

17. SCIATIC NERVE BLOCK: POSTERIOR AND ALTERNATIVE APPROACHES

INTRODUCTION

The sciatic nerve supplies motor and sensory innervation to the posterior aspect of the thigh as well as the entire lower leg, except for the medial leg, which is supplied by the saphenous nerve (the terminal branch of the femoral nerve). The sciatic nerve, formed from the anterior rami of spinal nerves L4–S3, is the largest nerve in the body. Because the sciatic nerve is so large, it can be blocked from several different locations along the lower extremity. Labat's sciatic nerve block is the classic approach, targeting the nerve in the gluteal region. Other sciatic nerve blocks include the anterior (Chapter 18) and lateral (Chapter 19) approaches, which allow the patient to remain in the supine position, as well as the parasacral and prone approaches. Raj's subgluteal approach is performed in the supine position with the hip flexed.

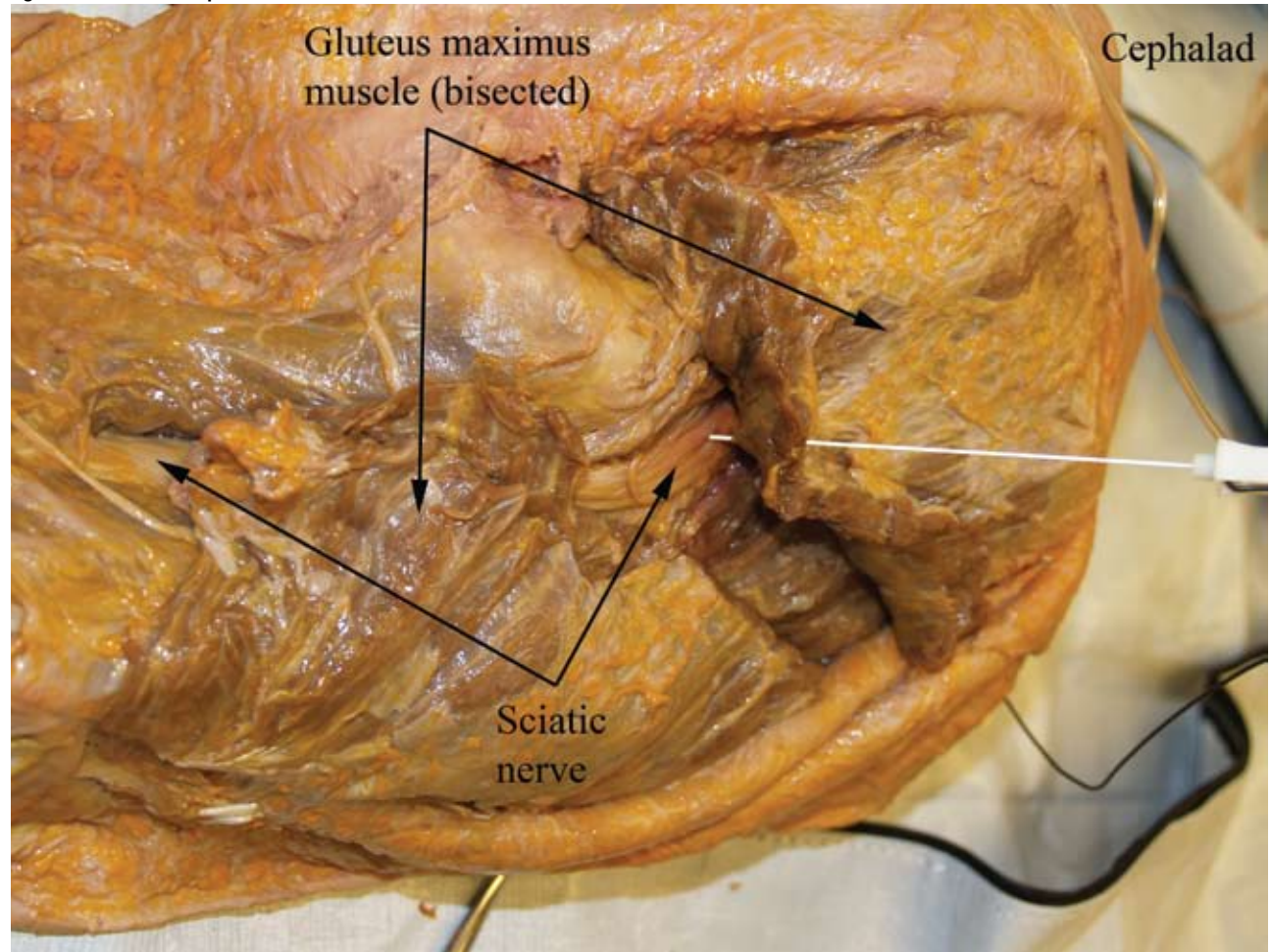
Sciatic nerve blocks require adequate set-up because this large nerve resists local anesthetic penetration, leading to longer block onset times. For complete anesthesia of the leg below the knee the saphenous nerve must also be blocked, either directly or via a femoral nerve block.

