Chapter 12

Anterior Lumbar Plexus Blocks

- Single-Injection Femoral Nerve Block
- Continuous Femoral Nerve Block
- Single-Injection Obturator Nerve Block
- Single-Injection Lateral Cutaneous Nerve of the Thigh Block




SINGLE-INJECTION FEMORAL NERVE BLOCK

Introduction

The single-injection femoral nerve block is indicated for surgery to the knee, femur, medial tibia, first toe, and medial side of the foot (1). It is essential to study the osteotomes (see Fig. 11-8), dermatomes (see Fig. 11-9), and neurotomes (see Fig. 11-10) of the lower limb to understand the extent of this block.

Specific Anatomic Considerations

The femoral nerve originates from the second, third, and fourth lumbar roots (see Fig. 13-1), and the bones of the L2, L3, and L4 osteotomes are covered by this block (see Fig. 11-8) (2). Note that this area starts with the femur and continues down to the medial aspect of the tibia and medial side of the foot.

Included in this block are the skin areas supplied by the L2, L3, and L4 dermatomes (see Fig. 11-9). Note again that coverage will extend all the way down to the big toe and the medial aspect of the foot.

The single-injection femoral nerve block usually does not involve the area innervated by the lateral cutaneous nerve of the thigh on the side of the thigh (see Fig. 11-4), nor does it commonly involve the medial area of the thigh innervated by the obturator nerve (see Fig. 11-3). The obturator nerve originates from the anterior rami of L2, L3, and L4 (see Fig. 13-1) and gives off branches to the hip joint and the posterior aspects of the knee joint capsule (2).

A pure femoral nerve block usually involves the areas shown in Figure 11-2, which include the anterior aspect of the thigh, as well as the medial aspect of the lower leg and the medial aspect of the foot by way of the saphenous nerve.

The single-injection femoral nerve block is therefore almost always combined with a sciatic nerve block for knee, ankle, and foot surgery. It is best suited for situations in which pain is expected to be of relatively short duration. For pain of longer duration, such as after anterior cruciate ligament repair or total knee replacement, a continuous nerve block is optimal.

Technique

The patient is positioned supine and the femoral artery is palpated and marked (Fig. 12-1). Figure 12-2 illustrates the sono-anatomy for ultrasound-assisted femoral nerve block.

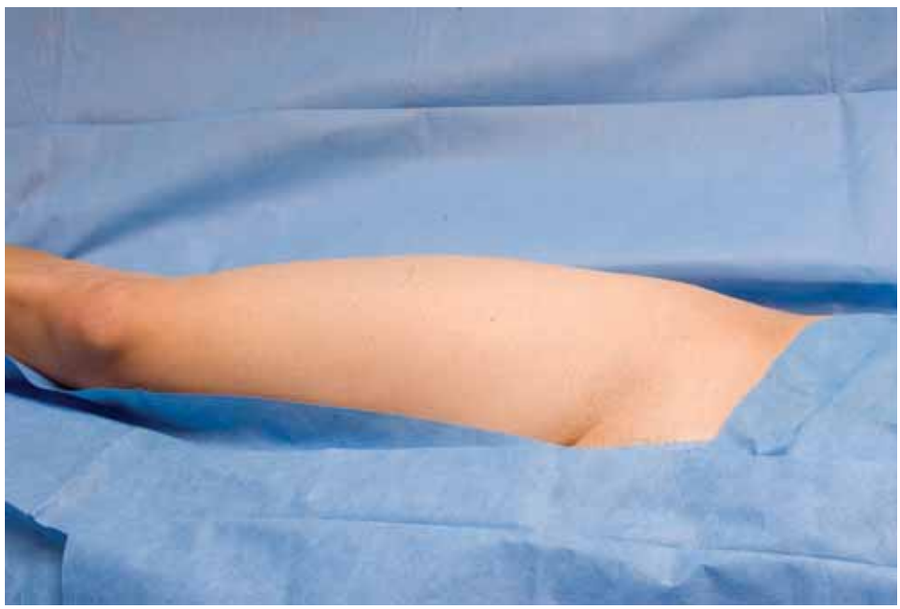


FIGURE 12-1 The patient is positioned in the supine position with the foot neutral, neither externally nor internally rotated.

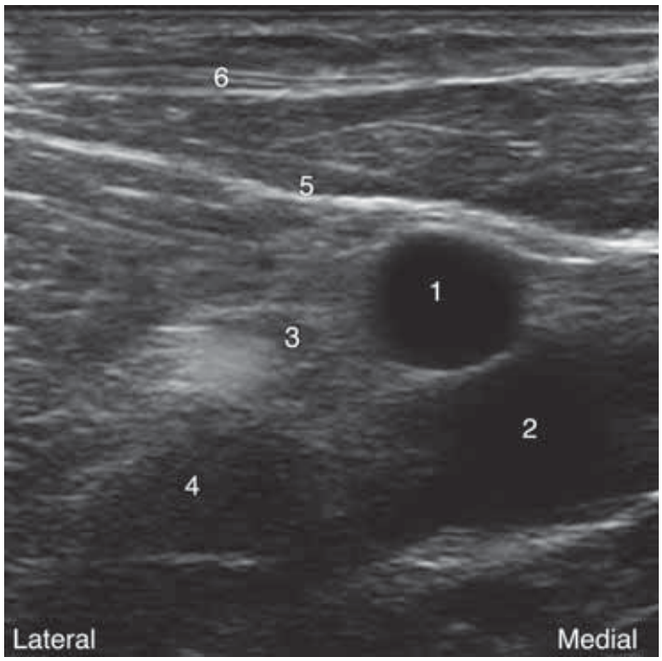


FIGURE 12-2 Transverse sonogram of femoral nerve area. 1 = Femoral artery; 2 = Femoral vein; 3 = Femoral nerve; 5 = Fascia iliaca; 6 = Fascia lata.

FIGURE 12-3 The *solid vertical line* indicates the position of the femoral artery, and the *horizontal line* the inguinal groove. The *line joining the two semicircles* indicates the position of the inguinal ligament. The skin and subcutaneous tissue are anesthetized.

The point of needle entry (Fig. 12-3, *single dot*) is approximately 1 to 1.5 cm lateral to the artery (see Fig. 12-2, *broad blue vertical line*) and 1 cm caudal to the inguinal crease (see Fig. 12-2, *thin blue horizontal line*). The *semicircles* in Figure 12-2 represent the anterior superior iliac spine and the pubic tubercle. Some anesthesiologists prefer needle entry inside the inguinal crease, whereas others prefer entry above the inguinal crease. Personal preference and the clinical situation should dictate the choice. Above the crease, however, the nerve is closer to the artery and sometimes deep to the artery.

After disinfecting the skin with an appropriate solution, the skin and subcutaneous tissue are anesthetized (Fig. 12-3).

The stimulating needle enters the skin at a slightly cephalic angle and two clear "pops" can usually be felt as the fascia lata and fascia iliaca are penetrated (Fig. 12-4). The nerve stimulator is now typically set at an output of 1 to 2 mA, a frequency of 2 Hz, and a pulse width of 100 to 300 μsec.

The nerve to the sartorius muscle is often encountered, and this should not be confused with femoral nerve stimulation.

