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Anatomy

- The sciatic nerve has 2 branches, the common peroneal (fibular) nerve and the tibial nerve, which are formed from the lumbosacral plexus (L4-S3).
- It innervates the lateral rotator group (except for the piriformis and quadratus femoris), as well as the posterior compartment of the thigh.
- The lateral rotator group is innervated by the sacral plexus (L4-S2) portion of the sciatic nerve except for the obturator externus (innervated by the lumbar plexus), and consists of six muscles that externally rotate the hip, including the gemellus superior, obturator internus, gemellus inferior and obturator externus.
- The posterior compartment of the thigh includes the knee flexors and hip extensors: biceps femoris (short head and long head), semitendinosus and semimembranosus mus-

cles. All are innervated by the tibial nerve portion of the sciatic nerve except for the short head of the biceps femoris, which is innervated by the common peroneal nerve.

- The individual fibers of the sciatic nerve converge to form the single nerve anterior to the piriformis, passing posterior to it through the greater sciatic foramen.
- The nerve then passes through the posterior thigh into the popliteal fossa where it bifurcates into the common peroneal and tibial nerves [1, 2] refer to Fig. 108.1 (a, b) in Chap. 108.

Conditions Affecting the Nerve

1. Nerve compression (sciatica/lumbar radiculopathy) caused by entrapment at:
 - Lumbar spine (spinal stenosis, disc herniation).
 - Compartment syndrome.
2. Neuropathy:
 - (a) Diabetes.
 - (b) Ischemia.
 - (c) Lower motor neuron disease.
3. Nerve injury:
 - (a) Untreated, chronic nerve compression.
 - (b) Trauma.
 - (c) Injury during total hip arthroplasty (THA) or spine surgery [1].

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Clinical Picture

Diagnosis

1. General:
 - History and Physical exam.
 - Imaging.
 - Radiographs to look for fractures.
 - CT.
 - MRI, if space occupying lesion suspected.
 - Nerve conduction studies to localize entrapment/injury in peripheral causes.
2. For foot drop:
 - (a) Physical exam to differentiate between damage to common peroneal nerve and deep peroneal nerve.
 - (i) focus on sensory findings.
 - Common peroneal nerve damage will have much broader sensory findings, while deep peroneal nerve damage will have quite narrow sensory findings.
 - Deep peroneal nerve damage will have sensory findings generally limited to 1st and 2nd phalangeal interspaces.
 - Common peroneal nerve damage will generally have broader sensory findings around the lateral leg and dorsum of the foot.
3. For lumbar spine causes:
 - (a) Radiographs to look for osteophytes or spondylolisthesis.
 - (b) MRI to evaluate evidence for disc herniations and nerve compression from stenosis.
 - (c) Electromyogram and nerve conduction velocity to rule in/out peripheral causes.
 - (d) Provocative tests:
 - (i) Straight leg raise/Seated leg raise to suggest lumbar spine etiology.
 - (ii) Exacerbation with plantar flexion and inversion caused by stretch of deep peroneal nerve.

Treatment

For foot drop

- Conservative management.
- Surgical decompression of nerve.
- Nerve repair for laceration.
 - Autologous grafting is standard of care.
 - Nerve transfer techniques are a new alternative option with unproven efficacy.
- Orthotics and braces, as last resort.

For lumbar disc herniation

- Conservative management, depending on etiology.
 - Reassurance and patient education.
 - Physical therapy/resumption of physical activity to tolerance.
- Operative management.
 - Surgery (disc herniation, spinal stenosis).

Nerve Block Techniques [3, 4]

1. Classic (Transgluteal) approach

Transgluteal approach is an anatomically proximal approach for sciatic nerve block in the gluteal area using the classic Labat's landmarks. The patient is positioned in the lateral position with the side to be blocked up. A line is drawn between the greater trochanter and the posterior superior iliac spine (PSIS). The needle entry point is 4 cm distal to the mid-point of that line. Another modification was described later By Winnie to compensate for difference in patient height and size, where a second line is drawn between the greater trochanter and the sacral hiatus. A perpendicular line is drawn from the mid point of the first line to the second line. The intersection between the perpendicular line and the second line is the needle entry point. The nerve lies deep to the gluteus maximus muscle at this level and superficial to the iliac bone.

