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Continuous Lateral Sciatic Blocks for Acute Postoperative Pain Management after Major Ankle and Foot Surgery

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ABSTRACT

We developed a continuous lateral sciatic nerve infusion technique for postoperative analgesia.

Methods: A 10-cm Insulated Tuohy needle connected to a nerve stimulator was Introduced posteriorly between the biceps femoris and vastus lateralis groove 10 cm cephalad from the tip of the patella. After proper positioning of the Insulated needle, a 20-gauge catheter was placed in proximity to the sciatic nerve.

Results: Continuous lateral sciatic Infusion of 0.2% ropivacaine was associated with a significant reduction of morphine consumption by 29% and 62% during postoperative days one and two, respectively, in patients who underwent open reduction and Internal fixation of the ankle.

Conclusion: Continuous lateral sciatic Infusion of 0.2% ropivacaine represents an alternative for acute postoperative pain control after major ankle and foot surgery.

Key Words: Foot Surgery; Ankle Surgery; Sciatic Block; Postoperative Analgesia

INTRODUCTION

It is established that posterior popliteal block combined with a sapheneous nerve block provides excellent anesthesia and immediate postoperative analgesia for up to 10 hrs for patients undergoing mostly minor foot and ankle surgeries.[9-11] This technique requires placing the patient in the prone position, which may not always be easy, especially in trauma and morbidly obese patients.

Most major ankle and foot procedures require postoperative pain management beyond 10 hrs. Although it Is possible to increase the duration of the postoperative analgesia by using only long-acting local anesthetics such as bupivacaine and more recently ropivacaine, single injection nerve block techniques rarely provide adequate postoperative analgesia beyond 24 hrs. As early as 1946, Ansbro proposed the use of continuous nerve blocks to prolong the duration of nerve blocks.[1] Since that time, continuous femoral and/or lumbar plexus nerve blocks have been demonstrated to provide excellent postoperative pain control for patients undergoing either knee[6] or hip surgery.[7] Singelyn et al. also reported on the use of a posterior approach to the sciatic nerve at the popliteal fossa for continuous sciatic nerve blocks in patients undergoing major ankle and foot surgery,[13] but this approach requires the patient to be in the prone position. To avoid patient repositioning, a distal lateral approach to perform single sciatic nerve blocks has also been reported.[8] We developed a lateral approach allowing the placement of a sciatic catheter for postoperative continuous infusion of local anesthetics.

METHODS

Anatomical Considerations

At the apex of the popliteal fossa, the sciatic nerve lies deep to the biceps femoris muscle. Within the popliteal fossa, the sciatic nerve divides into the common peroneal and tibial nerves. The division occurs at a level varying from patient to patient. The popliteal artery and vein emerge through the adductor hiatus and run anterior and medial to the tibial and common peroneal nerves.[5]

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Placement of a Lateral Sciatic Catheter

After obtaining appropriate informed consent, patients were brought to the recovery room prior to surgery for the placement of a lateral sciatic catheter. With the patient in a supine position and after adequate IV sedation with small doses of midazolam (2 mg IV) and fentanyl (50-100 mcg IV), a pillow was placed under the leg with the foot free (Fig. 1). The groove between the biceps femoris and the lateral border of the vastus lateralis muscles was identified and marked. The site of introduction of the needle was the intersection between the groove line and a vertical line drawn 10 cm cephalad from the tip of the patella. After local anesthesia of the skin and the groove using 2-3 ml of 1% lidocaine and a 25-gauge, 3.75-cm needle, a 10-cm 18-gauge insulated Tuohy needle (B-Braun Medical, Bethlehem, PA) connected to a nerve stimulator (Dig II, B-Braun, Bethlehem, PA) was introduced posteriorly at a 30° angle. After penetrating the skin, the nerve stimulator was set at 2 Hz, 1.5 mA and 0.1 ms. First, local muscular contractions of either the biceps femoris or vastus lateralis were observed, while the insulated Tuohy needle was run through the groove. Within 4 to 6 cm, the local contractions disappeared and within an additional 1 to 2 cm, a sciatic nerve-mediated motor response via the stimulation of either the common peroneal nerve (dorsiflexion or eversion of the foot) or the tibial nerve (plantar flexion or inversion of the foot and/or flexion of the toes) was elicited. If the sciatic nerve was not located, the insulated Tuohy needle was withdrawn to the level of the skin and reintroduced at a 35° angle. After proper positioning of the needle allowing the same motor response with a current intensity <0.5 mA and negative aspiration for blood, 30 ml of a mixture of 1.5% mepivacaine and 0.75% ropivacaine (v/v) was slowly injected 5 ml at a time with repeat negative aspirations for blood between each injection. Following this injection, a 20-gauge catheter was introduced 3 to 5 cm from the tip of the Tuohy needle in a cephalic direction corresponding to a final distance of 10 to 12 cm at the skin. After removing the introducing Tuohy needle, the catheter was secured in place with steri-strips and covered with a transparent Tegaderm™ dressing, allowing for direct visualization of the insertion site and catheter.