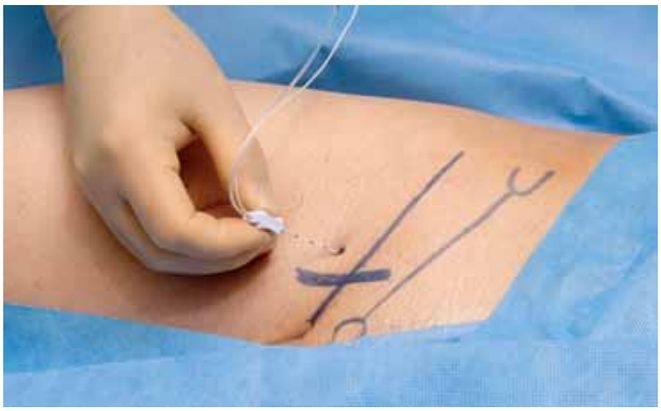


FIGURE 12-4 Needle entry with a 50-mm stimulating needle is 1 cm lateral to the femoral artery and 1 cm caudal to the inguinal groove.

Slight adjustment to the needle, first by advancing it slightly, then by moving it laterally, and finally by moving it medially, will bring it in contact with the femoral nerve with resulting clear cephalad movements of the patella owing to quadriceps muscle contractions. The nerve stimulator is now turned down to 0.3 to 0.5 mA.

Injection of local anesthetic agent or any other conducting fluid, such as normal saline, will cause the muscle twitches to stop immediately. This is a positive Raj test, which gives further assurance that the block will be successful.

Local Anesthetic Agent Choice

Almost all local anesthetics agents in various volumes, concentrations, and combinations have been used for this block. The author prefers to use 15 to 40 mL of ropivacaine 0.5% to 0.75%, or bupivacaine 0.5%. Ropivacaine 0.5% or bupivacaine 0.5% plus 0.3 mg of buprenorphine or 40 mg of dexamethasone may make this block last up to three times longer, but if a long-acting block is required, it is better to place a continuous femoral nerve block. It is, however, essential to place the needle deep to both the fascia lata and fascia iliaca for a successful femoral nerve block.

(See single-injection femoral nerve block movie on DVD.)

CONTINUOUS FEMORAL NERVE BLOCK

Introduction

The main indication for continuous femoral nerve block is anterior knee surgery such as anterior cruciate ligament repair or total knee replacement (3,4,5). It is essential to realize that there is an area behind the knee supplied by the sciatic or obturator nerves that may still be painful in approximately 20% to 80% of patients after major knee surgery. This pain, however, is usually short lived; if it bothers the patient, a single-injection sciatic nerve block may be performed after confirmation of an intact sciatic nerve in the postoperative period. If this is not successful in treating the pain, an obturator nerve block may be required.

If the tendon for anterior cruciate ligament repair is harvested from the hamstrings, a single-injection sciatic nerve block may also be needed. Continuous femoral nerve block is further indicated for painful surgery to the ankle joint (e.g., ankle arthroplasty and triple arthrodesis) in combination with a continuous sciatic nerve block.

If the catheter is placed on the femoral nerve deep to the fascia iliaca, the block will almost always incorporate the lateral cutaneous nerve of the thigh and the obturator nerve (6). Figure 12-5 indicates the spread of 3 mL (Fig. 12-5A), 5 mL (Fig. 12-5B), and 20 mL (Fig. 12-5C) of local anesthetic agent after a continuous femoral nerve block. Notice that 20 mL spreads all the way to the lumbar plexus. This probably makes the continuous femoral nerve block a more appropriate option than a continuous lumbar plexus block if a careful risk–benefit ratio is calculated (7).

Specific Anatomic Considerations

The femoral nerve originates from the second, third, and fourth lumbar roots, and the bones

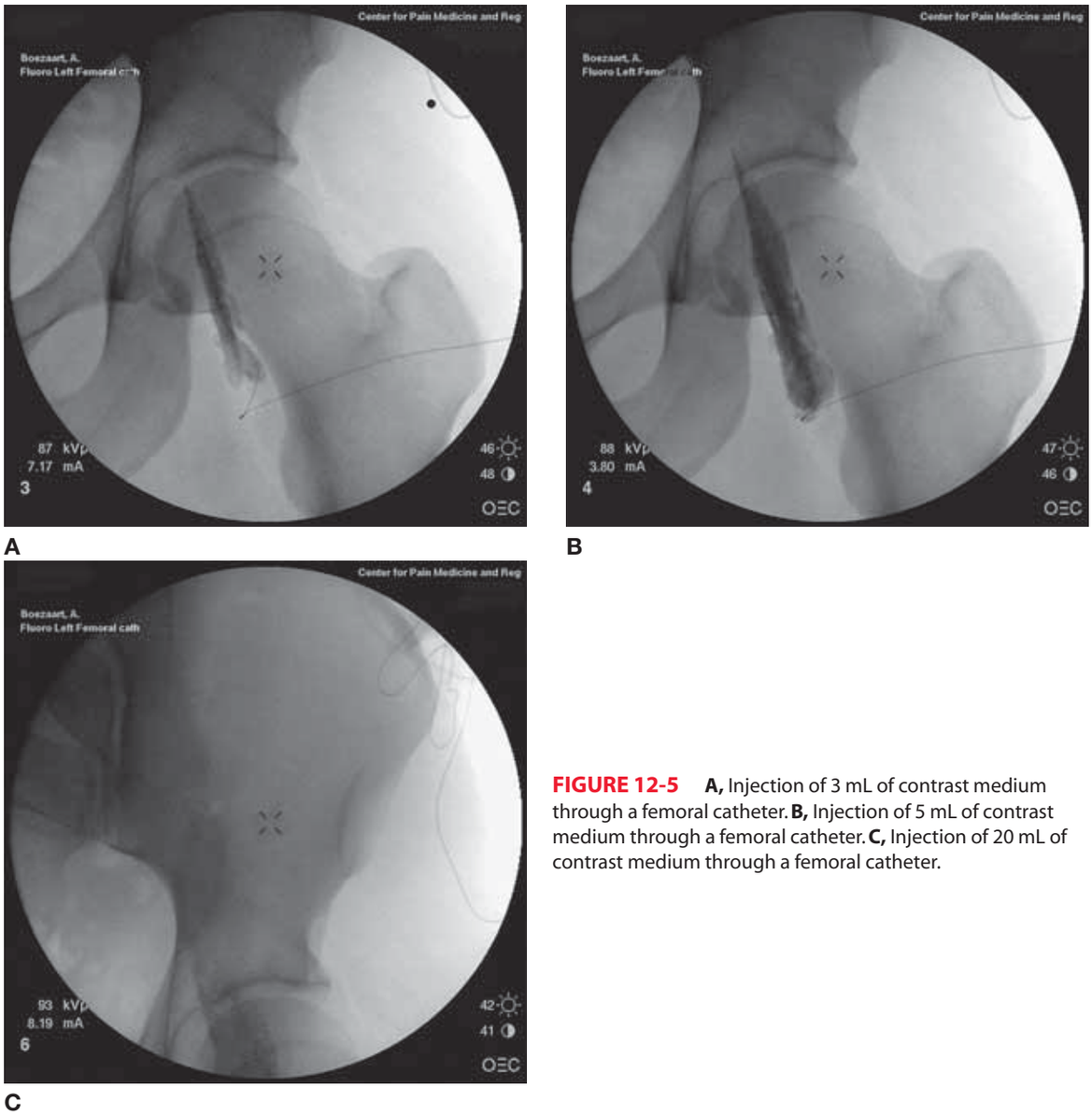


FIGURE 12-5 **A,** Injection of 3 mL of contrast medium through a femoral catheter. **B,** Injection of 5 mL of contrast medium through a femoral catheter. **C,** Injection of 20 mL of contrast medium through a femoral catheter.

of the L2, L3, and L4 osteotomes are covered by this block (see Fig. 11-8). Note that this includes almost the entire femur and continues down to the medial aspect of the tibia and medial aspect of the foot.

