Preoperative acupuncture: postoperative analgesia?

Thomas Lundeberg

In the linked study by Coura and collaborators, it is reported that acupuncture the day before surgery can reduce postoperative pain (see article on page 16). Although the study is small and there are gender differences between the groups, the findings are novel, suggesting that acupuncture may be used the day before surgery rather than given in the immediate preoperative period. This suggestion is supported by results showing that acupuncture given to patients just before operative removal of impacted mandibular third molars resulted in increased pain as compared with a control group receiving no treatment. A relevant question is whether the results obtained may be explained from a physiological perspective—that is, if acupuncture given the day before surgery may be used to prevent or reduce the postoperative pain.

Nociception is the term for pain that results from activation of nociceptors (high threshold peripheral sensory receptors) by noxious stimuli. Such pain may result from a scalpel blade cutting through skin. It signals the existence, location, intensity and duration of the stimulus and fades once the scalpel blade is removed. However, surgery commonly results in tissue injury, inflammation and inflammatory pain, a state characterised by heightened pain sensitivity. This is triggered by the release of sensitising inflammatory mediators (e.g., prostaglandins, ions, cytokines and growth factors) that leads to peripheral sensitisation (a reduction in the threshold of nociceptors). The peripheral sensitisation then results in an increase in the excitability of neurons in the central nervous system, central sensitisation. These phenomena, although evoked within a matter of minutes, can outlast the surgical tissue injury for several hours or days and drive acute postoperative pain until the surgical wound has healed.

Pre-emptive analgesia is a treatment that prevents establishment of the altered sensory processing that amplifies postoperative pain. The treatment should cover the entire duration of high-intensity noxious stimulation that can lead to establishment of central and peripheral sensitisation caused by incisional and associated inflammatory injuries. Of these two injuries, the associated inflammatory reactions are probably of greater clinical significance. Two approaches have been used to reveal pre-emptive analgesia. One is to demonstrate a reduction in pain intensity and/or analgesic use beyond the period during which an effective concentration of a drug is maintained in the vicinity of its site of action. This approach is based on a study design comparing preoperative treatment and non-treatment groups. The other approach is to prove that a treatment applied before surgery is more effective than the same treatment provided at the end of surgery. The latter has become the most common study design for pre-emptive analgesia.

The question is then whether it is possible that acupuncture treatment 1 day before surgery is effective, as opposed to acupuncture administered just before surgery. Interestingly, systemic opioids administered before the start of surgery have a negative effect on pre-emptive analgesia. This finding may be attributable to a phenomenon that counters the effect of pre-emptive analgesia: the development of acute tolerance to the analgesic effect of opioids. Thus, the advantage of the prevention of surgery-induced sensitisation is lost because of the need to use larger doses of opioids to overcome acute tolerance. Among the pharmacological interventions tested, epidural analgesia, peripheral local anaesthetic infiltrations and systemic non-steroidal anti-inflammatory drugs have been proved to have an end effect mainly on a reduction in supplemental analgesics, whereas systemic N-methyl-D-aspartic acid receptor antagonists and systemic opioids have not. This would suggest that acupuncture treatment given the day before the surgery either reduces the activity in the nociceptive system or more likely reduces the inflammatory response following the surgical intervention. Acupuncture has been reported to result in the release of the calcitonin gene-related peptide and vasoactive intestinal polypeptide—neuropeptides with anti-inflammatory and antiapoptotic properties.

Also, auricular acupuncture has been reported to result in the activation of a vagal cholinergic anti-inflammatory mechanism. The results of clinical studies on the value of pre-emptive acupuncture analgesia are far from being unanimous. There are a number of potential problems related to pre-emptive acupuncture analgesia that could lead to controversy about its clinical significance. However, the results of Coura and coworkers are promising and further studies are warranted using the protocol used.

Competing interests None.

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Commentary

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