ANATOMY

This anatomy description applies to all approaches of the sciatic nerve block (through Chapter 19). The sciatic nerve arises from the ventral rami of L4 through S3, which forms most of the sacral plexus (L4–S4). The sciatic nerve is actually two nerves in close apposition, the tibial and common peroneal

(fibular) nerves. These nerves usually do not separate until the mid-thigh, although separation as proximal as the pelvis occurs in about 12% of patients. The sciatic nerve leaves the pelvis via the greater sciatic foramen, travels under the gluteus maximus (Figure 17-1), and continues distally

Figure 17-1. Dissected proximal sciatic nerve



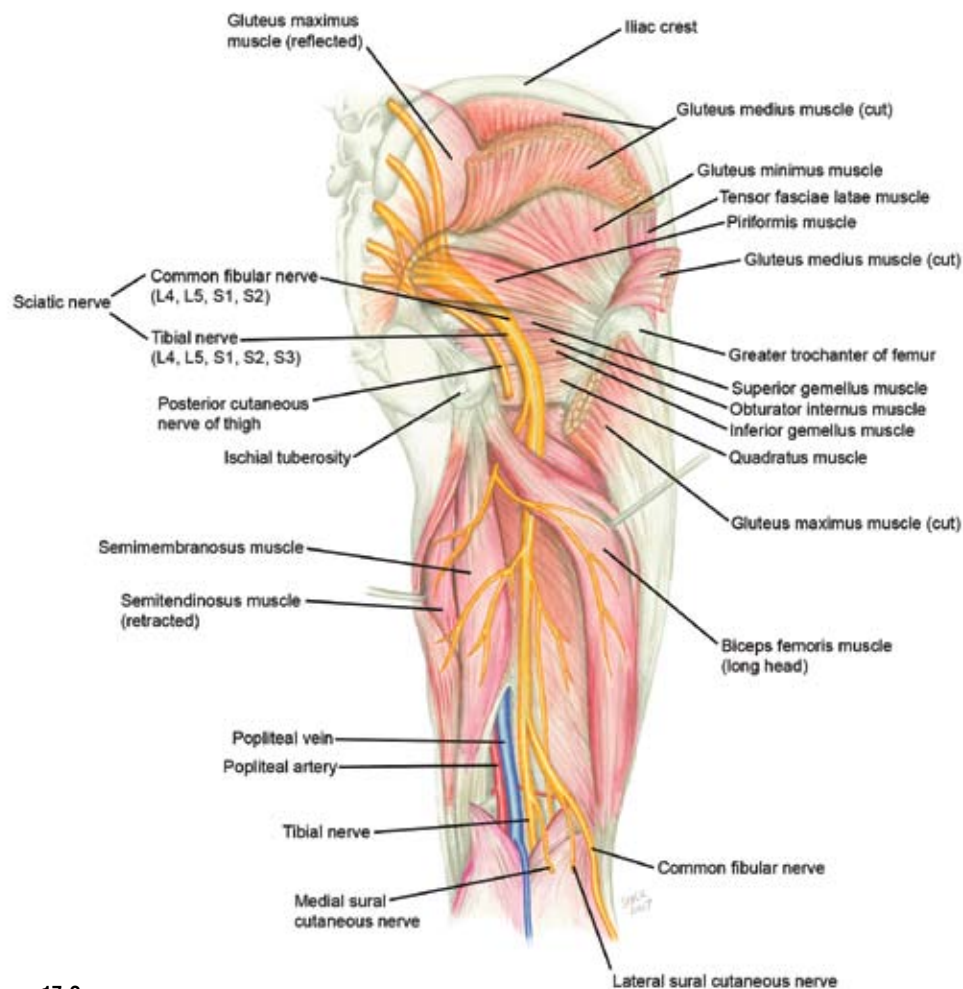


Figure 17-2

toward the posterior thigh between the greater trochanter and ischial tuberosity (Figure 17-2). Although the sciatic nerve does not innervate any muscles in the gluteal region, it does supply motor innervation

to the posterior thigh muscles as well as all muscles of the leg and foot. It also provides sensory innervation to the skin of most of the leg and foot (Figure 17-3).

