



Original Contribution

# Continuous intra-articular local anesthetic drug instillation versus discontinuous sciatic nerve block after total knee arthroplasty<sup>☆</sup>



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## Abstract

**Study objective:** Sciatic nerve block (SNB) is commonly used as adjunct to femoralis nerve block (FNB) to achieve high-quality pain relief after total knee arthroplasty (TKA). However, this combination is associated with considerable muscle weakness, foot drop and surgically related nerve injuries may be masked. The purpose of this study was to assess whether low risk continuous intra-articular anesthetic drug instillation is an adequate alternative to SNB when adding to FNB after TKA.

**Design:** Retrospective investigational follow-up study.

**Setting:** University teaching hospital. Interdisciplinary postoperative anesthetic and orthopedic survey.

**Patients:** For this investigational analysis, 34 of 50 consecutive patients were available.

**Interventions:** All patients underwent primary unilateral TKA. Group A (18 patients) received a continuous intra-articular 0.33% ropivacaine (5 mL/h) instillation for the first 48 h postoperatively. In Group B (16 patients) a discontinuous SNB was used. Both groups were treated with a continuous FNB.

**Measurements:** Main endpoints were mean and maximum postoperative pain intensity levels for both anterior and posterior knee side, amount of postoperative administered opioid drugs, differences in functional outcome or hospital stay and rate of postoperative complications.

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**Main results:** Group A showed higher pain intensity levels for the posterior knee side ( $P \leq .042$ ). Merely on the second postoperative day there were no differences within either study group. No differences were found regarding anterior knee pain. Group A showed a significant higher postoperative piritramid consumption ( $P \leq .007$ ). Length of hospital stay or postoperative functional outcome was not significant different. Postoperative complications were not related to anesthesia techniques.

**Conclusions:** SNB technique resulted in superior pain relief in comparison to continuous intra-articular local anesthetic drug instillation as adjunct to continuous FNB after TKA.

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## 1. Introduction

Severe pain is common after total knee arthroplasty (TKA). Particularly in the first 48 hours and after postoperative mobilization pain remains intense [1]. Adequate and effective pain relief is requested, mainly to improve patient satisfaction, to expedite mobilization and rehabilitation, to decrease the duration of hospital stay and consequently to lower the risk of deep vein thrombosis or nosocomial infections [2-4].

Different methods for postoperative pain relief after TKA were introduced such as epidural anesthesia, peripheral nerve blocks (PNB) or patient controlled anesthesia (PCA) with par- enteral administration of opioid drugs. While patient satisfac- tion was postulated to be high after surgery, peri- and postoperative pain management after TKA is still associated with considerable side effects. Epidural anesthesia technique is associated with urine retention, low blood pressure or epidu- ral bleeding [4,5]. Epidural or parenteral opioid administration may lead to dizziness, sedation, nausea, vomiting, pruritus or respiratory depression [4-6]. Even non-steroidal anti- inflammatory drugs (NSAIDs) for postoperative pain manage- ment are limited by well documented side-effects [7].

Femoral nerve block (FNB) is commonly used for intra- and postoperative analgesia after TKA. Advantages of high quality pain management, isolated unilateral motor blockade, no risks of epidural bleeding and no systemic drug administra- tion by high local anesthetic drug concentration were pro- claimed several times [4]. FNB was described as the “golden standard” for pain relief after TKA [8]. Because this procedure does not provide analgesia for the posterior knee side, a sciatic nerve block (SNB) is commonly used as adjunct to FNB to achieve high quality pain relief after TKA [9]. However, de- spite the high pain relief quality of combined sciatic and femo- ral nerve block this technique is limited by foot drop, muscle weakness and offers the risk of transient paresthesia, dysesthe- sia or infection [10-12]. Due to these limitations there is still no conclusion whether SNB is clinically advantageous when add- ing to FNB after TKA [4,9,13-15].

Consequently, to lower not only peripheral nerve block but also epidural anesthesia related risks and to minimize opioid consumption, several local anesthetic techniques were intro- duced in order to achieve adequate pain relief after TKA. Those techniques offer the potential advantage of high local anesthetic drug concentrations without toxic systemic distribution, absence of permanent motor block or muscle weakness, no masking of

postoperative surgical related nerve lesions, good pain relief, re- duced requirements of opioids, tendency to an earlier and im- proved mobilization, an easy and fast installation and potential of low-costs [2,16-23].

However, although there are encouraging results about local anesthetic drugs, to the best of our knowledge, nothing is known whether low-risk continuous intra-articular infusion can achieve same pain relief quality in comparison to SNB after TKA. Safa et al [24] found no additional benefit of SNB or posterior cap- sule local anesthetic infiltration analgesia when adding to FNB.

In a retrospective data analysis we compared the analgesic effects of continuous ropivacaine instillation accomplished by the intra-articular On-Q PainBuster pain relief system (I-Flow Corp, Lake Forest, CA) in comparison to SNB as adjuncts to continuous FNB after TKA. The primary aim of this study was to verify whether low-risk continuous intra-articular local anesthetic drug administration provides same adequate pain relief and affects the need of postoperative drug consumption within the first 48 hours postoperatively when comparing to SNB. As secondary outcome measurements differences in length of hospital stay, postoperative functional outcome and rate of postoperative complications were assessed.

## 2. Methods

We performed a retrospective data analysis of all patients, who received a continuous intra-articular local anesthetic drug infusion pump as treatment option to provide pain relief after TKA in our institution. All patients provided informed consent for this review board approved study.

There were 34 of 50 consecutive patients available after de- fining strict inclusion and exclusion criteria. All patients re- ceived a continuous FNB to achieve pain relief for the anterior aspect of the knee. However, in Group A (n = 18 patients, 18 TKA) FNB was combined with a continuous intra-articular lo- cal anesthetic drug instillation, accomplished by an elastomer- ic infusion pump (On-Q PainBuster, I-Flow Corp., Lake Forest, CA) connected to a multi-holed intra-articular catheter. In Group B (n = 16 patients, 16 TKA) a discontinuous SNB was used as adjunct to the continuous FNB.

Inclusion criteria were performance of an elective, primary, non-constraint, unilateral mobile-bearing TKA due to primary osteoarthritis of the knee and the ability to provide informed

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