

Assessment and management of perioperative pain in neurosurgical patients

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SUMMARY

Postoperative pain is common but undesirable after neurosurgery. Pain assessment is vital for effective treatment. Many developed nations assess pain using a structured format and manage pain predominantly using opioids. In our national survey among Indian neuroanesthesiologists (chapter 2), we noted that structured format for assessing pain was used by less than half of the healthcare facilities and opioid usage was minimal for postoperative pain management.

There is limited data regarding the burden of postoperative pain in neurosurgical patients in the Indian scenario. In our prospective observational study (chapter 3), we observed that every two out of three patients report moderate-to-severe pain at some point in the first three days after cranial neurosurgery. Presence of preoperative pain and pain in the post-anesthesia care unit predicted the occurrence of significant pain during the first three days after surgery.

Tracheal intubation, an essential part of general anesthesia for neurosurgical procedures, is a noxious stimulation that elicits acute stress response manifesting as increased heart rate and blood pressure. The Analgesia Nociception Index (ANI) is an objective parameter that quantifies the degree of nociception during noxious stimulation. We observed negative correlation between ANI and hemodynamic parameters during intubation (chapter 4).

Surgery results in trauma, tissue injury, and inflammation, which activate peripheral nociceptors to induce nociception. Stress response to surgery manifests as changes in hemodynamic and neuroendocrine parameters. The SPI is a monitoring parameter that measures surgical stress and nociception. Opioids are the

predominant analgesics used during neurosurgery to ablate stress response to surgery. In our study (chapter 5), we observed similar stress response during surgery for brain tumors with opioid (fentanyl) and non-opioid (dexmedetomidine) analgesia as assessed by SPI and blood markers such as cortisol, glucose, and pH.

Non-opioid analgesia is explored as an alternative to opioids to overcome their adverse effects. In our pilot RCT, we established feasibility of conducting a large-scale RCT comparing intraoperative dexmedetomidine versus fentanyl for postoperative pain outcomes and found dexmedetomidine to be non-inferior to fentanyl for perioperative analgesia during craniotomies (chapter 6).

In our systematic review and meta-analysis of trials comparing intraoperative opioids with non-opioids for craniotomies (chapter 7), we found that both analgesia techniques were similar with regards to postoperative pain parameters.

Non-opioid intraoperative analgesia however was found to be superior to opioid analgesia for pain outcomes and adverse effects in patients undergoing spine surgeries based on the available evidence in our systematic review (chapter 8).

Considering the ability of newer continuous monitors to detect intraoperative nociception/pain, it is prudent to include them in routine clinical practice. The high incidence of postoperative pain despite using opioids during surgery and recent evidence on the effectiveness of non-opioid analgesia necessitates the implementation of multi-modal analgesia techniques for postoperative pain management in neurosurgical patients. Large well-conducted RCTs are needed to confirm the benefits of non-opioid analgesia over opioids as shown in smaller clinical trials.