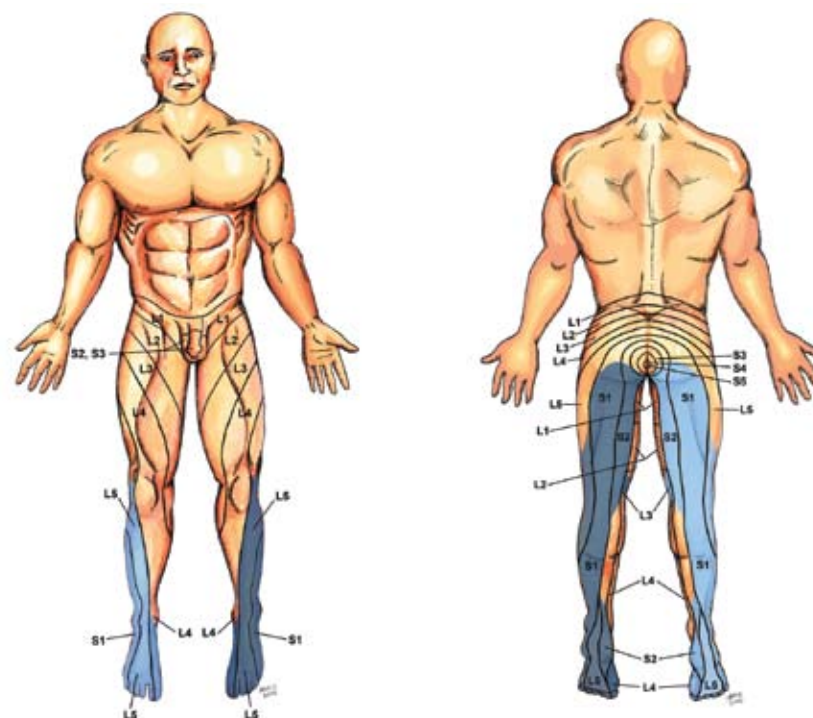


Figure 17-3. Dermatomes anesthetized with a proximal block of the sciatic nerve (dark blue)

Teaching Point. Of the various approaches to the sciatic nerve, Labat's posterior technique (first described in 1924) has the advantage of also blocking the posterior femoral cutaneous nerve. This nerve provides sensory innervation to the gluteus and uppermost medial and posterior thigh, and blocking it is important when thigh tourniquets are used for lower extremity procedures of long duration.

PROCEDURE

Landmarks. In Labat's classic approach, the patient is placed in lateral decubitus position (operative side up), and the leg is flexed at the knee. If the patient is unable to flex the leg, the leg should be extended at the hip as far as possible without producing patient discomfort. Draw a line between the greater trochanter to the posterior superior iliac spine (PSIS). Draw a second line from the greater trochanter to the patient's sacral hiatus (Winnie's modification). Determine the point of initial needle insertion by drawing a line perpendicular from the midpoint of the first line to its intersection with the second line. A fourth line can be drawn along the "furrow" formed by the medial edge of the gluteus maximus muscle and the long head of the biceps femoris muscle (Figure 17-4). The furrow represents the course of the sciatic nerve toward the lower leg. The triangle formed by the first, second, and fourth lines further defines initial needle placement, and subsequent adjustments of the needle within the triangle can improve success at sciatic nerve stimulation.

Needles

- 21-gauge, 10-cm insulated needle for the majority of patients. For obese patients, 15-cm needles may be needed.
- 18-gauge, 10-cm insulated Tuohy needle for catheter placement. Insert catheters 5 cm beyond the needle tip.

