ANKLE BLOCKS

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Introduction

The ankle block is a safe and effective method for obtaining anaesthesia and analgesia of the foot for surgical procedures on bones and soft tissues.

Indications

- Surgical anaesthesia of the foot especially when general, epidural or spinal anaesthesia is contra-indicated.
- For post-operative analgesia.

Anatomy

Five nerve branches supply sensation to the foot. All are branches of the sciatic nerve, except the **saphenous nerve**, which is the terminal branch of the femoral nerve. The sciatic nerve divides into the tibial nerve and the common peroneal nerve at a variable point between the buttock and the popliteal fossa. The tibial nerve then divides into the **posterior tibial** and **sural nerves**, and the common peroneal nerve into the **deep** and **superficial peroneal nerves**. The posterior tibial nerve finally divides into the **medial and lateral plantar nerves.**

Figure 1 shows the sensory distributions of these nerves. Of particular note;

- The posterior tibial nerve innervates all but one of the intrinsic muscles of the foot, via its terminal branches, the medial and lateral plantar nerves. Blockade of this nerve is important for surgery to deeper structures.
- The deep peroneal nerve innervates the first web-space and so must be blocked for anaesthesia of the great toe.
- Surgery is unusual in the territory of the sural nerve therefore it is not often blocked.

Figure 1 shows the anatomical relations of these five nerves. Note:

- The **posterior tibial nerve** lies immediately posterior to the posterior tibial artery, at the medial malleolus.

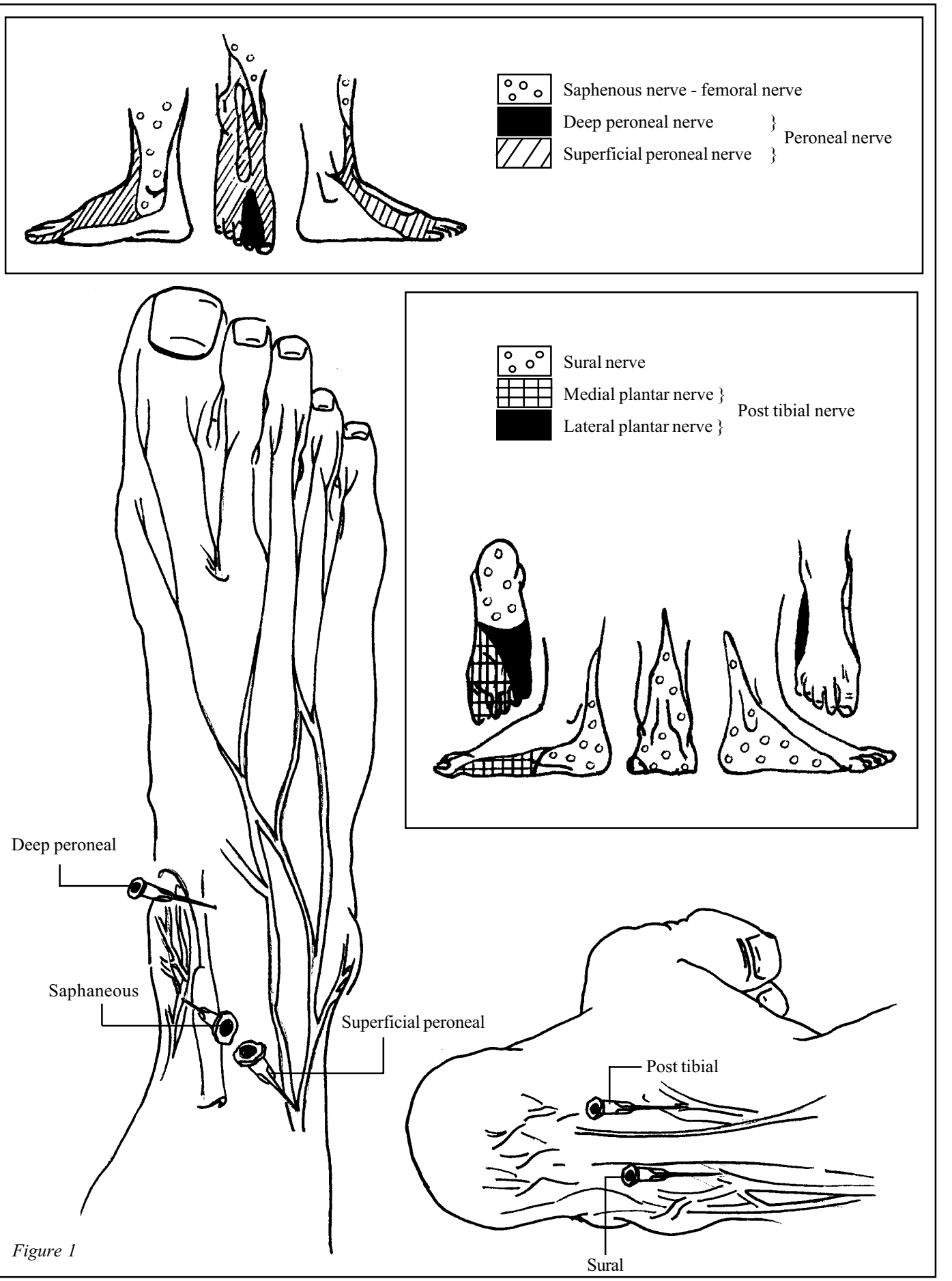
Saphenous nerve - femoral nerve
Deep peroneal nerve
Superficial peroneal nerve
Peroneal nerve
Sural nerve
Medial plantar nerve
Lateral plantar nerve
Post tibial nerve
Deep peroneal
Saphaneous
Superficial peroneal
Post tibial
Sural

