PERSPECTIVE

Sciatic nerve block prior to surgery versus post-operative surgeon-installed a peri-neural stump catheter to reduce pain from phantom limbs following a below-knee amputation

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ABSTRACT

Up to 80% of patients experience phantom limb discomfort following a significant lower limb amputation. There have been around 60 treatments for phantom limb pain described, however there is still a lack of evidence to support the best course of treatment or prevention. When a significant limb is amputated, nerve structures are directly transected during surgery, creating an anatomical target for treatment. Prior to surgical transection, chemically inhibiting nerve structures could prevent peripheral pain input to the central nervous system, perhaps avoiding the development of phantom limb discomfort. The measurement of gastric content and volume is a new point-of-care procedure. An ultrasound application that can assist in determining the danger of aspiration.

Key Words: *Gastric aspiration; Ultrasonography; Pulmonary aspiration*

INTRODUCTION

This single-center, tertiary study examined whether pre- and postoperative regional analgesia (sciatic nerve block prior to surgery with continuous sciatic nerve infusion for 5 days afterwards) decreased phantom limb pain after below-knee amputation when compared to a surgically placed perineural sciatic catheter (continuous nerve sheath infusion for 5 days). The project received ethical and regional approvals and was prospectively registered. An impartial researcher selected and randomly assigned consecutive vascular patients for below-knee amputations (1:1 manner, concealed envelopes). Prior to surgery, the intervention group underwent a pre-operative sciatic nerve block (with 30 ml of bupivacaine 0.25%) and had a continuous peripheral sciatic nerve catheter implanted. This catheter was then continuously infused with bupivacaine 0.25% at a rate of 6 ml/h–10 ml/h for five days [1]. Before wound closure, a postoperative perineural sciatic catheter was inserted in the control group after limb amputation. Following the establishment of the block (with 30 ml of bupivacaine 0.25%), 3 ml-5 ml of bupivacaine 0.5% was infused every hour for five days. The infusion protocol allowed for a low-volume infusion and gave each group an equal milligram dose of a local anesthetic. Phantom limb pain was the key end measure and was measured using an adjusted questionnaire from prior research on phantom limb pain outcomes at 5 days, 6 months, and 12 months after surgery [2]. Mean pain scores over the first five postoperative days and opioid use in oral morphine equivalents served as secondary outcomes. A prior power analysis was performed. 70% of people in this area had pain from phantom limbs. A clinically significant reduction in phantom limb discomfort was defined as a 35% absolute risk reduction. Although 30 individuals in each group would be needed (a0.05 and b0.8), a target of 40 patients per group was set due to the significant 1-year mortality in this patient population. Statistical analysis was performed using Mann-Whitney U, chi-squared tests, or Student's t-tests, with a significance level of p 0.05. In R (R Foundation for Statistical Computing, Vienna, Austria), statistical analysis was accomplished [3].

A total of 80 individuals were gathered. At 5 months, 6 months, or 12 months, there was no difference in the frequency of pain from phantom limbs. Average (IQR [range]) oral morphine equivalents after surgery. 4 hours after surgery, the intervention group's pain scores (NRS) were lower than those of the control group (control: 3 (0-5.8 [0-10] vs. intervention: 0 (0-1[0-9]); adjusted p=0.03). At any other times throughout the first 48 hours, there were no variations in the pain scores across groups. Between the two groups, the total amount of local anaesthetic administered via catheters was comparable (control mean (SD) 2132.3 mg (644.4 mg) vs. intervention 1899.5 mg (881.6 mg) in terms of bupivacaine equivalents. There were no differences in the lengths of local anaesthetic infusion (control mean (SD) 97.8 h (23.5 h) vs. intervention 98.5 h (34.5 h) or patient-controlled analgesia use (control median (IQR [range]) 44.5 h (18.0-85.2[0-183]) vs. intervention 39.5 h (13.8-69.5[0-236]). Eight patients, all of whom passed away during trial follow-up, underwent consecutive above-knee

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amputations of the same leg for progression (control 5 (12.5%) vs. intervention 3 (7.5%).

As more data on the validity (accuracy) and reliability (reproducibility) of stomach sonography becomes available, the next big challenge is how to appropriately integrate this novel diagnostic tool into daily clinical practise to assess aspiration risk and adapt anesthesia care in appropriate instances.

An empty stomach indicates a low risk of aspiration, which can only be verified qualitatively. As previously noted, solid, particle, or thick fluid content with a significant risk of aspiration can also be diagnosed using sonographic appearance [4].

19 patients (23.8%) died during the experiment within 12 months (5 during the index admission, 9 between discharge and 6 months, and 5 between 6 months and 12 months) (control: 10 (25.0%) vs. intervention: 9 (22.5%). Our findings show that pre-operative peripheral nerve blocking does not result in a decrease in the incidence of phantom limb pain at 5 days, 6 months, or 12 months after below-knee amputation, despite the possibility of any effect of the pre-operative sciatic nerve given the small size of the study. A pre-operative sciatica nerve block may have short-term analgesic benefits, despite the fact that changes in long-term analgesic results were not found [5].

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