoas major and psoas minor muscles, and the diaphragm, posteriorly by the erector spinae muscle, and laterally by the abdominal wall muscles. Anterior to both the QL and psoas major muscles is the peritoneum. Innervated by T12 and L1-L4 ventral rami, the QL muscle unilaterally provides lateral flexion of the vertebral column and bilaterally provides extension of the thoracic rib cage and assists in inhalation [46].

The QL block was first described in an abstract by R. Blanco in 2007 as a "posterior" or alternative to the transversus abdominis plane (TAP) block for use in abdominoplasties and involves the deposition of a local anesthetic posterior to the QL muscle, which allows expansion beyond the middle layer of the thoracolumbar fascia (TLF) and into a space termed the "lumber interfascial triangle." [47] It was discovered, in part, out of necessity, as traditional truncal blocks, TAP block, were limited to somatic analgesia and failing to provide visceral analgesia. Since this time, further variations of the QL blocks have been described and differentiated by their site of injection, analgesic effects, and mechanism of action; however, there remains no agreed-upon or validated definition or the best approach. QL blocks have shown satisfactory results when used both as a single injection and as a continuous infusion. Most literature available on the comparison of QL and TAP blocks are case reports, case series, and small studies; nonetheless, results have shown that QL blocks offer a wider somatic sensory blockade than TAP blocks using the same volume of the local anesthetic [48], confer additional visceral pain coverage [49], provide longer duration and better analgesia, and have a greater opioid-sparing effect [50], likely due to paravertebral spread, as it is performed closer to the central neuraxial system [48,49]. For example, randomized controlled trials showed that QL blocks were more effective in reducing morphine consumption than TAP blocks in perioperative cesarean section management [47] as well as in lower abdominal surgeries [51].

Indications

Owing to its broad distribution of the local anesthetic, the QL block provides a large area of sensory inhibition, and thus, the original indications for QL blocks are extensive in abdominal procedures, whether used as a sole block or combined with another block. Procedures that can benefit from abdominal wall incisional/somatic and/or intra-abdominal visceral pain coverage from T6 to L1 can be partially managed with a QL block. This includes, but not limited to, exploratory laparotomy, large bowel resection, ileostomy, appendectomy, cholecystectomy, inguinal hernia repair, scrotal surgery, abdominoplasty, total abdominal hysterectomy, laparoscopic ovarian surgery, nephrectomy, iliac crest bone graft, prostatectomy, open liver resections, kidney transplants, nephrectomies, and major colorectal surgeries [48,52,53].

The newest indication for a QL block is in the orthopedic surgeries, when it is utilized as a relatively motor-sparing alternative to the lumbar plexus block for the hip [54,55] and spine procedures [56,57]. Studies have shown the successful use of the QL block with effective analgesia, earlier participation of physical therapy or decreased length of stays in hip arthroscopy [58], total hip arthroplasty [59–62], and femoral neck fracture repair [63]. In addition, QL blocks have provided promising analgesia in lumbar spine fusion [56], lumbar laminoplasty, and lumbar laminectomy, likely due to blockade of posterior branches of the lumbar spinal nerve [57].

Block-specific contraindications to the QLB block include local infection/bleeding, and coagulopathy.

Techniques

The QL block can be performed with the patient prone, sitting up, or in the lateral decubitus position (Fig. 4). For example, the patient can be placed in the lateral decubitus position with the operative laterality upward. Ideally, the patient should be flat and the QL muscle should be contracted; this is accomplished by abducting the hip and laterally flexing the hip toward the ipsilateral side. A curvilinear probe is advised in a typical adult patient. To start, the probe can be placed over the classic TAP block region (between iliac crest and costal margin), and the three muscle layers (external oblique muscle, internal oblique muscle, and transversus abdominis muscle) are properly identified. The probe is then moved laterally, as the TAP forms the transversalis fascia, a hyperechoic line. As the probe continues laterally, various muscles should come into view in what is described as the shamrock sign. The shamrock sign is made up of the QL muscle (lateral leaf), erector spinae muscle (posterior leaf), psoas muscle (anterior leaf), and the transverse process as the stem [64]. Once the QL (hypoechoic relatives to

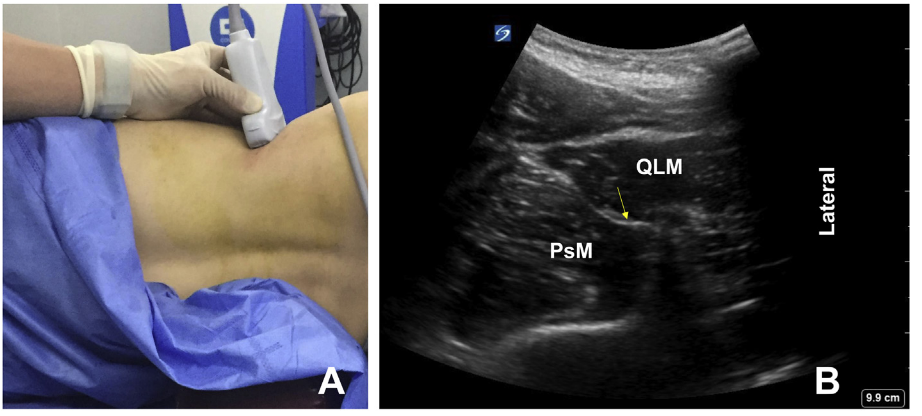

Fig. 4. Ultrasonographic presentations of a quadratus lumborum block. Panel A shows patient (lateral decubitus) and probe positioning. Panel B is a sonographic image that corresponds to panel A. PsM: psoas muscle, QLM: quadratus lumborum muscle. The yellow arrows depict the injection site.