Stimulation. Set the nerve stimulator initially at 1.0 to 1.5 mA. Insert the needle perpendicular to all planes (Figure 17-5). Stimulation of the patient's gluteus maximus muscle is often encountered just before sciatic nerve stimulation. Patients often find this uncomfortable, and the needle should be advanced through gluteus stimulation without pause. Successful needle placement in proximity to the sciatic nerve is observed with plantar flexion/inversion (tibial nerve) or dorsiflexion/eversion (common peroneal nerve) with 0.5 mA or less of current. Occasionally, hamstring muscle twitching will be noted, which suggests the needle tip has

been placed too medial. Slight adjustment of the needle tip laterally will usually result in successful localization of the sciatic nerve.

Local Anesthetic. In most adults, 20 to 30 mL of local anesthetic is sufficient to block the plexus.

Teaching Points. The posterior approach to the sciatic nerve combined with a lumbar plexus block provides complete anesthesia of the lower extremity (a femoral nerve block often misses the obturator nerve). Labat's approach is well suited for continuous catheter techniques.

Studies of this posterior approach have demonstrated that plantar flexion of the foot (tibial nerve stimulation) resulted in a shorter onset time and more frequent success of the block versus dorsiflexion (common peroneal nerve).

The addition of the furrow line can be especially useful in obese patients, when palpation of traditional landmarks is difficult.

Figure 17-4. Landmarks for posterior approach to the sciatic nerve

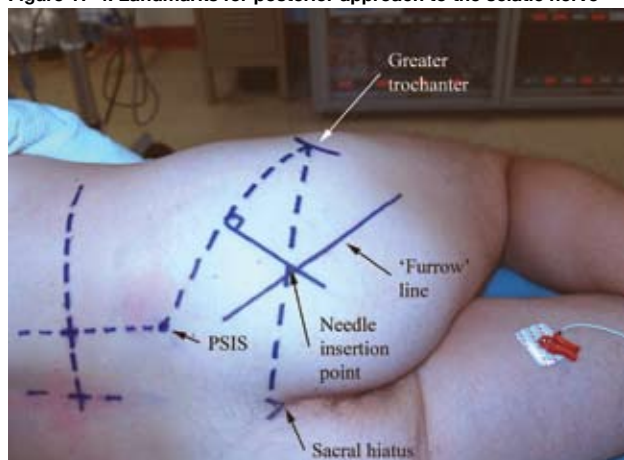


Figure 17-5



BLOCK WITH ULTRASOUND PROBE

Probe. Low frequency (2–5 MHz), curved, or high frequency (5–12 MHz), linear (a linear probe is used in Figures 17-6 to 17-8).

Probe Position. With the patient positioned in the lateral decubitus position, operative side up, draw a line connecting the greater trochanter with the ischial tuberosity. The sciatic nerve bisects the midpoint of this line. Place the probe directly on the line, which is perpendicular to the sciatic nerve, to allow a transverse view of the nerve (Figure 17-6). The ischial tuberosity (medial) and the greater trochanter (lateral) should be visible as hyperechoic curved structures on either side of the ultrasound screen. The sciatic nerve, which appears as a hyper-echoic elliptical structure, is located between these two landmarks (Figure 17-7).