Figure 1

- The **superficial peroneal nerve** divides into terminal branches anterior to the ankle, necessitating a wide fan of infiltration for blockade.

Preparation

1. Check resuscitation equipment and drugs.
2. Perform block in an anaesthetic or operating room.
3. Explain procedure to patient and obtain consent.
4. Establish IV access.
5. Full monitoring is advised where available (ECG, pulse oximetry, NIBP).

Technique - General

- As performing the block can be painful, remember to inject the local anaesthetic slowly. Heating the local anaesthetic to body temperature may also help to reduce pain. Sedation may be required.
- All five nerves can be blocked with the patient supine and the foot on a padded support. Some prefer to block the **posterior tibial** and **sural nerves** with the patient prone. To block the posterior tibial nerve in a supine position, flex the knee and place the ankle on top of the contralateral shin. This allows easy access to the medial and lateral maleolus.
- As four of the nerves are almost entirely sensory an infiltration technique is used. Where available, nerve stimulation can be used to localise the posterior tibial nerve. Stimulation will produce movement of the big toe. A 23G needle, 4cm in length, is appropriate for all injections. It is important always to aspirate prior to injection of local anaesthetic, to exclude intravascular injection.
- The aim is sensory block alone and so low concentrations of local anaesthetic (LA) are sufficient (e.g. 0.25% bupivacaine) in most cases.

The five nerves are blocked by injections that form a ring of infiltration around the ankle at the level of the malleoli.

Posterior tibial nerve

- Introduce the needle along the medial aspect of the Achilles tendon, at the level of the cephalic (towards head) border of the medial malleolus.
- Advance, in an anterior direction, towards the posterior border of the tibia (nerve lies just posterior to the posterior tibial artery).
- If paraesthesia is felt, inject 3-5ml LA. If not, advance to contact the tibia, withdraw 0.5cm and then inject 5-7ml LA.

Sural nerve

- Introduce the needle along the lateral border of the Achilles tendon at the level of the cephalic border of the lateral malleolus.
- Advance anteriorly towards the fibula.
- If parasthesia is felt inject 3-5ml LA. If not, inject 5-7ml LA as the needle is withdrawn. This gives subcutaneous infiltration from the Achilles tendon to the fibula.

Infiltration around the remaining three nerves can be performed from a single site. The needle is inserted 1cm lateral to the tendon of extensor hallucis longis (or just lateral to the anterior tibial artery, if palpable), at the level of the cephalic borders of the malleoli. This tendon is prominent on the dorsum of the foot, during extension of the big toe.

Deep peroneal nerve

- From the position described above, advance the needle posteriorly (i.e. at 90° to the skin). Inject 3-5ml LA deep to the fascia, on either side of the anterior tibial artery.

Superficial peroneal nerve

- After blocking the deep peroneal nerve, withdraw the needle to just stay in the skin.
- Turn the needle towards the lateral malleolus and inject 5ml LA in a subcutaneous band between the lateral malleolus and the anterior border of the tibia. This should reach all the branches of this nerve.

Saphenous nerve

- Again withdraw the needle to just stay in the skin and turn the needle to point towards the medial malleolus.
- Infiltrate 5ml LA subcutaneously as the needle is advanced towards the medial malleolus. The great saphenous vein lies in this area, just antero-medial to the medial malleolus, in order to infiltrate around the vein, without causing damage, it may be necessary to make a further skin puncture lateral to the vein.

Notes:

- Check the block prior to surgery, testing sensation to pinprick.
- If anaesthesia is inadequate, identify which nerve supplies the relevant area and repeat the infiltration of that nerve.
- Within the limits of maximal local anaesthetic doses, advise the surgeon to infiltrate locally during surgery to augment the block.

Cautions

1. It is best to avoid adrenaline in the LA. There are theoretical risks to the foot from the vasoconstrictor effect.
2. Although systemic absorption from the subcutaneous tissues of the ankle is low, and toxicity is therefore unlikely, total recommended maximum total dose of local anaesthetic should not be exceeded.