The skin area of the leg supplied by the L2, L3, and L4 dermatomes is covered by the continuous femoral nerve block (see Fig. 11-9). Note again that this area extends to the big toe.

The continuous femoral nerve block almost always involves the lateral cutaneous nerve of the thigh, the obturator nerve, and femoral nerve if the catheter is advanced under nerve stimulator control next to the nerve (see Figs. 11-2 to 11-4).

In young, fit, healthy patients, there is no or very little brown fat surrounding the femoral nerve, which makes catheter placement in these patients more challenging than in older patients and patients with more adipose tissue. Patience is required for accurate catheter placement in such patients. It is, however, preferable to place a stimulating catheter on the femoral nerve to achieve a successful secondary block.

FIGURE 12-6 The patient is positioned supine with the foot in the neutral position.

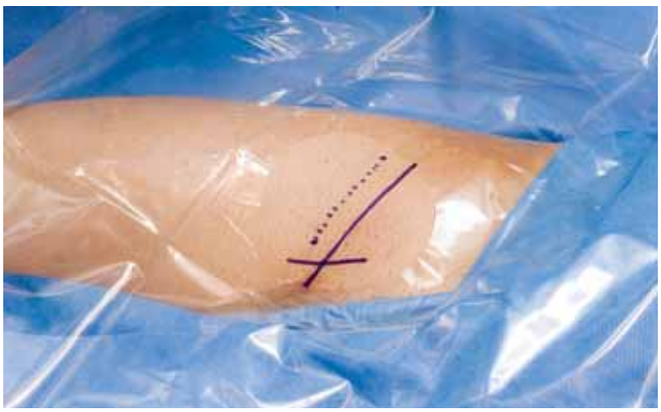


FIGURE 12-7 The *horizontal dotted line* indicates the intended path for tunneling the catheter. The *vertical solid line* indicates the position of the femoral artery, and the *horizontal solid line* the inguinal groove.

Technique

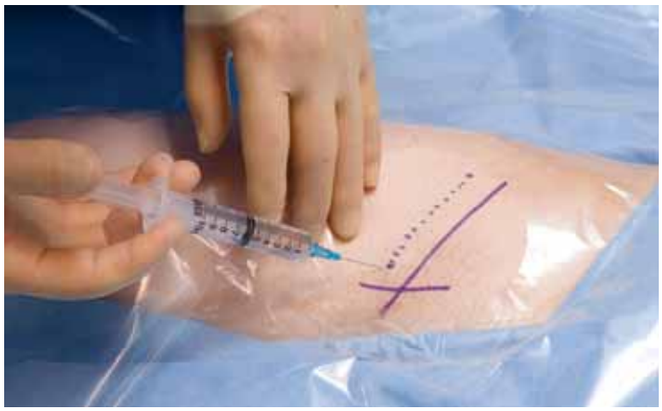
The patient is positioned supine with the foot neutral, neither externally nor internally rotated (Fig. 12-6).

After palpating and marking the femoral artery and inguinal crease, and disinfecting the skin, the area is covered with a sterile, fenestrated, transparent plastic drape (Fig. 12-7).

The skin, subcutaneous tissue (Fig. 12-8A), and the intended path for tunneling of the catheter (Fig. 12-8B) is anesthetized with lidocaine and 1:200,000 epinephrine.

An insulated 17- or 18-gauge Tuohy needle is attached to the nerve stimulator, which is set to an output of 1 to 1.5 mA, a frequency of 2 Hz, and a pulse width of 100 to 300 μsec, and enters the skin 1 to 1.5 cm lateral of the femoral artery and 1 cm caudal of the inguinal crease (Fig. 12-9). The bevel of the needle points upward and the needle enters at a cephalic angle of approximately 45 degrees. The needle can also be placed by ultrasound-assistance (Fig. 12-2).

Some anesthesiologists prefer needle entry inside the inguinal crease, whereas others prefer entry above the inguinal crease. Personal



A

B

FIGURE 12-8 **A,** The skin and subcutaneous tissues are anesthetized. **B,** The intended path for tunneling the catheter is anesthetized.

FIGURE 12-9 An insulated 18-gauge Tuohy needle, attached to a nerve stimulator, enters 1 cm lateral to the artery and 1 cm caudal to the inguinal groove.

preference and the clinical situation should dictate the choice. Above the crease, however, the nerve is closer to the artery and sometimes deep to the artery.

There are usually two distinct "pops" as the fascia lata and fascia iliaca are penetrated. Cephalad movement of the patella is clearly observed as the femoral nerve is stimulated.

After identifying the femoral nerve with the needle, the nerve stimulator output is turned down to between 0.3 and 0.5 mA and a brisk motor response of the quadriceps muscle should

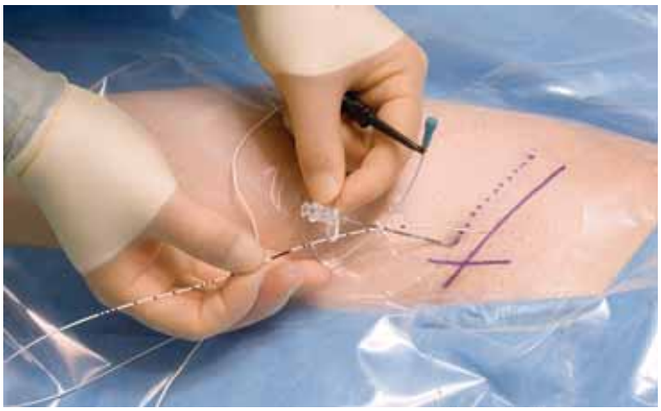


FIGURE 12-10 Once the nerve has been located with the needle, the nerve stimulator is attached to the proximal end of the catheter, and the distal end of the catheter is inserted into the needle shaft.

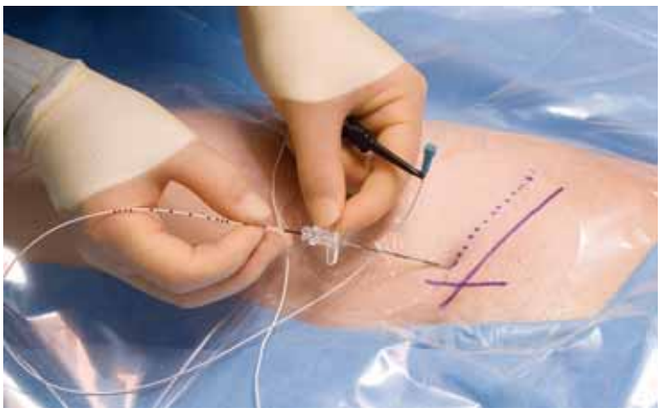


FIGURE 12-11 The special mark on the catheter indicates that the catheter tip is now situated at the needle tip.

still be present. This ensures correct needle placement deep to the fascia iliaca, but it does not ensure accurate catheter placement. It is essential not to inject any local anesthetic agent or other electrically conductive fluid such as normal saline through the needle at this point because this will render stimulating catheter placement impossible. The notion of using normal saline to "open up the space" in which to advance the catheter is not based on scientific fact because in live tissue it only infiltrates the tissue, making it edematous and rendering further nerve stimulation impossible or very difficult. If the anesthesiologist does subscribe to the notion of "opening up the space," he or she should use 5% dextrose in water because it will not abolish the motor response and will allow stimulating catheter placement.