the psoas muscle [46]) and its surrounding structures are visualized, there are 4 injection points, described as QL 1–4 [46]. In all cases, the needle is inserted in a sterile, in-plane manner from lateral to medial toward the desired location. As in most fascial plane blocks, local anesthetic volume is more important than concentration, and typically 20–40 ml local anesthetics are required to achieve the desired spread and analgesic effects.

1) QL1, also known as lateral QL, involves injection of LA on the lateral aspect of the QL muscle where it contacts the transversalis fascia.
2) QL2 is localized to the posterior aspect of the QL muscle. LA is injected posteriorly between the QL muscle and the TLF. The TLF separates the QL muscle from the latissimus dorsi and erector spinae muscles.
3) QL3 implies depositing LA to the anterior portion of the QL muscle that is in contact with the psoas muscle.
4) QL4 involves direct injection of LA into the body of the QL muscle.

Outcomes

While there has been a myriad of papers in the last decade regarding the QL block, most are case reports or studies with relatively small numbers. There have been no large studies comparing QL1-4 regarding which one or combination is most effective. Some recent studies did help delineate the dermatomal relationship between the various QL blocks. In those studies, QL 1 and QL 2 blocks provided coverage from T7 to L1 [65], while the QL3 block covered T10-L4 in one study and T6/7-L1/2 in another [66]. The QL4 block provided dermatomal coverage from T7 to 12 [52].

Block-specific complications

Bleeding in general should be put into consideration, as QL blocks are deeper and noncompressible blocks. Bleeding risk is more problematic in the QL1 and 2 techniques as the lumbar arteries course through this area [46]. Specific risks to the QL blocks include potential spread to the lumbar plexus, although rare, which may lead to motor weakness and delayed mobility [67]; for example, a case of lower extremity weakness due to lumbar plexus spread has been described [67]. Another potential risk is hypotension, which could be attributed to paravertebral spread [68]. Because of the proximity to the peritoneum, there is the theoretical risk of needle trauma to peritoneal contents including the kidney [69].

Summary

The current studies show considerable potential for the QL blocks in a variety of abdominal and orthopedic surgeries such as hip and spine procedures. However, it is early for a new technique, and the data sets are relatively small to make any definitive conclusions on the overall efficacy and safety of the QL blocks. Larger randomized trials comparing QL blocks with other blocks, such as lumbar plexus block in hip procedures, TAP block in abdominal procedures, and erector spinae block in spine procedures, are needed to demonstrate consistent dermatomal coverage as well as outcomes in terms of pain scores, opiate consumption, and surgical outcomes.

Conclusion

The onset of ultrasonography has made fascial plane blocks easier to perform and with demonstrated higher efficacy and effectiveness. One can take advantage of the blockade effects of various motor-sparing blocks and strategically combine two or more blocks to achieve desired effects. In many knee surgeries, such as the major painful total knee replacement, the routine but painful anterior cruciate ligament repair, and the difficult-to-manage tourniquet pain, ONB has found itself plenty of new indications. Each of QL block, LFCN block, and ON block has shown its individual effects in various types of hip procedures; the combination of two or three of these blocks provides effective analgesia from hip fracture repair to total hip arthroplasty. Available opioid-sparing perioperative pain management options are few for spine surgeries, yet QLB has been showing to be promising in lumbar spine fusion, lumbar laminoplasty, and lumbar laminectomy, likely due to blockade of posterior branches of lumbar spinal nerve. Even though data are limited in the novel usage of these fascial plane blocks in hip and knee surgeries, the results are promising. With the wide adoption of ultrasound in daily clinical practice, one would reasonably expect to see more innovative usage of motor-sparing facial plane blocks in orthopedic procedures.

Practice points

- Ultrasound has made fascial plane blocks safer, easier to perform, and more effective.
- Obturator nerve block is a useful block for both hip and knee procedures.
- Lateral femoral cutaneous nerve block is a low-risk motor-sparing block that provides useful analgesia for hip and knee procedures.
- Quadratus lumborum block offers a motor-sparing alternative to traditional lumbar plexus block for hip procedures.

Research agenda

- Studies are needed to compare the effectiveness and efficacy of ultrasound-guided vs. landmark techniques in fascial plane blocks.
- Controlled prospective studies are required to compare the different proximal and distal approaches of obturator nerve block in terms of effectiveness and safety, with the aim to standardize its clinical practice.
- The effects of various types and approaches of quadratus lumborum block in hip procedure require further study and standardization.

Funding

None.

Conflicts of interest

None.

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