Peripheral Nerve Blocks in Foot and Ankle Surgery

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KEYWORDS

• Peripheral nerve block • Foot • Ankle surgery

KEY POINTS

- Increasing outpatient surgery rates necessitates controlling postoperative pain.
- Regional anesthesia decreases hospital length of stay, hospital-associated costs for patients, and perioperative opioid use.
- Postoperative pain has been shown to be factor in patient outcomes.
- Peripheral nerve blocks are a safe alternative to traditional approaches to managing postoperative pain.
- Safe alternative or adjunct to traditional methods for the elderly and those with cardiopulmonary disease.

INTRODUCTION

The advancement of peripheral nerve blocks in foot and ankle surgery has vastly expanded the plethora of choices for pain management in the perioperative period. Without the need for high doses of intravenous pain medication, a larger number of operative procedures can be performed on an outpatient basis, or with shorter observational single-night stays in a hospital setting. These forms of regional anesthesia lead to decreased opioid use and lower reported levels of perioperative pain.[1–4] This may allow patients the option of recovering comfortably at home while incurring lower surgery-related costs.[5] In addition, there are many patients in whom opioids may pose a risk secondary to other medical comorbidities, including those with decreased cognition, dementia, or a previous history of narcotic dependence.

ANATOMY

Sensation to the foot and ankle is provided by the branches of the sciatic nerve and the femoral nerve. Particularly, the femoral nerve terminates as the saphenous nerve, providing sensation to the medial foot. The sciatic nerve divides into the tibial nerve and the common peroneal nerve. The tibial nerve provides plantar foot sensation via the medial and lateral plantar nerves. The common peroneal nerve splits into the superficial peroneal nerve, providing sensation to the dorsal foot, and the deep peroneal nerve, providing sensation to the first web space. The sural nerve is generally derived from branches of both the common peroneal and tibial nerves and provides lateral foot sensation. Targeted anesthesia to the foot and ankle can be delivered to a specific dermatomal distribution by perineural injections of local anesthetic. Alternatively, one can target the sciatic nerve proximally

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in the popliteal fossa to target most of the sensation to the foot. A separate injection can then be used medially to block the saphenous nerve and thereby provide anesthesia to the foot (Fig. 1).

Sciatic Nerve

The most commonly used proximal nerve block for foot and ankle surgery is a sciatic nerve block at the level of the popliteal fossa. Generally, the injection is located proximal to the location where the sciatic nerve divides into the tibial nerve and common peroneal nerves. A single injection of anesthetic in this location can provide anesthesia to nearly the entire foot, excluding the medial foot saphenous nerve distribution. In the popliteal fossa, the sciatic nerve lies lateral to the popliteal artery, and is bordered by the heads of the biceps femoris and gastrocnemius on the medial and lateral sides. Success with sciatic nerve blocks has been reported for a wide variety of foot and ankle procedures.[1–3,5–9] Although the sciatic nerve block generally provides adequate anesthesia distally, the common use of thigh tourniquets in foot and ankle surgery may necessitate further anesthesia to avoid thigh discomfort from tourniquet compression. As an alternative, a lower-leg tourniquet around the calf can safely be used and may obviate more proximal anesthesia. Grebing and Coughlin[10] reported the Esmark bandage provided average tourniquet pressures between 222 and 288 with 3 or 4 wraps, respectively. The complication rate of these ankle level tourniquets was .1%. Michelson and colleagues[11] found no postoperative neurovascular deficits in 454 limbs using cast padding and a standard calf tourniquet (Fig. 2).

Saphenous Nerve

Conventionally, the saphenous nerve was thought to provide sensation to the medial leg and foot. However, there has been much debate about the true contribution to medial foot and ankle sensation, and this is highly variable. Some investigators suggest that the saphenous nerve does not extend past the midfoot, whereas others have found contributions to the first ray, talonavicular, subtalar, and medial ankle joints. These investigators recommend that a saphenous nerve block should be included as a component of the regional block to provide adequate anesthesia during the perioperative period of procedures involving the forefoot.[12–16] At the level of the knee joint, the saphenous nerve can be found between the vastus medialis and sartorius myotendinous junctions. A fascial plane separates these muscles that can be used as a landmark for anesthetic injections.[6] Addition of anesthesia to this area in combination with the sciatic block will theoretically block the entire foot. Multiple

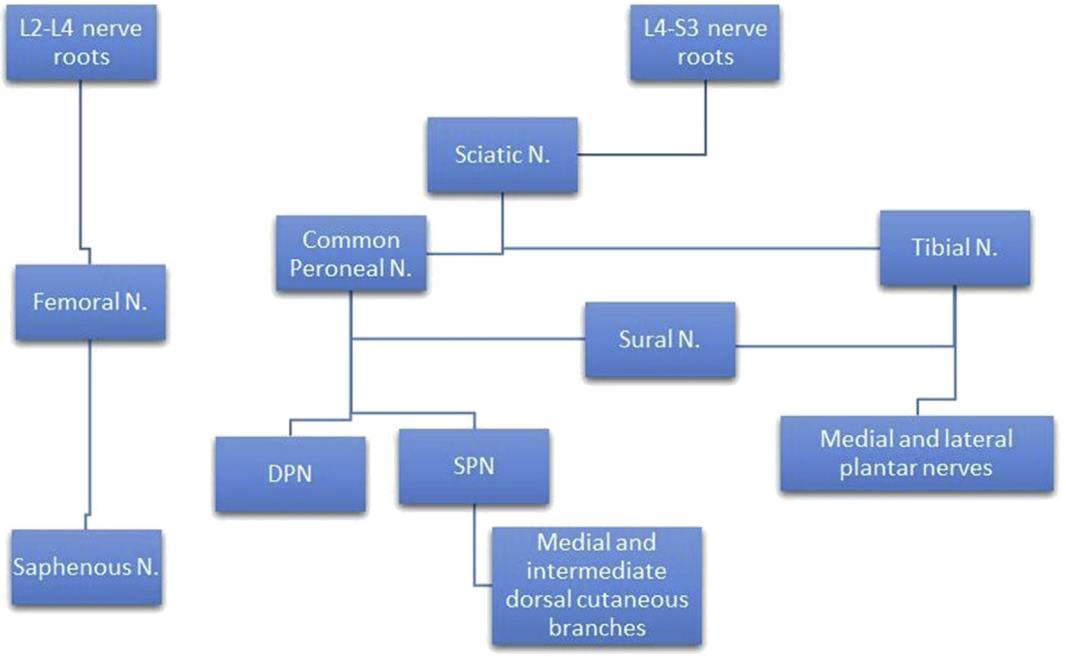

Fig. 1. Lower extremity nerves. DPN, deep peroneal nerve; SPN, superficial peroneal nerve.