The nerve stimulator is now attached to the proximal end of the stimulating catheter, which is placed in the palm of the operator's left hand, and the catheter is held with the right hand at the area of the special mark, which is 10 cm from the catheter tip (Fig. 12-10).

The catheter tip is inserted into the shaft of the needle. The motor response will immediately resume, and the special mark on the catheter indicates that the catheter tip is situated at the tip of the needle, but it is not yet protruding from the needle tip. The needle should not be manipulated if this broad black mark is not completely visible (Fig. 12-11).

If the twitches disappear on advancement of the catheter, the catheter is carefully withdrawn into the needle shaft such that the entire special mark is visible once again. A small adjustment to the needle is made by rotating it one-fourth turn clockwise or counterclockwise or by withdrawing or advancing the needle slightly, and the catheter is advanced again (Fig. 12-12). This maneuver is repeated as often as necessary to ensure correct and accurate catheter placement

FIGURE 12-12 If the motor response is lost during catheter advancement, the catheter is withdrawn to inside the needle shaft and the needle manipulated—in this case, it is turned a quarter turn clockwise.

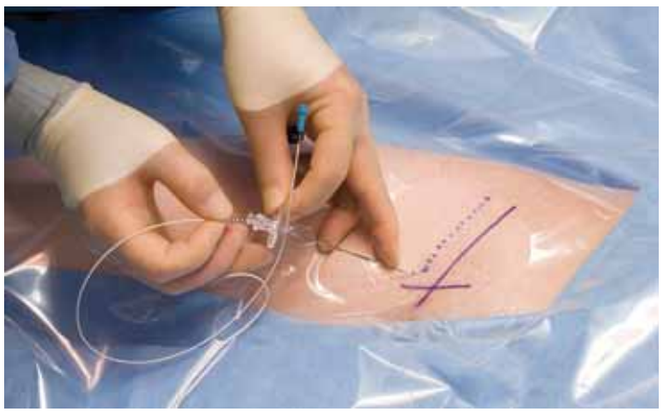


FIGURE 12-13 The catheter is advanced again and after correct catheter placement, the needle is removed without disturbing the catheter.

and successful secondary block. In young, fit adults, it may be necessary to repeat these maneuvers many times, and patience is required. If the catheter is placed without quadriceps stimulation during catheter advancement, it simply means that the catheter is not on or near the nerve and the block cannot be expected to be successful. If required, the catheter can be advanced until adduction of the thigh due to obturator nerve stimulation is observed, but this maneuver is usually unnecessary because the local anesthetic agent will spread along the femoral nerve if the catheter is properly placed (see Fig. 12-5C).

Remove the needle without disturbing the catheter (Fig. 12-13).

Catheter Tunneling with a Skin Bridge

The catheter is tunneled by first inserting the inner stylet of the needle 1 to 2 mm from the catheter exit site if a skin bridge is required (Fig. 12-14A), and advancing it subcutaneously to a point approximately 8 to 10 cm lateral if this is appropriate for the surgery (Fig. 12-14B). This area has previously been anesthetized. The skin bridge tends to make catheter removal easier, but this is offset by a higher frequency of leakage.

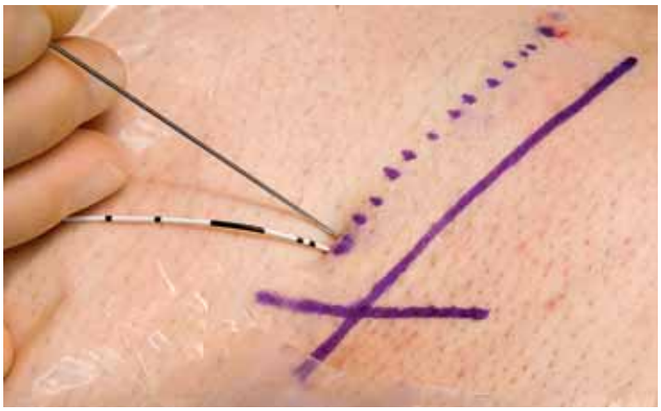
The needle is "railroaded" retrogradely over the stylet (Fig. 12-14C, D).

The stylet is removed, the catheter is fed through the needle, and the needle is removed (Fig. 12-14E, F).

The piece of silicone tubing that protected the catheter tip while packaged is handy for placing in the loop made by the catheter to protect the skin under the skin bridge (Fig. 12-14G).

Catheter Tunneling without a Skin Bridge

Figure 12-15 explains the steps involved in catheter tunneling without a skin bridge.



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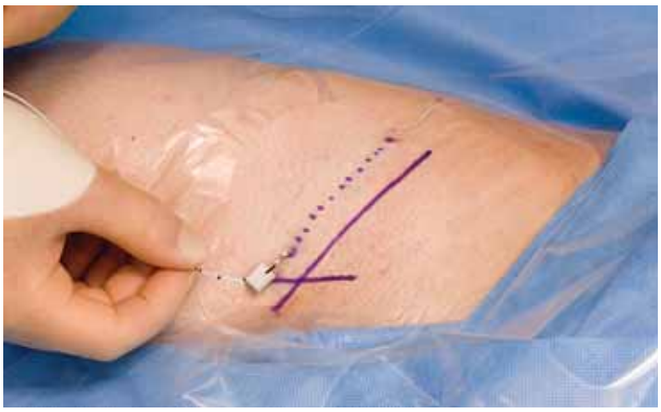

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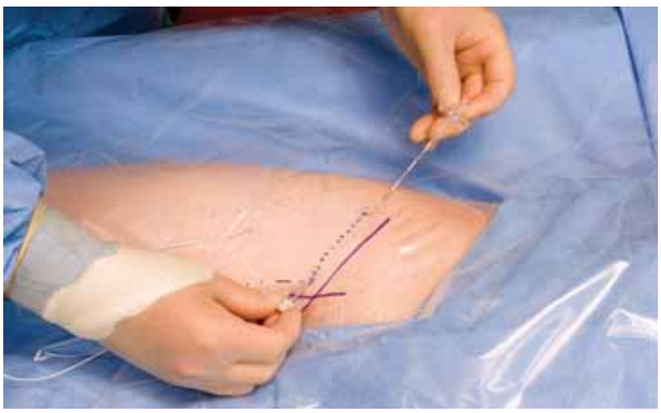


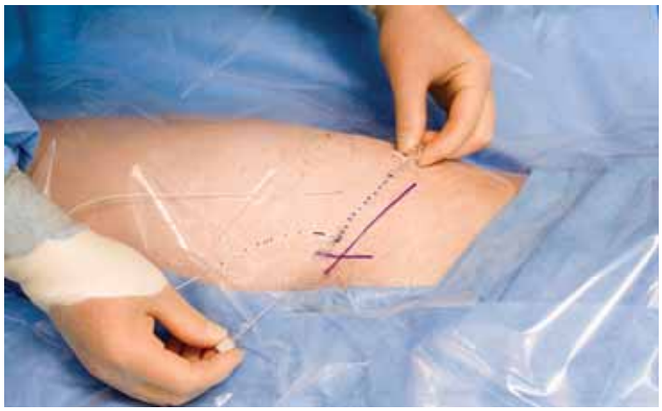
C

FIGURE 12-14 Tunneling with a skin bridge. **A,** The needle stylet enters the skin 1 to 2 mm lateral to the exit site of the catheter. **B,** The inner stylet of the needle is advanced 8 to 10 cm laterally. **C,** The needle is "railroaded" over the stylet.

