

20. POPLITEAL NERVE BLOCK

INTRODUCTION

The popliteal nerve block is a block of the sciatic nerve in the popliteal fossa with the patient in the prone position. The block is ideal for surgeries of the lower leg, particularly the foot and ankle. It anesthetizes the same dermatomes as both the anterior and lateral approaches to the sciatic nerve (Figure 18-1). Unlike more proximal approaches to the sciatic nerve, the popliteal nerve block preserves hamstring function, allowing easier ambulation of the postoperative patient. Even so, patients should be cautioned against bearing weight on the blocked lower extremity for 24 hours, as with all blocks of the sciatic nerve.

ANATOMY

The popliteal fossa is bordered laterally by the biceps femoris muscle and medially by the semimembranosus muscle. It is the site where the sciatic nerve splits into its two major components, the tibial and common peroneal nerves (Figure 20-1). To avoid an incomplete nerve block, the needle entry site must be proximal to the splitting of these two nerves (Figure 20-2). Studies have demonstrated that the needle entry point should be 10 cm from the popliteal crease to optimize needle placement. Because of the possibility of needle placement distal to the bifurcation of the two nerves, a larger volume of local anesthetic is typically used with this approach (40–45 mL).

The sciatic nerve supplies motor innervation to the entire lower leg via the posterior tibial nerve, superficial and deep peroneal nerves, and the sural nerve. The sural nerve is sensory only. These major branches of the sciatic nerve also supply sensory innervation to the lower leg, except for the medial inner strip, which is supplied by the saphenous nerve (a branch of the femoral nerve).

Teaching Points. Vascular puncture and intravascular injection are rare with this block because the nerve is superficial to the popliteal artery and vein at this location.

For a complete sensory blockade of the lower extremity, the saphenous nerve must also be blocked, which can be done at the level of the popliteal fossa (see Chapter 21).

Figure 20-1

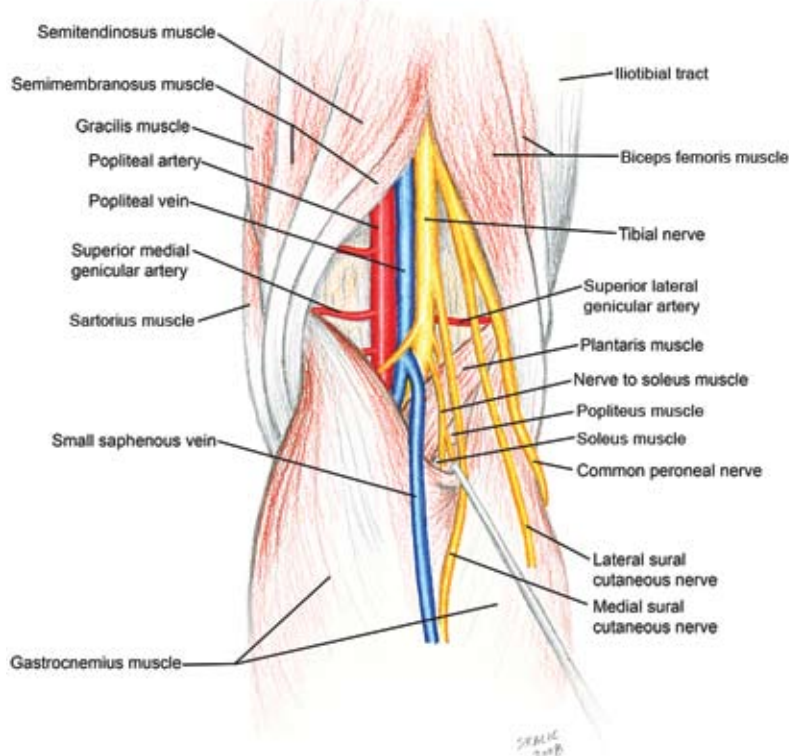
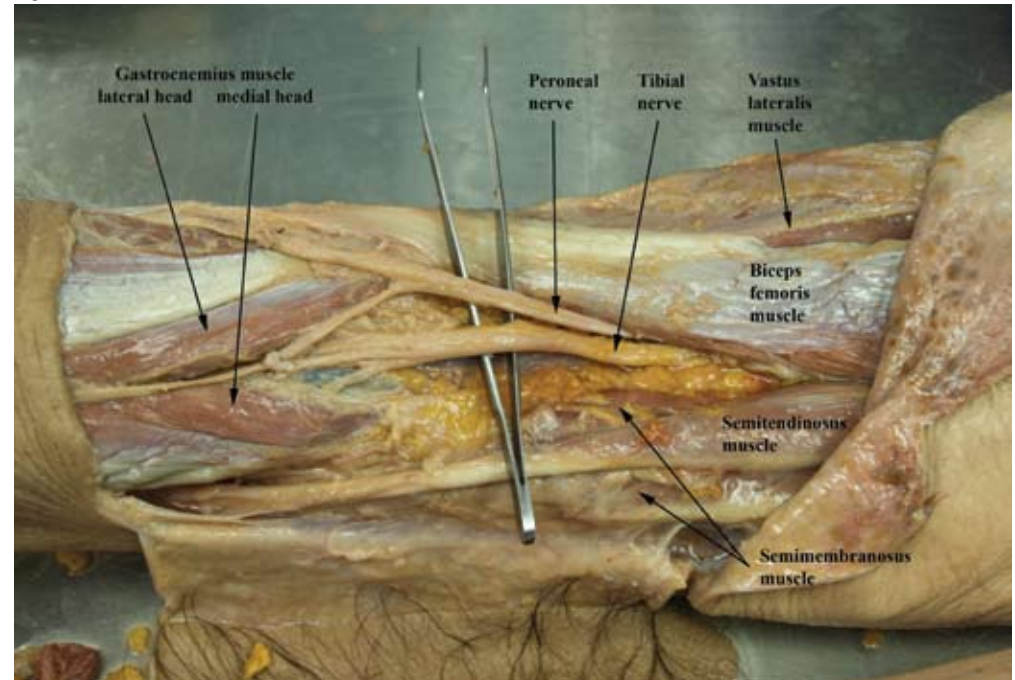


