

Analgesia for total knee arthroplasty

Total knee arthroplasty is commonly associated with moderate to severe postoperative pain. Patients undergoing these procedures are often elderly with multiple co-morbidities and an effective pain management strategy will reduce pain intensity, limit unwanted side effects, and improve surgical outcome by facilitating postoperative rehabilitation (Capdevila et al, 1999). The control of postoperative pain is not only important to the patient, an important humane aspect, but can hasten recovery and hence hospital discharge.

The options

Total knee arthroplasty is amenable to peripheral nerve blockade, neuroaxial and systemic analgesia. Peripheral nerve block and neuroaxial analgesia both attenuate the neuroendocrine stress response, reducing the risks of postoperative myocardial ischaemia and infarction, and potentially reducing the incidence of chronic pain syndromes. Doses of systemic opioids required to control severe pain alone risk respiratory depression, nausea and vomiting, and pruritus (Bonnet and Marret, 2005). Infiltration of high volume, low concentration local anaesthetic at the knee shows potential although this technique is currently lacking substantial evidence.

Peroneal nerve palsy

Peroneal, and to a lesser degree tibial nerve palsy (both terminal branches of the sciatic nerve) are recognized complications of total knee arthroplasty. The method of injury is multi-factorial but is associated with compression and ischaemia of the affected nerve. Patient risk factors include a preoperative valgus or contracture deformity, and pre-existing neuropathy (the 'double-crush' phenomenon, whereby an impinged proximal axon is less able to tolerate distal compression).

Surgical causes include perioperative nerve traction, a tourniquet time greater

than 2 hours, and tight constrictive dressings. Importantly for the anaesthetist, epidurals have been repeatedly associated with peroneal palsy. The presumed mechanism is that a profound sensory block may mask the early identification of nerve injury, preventing early, beneficial intervention such as the release of dressings and limb positioning to decrease nerve traction. Such a block could also facilitate nerve injury by allowing the limb to lie in an unprotected position, leaving it exposed to local compression (Idusuyi and Morrey, 1996). Finally, a sciatic block could itself cause a palsy as a result of direct nerve trauma, e.g. by unrecognized intra-neural injection.

Epidural vs peripheral nerve block

Fowler et al (2008) performed a systematic review and meta-analysis comparing epidural analgesia with peripheral nerve blockade for major knee surgery. They concluded that a technique including femoral nerve blockade produced analgesia 'comparable with that obtained with an epidural but with a lower incidence of hypotension'. This was consistent with other such published conclusions. They also concluded that despite the sciatic nerve providing sensory innervation to the posterior aspect of the knee, there was little analgesic benefit of sciatic blockade in the first 24 hours postoperatively. Co-analgesics were deemed sufficient to negate any increase in pain beyond this period.

The use of femoral nerve catheters has been advocated to prolong the duration of analgesia compared to a single shot technique. However, the risk of infection, increased skill needed to place such a catheter, and the nursing requirements to manage such a patient means this option remains unpopular (Salinas et al, 2006). The use of a lumbar plexus block which blocks, among others, the origins of the femoral nerve, provides no additional benefit, only additional risk. The most problematic aspect of femoral nerve blocks is the associated quadriceps weakness that some patients find unpleasant, but this temporary weakness may aid the analgesic

effect by preventing painful muscle spasms and hence facilitating physiotherapy (Fowler et al, 2008).

Conclusions

Femoral nerve blockade provides the current best option for postoperative analgesia for total knee arthroplasty. Combined with general anaesthesia, and then as part of a multi-modal analgesic approach (including systemic opioids for breakthrough pain), it provides adequate intra-operative and then postoperative analgesia to facilitate early mobilization. In those patients for whom a general anaesthetic is not suitable, spinal anaesthesia with local anaesthetic and either a long-acting intrathecal opiate or combined with a femoral nerve block is appropriate (Fischer et al, 2008).

By providing adequate postoperative analgesia anaesthetists can work with surgeons to shorten convalescence, reduce complications, and hasten rehabilitation from a total knee arthroplasty. **BJHM**

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