Raj Test

The Luer lock connecting device is attached to the proximal end of the catheter, the nerve stimulator is clipped to the connecting device, and the nerve stimulation is set to an output of 0 mA.

The nerve stimulator output is turned up slowly until a quadriceps muscle twitch can just be seen. Local anesthetic agent or normal saline is injected and the motor response immediately stops. This constitutes a positive Raj test, which is a further indication that the secondary block will be successful.



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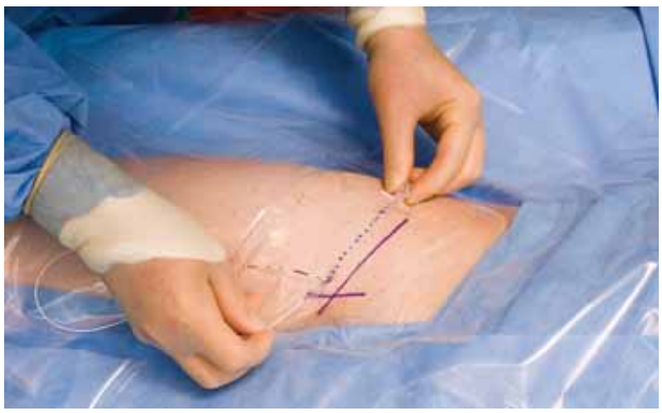

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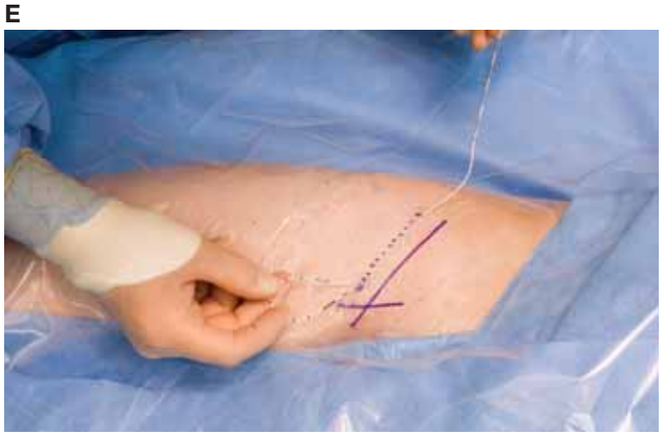


F

FIGURE 12-14 *(continued)* **D,** The stylet is removed. **E,** The catheter is advanced retrogradely through the needle. **F,** The needle is removed.

The catheter and connecting device is placed in the fixation device, which is placed in a convenient position, usually on the patient's abdomen.

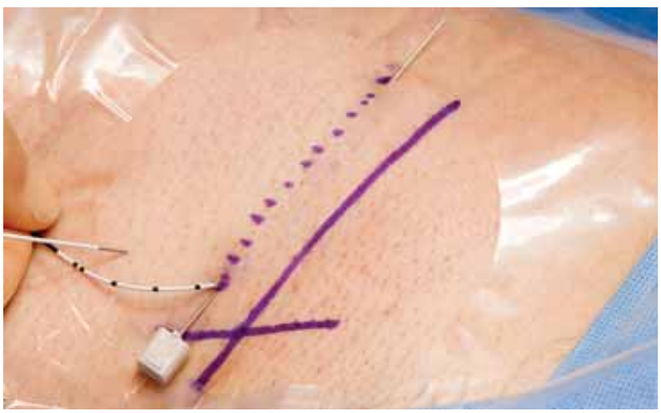
Catheter Removal

Catheter removal is a sterile procedure done after the patient no longer requires the continuous nerve block and full sensation has returned to the leg. A common strategy is to discontinue the infusion for 3 to 6 hours when it is anticipated that the patient will not need the block any longer. This gives the patient and health care providers an opportunity to judge the efficacy of the other analgesics. If the patient experiences severe pain again, a bolus is activated through the

G

FIGURE 12-14 *(continued)* **G,** Silicone tubing is placed to protect the skin.

A



B

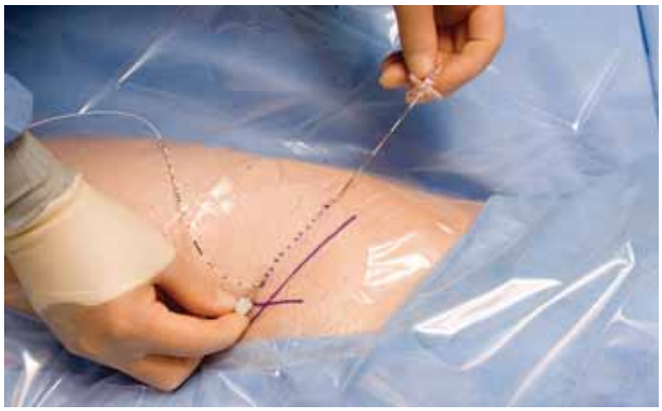
FIGURE 12-15 Catheter tunneling without a skin bridge. **A,** The needle stylet enters the exit wound of the catheter. **B,** The needle stylet is advanced 8 to 10 cm laterally.

catheter and the infusion restarted at its previous settings. If the alternative analgesic agents seem to be effective, the catheter can be removed.

The proximal end of the catheter is held with the left hand and the distal end is removed from the skin bridge. This part of the catheter is kept sterile and the rest of the catheter is removed (Fig. 12-16).

Local Anesthetic Agent Choice

Almost all local anesthetic agents and combinations of agents have been used for this block, but the



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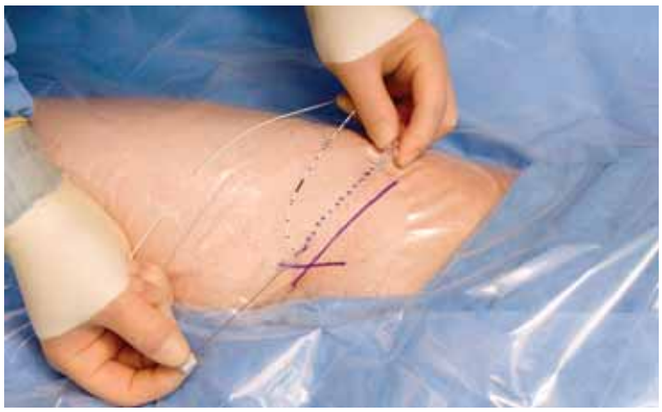