Figure 17-6

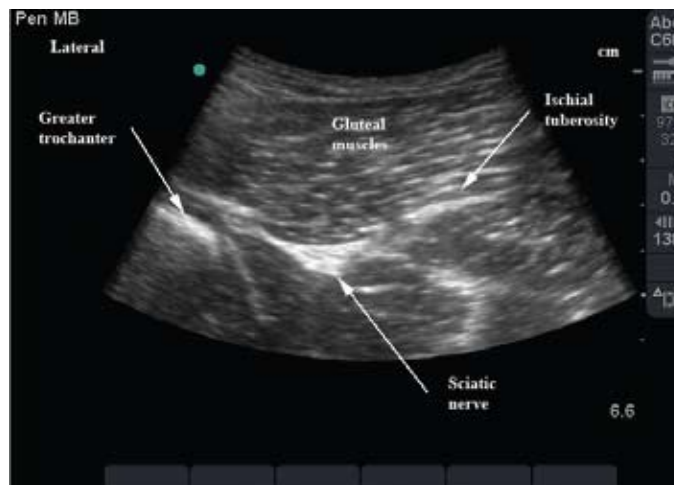


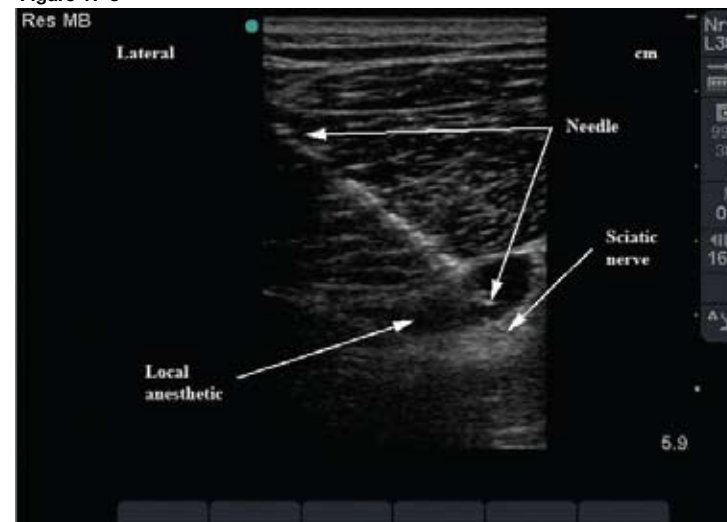
Figure 17-7

Teaching Point. To easily identify the sciatic nerve, use the low-frequency curved probe to identify both the greater trochanter and ischial tuberosity. If only one is visible, increase the depth on the ultrasound monitor to allow the other landmark to be observed. Once the sciatic nerve is identified, the depth can then be decreased to focus on the nerve only. A high-frequency linear probe can be used at this point to increase nerve resolution during insertion of the needle and injection of local anesthetic.

Approach. Insert the needle at the lateral aspect of the ultrasound probe for an in-plane approach. Lateral needle insertion is preferred to medial insertion because the inferior gluteal artery is located medial to the nerve and may interfere with needle advancement.

Injection. At this level, the sciatic nerve is located within a discrete space (the sub-gluteal space) located between the anterior surface of the gluteus maximus muscle and the posterior surface of the quadratus femoris muscle. If proper needle placement is achieved, the injection and spread of 20 to 30 mL of local anesthetic often surrounds the nerve, which is optimal. If this does not occur, the needle can be adjusted to achieve local spread all around the target nerve (Figure 17-8).

Figure 17-8



ALTERNATIVE APPROACHES TO THE SCIATIC NERVE BLOCK

Raj Technique. This posterior approach is unique because the patient remains in the supine position. The hip and knee are both flexed at a 90° angle, with the foot resting on a Mayo stand or held up by an assistant. By flexing the hip in this way, the gluteal muscles are flattened and the sciatic nerve becomes more superficial. Palpate the greater trochanter and ischial tuberosity, and draw a line connecting them. Insert a 10-cm needle at the midpoint of this line, at a perpendicular angle to the skin (Figure 17-9).

Figure 17-9



Parasacral Technique. This technique is the most proximal approach to the sciatic nerve, targeting the nerve in the greater sciatic foramen. Patients are placed in the lateral decubitus position. This technique typically blocks the obturator nerve, enabling the entire lower extremity to be anesthetized with a sciatic and femoral nerve block (without a lumbar plexus block). Landmarks are the PSIS and the ischial tuberosity. Draw a line connecting these two points, and insert a 10-cm needle 6 cm caudal to the PSIS. If bone is contacted, “walk off” the needle caudally until it advances through the sciatic foramen. The nerve is usually found at a depth of 6 to 7 cm (Figure 17-10).

Figure 17-10



Midline Technique. Franco has described two techniques that target the sciatic nerve 10 cm lateral to the midline of the pelvis. The first, a midgluteal approach, is performed with the patient in the prone position. Insert a 10-cm needle at the midpoint of the intergluteal sulcus 10 cm lateral to the midline. Advance the needle parallel to midline and perpendicular to the table. If no response is elicited, adjust the needle slightly medial or lateral.

The second technique is a subgluteal approach with the patient in the lateral decubitus position, flexed at the hips and knees (as if performing a lateral neuraxial technique). Insert the needle in the subgluteal fold 10 cm from the intergluteal sulcus, directing it parallel to the bed (Figure 17-11).

Figure 17-11

