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EDITORIAL II

Local infiltration analgesia for total knee arthroplasty

C. J. L. McCartney[1]* and G. A. McLeod[2]

[1] Department of Anesthesia, Sunnybrook Health Sciences Centre, University of Toronto, 2075 Bayview Avenue, ON, Canada M4N 3M5
[2] University Department of Anaesthesia, Ninewells Hospital and Medical School, Dundee, Tayside, UK

* E-mail: colin.mccartney@utoronto.ca

Total knee arthroplasty (TKA) is a common surgical procedure but is painful and requires careful management in order to balance patient comfort and early postoperative function. Traditional methods of pain management such as the use of parenteral opioids provide inadequate pain relief and are limited by excessive adverse effects. In contrast, epidural analgesia is used in many institutions and can provide good pain control. However, the failure rate with epidural analgesia approaches 20% and is commonly associated with adverse effects such as excessive motor block.[1] The more recent use of peripheral nerve blocks such as continuous femoral block has been shown to provide pain control equivalent to epidural techniques, but with fewer adverse effects, especially when used as part of a multimodal analgesic regimen.[2] Consequently, the use of continuous femoral block in this context has come to be regarded by many to be the gold standard for pain relief after TKA.[3] However, placing continuous perineural catheters is technically demanding, requires additional anaesthetic time, and is an acquired skill. Although a femoral block provides effective analgesia for the anterior aspect of the knee joint, careful management is important to avoid significant motor block of the quadriceps which can inhibit rehabilitation or more rarely cause falls. An initial bolus of ropivacaine 2 mg ml^{-1} and subsequent infusion[4 5] of ropivacaine 1–2 mg ml^{-1} injected around the femoral nerve provides not only very good postoperative pain relief, but also ready mobilization on the evening of and days after surgery. A simpler technique that is available to more patients and that could be provided by anaesthetists without subspeciality expertise in regional anaesthesia would be desirable but only if it guaranteed adequate and prolonged analgesia in the postoperative period, without the limitation of side-effects.

Local infiltration analgesia (LIA) at the surgical site has become relatively common for a number of surgical procedures and can produce effective analgesia and has the advantage of relative simplicity compared with other regional anaesthesia techniques. The benefit of infiltration of the knee after TKA was demonstrated in a small, though well designed, randomized trial comparing local infiltration against placebo.[6] Subsequently, an effective protocol for LIA was developed and then shown to provide effective pain control and ability to ambulate in a series of 86 patients having TKA.[7] Since then, there have been 20 further studies with several demonstrating improved pain control and reduced adverse effects with the LIA technique compared with placebo. Currently, only four studies have compared LIA with other regional anaesthesia techniques; two studies with epidural analgesia and two with continuous femoral nerve block (FNB).

Although the former studies appear to suggest that LIA is superior to epidural analgesia, methodological issues cloud the results in both cases. An unblinded study[8] compared LIA against epidural analgesia and found decreased pain and reduced opioid consumption in the LIA group. A further comparison of LIA and epidural analgesia[9] also found that LIA produced better pain control and reduced opioid consumption. However, in this study, the epidural group was not given non-steroidal anti-inflammatory adjuvant analgesia and the pain scores in both groups were excessively high during the first 72 h after surgery.

Two studies to date have compared LIA with continuous FNB.[10 11] An unblinded study of 80 patients randomized to receive either LIA and placebo FNB or continuous FNB and placebo LIA found that patients were able to be more active and used less analgesics on the first postoperative day in the LIA group.[10] However, there were two major complications (deep infection and wound dehiscence) in the LIA group, and no overall differences in pain outcomes or length of stay were demonstrated.

A blinded study of 40 patients randomized to receive either LIA and placebo FNB or placebo LIA and FNB demonstrated increased analgesic use in the LIA group and better functional outcome at 6 weeks after surgery in the FNB group.[11] Early evidence comparing FNB with LIA is inconclusive and requires further study.

Despite the lack of definitive evidence, several centres around the world have adopted the use of LIA for TKA, but results have yet to be definitively reported. The attractiveness of the method relates to: the simplicity of the technique, as opposed to the advanced skills required for placing continuous perineural catheters; the limited time taken to perform LIA, as opposed to the 15–20 min often taken for continuous femoral block; and the apparent avoidance of motor block that can limit rehabilitation with single injection and continuous perineural techniques.[12] However, it is not clear at the present time if a single-injection LIA technique provides sufficient analgesia or if it is necessary to place an indwelling catheter in the periarticular tissue for later infusion or bolus of local anaesthetic. Studies that have used intraoperative LIA bolus alone[13] appear to suggest that the duration of action is relatively short. However, it is unclear as to whether the duration of action can be extended by intermittent boluses of local anaesthetic through an indwelling catheter.[14] In addition, there are concerns about the risk of infection with an indwelling catheter. It is also not clear at the present time if the LIA technique provides equivalent analgesia to continuous FNB or has the same, well-documented, track record of safety.[15] The injection of large volumes of local anaesthetic and other adjuvant drugs around the knee joint may have potential for local and central toxicity and studies need to be performed to examine these concerns.

TKA often produces severe acute pain that can become chronic in a high proportion of cases. A recent observational study[16] quantified the incidence of persistent pain as 36% after primary knee arthroplasty, and showed that the most important independent predictor of persistent pain was the degree of pain relief in the first week after operation. Future studies should examine the impact of acute pain relief treatments on both short- and long-term pain outcomes, in addition to functional outcomes, after knee arthroplasty.

In summary, LIA is a relatively simple technique that has shown early promise as a method of pain relief after TKA. However, on the basis of current evidence, it is not clear if this method provides pain relief or has a record of safety equivalent to continuous FNB. TKA is a common and painful procedure that requires effective methods of pain relief both for patient comfort and to provide optimal conditions for rehabilitation. Current evidence suggests that we should not abandon the use of the continuous FNB until further data become available.

Conflict of interest

None declared.

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