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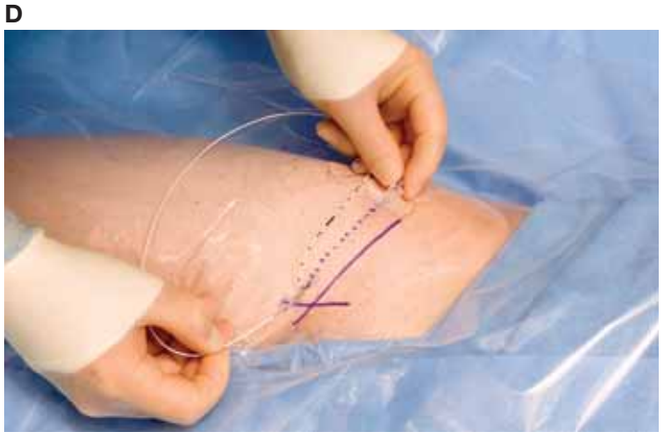


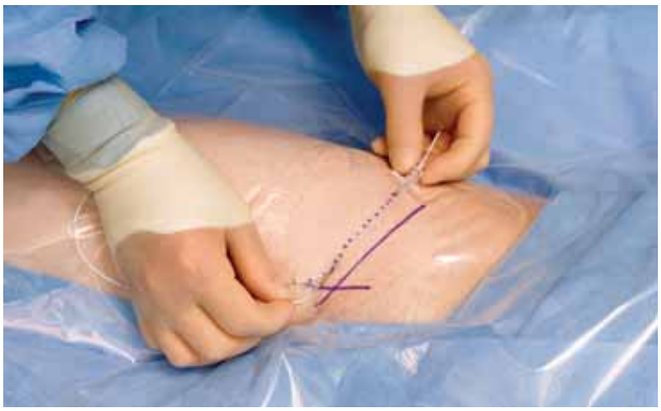
E

FIGURE 12-15 ***(continued)*** **C,** The needle is "railroaded" over the stylet. **D,** The catheter is advanced retrogradely through the needle. **E,** Catheter advancement through the needle.

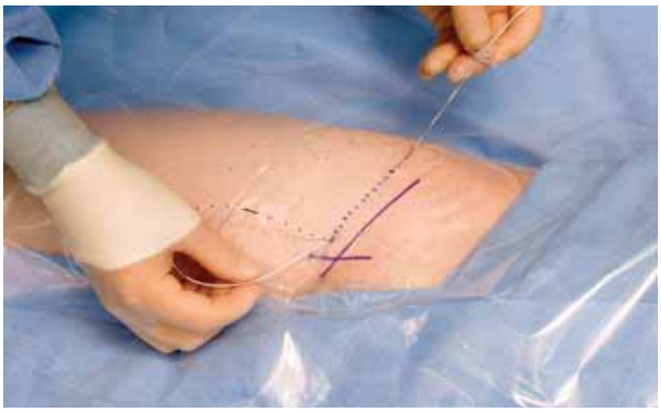
author prefers to use 15 to 40 mL of ropivacaine 0.5% to 0.75% as the initial bolus for intraoperative analgesia, followed with a 2- to 10-mL/hour continuous infusion of ropivacaine 0.1% to 0.2%. Patient-controlled boluses of 5 to 10 mL every hour are usually sufficient to control breakthrough pain.

This block can jeopardize quadriceps function and some authorities believe that quadriceps function may be essential for knee rehabilitation. Although the importance of quadriceps function for knee rehabilitation has not yet been verified by research, it is advisable to use a dilute concentration of ropivacaine (i.e., 0.1% or 0.05%) to preserve quadriceps function during the postoperative period. Research is ongoing to evaluate buprenorphine in this role.

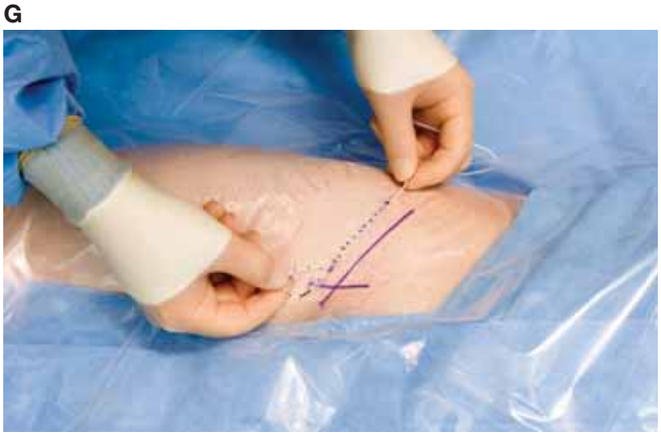
(See continuous femoral nerve block movie on DVD.)



F



G



H

FIGURE 12-15 *(continued)* **F,** The needle is removed. **G,** The loop in the catheter is reduced. **H,** The loop in the catheter disappears under the skin.

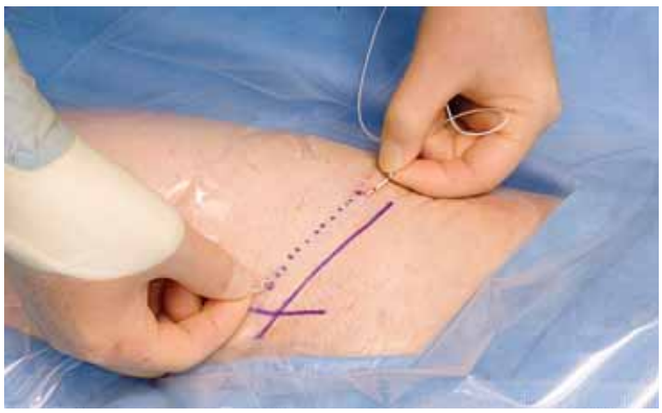
SINGLE-INJECTION OBTURATOR NERVE BLOCK

Introduction

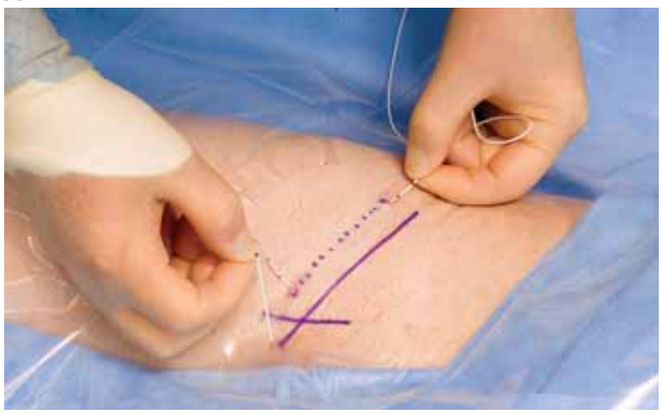
The obturator nerve block is seldom indicated, but after knee surgery and incomplete lumbar plexus block by the anterior approach (femoral nerve block), the patient may experience posterior or medial knee pain. A single-injection sciatic nerve block usually alleviates posterior pain, but an obturator nerve block may be indicated. The anterior division of the obturator nerve supplies the skin over the medial aspect of the lower thigh and does not contribute to the innervation of the

I

FIGURE 12-15 *(continued)* **I,** Finished.



A



B

FIGURE 12-16 Catheter removal. **A,** The proximal end of the catheter is fixed with one hand and the silicone tubing held in the other hand. **B,** The distal end of the catheter is removed while keeping it sterile.

knee joint itself, whereas the posterior division innervates the posterior knee capsule. There are few indications for either a single-injection or a continuous obturator nerve block.

