

# Sciatic nerve block in a battle casualty amputee

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A FIELD HOSPITAL led by the Canadian Forces is situated at Kandahar Airfield in southern Afghanistan. Initial treatment is provided to sick and wounded Coalition forces personnel before return to duties or evacuation out of Afghanistan. Some Australian medical and nursing personnel work within the hospital.



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## Abstract

- ◆ A Coalition soldier sustained a severe injury to his right foot and ankle during combat in southern Afghanistan. He had a non-viable foot and mangled extremity. Following resuscitation, he underwent a below-knee amputation.
- ◆ He had required large doses of oral and parenteral analgesia with limited success. He had also been sedated with 2 mg of lorazepam, without relief. There was concern about inadequate analgesia and over-sedation on his evacuation flight to Germany, so regional analgesia was considered.
- ◆ Sciatic nerve blockade was performed, using the anterior approach, with appropriate landmarks and a nerve stimulator.
- ◆ After 30 minutes, his stump was completely non-tender to firm palpation. His leg remained pain-free for the entire trip to Germany, about 11 hours in total.

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In 2006, a Coalition unit suffered a sustained attack. One soldier died at the scene, one was pronounced dead on arrival at the field hospital, and a further seven soldiers were treated at the field hospital.

## Clinical record

One of the seven surviving soldiers had a mangled, non-viable right foot and lower leg (Box 1). A combat application tourniquet (Phil Durango, LLC, USA) had been applied in the field. The patient arrived at the hospital within 30 minutes of the attack. He was haemodynamically stable and required no blood product transfusions. That night he underwent an amputation at the mid transtibial level.

During surgery, the patient received 10 mg morphine, and the stump was infiltrated with 10 mL of 0.5% plain bupivacaine in the tibial and common peroneal nerve regions. Postoperative analgesia lasted only 2 hours. Through the night and the following day, the patient required large doses of parenteral and oral analgesia. He received a total of 23 mg morphine over 8 hours, 10 mg/650 mg oxycodone/paracetamol mixture and 30 mg intravenous ketorolac 30 minutes before the procedure, and 300 mg gabapentin 1 hour beforehand. He had also been sedated with 2 mg lorazepam. The patient was drowsy, but still in considerable pain.

The medical team was concerned about excessive sedation if the patient were to receive further parenteral analgesia

## 1 The mangled foot



## 2 Landmarks for the anterior approach to sciatic nerve blockade



during evacuation, so regional analgesia by sciatic nerve blockade was considered.

The anterior technique for sciatic nerve blockade, described in 1963,<sup>1</sup> has not been widely used,<sup>2</sup> as it can be difficult to identify landmarks in obese patients, and it involves the deepest needle penetration of all the approaches to the sciatic nerve. In our patient, repositioning to use a posterior or lithotomy approach would have been too painful, and the dressing would not allow a popliteal approach. Neuraxial analgesia was contraindicated, as the patient had been given subcutaneous enoxaparin 30 mg twice daily.

### Sciatic nerve blockade

After we had prepared emergency drugs, applied pulse oximetry and given oxygen via nasal prongs, we identified and marked landmarks (Box 2). With the patient supine and the leg in a neutral position, a line from the anterior superior iliac spine to the pubic tubercle was drawn. A perpendicular line was drawn from the junction of the medial third and lateral two-thirds of the first line. A third line, parallel to the first, was drawn from the greater trochanter. The lesser trochanter is located deep beneath the point of intersection of the second and third lines described above. The sciatic nerve runs posteromedially to the lesser trochanter.

Under aseptic conditions, a 12 cm insulated, short-bevelled needle catheter was inserted at the intersection of the two lines. The needle was connected to a nerve stimulator, set at 5 mA and 2 Hz. The current was not decreased, as there was no way to tell if the sciatic nerve was stimulated; the patient did not report any paraesthesia or pain when questioned. Neither ankle jerks nor calf twitches (indicating stimulation of the tibial nerve, a branch of the sciatic nerve) would have been seen because of the recency of the amputation, the extent of his dressings, and the imminence of his evacuation precluding removal of the dressings. The nerve locator was used to ensure

that the needle tip was not stimulating the femoral nerve or muscles supplied by it.

The needle was inserted until it touched bone, then withdrawn and redirected medially, to a depth of about 5 cm past the bone. At this point, 30 mL of 0.5% bupivacaine with adrenaline was injected, aspirating the syringe plunger prior to injection and after each 5 mL of injected anaesthetic (the patient's weight was 90 kg). The site was massaged for just over 1 minute, to enhance local anaesthetic spread and transperineural diffusion.

