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Postoperative Analgesia after Cardiac Surgery: Is there a Safe Alternative to Opioids?

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Cardiac surgery performed with median sternotomy is an important source of postoperative pain in both intensive care and surgery ward. After cardiac surgery, 30 to 75% of the patients report moderate to severe acute pain.[1] The most intense pain localization during the first days is the sternotomy site. The most intense pain is that induced by the movements or "dynamic pain," especially those of coughing and deep breathing, and those made to turn in or get out of bed.[2]

Postoperative pain causes a complex response, characterized by significant endocrine and metabolic changes that may contribute to complications, such as myocardial ischemia, arrhythmia, hyper-coagulation, pulmonary complications, delirium, or surgical wound infection.[2]

Treatment of pain after cardiac surgery is a challenge for the clinician,[3] especially when patients are elderly and have multiple comorbidities.[4]

Opioids are the main agents used to treat acute pain after major surgery, including cardiac surgery. However, the efficacy of analgesia provided by opioids may be tempered by their adverse effects, which may prevent rapid postoperative recovery. In addition to usual side effects, such as postoperative nausea and vomiting (PONV), sedation, confusion, transit delay, urinary retention and pruritus,[5] opioids may impair immunity,[6] may cause hyperalgesia[7] and other less known side effects, such as serotonin syndrome, adrenal insufficiency and decreased circulating levels of sex hormones. All of these adverse effects of opioids are associated with a significant impact on the costs of hospital treatment.[8]

The concept of multimodal analgesia introduced more than twenty years ago by H. Kehlet consists of combining different pharmacological agents and techniques that produce analgesic effects at different stages of the nociceptive pathways. The goal is the improvement of analgesia and the reduction of opioid-related adverse effects. To treat pain after cardiac surgery, paracetamol is not very effective,[9] ketamine has psychodysleptic effects, gabapentinoides have a modest effect, and dexmedetomidine has an important sedative effect remains and is expensive.[3]

Two particularly interesting analgesic techniques after cardiac surgery are locoregional analgesic techniques and the use of nonsteroidal anti-inflammatory drugs (NSAIDs) because of effective analgesia on dynamic pain. The local anesthetics, in addition to their direct nociception blocking effect through blocking of sodium channels, have other so-called "alternative" effects, such as anti-inflammatory, antioxidant, anti- hyperalgesic, and neuroprotective properties.[10]

Epidural analgesia is known to be effective but difficult to practice in a large number of patients after cardiac surgery because of risk of peri-medullary hematoma and other technical problems of insertion and dysfunction.[11] This explains why only 7% of anesthesiologists practice this type of analgesia after cardiac surgery.[12]

The use of bilateral sternal (BLS) perfusion of local anesthetics with multi-hole catheters is an excellent analgesic alternative after cardiac surgery.[13] Continuous BLS anesthetic perfusion decreases mobilization (dynamic) pain by 41%, decreases pain at rest and morphine consumption (about 40%). It allows earlier recovery, earlier food and oral treatment intake, earlier mobilization and greater patient satisfaction.[14]

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The BLS perfusion decreases postoperative complications like postoperative delirium, respiratory infections and postoperative nausea and vomiting.[15] An economic analysis demonstrated that BLS perfusion has a major economic benefit. A 90-fold return on investment was calculated. The use of such perfusion after cardiac surgery involving sternotomy could have substantial economic benefits for healthcare facilities.[16]

The NSAIDs are also a good analgesic alternative after cardiac surgery.[17] They modulate pain pathways through several mechanisms. They reduce inflammatory hyperalgesia and allodynia by reducing prostaglandin synthesis; they can decrease the recruitment of leucocytes, and consequently, their inflammatory mediators; finally, they cross the blood-brain barrier to prevent the production of medullary neuromodulators.[18] The NSAIDs decrease dynamic and the pain at rest, PONV and sedation, and opioid consumption.[19]

The safety of using NSAIDs to treat postoperative pain after cardiac surgery because of adverse effects is still a point of debate in the literature. Adverse effects of NSAIDs seem directly related to duration and exposure dose and should, therefore, be used at the lowest effective dose for the shortest possible time.[20] However, are the NSAIDs really deleterious if they are used postoperatively in cardiac surgery with a low dose for 48 hours period? The gastric side effects related to NSAIDs are rare before five days, and renal toxicity is related to the patient's hemodynamic volume status. The NSAIDs did not increase the risk of renal impairment if they were prescribed in optimized doses, in the immediate postoperative period, in a normovolemic patient and in patients with low risk of renal dysfunction.[21]

The combination of BLS perfusion of local anesthetics, paracetamol and NSAIDs after cardiac surgery after sternotomy provides very satisfactory analgesia and allows a very significant decrease or even lack in opioid requirements. If a locoregional analgesic technique with local anesthetic could not be used, then, the combination paracetamol, NSAIDs and continuous intravenous lidocaine[22] remains a good solution.

Peer-review

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Conflict of Interest

None declared.

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