Specific Anatomic Considerations

The obturator nerve is a branch of the lumbar plexus formed from the anterior rami of the second, third, and fourth lumbar nerves (see

C

D

FIGURE 12-16 *(continued)* **C,** Traction is applied to the proximal end while still keeping the distal end sterile. **D,** The entire catheter is removed.

Fig. 13-1) (8). It passes on the brim of the pelvis (Fig. 12-17) to leave the pelvis through the obturator foramen. After exiting the foramen, it divides into an anterior and a posterior division. The anterior division passes above the external obturator muscle, whereas the posterior division passes through the upper border of this muscle.

Obeying Hilton's law that a nerve supplying a muscle that moves a joint also innervates that joint (see Chapter 19), the anterior division of the obturator nerve gives off a branch that provides sensory innervation to the hip. It then descends in the inner thigh behind the adductor longus muscle, which it supplies. It continues on the anterior surface of the adductor brevis muscle, supplying it and the gracilis muscle, finally joining up with the subsartorial plexus, the branches of which supply the skin over the medial aspect of the thigh. The obturator nerve often gives off direct branches to the skin of the medial aspect of the thigh before joining the subsartorial plexus.

The posterior division of the obturator nerve passes downward on the adductor magnus muscle deep to the other adductor muscles. It supplies this muscle and terminates in a fine branch that joins the femoral artery and then joins the middle geniculate artery to supply the posterior capsule of the knee joint. The adductor brevis muscle separates the anterior and posterior divisions of the obturator nerve (8).

Technique

The patient is positioned supine, exposing the pubic area (9). The pubic tubercle is palpated and the needle entry point is 2 cm lateral and 2 cm caudal to the tubercle (Fig. 12-18).

After numbing the skin with a small amount of local anesthetic agent by fine

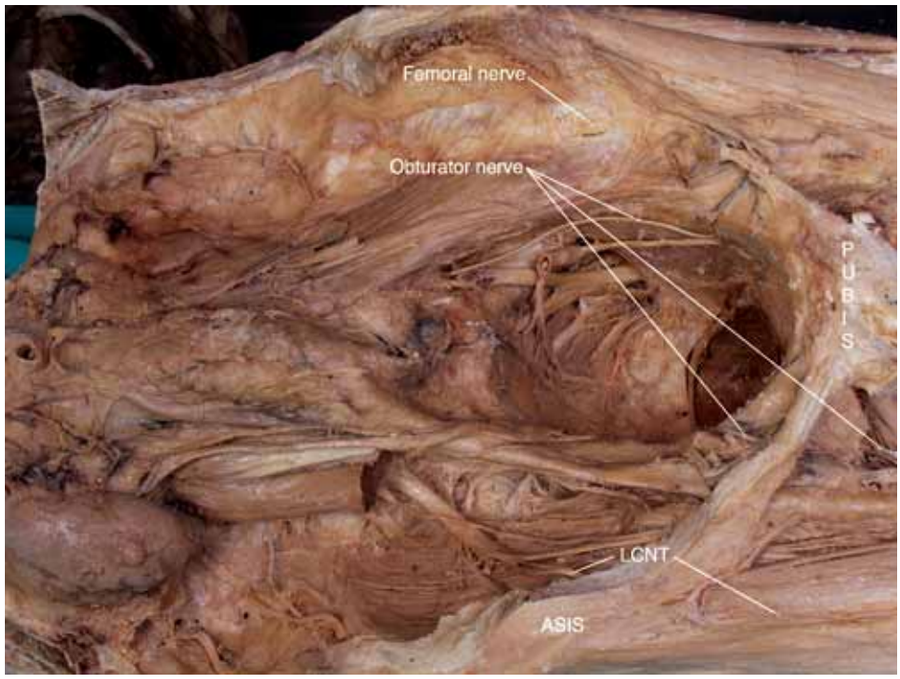


FIGURE 12-17 Dissection showing femoral nerve, obturator nerve, and lateral cutaneous nerve of the thigh. ASIS, anterior superior iliac spine.

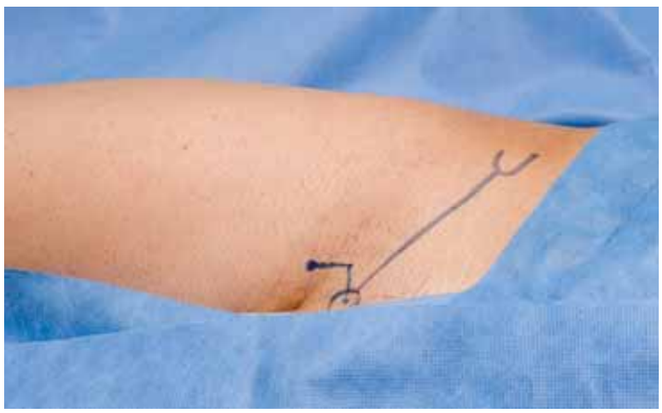


FIGURE 12-18 The pubic tubercle is identified and needle entry is 2 cm lateral and 2 cm caudal to the pubic tubercle.

needle, a 22-gauge stimulating needle, attached to a nerve stimulator set to an output of 1 mA, a frequency of 2 Hz, and a pulse width of 100 to 300 µsec, enters perpendicular to the skin until adductor motor responses are encountered (Fig. 12-19). If the needle is aimed too cephalad, the ramus of the pubis may be encountered. The needle tip is then "walked" posteriorly until the obturator membrane is encountered. The obturator nerve is usually encountered simultaneously, but care must be taken not to penetrate this membrane.

The nerve stimulator output is now turned down to 0.3 to 0.5 mA, while brisk adductor muscle twitches are still present. A small amount of normal saline injection stops the motor response (i.e., a positive Raj test), and the main local anesthetic dose can be injected.

Local Anesthetic Agent Choice

Most local anesthetic agents have been used for this block. It is usually not necessary to have a long-lasting block because the pain originating from the

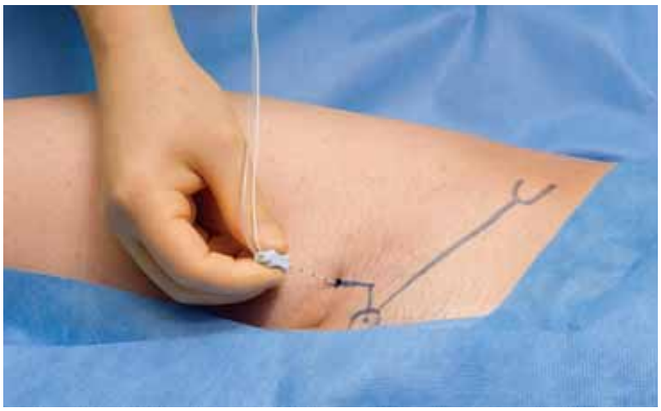


FIGURE 12-19 A 50-mm stimulating needle enters the skin until an adductor motor response is evoked.