After about 15 minutes, the pain was much relieved. After a further 15 minutes, the patient was asleep, and did not wake when the stump was squeezed. Enquiries made to the nursing staff looking after the patient, and to medical authorities in Germany, revealed that he remained pain-free until his evacuation flight and for the duration of the flight — about 11 hours in total.

### Discussion

Civilian evacuation generally involves consultants or senior registrars in intensive care, emergency medicine or anaesthesia. In contrast, military aeromedical and land evacuation is often conducted by junior medical officers (JMOs), who frequently have only superficial familiarity with hypnotics, which are often used as adjuncts to acute analgesia. High doses of parenteral analgesia, hypnotics/sedatives, or both can lead to complications that can be difficult to manage in flight. These include airway obstruction, desaturation, aspiration, dysphoria, apnoea, and cardiovascular instability. Peripheral neural blockade is a relatively safe way to ensure a comfortable patient, while minimising the doses of parenteral analgesia for long evacuations.

Landmark identification for the blockade was straightforward in our patient, as he had a lean body mass. It has been noted that sciatic nerve blockade may be difficult to perform

in patients with distal limb fractures because of the pain from ankle jerks,<sup>2</sup> so the amputation may have facilitated the block in one way, while also being a cause of reduced accuracy of placement, as described above. Ultrasound guidance may be a useful adjunct in needle placement: one study reported success rates of “almost 100%”, but reported ultrasound guidance only with the subgluteal (posterior) approach.<sup>3</sup>

The failure rate for the anterior approach has been reported at about 14% without a nerve stimulator, using the paraesthesia elicitation technique,<sup>2</sup> but this was in the hands of a highly experienced operator. With a nerve stimulator, the reported success rate is 87%–97%.<sup>3</sup> This is thought to be due to the size of the nerve, but the nerve’s size may also render it more prone to epineural puncture. Because the sciatic nerve actually consists of two nerve branches, the tibial and peroneal nerves, in a shared epineurium, achieving clinically noticeable muscle contractions may require the nerve stimulator to puncture the epineurium. This increases the risk of perineural puncture and nerve injury.

Concern has been raised as to the potential for delayed diagnosis of distal limb compartment syndrome because of suppression of pain.<sup>4,5</sup> Medical officers contemplating neural blockade should consult with the treating surgeon because of this potential risk.

If a patient has already received significant doses of narcotics and/or hypnotics before administration of the block, the potential for over-sedation exists once the block is effected. Ideally, such a block should be used to prevent such doses being administered in the first place. However, this patient had already received a relatively high cumulative sedative load. His was a case of balancing this concern with the need for adequate in-flight analgesia. Indeed, he had been a somewhat belligerent patient before the block; withholding further analgesia on the ground due to concerns about over-sedation, coupled with increased pain from aircraft vibration after take-off, could develop into a flight hazard, quite apart from patient discomfort. The presence of vigilant medical personnel coupled with physiological monitoring is critical in the successful strategic evacuation of any seriously injured soldier.

For its potential benefit, the risk associated with this nerve block is small, but practical training and consistent practice are needed for medical officers contemplating peripheral blockade for evacuation. As alluded to above, the sciatic nerve block itself is not necessarily innocuous. Along with the usual complications of any nerve block (intravascular injection of

local anaesthetic, neural damage from repeated needle puncture, intraneural injection, and direct neural local anaesthetic toxicity), the block may also fail partially because of injection distal to branching of the sciatic nerve.<sup>6</sup> Residual dysaesthesias may result from sciatic nerve blockade, but these are usually associated with long-bevelled needles and are generally self-limiting. Some sympathetic nerve fibres blocked by the technique may result in distal blood pooling, but this is usually insufficient to cause hypotension. In this case, the possibility of contralateral vasoconstriction may lead to slight hypoxia of that limb, but this is not thought to be clinically significant.<sup>7</sup>

Evacuation flight times must be carefully considered. The possibility exists that the block may wear off at an inconvenient time, perhaps in flight. Should this occur, offset of the block would not be sudden, and further parenteral analgesia can be given before the block wears off completely.

We do not recommend that JMOs perform nerve blockade, but they should be aware of this mode of analgesia, and consult with anaesthetically trained medical officers before evacuation of patients for whom analgesia proves problematic.

## Competing interests

None identified.

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