COMMENTARY

Preop analgesia for postop pain

Approaches to the management of acute postoperative pain have largely focused on treating the patient after surgery in an effort to reduce already established pain. However, we now know that the very act of cutting tissue, nerve, and bone may induce long-lasting changes in central neural function that amplify postoperative pain intensity and increase the need for analgesics. "Pre-emptive analgesia" represents a novel approach to postoperative pain management, whereby analgesic agents (opioids, local anaesthetics, and non-steroidal anti-inflammatory drugs:) are administered before surgical incision in an effort to prevent nerve impulses arising from the incision, and other intraoperative events, from reaching and sensitising central neural structures involved in pain perception.

The concept of pre-emptive analgesia has developed directly from basic research in animals carried out over the past decade.[1] This work has shown that the injury-induced spinal hyperexcitability and associated pain-related behaviours are prevented if animals receive opioids or local anaesthetics before noxious stimulation or injury. By contrast, the same treatments are less effective when administered only minutes later, once the persistent central excitability and pain behaviours have been established. For example, Woolf and Wall[2] found that the dose of systemically administered morphine required to abolish already established hyperexcitability was ten times that required to prevent its development by pretreatment.

How well does this approach translate into clinical practice? In this issue Richmond and colleagues report that patients who received 10 mg of morphine intravenously just before surgery (at the time of induction of general anaesthesia) required less morphine during the first 24 h after surgery than those who received the very same dose by the very same route at the time of closure of the peritoneum near the end of the operation. The pre-emptive effects were observed long after the expected clinical duration of action of the morphine given preoperatively.

These results have important implications. Postoperative morphine use via patient-controlled analgesia (PCA) was reduced by 27% simply by altering the timing of administration of a small dose of the drug. We do not know how morphine consumption was distributed over time within the intravenous pre and intravenous post groups, but the total morphine-sparing effect amounted to 10·3 mg or about 0·4 mg/h over the 24 h study period. The clinical relevance of a larger mean hourly reduction in PCA morphine[3] has lately been questioned,[4] but since most patients do not experience adequate postoperative analgesia, any decrease in pain and morphine use without added risk is to be welcomed. Moreover, we do not know the upper limit of the postoperative morphine-sparing effect. Should it prove to be larger, and dependent on the dose administered before surgery, then we have the potential to reduce pain still further, and perhaps even to lower the frequency of postoperative respiratory depression.

The study of Richmond et al addresses another important issue—namely, the confounding effects of administering opioids as a premedication or at the time of induction of general anaesthesia. These latest results show that even a small dose of intravenous morphine given preoperatively is capable of pre-empting postoperative pain. Other studies

studies have failed to show a significant difference in postoperative pain or analgesic requirements between groups of patients who received epidural blockade[5,6] or local anaesthetic infiltrations[7] before or after surgery. These negative findings may be explained by the fact that all patients received a small but potent pre-emptive dose of an opioid as a premedication or at the time of induction. Although we do not know the minimum effective dose that attenuates the central neural consequences of noxious perioperative events, we now know that 10 mg of intravenous morphine is sufficient. We must also be aware of the possibility that certain agents, administered as part of the general anaesthetic, may be differentially effective in pre-empting pain when administered alone or in combination. Rats that received nitrous oxide before injury showed a dose-dependent suppression of behaviour indicative of pain long after the analgesic effect of the agent had worn off; this pre-emptive effect was not observed when nitrous oxide was administered in combination with a volatile anaesthetic agent (T Goto, personal communication).

The longer-term effects of the pre-emptive regimen probably were not anticipated by Richmond et al. After 48 h, pain intensity (visual analogue scale) on movement was significantly higher in the intravenous pre group than in the intravenous post group whereas relative pain thresholds in response to applied pressure were greater in the intravenous post group. The reasons for these findings are not obvious since we know neither the nature and quantity of analgesics received by the patients during the second 24 h after surgery (ie, between 24 and 48 h) nor whether the pain scores were similar or different for the three subgroups of patients from whom pain thresholds were obtained. Richmond et al suggest that the intergroup difference in pain scores on movement after 48 h reflects a pre-emptive effect in which the greater morphine consumption by the intravenous post group during the preceding 24 h attenuated the subsequent effects of ongoing inputs from the surgical wound. This reasoning raises the possibility that noxious perioperative stimuli are only partly responsible for the state of central sensitisation. In the hours and days after surgery, ongoing neural activity arising from injured tissue further amplifies the central state, leading to pain and secondary hyperalgesia that spreads as far away as 10 cm from the wound. If the researchers are correct, it is imperative that patients have continuous access to adequate analgesia throughout the postoperative recovery period.

To what extent do preoperative, intraoperative, and postoperative factors contribute to the increased analgesic requirements, pain, and secondary hyperalgesia. When we have ascertained the relative contributions to postoperative pain of factors such as pre-existing pain, skin incision, and inflammation, we will be able to design multiagent pre-emptive treatments aimed specifically at minimising the detrimental effects of these factors. We also need to know whether the incidence or severity of chronic disorders such as painful scars, post-thoracotomy chest-wall pain, and phantom limb and stump pain can be reduced by blocking nociceptive inputs before surgical incision.

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