

The Effect of a New Multimodal Perioperative Anesthetic Regimen on Postoperative Pain, Side Effects, Rehabilitation, and Length of Hospital Stay After Total Joint Arthroplasty

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Abstract: This study evaluated the effect of a new multimodal perioperative anesthetic and pain management strategy for primary total hip (THA) and total knee arthroplasty (TKA). Two cohorts of 50 consecutive THA and 50 TKA patients from before and after initiation of the new protocol were compared. The protocol involved scheduled oral narcotics, cyclooxygenase-2 inhibitors, no intrathecal narcotics, femoral nerve catheters for TKAs, and local anesthetic wound infiltration. Use of patient-controlled analgesia was discouraged. Physical therapy was attempted on the day of surgery. The demographic data, surgical procedure, and implants were similar. There were statistically significant improvements after the protocol regarding rest-pain scores post-operative day (POD) 1 and 2, total narcotic consumption, distance walked POD 1 and 2, and length of stay. There were no significant differences in complications. Implementation of this new multimodal perioperative protocol combined with early mobilization for TKA and THA patients has shortened length of stay, improved pain control, and accomplished therapy goals sooner with less narcotic consumption. **Key words:** total joint arthroplasty, postoperative pain, length of hospital stay.

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Recently, in the field of total joint arthroplasty, several innovations including less invasive surgery and novel pain management techniques have been introduced with the goal of accelerating patient recovery and reducing perioperative pain. Although some early data have become available regarding the effect of smaller incisions in total hip arthroplasty [1-8], relatively little information on the isolated effects of perioperative anesthetic and

pain management techniques and their influence on recovery after total joint arthroplasty have been published [9-13].

Anesthetic techniques and perioperative pain and functional management are often overlooked as important modalities to lessen perioperative morbidity and accelerate recovery from total joint arthroplasty. The authors, therefore, initiated a new multimodal anesthetic regimen and perioperative pain management strategy in an effort to decrease anesthetic and narcotic-induced side effects as well as speed short-term functional recovery. This new approach emphasized regional anesthesia rather than general, avoidance of intravenous narcotics, scheduled multimodal oral medications, and early mobilization with physical therapy beginning on the day of surgery. Several years before institution of this protocol we began using

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less invasive surgical approaches for total knee and total hip arthroplasty defined primarily by reduced incision size and smaller deep dissections. Because the surgical approaches have remained the same before and after institution of the multimodal perioperative anesthetic and pain management protocol, the relatively independent effects of the protocol could be investigated. The authors hypothesized that this new strategy would provide for faster functional recovery, reduced hospital stay, better pain control, and reduced medication- and anesthetic-related side effects.

Materials and Methods

This retrospective clinical study was deemed exempt from formal review by the authors' institutional review board. The study was designed to evaluate the experience with a new multimodal anesthetic and pain management perioperative protocol. In September 2004, this new protocol was combined with early mobilization for all patients undergoing primary hip or knee arthroplasty. Fifty consecutive unilateral total knee arthroplasty (TKA) patients and 50 consecutive total hip arthroplasty patients (THA) from immediately before (group 1) and 50 consecutive TKAs and 50 consecutive THAs after implementation of the protocol (group 2) were selected. All study patients' surgical procedures were under the supervision of the senior author (CLP).

The new protocol emphasized spinal anesthesia using bupivacaine rather than general anesthesia. Long-acting intrathecal narcotics such as Duramorph and morphine were not used; instead, a short-acting intrathecal narcotic, fentanyl, was used at the discretion of the anesthesia service. General anesthesia was discouraged at the time of scheduling the arthroplasty procedure in the office and also by the anesthetic team.

During this study period, on the morning of surgery, group 2 patients received a single 10-mg dose of sustained-release oxycodone (Oxycontin) and a 20-mg dose of valdecoxib (Bextra). Currently, because Bextra is no longer available, we use a preoperative dose of 200 mg of celecoxib (Celebrex) with the same dose of Oxycontin. Patients with a history of renal insufficiency or a preoperative creatinine level of greater than 1.5 mg/dL did not receive nonsteroidal anti-inflammatory medications. Oxycontin 10 mg was given every 12 hours, Valdecoxib 20 mg was given once a day, and a shorter-acting narcotic such as oxycodone or hydrocodone was provided as needed for pain postoper-

atively. Use of patient-controlled analgesia (PCA) or other forms of parenteral narcotics was avoided during the postoperative period unless pain was not well controlled with oral narcotics. Before this protocol, perioperative pain was managed predominantly with PCA and parenteral narcotics.

All patients undergoing TKA had a femoral nerve block placed preoperatively under ultrasound guidance using 0.5% bupivacaine. Concomitantly, a femoral nerve catheter was inserted as described by Sites et al [14] and postoperatively connected to an autoinfusing reservoir containing the same local anesthetic for 48 hours. Femoral nerve blocks were repeated and boluses were administered through the catheter for TKA patients with inadequate pain control. Perioperative management of these peripheral catheters was performed by the members of the department of anesthesia.

Before wound closure, 50 mL of 0.25% bupivacaine with epinephrine was injected into the deep and subcutaneous tissues for group 2 THAs and 30 mL of the same anesthetic was injected in the deep and subcutaneous tissues for group 2 TKAs, not including the posterior capsule. Thirty milliliters was chosen for group 2 TKAs to minimize the chance of bupivacaine toxicity, considering these patients also had a femoral nerve catheter with bupivacaine. No patient was given a total dose of 0.25% bupivacaine in excess of 1 mg/kg body weight. An ice pack was placed over the postoperative dressing for all THAs and replaced regularly for 24 hours. A cryotherapy pad was placed within the postoperative dressing and used continuously postoperatively for all TKAs.

A posterolateral approach was used for all THA patients. An attempt was made to keep incision lengths as small as possible without compromising exposure and component placement. In general, incision length averaged 3 to 5 in. The deep dissection consisted of takedown of the short external rotators proximal to the quadratus femoris with the underlying hip capsule. All THA patients had placement of cementless proximally porous-coated femoral component and a cementless acetabular component. The size of the femoral head chosen was either 36 or 38 mm. For TKA patients, a medial parapatellar arthrotomy was used. The length of the incision into the quadriceps tendon was kept as small as possible and was generally 2 to 4 cm proximal to the superior pole of the patella. All patients were allowed to weight-bear as tolerated on the operative extremity. Group 1 patients were mobilized with physical therapy beginning on POD 1. Group 2 patients were mobilized if possible on the day of surgery.

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