

Local infiltration analgesia: a technique for the control of acute postoperative pain following knee and hip surgery

A case study of 325 patients

Dennis R Kerr and Lawrence Kohan

Acta Orthopaedica 2008; 79 (2): 174–183
DOI 10.1080/17453670710014950

Background We have developed a multimodal technique for the control of pain following knee and hip surgery, called “local infiltration analgesia” (LIA). It is based on systematic infiltration of a mixture of ropivacaine, ketorolac, and adrenaline into the tissues around the surgical field to achieve satisfactory pain control with little physiological disturbance. The technique allows virtually immediate mobilization and earlier discharge from hospital.

Patients and methods In this open, nonrandomized case series, we used LIA to manage postoperative pain in all 325 patients presenting to our service from Jan 1, 2005 to Dec 31, 2006 for elective hip resurfacing (HRA), primary total hip replacement (THR), or primary total knee replacement arthroplasty (TKR). We recorded pain scores, mobilization times, and morphine usage for the entire group.

Results Pain control was generally satisfactory (numerical rating scale pain score range 0–3). No morphine was required for postoperative pain control in two-thirds of the patients. Most patients were able to walk with assistance between 5 and 6 h after surgery and independent mobility was achieved 13–22 h after surgery. Orthostatic hypotension, nausea, and vomiting were occasionally associated with standing for the first time, but other side effects were unremarkable. 230 (71%) of the 325 patients were discharged directly home after a single overnight stay in hospital.

Interpretation Local infiltration analgesia is simple, practical, safe, and effective for pain management after knee and hip surgery.

Guest editorial

LIA in arthroplasty – the history of a single-center observational study leading to implementation in general clinical practice

Although local anesthetic wound infiltration has been widely used for more than 50 years in different surgical procedures, the observational study by Kerr and Kohan (2008) in 325 patients undergoing 3 different hip and knee arthroplasties led to an increased attention to the very simple, surgeon-administrated technique of high-volume local anesthetic wound infiltration (LIA), with claimed effects on pain, mobilization, opioid use and hospital stay. This study was a non-RCT performed by 2 physicians in a small private hospital in Sydney, factors that usually argue against the value of such reports. Nevertheless, in this case the article further stimulated others to do original and more scientific research including RCT's and later followed by several systematic reviews. However, these reviews unfortunately often suffered from methodological problems, since the efficacy of LIA (with NSAID) was not compared to appropriate control groups including systemic NSAIDs and paracetamol (Andersen et al. 2014). Also, although the original suggestion that ketorolac and epinephrine should be added in the solution in some way was rational, it was not proven in later studies to be necessary or essential compared to systemic

NSAIDs/Cox 2 inhibitors (Spreng et al. 2010, Schotanus et al. 2017).

Whatsoever, history has shown that the observational study by Kerr and Kohan (2008) stimulated much research to argue that the technique is simple, safe and effective in TKA, but apparently not in THA (Andersen et al. 2014, Tan et al. 2019, Wainwright et al. 2020). The reasons for this discrepancy between TKA and THA still needs to be clarified but may be related to wound size and the fact that pain is less following a THA compared with TKA.

Concomitant with the availability of more scientific data on LIA, the concept of fast-track THA and TKA was undergoing much progress. Since optimal patient management is a prerequisite for enhanced recovery and early mobilization, LIA most probably may have played an important role in this process, although a direct association is difficult to prove.

The suggestion that further efficacy can be obtained by a wound catheter is controversial (Andersen et al. 2014, Wainwright et al. 2020) although this author personally observed an effect in a patient the day after a knee replacement in

the orthopedic hospital in Sydney when visiting Kerr and Kohan.

Although safe, simple and effective, however, there is still a demand to take the time to do the infiltration meticulously to cover all important wound layers and probably also to do further studies on which tissue layers and places to be most important to infiltrate to obtain sufficient analgesia (Andersen et al. 2014). In this context, more information is needed on the additional analgesic effect of performing a surgeon-administered “blind” saphenous block when being inside the joint. Finally, although many studies are available, we need more data from comparing or combining LIA with different peripheral nerve blocks (Zhang et al. 2018, Sardana et al. 2019).

In conclusion, this study is a nice example of an idea that subsequently has been well-documented to be useful and furthermore implemented in clinical practice in many centers around the world as well as in clinical guidelines. (Soffin et al. 2019a and b, Wainwright et al. 2020).

Henrik Kehlet

*Rigshospitalet, Section of Surgical Pathophysiology,
Copenhagen, Denmark
E-mail: henrik.kehlet@regionh.dk*

Andersen L O, Kehlet H. Analgesic efficacy of local infiltration analgesia in hip and knee arthroplasty: a systematic review. *Br J Anaesth* 2014; 113(3): 360-74.

Kerr D R, Kohan L. Local infiltration analgesia: a technique for the control of acute postoperative pain following knee and hip surgery: a case study of 325 patients. *Acta Orthop* 2008; 79(2): 174-83.

Sardana V, Burzynski J M, Scuderi G R. Adductor canal block or local infiltrate analgesia for pain control after total knee arthroplasty? A systematic review and meta-analysis of randomized controlled trials. *J Arthroplasty* 2019; 34(1): 183-9.

Schotanus M G M, Bemelmans Y F L, van der Kuy P H M, Jansen J, Kort N P. No advantage of adrenaline in the local infiltration analgesia mixture during total knee arthroplasty. *Knee Surg Sports Traumatol Arthrosc* 2017; 25(9): 2778-83.

Soffin E M, Gibbons M M, Ko C Y, Kates S L, Wick E, Cannesson M, Scott M J, Wu C L. Evidence review conducted for the Agency for Healthcare Research and Quality Safety Program for Improving Surgical Care and Recovery: focus on anesthesiology for total knee arthroplasty. *Anesth Analg* 2019a; 128(3): 441-53.

Soffin E M, Gibbons M M, Ko C Y, Kates S L, Wick E C, Cannesson M, Scott M J, Wu C L. Evidence review conducted for the Agency for Healthcare Research and Quality Safety Program for Improving Surgical Care and Recovery: focus on anesthesiology for total hip arthroplasty. *Anesth Analg* 2019b; 128(3): 454-65.

Spreng U J, Dahl V, Hjal A, Fagerland M W, Raeder J. High-volume local infiltration analgesia combined with intravenous or local ketorolac+morphine compared with epidural analgesia after total knee arthroplasty. *Br J Anaesth* 2010; 105(5): 675-82.

Tan N L, Gotmaker R, Barrington M J. Impact of local infiltration analgesia on the quality of recovery after anterior total hip arthroplasty: a randomized, triple-blind, placebo-controlled trial. *Anesth Analg* 2019; 129(6): 1715-22.

Wainwright T W, Gill M, McDonald D A, Middleton R G, Reed M, Sahota O, Yates P, Ljungqvist O. Consensus statement for perioperative care in total hip replacement and total knee replacement surgery: Enhanced Recovery After Surgery (ERAS) Society recommendations. *Acta Orthop* 2020; 91(1): 3-19.

Zhang L K, Ma J X, Kuang M J, Ma X L. Comparison of Periarticular local infiltration analgesia with femoral nerve block for total knee arthroplasty: a meta-analysis of randomized controlled trials. *J Arthroplasty* 2018; 33(6): 1972-8.e4.