Figure 20-2



PROCEDURE

Landmarks. Place the patient in the prone position with the operative leg supported below the knee. The knee should be slightly bent and the foot resting freely above the bed. The popliteal fossa can be accentuated by having the patient bend the knee against resistance. The popliteal triangle is formed medially by the semitendinosus and semimembranosus muscles, laterally by the biceps femoris muscle, and at the base by the popliteal crease. Needle insertion should be at least 7-cm superior to the popliteal crease and approximately 1 cm lateral to the apex of the popliteal triangle (Figure 20-3). Insert the needle at a 45° to 60° angle to the skin in a cephalad direction (Figure 20-4).

Needles

- 21-gauge, 10-cm insulated needle.
- 18-gauge, 10-cm insulated Tuohy needle for catheter placement. Catheters inserted a minimum of 3 to 5 cm beyond the needle tip.

Stimulation. Set the nerve stimulator initially between 1.0 and 1.2 mA. Inversion of the foot indicates stimulation of the tibial and deep peroneal nerves, eversion of the foot indicates stimulation of the superficial peroneal nerve, plantar flexion indicates stimulation of the posterior tibial nerve, and dorsiflexion indicates stimulation of the deep peroneal nerve. Studies have shown that inversion of the foot leads to the best sensory and motor block, and dorsiflexion of the foot is second best (in contrast to more proximal sciatic nerve blocks, where the nerve components are in close proximity, allowing injection of local anesthetic on any twitch in the sciatic distribution).

Occasionally, a local twitch of the biceps femoris muscle is elicited after needle insertion, indicating that needle placement is too lateral and must be redirected slightly medial. Conversely, if local twitching of the semitendinosus and semimembranosus muscles occurs, needle placement is too medial and must be redirected slightly more lateral.

Local Anesthetic. In most adults, 35 to 45 mL of local anesthetic is sufficient to block the nerves.

Teaching Points. If no motor response is obtained with initial stimulation, subsequent attempts should be made more lateral (rather than more medial, which causes a risk of inadvertent vascular penetration). The anesthesiologist should attempt to achieve stimulation in a position as cephalad in the popliteal fossa as possible, making it less likely that the sciatic nerve has divided at that point, and improving block success.

