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Phantom limb pain

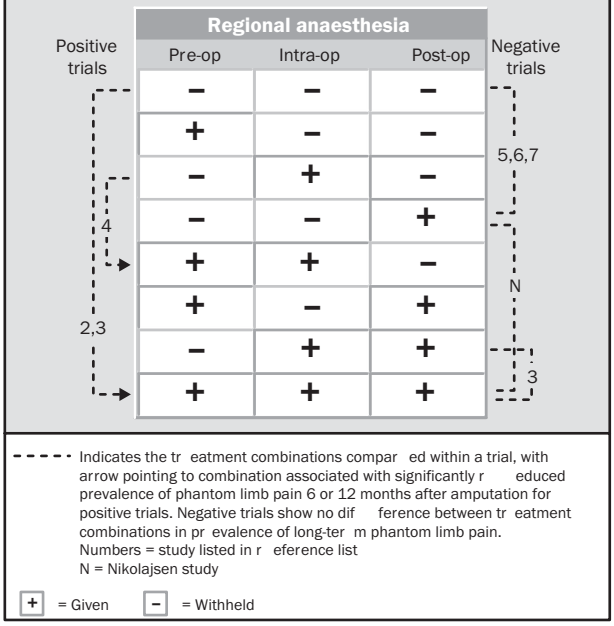
Traditional methods of postoperative analgesia do not provide adequate control of pain, in part because they focus on treating the patient only after the pain is well entrenched. Despite recent advances in the management of postoperative pain, up to 60% of patients continue to report moderate to severe pain shortly after surgery.[1] Patients are ordinarily transported to the recovery room, in considerable pain, where they receive high doses of morphine in an attempt to bring the pain under control.

The idea behind pre-emptive analgesia is to administer analgesics or local anaesthetics before the start of surgery with the aim of reducing postoperative pain intensity and postoperative analgesic requirements. The concept is not simply that pre-emptive analgesia reduces pain during the procedure, although that in itself is a worthwhile goal. The hypothesis is that the transmission of noxious afferent input from the periphery (brought about by, for example, pre-amputation pain, incision and subsequent noxious intraoperative events, and postoperative noxious inputs from the amputation stump) to the spinal cord induces a prolonged state of central neural sensitisation or hyperexcitability that amplifies subsequent input from the wound and leads to increased postoperative pain. By interrupting the transmission of noxious peri-operative inputs to the spinal cord, a pre-emptive approach is thought to prevent the establishment of central sensitisation and to result in reduced pain and analgesic requirements after the analgesic effects of the (pre-emptive) agents have worn off.

The need for well-controlled trials to find out whether regional anaesthesia given before, during, or after surgery prevents long-term phantom-limb pain was discussed in these columns only earlier this year.[2] We know that more than 70% of amputees report phantom-limb pain years after amputation,[2] but we do not know the factors responsible for the transition of acute postoperative pain to long-term pain. In today's *Lancet* Lone Nikolajsen and colleagues report the results of a randomised trial evaluating the long-term effects on phantom limb and stump pain of continuous epidural morphine and bupivacaine administered 18 hours before, during, and for about a week after lower-limb amputation. The control group received epidural saline before and throughout the surgical procedure, followed by epidural morphine and bupivacaine postoperatively. There were no significant differences between the groups in pain incidence, pain intensity, or opioid consumption at any time up to 12 months after surgery. This work is by far the most carefully controlled study done to date. What is the future for preventive or pre-emptive epidural anaesthesia for amputation? What further studies should be done?

The accompanying figure shows the eight possible treatment combinations for timing of regional anaesthesia for amputations. Also depicted are the positive and negative trials conducted so far, along with their treatment comparisons. On the basis of existing data, the study design with the most potential for reducing long-term phantom limb pain would be a well-controlled replication of the studies by Jahangiri et al[3] and Schug et al[4] comparing pre-operative, intra-operative, and post-operative epidural treatment with a placebo or sham epidural control. Logistical and ethical considerations, however, may make such a study difficult to implement in a double-blind, placebo-controlled fashion.

Trials for limb amputation



The ability to demonstrate a pre-emptive analgesic effect depends on the interaction of multiple factors, including the extent and nature of damaged tissue, duration of surgery, agents used pre-emptively, their route and timing of administration and their duration of action, extent of afferent blockade, ability of other agents given during surgery to pre-empt postoperative pain, and the time course of central sensitisation. Further research of the calibre of the study by Nikolajsen and colleagues is called for to take into account these factors before an informed conclusion can be reached on the basis of empirical evidence.

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