Analysis of Reduced Opioid Consumption Across Multiple Clinical Summaries

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INTRODUCTION

For many patients, pain is a reality of total knee arthroplasty (TKA) procedures.

More than 80% of patients experience acute postoperative pain, yet fewer than 50% report adequate pain relief.\(^1\) The principal treatment for preoperative and postoperative pain in the US are opioid analgesics. Reports show that while the U.S. represents just 5% of the world’s population, the nation consumes 80% of the global opioid supply.\(^2\)

TKA procedures are among the most painful types of surgical procedures.\(^3\) Hence, effective postoperative pain control is essential for these surgeries. Selection of the most appropriate pain analgesic has implications on multiple factors. Opioid-based pain medications often produce significant adverse effects, with both clinical and financial consequences. Multiple studies suggest that the decreased application of opioid-based pain medications provide superior short and long-term results, including decreased instances of adverse effects.\(^3\)

A retrospective analysis from Sun et al, encompassing 641,941 opioid naïve patients undergoing a variety of surgical procedures, showed that the majority of these procedures led to an increased risk of post-operative chronic opioid use. Among patients at highest risk for chronic opioid use within one year of surgery were TKA patients (OR, 5.10; 95% CI, 4.67-5.58; P < .001).\(^4\) Studies further suggest that patients taking opioids before TKAs often continued the medication up to six months after the operation, although this persistent use was not associated with a change in joint pain. Approximately 8.2% of patients that were opioid-naive prior to their surgery continued consumption during the following six months, versus 53.3% of TKA patients who reported taking opioids preceding surgery.\(^5\)

Multimodal analgesia approaches may reduce the risk of post-operative opioid addiction as well as other negative outcomes, including mortality, complications, increased length of stay and opioid-related side-effects.\(^4\) Clinical Practice Guidelines on the Management of Postoperative Pain, a joint report from the American Pain Society and the American Society of Anesthesiologists strongly recommend the use of multimodal pain approaches. In the Guidelines, input from an interdisciplinary expert panel suggests that multimodal analgesia may have additive effects for better pain relief versus with single-modality options. In randomized trials, multimodal approaches involving simultaneous use of several analgesics for different receptors – delivered via different techniques – produced superior pain management and a decrease in opioid consumption, versus applications of a single medication.\(^1\)

REVIEW OF THE LITERATURE – THE EFFECTS OF CPNBs on OPIOID CONSUMPTION AFTER TKA

The volume of TKA procedures has nearly doubled in the past decade, with an estimated four million U.S. adults living with a knee replacement, and demand for TKAs is expected to increase substantially by 2030.\(^6\) With TKA procedures,
current literature suggests that continuous peripheral nerve blocks (CPNBs) often provide superior pain management while reducing opioid consumption. The selected studies compare CPNBs and femoral nerve blocks (FNBs) to multiple opioid-based solutions, including patient controlled analgesia (PCA), epidural, local infiltration analgesia, and single-shot pain management options. Results suggest that CPNBs are an effective way to reduce opioid usage while delivering strong pain remediation for orthopedic procedures, such as TKAs. These findings are further supported in a wide-ranging report from Cochrane Library, encompassing 45 randomized controlled trials (RCTs) with a combined 2,710 participants. These cited high-evidence studies report that CPNBs provide a better option for managing postoperative pain associated with TKAs, while enabling healthcare practitioners to administer fewer opioids.\(^3\)

Bingham’s meta-analysis and systematic review of orthopedic (including TKA) and breast procedures compared patients receiving a single shot block to those with CPNB. This review, comprised of over 700 patients and 21 randomized controlled trials, determined that opioid consumption was significantly less with CPNBs versus single-shot analgesia. Patients with CPNB also reported significantly less nausea.\(^7\) These findings were similar in the previously mentioned Cochrane Review where opioid consumption was significantly less in the continuous FNB group compared with the single-shot FNB group at 24 hours and 48 hours.\(^3\)

Determined from the strength of the evidence reviewed, the American Pains Society and American Society of Anesthesiologists strongly recommend the use of CPNB over single injection blocks stating that CPNB are preferred with prolonged postoperative pain, because of the limited duration of effect with single injection blocks.\(^1\)

Nader et al report on a randomized trial of 62 patients assigned to continuous femoral analgesia (CFA) or oral opioid analgesia (OOA) groups after TKAs. The CFA group experienced reduced opioid consumption. The CFA group experienced additional benefits after surgery that may impact long-term outcomes. These patients experienced less pain, consumed fewer oral narcotics, and performed better knee flexion versus the OOA patients.\(^9\)

Wu et al conducted a controlled trial in a where 60 patients underwent elective TKA procedures. Patients were randomly assigned to continuous FNBs or conventional patient-controlled analgesia. Those that received FNBs consumed a significantly lower amount of opioids, and expressed greater satisfaction with the quality of the postoperative pain control. This group also experienced less mobility-related pain and achieved earlier ambulation. The CPNB group experienced fewer side effects, such as nausea and/or vomiting (27% vs 63%) and dizziness (17% vs 40%).\(^9\)

Advancement in regional anesthesia has resulted in techniques such as continuous adductor canal blocks (CACB) for ACL and TKA procedures. Unlike a femoral nerve block, the adductor canal block is predominately a sensory block, which preserves quadriceps muscle strength and improves ambulation ability without compromising pain control.\(^10,11\) Hanson reported reduced opioid consumption, effective pain control, better rehabilitation, and improved patient satisfaction scores in patients receiving an adductor canal block compared to a placebo.\(^12\) In a systematic review and meta-analysis involving over 400 patients, Li concluded that adductor canal block (ACB) deliver better pain control, improved ambulation, and faster recovery after TKAs compared to FNBs.\(^13\) Additional research shows that adductor canal CPNB solutions may provide early postoperative ambulation versus FNBs.\(^14\)

**CONCLUSION**

Patients undergoing TKA surgeries are at risk for significant postoperative pain. Inadequately controlled pain adversely affects a patient’s quality of life, interferes with functional recovery, increases the risk of post-surgical complications, and the risk of continued opioid use in the months following surgery.\(^14\)

Healthcare professionals are called upon to reduce opioid use.\(^15\) The evidence supports incorporating CPNBs to significantly reduce opioid use and their associated side effects as part of a multimodal approach to manage patients’ pain after TKA surgery. Additional benefits of CPNB include superior pain control, faster recovery, and improved patient satisfaction.\(^7, 8, 9, 12, 13\)
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