Using a stimulating needle, the nerve is approached until motor response is elicited in the distribution of one of the branch components of the sciatic nerve; planter flexion and inversion (tibial nerve) or dorsiflexion and eversion (common peroneal nerve) at a current of 0.2–0.5 mA. Motor response in the hamstring muscles is also accepted with this approach. Alternatively, ultrasound can be used to guide the needle using a curvilinear probe for deeper penetration and finally 10–20 ml of a local anesthetic is injected around the nerve, which usually results in sensory and motor block in the distribution of the sciatic nerve.

2. Subgluteal approach

Landmarks for this approach are the greater trochanter and ischial tuberosity. The patient is positioned in the lateral decubitus position. The needle entry point is the intermuscular groove between the adductors and the hamstrings between these two landmarks. The nerve is located between the gluteus maximus and biceps femoris muscles at this level. Similar to the transgluteal approach, stimulation or ultrasound guidance can be used to block the nerve as described above.

3. Parasacral approach

This is the most proximal approach for sciatic nerve block. With the patient in the lateral decubitus position, a line is drawn connecting the posterior superior iliac spine and the ischial tuberosity. A point three fingers' breadth (6 cm) caudal from the posterior superior iliac spine along this line is the point of entry. Stimulation or ultrasound guidance can be used as mentioned before.

4. Raj technique

With the patient in the supine position the hip is flexed to about 90 degrees as well as the knee to provide access to the subgluteal area. The greater trochanter and ischial tuberosity are marked. A line is drawn joining these two points and the intermuscular groove between the adductors and the hamstrings is the entry

point. Stimulation or ultrasound guidance can be used for nerve block.

5. Anterior approach

Anterior approach is an old technique that has been revived recently due to the advanced in the use of ultrasound. The landmarks are the femoral crease and femoral artery pulse. The needle entry point is usually 4–5 cm along a line perpendicular to the femoral crease and passing through the femoral pulse. With the patient in the supine position, a curvilinear probe is used to scan the proximal anterior thigh below the inguinal ligament. The femur and the femoral artery are identified. The needle is advanced between the artery and the femur until motor stimulation is obtained in the distribution of the sciatic nerve. It is helpful to use combined ultrasound and stimulation with this approach as well as a long needle due to the deep path required to achieve this block. The sciatic nerve lies deep to the adductor muscles and is usually 8–12 cm deep in most cases. This block has a higher risk of hematoma formation, but can be useful in patients who cannot be moved to a different position especially after lower extremity surgery.

Indications

- Neuralgia refractory to conservative management.
- Failed spine surgery syndrome.
- Palliative measure for chronic pain that may include multiple modalities.

Contraindications

- Allergy to anesthetic solution or additives.
- Overlying infection.
- Severe bleeding disorder or coagulopathy.
- Preexisting neurological damage.

Side Effects and Complications

- Recalcitrant symptoms.
- Foot drop.

High Yield Points

- Sciatic nerve is one of the biggest nerves in the lower extremities and takes origin from L4-S3.
- It divides into tibial and common peroneal nerves.
- There are several techniques for blocking the nerve using anatomical landmarks, ultrasound and nerve stimulation.

2. Proximal to the knee, the sciatic nerve divides into:

- A. 3 branches
- B. 4 branches
- C. 2 branches
- D. 1 branch

Answer: C

3. Which of the following structures is used as a landmark when performing the sciatic nerve block (classic approach):

- A. Ischial tuberosity
- B. Greater trochanter
- C. Anterior superior iliac spine
- D. L5 spinous process

Answer: B

Questions

1. You are called to perform a nerve block on a 26 year old man who just had an ankle surgery. You perform a sciatic nerve block with excellent relief of pain except for the medial aspect of the ankle. Supplemental block to which nerve is needed:

- A. Sural nerve
- B. Saphenous nerve
- C. Deep peroneal nerve
- D. Posterior tibial nerve

Answer: B

References

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