Study Design

To assess the analgesic potency of continuous lateral sciatic blocks for postoperative pain management fol-

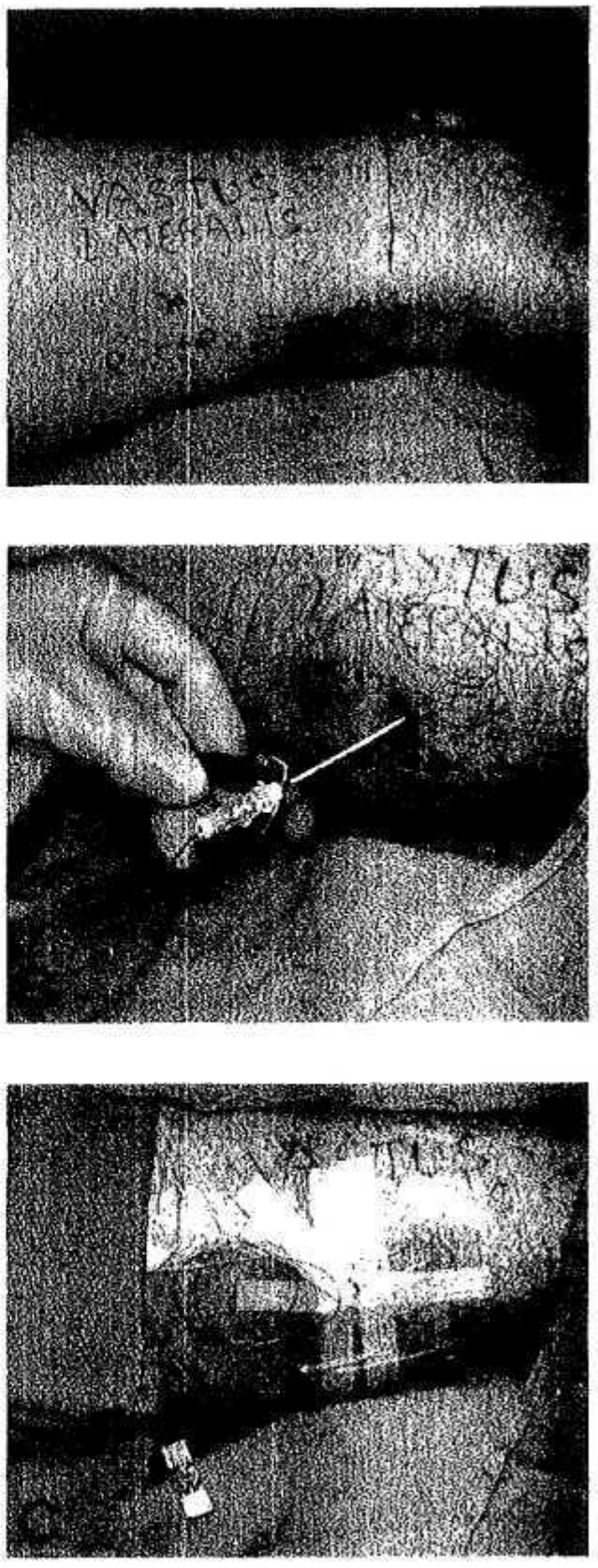

Fig. 1: (a) The anatomic landmarks for the placement of a lateral sciatic catheter: The site of insertion of the needle is 10 cm cephalad from the patella at the level of the groove between the femoralis biceps and the sartorus muscle; (b) Placement of a Tuohy insulated needle; (c) Fixation and protection of the lateral sciatic catheter after its Insertion.