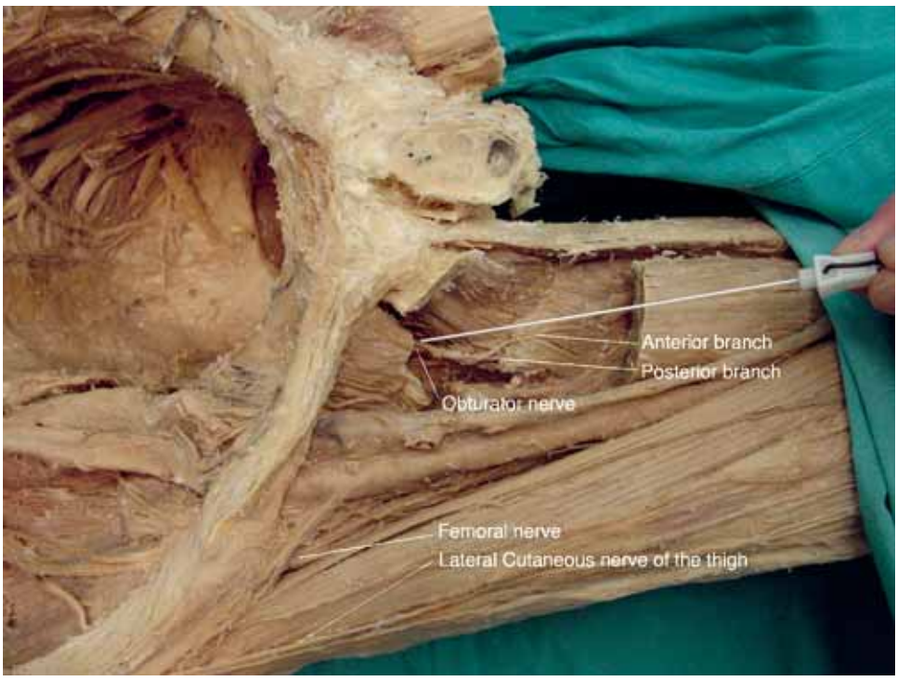


FIGURE 12-20 Dissection showing the anterior and posterior branches of the obturator nerve separated by the adductor brevis muscle.

posterior knee capsule is not long lived—usually 6 to 8 hours.Twenty milliliters of ropivacaine 0.5% is typically all that is required for this block.

Doing the block more distally, as advocated by some authors, may result in only one of the divisions being blocked, leaving the skin on the medial aspect of the thigh (anterior division) or posterior knee capsule (posterior division) unblocked (Fig. 12-20). Ultrasonography has effectively removed this potential problem, however. Because this block is almost always used to supplement another block, typically a femoral nerve block, attention must be given to the possibility of toxic doses of local anesthetic agents, and smaller volumes can be used.

SINGLE-INJECTION LATERAL CUTANEOUS NERVE OF THE THIGH BLOCK

Introduction

Like the obturator nerve block, the lateral cutaneous nerve of the thigh (LCNT) block is usually

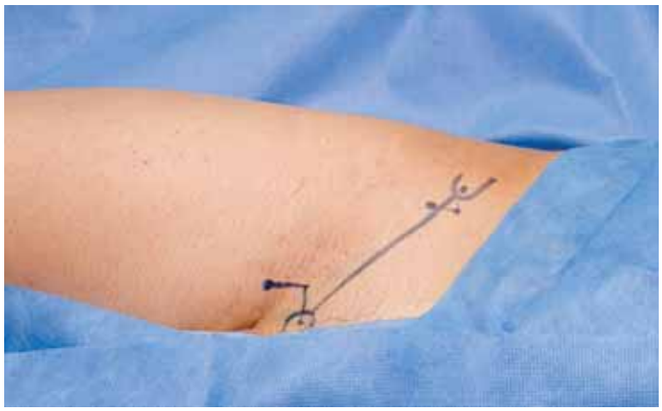


FIGURE 12-21 The *lateral semicircle* indicates the anterior superior iliac spine.

used to supplement an incomplete femoral nerve block. It is seldom indicated on its own, and continuous LCNT block is seldom indicated. Pain originating from the area supplied by this nerve, the lateral skin of the thigh, is seldom long lasting and usually only single-injection blocks are indicated (10).

Specific Anatomic Considerations

The LCNT is derived from the L2 and L3 roots of the lumbar plexus (8). It passes from the lateral border of the psoas muscle across the iliac fossa and lies behind the fascia iliaca at first (see "LCNT" in Fig. 12-17). Further down, it is incorporated within the substance of the fascia iliaca, which is a thick, tough membrane in the fossa iliaca. The nerve passes deep to the inguinal ligament, where it lies free in a fibrous tunnel 1 cm to the medial side of the anterior superior iliac spine (ASIS; see Fig. 12-17). (Meralgia paraesthetica may be due to irritation or compression of the nerve in this fibrous canal.)

The LCNT enters the thigh deep to the fascia lata and divides into anterior and posterior branches that pierce the fascia lata separately 2 to 5 cm below the ASIS (see Fig. 12-20). The anterior branch contains L3 fibers and is distributed along the anterolateral surface of the thigh. Its terminal branch joins the prepatellar plexus, whereas the posterior division, which contains only L3 fibers, passes down the thigh along the posterolateral aspect of the iliotibial tract (8).

Technique

The patient is positioned supine with the ASIS exposed (Fig. 12-21). The ASIS is palpated and marked, and the needle entry point is 2 cm medial and 2 cm caudal to the ASIS (the lateral semicircle in Fig. 12-21).

After raising a small skin wheal with a small volume of local anesthetic agent, the block needle with a B-beveled tip is inserted until a distinct "pop" is felt as the fascia lata is penetrated (Fig. 12-22). Local anesthetic agent is injected at this point, with the anesthesiologist "fanning" it somewhat to ensure that the nerve is blocked.

Local Anesthetic Agent Choice

Most local anesthetic agents have been used for this block, but because the LCNT supplies only the skin over the lateral aspect of the thigh, and pain originating from this area is not long lasting, single-injection blocks with long-acting drugs are not indicated. Because the nerve provides no muscle innervation, long-lasting agents such as 5 to 10 mL of 0.5% bupivacaine can comfortably be used. Other drugs (e.g., ropivacaine, levobupivacaine) can also be used depending on the anesthesiologist's preferences. Because this block is almost always done to supplement an incomplete femoral nerve block or psoas compartment block, attention must be given to the possibility of drug toxicity. The block is also sometimes indicated for meralgia paraesthetica

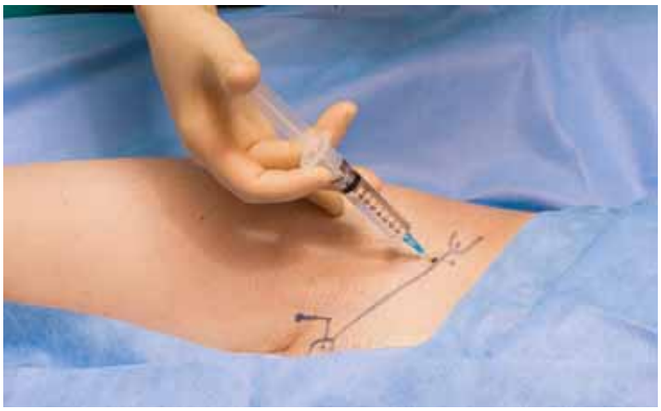


FIGURE 12-22 Needle entry is 2 cm medial and 2 cm caudal to the anterior superior iliac spine.

before surgery is considered, and 5 to 10 mL of 0.5% to 0.75% ropivacaine typically is used for this. Steroid injection is sometimes helpful in this condition.

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