Figure 20-3

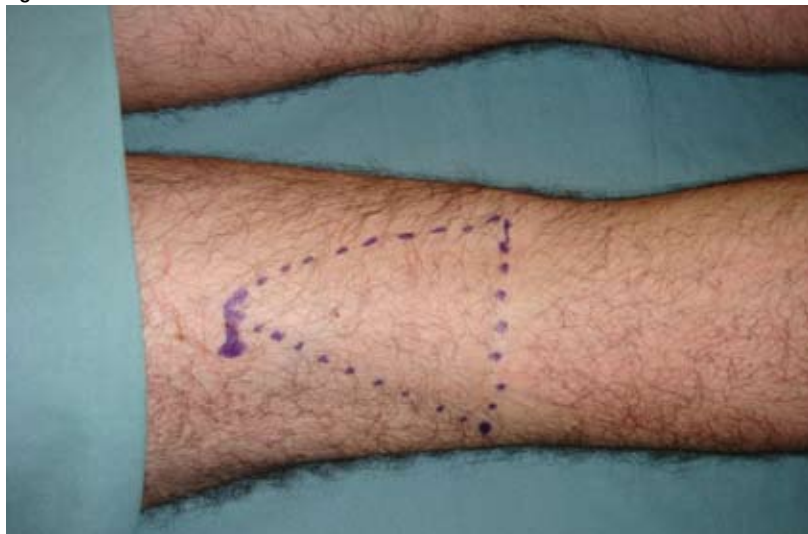


Figure 20-4



BLOCK WITH ULTRASOUND PROBE

Probe. High frequency (5–12 MHz), linear.

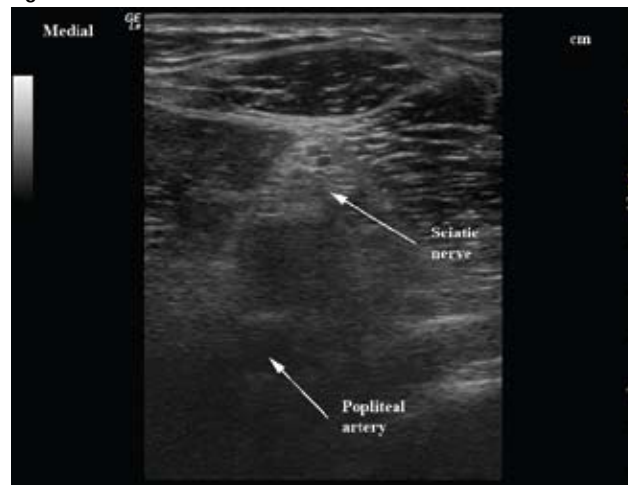
Probe Position. A transverse plane (parallel to the popliteal crease) gives the best image of the sciatic nerve (Figure 20-5). Depending upon the location of the split of the sciatic nerve into its tibial and peroneal components, either one large or two smaller round hyperechoic structures will be seen. If the popliteal artery is visualized, the nerve will be lateral to the artery (Figure 20-6).

Figure 20-5



Approach. As with most ultrasound-guided blocks, an in-plane or out-of-plane approach is possible. Because the in-plane technique allows for complete visualization of the needle, it is the preferred approach at Walter Reed Army Medical Center. With the probe parallel to the popliteal crease and at a level proximal to the nerve split, insert the needle at the lateral aspect of the probe and advance it toward the nerve. After the sciatic sheath is penetrated and the nerve is stimulated, inject 40 mL of local anesthetic. Repositioning the needle may be necessary to ensure complete coverage of the nerve.

Figure 20-6



Teaching Points. For block success, the local anesthetic must be deposited proximal to the splitting of the sciatic nerve. By placing the probe at the popliteal crease and scanning the leg in the cephalad direction, both the tibial and peroneal components of the sciatic nerve can be visualized separately as they coalesce to form the sciatic nerve (Figure 20-7).

The popliteal block is performed in the same area as the lateral sciatic block; however, the patient is in a prone rather than a supine position. Scanning the nerve in the popliteal approach may be easier, although positioning the patient prone is more cumbersome.

The common peroneal and tibial nerves can be blocked distal to the sciatic nerve bifurcation using two separate injections of local anesthetic around each nerve.

Figure 20-7

