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Original Contribution

Continuous ambulatory adductor canal catheters for patients undergoing knee arthroplasty surgery☆,☆☆,★

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Abstract

Study Objective: To determine after knee arthroplasty surgery the feasibility of discharging patients home on postoperative day 1 with continuous adductor canal blocks.

Design: Retrospective case series.

Setting: Outpatient setting after hospital discharge.

Patients: Patients undergoing knee arthroplasty surgery from October 2013 to August 2014.

Interventions: All patients received continuous adductor canal catheters for postoperative analgesia and were discharged to home on postoperative day 1. Continuous catheters were intended to remain intact in the ambulatory setting through postoperative day 3.

Measurements: Data obtained included demographic information, duration of hospital stay, resting and active pain scores, opioid utilization, opioid-induced adverse effects, complications relating to the perineural catheter, and hospital readmissions.

Main Results: Sixty-nine of 582 patients (11.9%) were discharged to home on postoperative day 1. The median numerical pain score after discharge with a continuous adductor canal block was ≤2 at rest and ≤4 with activity. After block discontinuation on postoperative day 4, median pain scores were the same. No patients reported any unintentional catheter dislodgements, falls, or dysesthesias. There were no readmissions of any patient in this cohort within 90 days of surgery.

Conclusions: Ambulatory adductor canal catheters are a feasible analgesic modality after knee arthroplasty surgery as pain scores remained low and adverse events were minimal.

☆ Conflicts of interest: N.A. Hanson, P.H. Lee, S.C. Yuan, D.S. Choi, and C.J. Allen certify that they have no commercial associations (eg, consultancies, stock ownership, equity interest, patent/licensing arrangements, etc) that might pose a conflict of interest in connection with the submitted article. Dr. Auyong has received honoraria for educational lectures from Kimberly Clark Corporation, but nothing related in any way to the study presented here.

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1. Introduction

Over the past few decades, continuous peripheral nerve blocks (CPNBs) have been shown to improve analgesia after major orthopedic surgery [1-4]. CPNB use has resulted in shorter hospital length of stay (LOS) and a reduction in health care utilization costs [5-8]. Currently, the national average length of hospitalization for total knee arthroplasty (TKA) is 3 to 4 days [9]. Although isolated centers have shown promise in reducing LOS significantly after TKA surgery, fast-track orthopedic total joint programs in tertiary care centers do not routinely demonstrate further LOS reduction less than 3 days [10-13].

New potential innovations in nerve blocks for orthopedic surgery continue to be published [14-16], with the adductor canal block (ACB) becoming a viable analgesic technique to attenuate pain and reduce opioid consumption after TKA [17-21]. Most recently, incorporation of continuous ACBs within an enhanced recovery after orthopedic surgery pathway has been shown to significantly lower length of hospitalization after surgery [22]. Patients within the continuous ACB enhanced recovery after orthopedic surgery pathway cohort participated more in physical therapy, had less opioid-related adverse effects, and required less postdischarge resources. Although the application of a continuous ACB for analgesia has been successful in the inpatient setting, home discharge with a continuous ACB after TKA surgery has yet to be examined. The purpose of this retrospective analysis was to determine the feasibility of sending patients home with continuous ACBs on postoperative day (POD) 1 after knee replacement surgery by looking at the following outcomes after discharge: pain scores, opioid utilization, opioid-related adverse effects, complications relating to the perineural catheter, and hospital readmissions.

2. Materials and methods

After institutional research ethics board approval, we conducted a retrospective observational analysis on all patients at a single tertiary care hospital from October 2013 through August 2014. All patients who were discharged on POD1 with an adductor canal catheter were included in this analysis if they underwent one of the following surgical procedures: primary unilateral TKA, primary unicompartmental knee arthroplasty, revision of TKA, or bilateral unicompartmental knee arthroplasties. All ambulatory adductor canal catheters were intended to remain intact until POD3. The anesthetic technique used and the outcome data were obtained from review of the electronic medical records.

Data obtained included demographics, type of anesthesia, surgery duration, estimated blood loss, hours from end of surgery to discharge, resting and active pain scores, multimodal analgesia use, nausea, vomiting, and readmissions. Postoperative notes from standard follow-up telephone calls were evaluated for pain scores, opioid use, adverse effects, and complications.

As part of a standard care pathway for all knee arthroplasties at this institution, patients preferentially received a spinal anesthetic (if indicated) as well as antiemetic medications including transdermal scopolamine patch and intravenous dexamethasone. A continuous adductor canal catheter was placed in the postanesthesia care unit under ultrasound guidance. Ropivacaine 0.2% was continuously infused through the catheter at 8 mL/h via a portable infusion pump. All perineural catheters were secured with an adhesive (2-octylcyanoacrylate; Ethicon Inc, Somerville, NJ) and a clear dressing (Opsite IV3000; Smith & Nephew, San Antonio, TX) cover. Physical therapy was initiated on the day of surgery. Standard postsurgical inpatient opioid analgesics included oral oxycodone 5-15 mg as needed every 3 hours. Non–opioid analgesics included oral acetaminophen 650 mg every 6 hours, oral meloxicam 15 mg each day, and oral gabapentin 300 mg at bedtime, unless contraindicated.

Patients were discharged home with a continuous ACB on POD1 only after meeting the following criteria: stable vital signs, adequate analgesia with oral analgesics described in the preceding paragraph to achieve Numerical Rating Scale (NRS) scores ≤ 4, absence of nausea and vomiting, discontinuation of surgical drain and bladder catheter, appropriate wound care, and an identified caregiver at home. Patients also completed all standard physical therapy milestones, which included the following: the ability to transfer from sitting to standing, transfer to the toilet, ambulate >100 ft, climb 3 stairs, and transfer in and out of a simulated car. The infusion pump was programmed to continue for 50 hours at 8 mL/h from the time of discharge. All patients received standard written and verbal discharge education on the continuous ACB from an anesthesiologist, including precautions for potential muscle weakness, basic pump operation, and catheter removal. A phone number to contact each patient at home was collected before discharge. Standard oral analgesics for home discharge were similar to the inpatient regimen described earlier, with the exception of gabapentin, which was not continued after hospital discharge.

After discharge, daily telephone calls were placed by an anesthesiologist on postoperative days 2 through 4 for standard follow-up, assessment of estimated average NRS scores throughout the day, and evaluation of any perineural catheter complications (falls, leakage, premature catheter dislodgements, dysesthesias, catheter site infections, or evidence of local anesthetic systemic toxicity). Patient care management was performed primarily over the telephone. Any surgical issues detected through these phone calls (eg, incisional bleeding or care of surgical dressings) were referred to the surgery team. Based on the situation, patients could return to the hospital for face-to-face evaluation by a health care provider. Each phone call concluded by confirming patients did have the appropriate contact information to reach the on-call anesthesiologist, 24 hours per day, via pager or the hospital operator.