lowing major foot and ankle surgery, we studied 14 inpatients who underwent an open reduction and internal fixation of an ankle fracture. Exclusion criteria included patients with multiple traumas and other severe abdominal or thoracic trauma, Appropriate informed consent was obtained preoperatively. The study was approved by The University of Texas IRB. According to the case–control design, patients were divided into two equal groups. Group 1 (control) received postoperatively patient-controlled analgesia (PCA) morphine (1 mg with a lockout period of 10 min, no basal, for a maximum possible total dose of 6 mg/hr), and Group 2 received postoperatively a continuous infusion of 0.2% ropivacaine via a lateral sciatic catheter and PCA morphine (1 mg with a lockout period of 10 min, no basal, for a maximum possible total dose of 6 mg/hr). Postoperatively In the recovery room, the lateral sciatic catheter was connected to a Baxter II pump (Baxter HealthCare Corporation, Deerfield, IL) infusing 0.2% ropivacalne at a rate of 10 ml/hr for 48 hrs. Morphine consumption was recorded during the first two postoperative days.

Table 1: Inpatient Demographics

	Group 1 Control	Group 2 Block
N	7	7
Age (years)	38.9 ± 4.5	39.9 ± 5.6
Gender (F/M)	4/3	4/3

Statistical Analysis

A Mann-Whitney u-test was used to compare postoperative morphine consumption, and demographic data were analyzed using an unpaired t-test. Unless otherwise indicated, results are presented as mean (minimum-maximum) or as percentage. A value of $p < 0.05$ was considered statistically significant.

RESULTS

Morphine consumption was 28 (10-48) mg on postoperative day one and 34 (13-90) mg on postoperative day two in Group 1. The use of a continuous lateral sciatic block was associated with a 29% and 62% significant reduction in morphine consumption during the first and second day following surgery, respectively. The use of a continuous lateral sciatic block was not associated with any complications.

DISCUSSION

Singelyn et al. advocated the use of continuous popliteal nerve block for postoperative pain management after foot and ankle surgery.[13] Our data indicate that continuous lateral sciatic infusion of 0.2% ropivacaine represents a valuable alternative. Compared with a posterior popliteal approach, the lateral approach offers the following advantages:

1. Patients remain in a supine position while the block is performed, compared with the prone position required to perform a posterior popliteal block.
2. With a lateral approach and the use of a transparent dressing, the catheter site is directly visible, allowing verification of the absence of bleeding, inflammation, leaking and displacement, compared with the need to turn the patient to access the site of the catheter in the case of a posterior popliteal approach.
3. Catheter displacements are less frequent with a lateral than with a posterior popliteal approach.

Our protocol included an infusion of 0.2% ropivacalne at 8 ml/hr for inpatients. The infusion of 0.125% bupivacaine has also been reported in the same indication.[13] However, bupivacaine is a racemic mixture, whereas ropivacaine Is a pure isomer. Furthermore, bupivacaine has been demonstrated to be more toxic than ropivacaine[12] and to produce more paresthesia.[2] Because the cardiotoxicity of bupivacaine is believed to be mostly related to the d-isomer, levobupivacaine, the pure l-isomer, has been recently approved. Preliminary data indicated that levobupivacaine used for a single sciatic block was equally effective as ropivacaine[3] or bupivacaine[4] for anesthesia in patients undergoing foot and ankle surgery.

CONCLUSION

Continuous lateral sciatic technique represents an alternative to postoperative pain management of patients undergoing foot and ankle surgery.

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