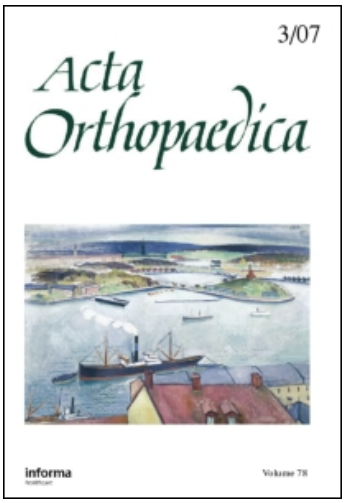

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High-dose local infiltration analgesia after hip and knee replacement—what is it, why does it work, and what are the future challenges?

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Guest editorial

High-dose local infiltration analgesia after hip and knee replacement—what is it, why does it work, and what are the future challenges?

Over the past decade, several efforts have been made to improve postoperative recovery, and to reduce morbidity and need for hospitalization and rehabilitation (Kehlet and Dahl 2003). Significant improvements have also been made in the orthopedic speciality, especially regarding optimization of perioperative pain relief and organizational issues (clinical pathways), since other stress-induced organ dysfunctions are relatively rare after extremity surgery.

In lower extremity joint replacement, the most effective pain treatment has traditionally been epidural analgesia or continuous peripheral nerve blocks (Fischer and Simanski 2005, Ilfeld et al. 2006), both of which either have significant demands on technical skills, have potential side effects, or are costly. More recently, a special multimodal wound infiltration analgesic technique has been developed by Lawrence Kohan and Dennis Kerr in Sydney, Australia, with extremely effective pain relief—reducing hospital stay to 1–2 days (personal communication/visit). Unfortunately, to date this fascinating technique has not been published in detail by the instigators, but only by others in preliminary series (Reilly et al. 2005, Busch et al. 2006, Venditolli et al. 2006), and without the complete program as developed in Sydney. In contrast to epidural analgesia and peripheral nerve blocks, the multimodal infiltration technique is simple, apparently safe, cheap, and requires no technical skill. In essence, the technique includes an intraoperative infiltration of the whole surgical area with about 150 mL of a solution of 300 mg ropivacaine, 30 mg ketorolac, and 0.5 mg adrenaline. A catheter is left from the joint cavity to the skin, allowing repeated infusion in the evening if needed, but normally only on the morning after surgery—whereafter it is withdrawn. The program includes a pressure bandage and ice pack on the wound area for the first 4–6 postoperative hours, to prolong analgesia. The anesthetic technique is traditional, with spinal anesthesia and light general anesthesia with spontaneous ventilation. Early postoperative mobilization is started within the first 3–5 hours, aiming at discharge on the first postoperative day. This has been successful in both knee and hip replacement in more than half of the patients, with most of the remaining patients being discharged on the second postoperative day. Of major interest is the fact that post-discharge pain treatment is traditional, with paracetamol, NSAIDs and weak opioids only, but allowing full mobilization.

In addition, no systemic antithrombotic treatment is given, except for aspirin. The Sydney group has proven that this regimen, including the enforced early mobilization, is followed by extremely few thromboembolic events—as assessed by detailed follow-up with ultrasound venography on postoperative visits. Also, organ dysfunctions such as pneumonia and myocardial infarctions/arrhythmias are virtually eliminated (Kerr and Kohan, unpublished).

The regimen of multimodal, high-dose wound infiltration analgesia in major orthopedic surgery thus represents a fascinating tool within the area of fast-track surgery (Kehlet and Dahl 2003). However, there is a need for research on this technique regarding several specific issues. What is the role of wound administration of NSAIDs, since other studies have shown inconclusive advantages with local use of these agents (Rømsing et al. 2000)? What is the role of adrenaline—a reduction of local

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anesthetic absorption or a peripheral analgesic effect per se? What is the role of compression and ice packing? Why is this simple technique apparently so effective, allowing early mobilization with concomitant reduced need for stronger analgesics in the early postoperative period, when other studies with single-dose infiltration have shown transient, rather short-lasting effects (Møiniche et al. 1998)? What is the need for postoperative and post-discharge physiotherapy with this effective analgesia and early mobilization technique? What is the need for conventional thromboembolic prophylaxis with such early mobilization and, if there is a need, is prolonged treatment for several weeks necessary—as suggested by recent studies with conventional perioperative care regimens? What is the role of the technically more demanding minimally invasive joint replacement compared to this new "fast-track" paradigm with conventional surgical technique?

In this issue of Acta Orthopaedica, 3 more randomized studies and results of the technique are presented. In a study on knee arthroplasty, Toftdahl et al. (2007) have compared the Local Infiltration Analgesia (LIA) technique to continuous femoral block. They found a significant reduction of opioid consumption and less pain during physiotherapy in the group receiving intraarticular infiltration. They also noted improved walking ability and better quadriceps function in the same group. Even though this study has some limitations (no blinding of patients, uneven distribution of NSAIDs), the authors conclude that the technique of local infiltration provides good analgesia after knee arthoplasty without increased risk. They also emphasize the need for further studies to optimize the technique.

Andersen and colleagues (2007a) have performed a study on this technique in hip arthroplasty, comparing LIA to continuous epidural infusion. Also in this study, the results are in favor of the local infiltration technique. Once again, it was found that narcotic consumption was significantly reduced. Pain relief at rest was good, but similar in the two groups in the immediate postoperative period, and significantly reduced in the LIA group from the second day when active treatment had ended. Furthermore, side effects were significantly lower due to avoidance of epidural analgesia, walking ability was better, and the hospital stay was reduced by 2 days in the LIA group. The authors conclude that this technique can be recommended for hip arthroplasty.

In a randomized, double-blinded, placebo-controlled study from Odense University Hospital (Andersen et al. 2007b) local infiltration analgesia was used in hip arthroplasty and compared to a control group receiving pure saline solutions. The patients treated with LIA experienced less pain up to 2 weeks postoperatively. They needed less additional analgesics and were more satisfied. Interestingly, this treatment regimen also resulted in less joint stiffness and better function 1 week postoperatively.

In conclusion, some fascinating clinical observations made and developed by Kohan and Kerr in Sydney over the past 9 years and also confirmed by others (Reilly et al. 2005, Busch et al. 2006, Venditolli et al. 2006)—including some in the present issue of Acta Orthopaedica (Andersen et al. 2007a, b, Toftdahl et al. 2007)—open up the field for plenty of new research topics, all focused on enhancing recovery and improving quality of treatment after major orthopedic surgery. Such a comprehensive research program is being planned as a joint venture between clinics in Scandinavia, to try to answer the questions raised by this technique and hopefully confirming and improving the favorable clinical results already seen. Please contact us for further information if you wish to participate in the research program.

Both authors have served as unpaid consultants for AstraZeneca, Södertälje, Sweden.

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