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Femoral and sciatic nerve blocks for total knee arthroplasty postoperative analgesia. A systematic review of current evidence

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Abstract The combination of postoperative pain from total knee arthroplasty (TKA) and the pain associated with early ambulation and rehabilitation creates significant issues as to how to manage both the acute pain and the need for rehabilitation. Conventional methods of simply providing opioid analgesia are moderately effective, however they do not have as superior analgesia effect when compared to femoral and sciatic nerve block. A thorough review of the literature was conducted to evaluate the efficacy of combined femoral and sciatic nerve blocks in adults undergoing TKA. The evidence demonstrated that perioperative use of femoral and sciatic nerve blocks are effective in reducing postoperative pain, decreasing opioid consumption, decreasing length of stay, improved inpatient rehabilitation and improved patient satisfaction.

Editor's comments
The management of pain in the post-operative elective surgery patient remains an issue of utmost interest to the orthopaedic and trauma practitioner. Pain affects patients' experiences of surgery, recovery and rehabilitation as well as the outcomes of the surgery and hospital stay. The use of nerve blocks to manage post-operative pain is now standard practice in many units and for many types of limb surgery. This paper helps the practitioner to understand the rationale and value of this strategy. What is needed in addition is careful consideration of the nursing implications and potential risks of this mode of analgesia. JS-T

Background and significance

Total knee arthroplasty (TKA) in the adult patient population is a prevalent surgical procedure. In 2005, the National Center for Health Statistics reported that total knee arthroplasty had become one of the most common orthopedic procedures performed in older adults in the United States (US) (Centers for Disease Control and Prevention (CDC), 2005). The rate of TKA per 100,000 patients tripled between 1990 and 2002 (Kurtz et al., 2005).

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Pain after TKA is often significant and can be very difficult to manage and treat for both medical and nursing staff.

The primary reason patients undergo TKA is because of arthritic degeneration of the joint. The National Institute of Arthritis and Musculoskeletal and Skin Diseases (2002) estimates that 21 million people in the US suffer from arthritis. These arthritic changes create significant pain and discomfort and impair function. As the degenerative process advances, pain becomes significant and physical activity can be greatly reduced. TKA is an option for patients to improve quality of life. A study by Ethgen et al. (2004) showed a significant improvement in quality of life dimensions after TKA. This same study reported a slight decrease in quality of life during the acute rehabilitation phase due to pain.

The utilization of a femoral and sciatic nerve block has been shown to significantly decrease postoperative pain and overall opioid requirements (Hunt et al., 2009). Infiltrating both the femoral and sciatic nerve with local anesthetic can be performed at any time during the perioperative course. Many anesthesia providers will place femoral and sciatic nerve blocks into the surgical leg as a means to decrease anesthesia requirements intraoperatively, as well as provide analgesia postoperatively.

Varying techniques exist in the placement of femoral and sciatic nerve blocks. The nerve block can be performed easily with ultrasound guidance or nerve stimulation technique (New York School of Regional Anesthesia (NYSORA), 2010). Perineural catheters may also be utilized to allow for continuous infusion of local anesthetic at the nerve site. The alternative to placement of a perineural catheter is a single injection at both the femoral and sciatic nerve sites with a medium to long acting local anesthetic. The major disadvantage to single shot injection is the inability to quickly administer local anesthetic without the patient receiving another injection, as there is no catheter in place.

Time constraints and a busy operating room schedule can sometimes create anesthesia provider resistance to placing regional blocks. A study by Hunt et al. (2009)) showed that blocks could be placed in 5 min. Placement of the femoral and sciatic nerve block does require a certain level of clinical expertise. However, the minimal time required to place these blocks is outweighed by improved quality of care and decreased postoperative pain (Hunt et al., 2009).

The need for early and effective rehabilitation and physical therapy for patients who have undergone TKA is a high priority. In some institutions patients are ambulated the day of surgery in an attempt to avoid deep vein thrombosis (Chandrasekaran et al., 2009). Patients who engage in early ambulation and physical therapy following TKA have a decreased length of hospital stay and an overall decreased inpatient cost (Larsen et al., 2009).

The combination of postoperative pain from the TKA and the pain associated with early ambulation and rehabilitation creates significant questions about how to manage both the acute pain and the need for rehabilitation. Conventional methods of simply providing opioid analgesia are effective but do not have the superior level of analgesia effect when compared to femoral and sciatic nerve blocks (Cook et al., 2003). Postoperative nausea and vomiting are frequent side effects of anesthesia and opiates, and less frequent, but more severe, apnea and hypotension (Nagelhout and Zaglaniczny, 2001). Adding these side effects to a typically older patient population has the potential to further increase morbidity and possibly mortality.

Although epidural infusion analgesia has been shown to significantly reduce pain after TKA (Davies et al., 2004), there are inherent risks from the procedure. Unfortunately there are several negative inherent risks associated with the use of epidural analgesia. With the need to prevent deep vein thrombosis in patients undergoing TKA it has become the standard of care for the patient to receive low molecular weight heparin therapy both preoperatively and postoperatively as a means to reduce the incidence of deep vein thrombosis. This poses additional risk to the patient in placement and management of an epidural catheter, as epidural hematoma is a risk (Llau and Ferrandis, 2009). Indwelling epidural catheter infusion also carries with it the negative effect of partial or complete motor blockade. This motor block has the potential to delay the rehabilitation and inpatient discharge process.

The use of a combined femoral and sciatic nerve block, however, does provide excellent analgesia without the risk of apnea, postoperative nausea and vomiting, epidural hematoma or a sensory and motor blockade of the entire lower body. When femoral and sciatic nerve blocks are placed perioperatively, a significant decrease in total opioid consumption has been shown (Appendix A). Allen and colleagues (1998) showed a 50% reduction in morphine consumption with the use of both a femoral and sciatic nerve block for postoperative pain management (Allen et al., 1998). Besides decreasing total opioid consumption, femoral and sciatic nerve blocks may be placed with limited concern