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Can Peripheral Nerve Blocks Improve Patients' Outcomes in Adults With Hip Fracture?

A Cochrane Review Summary With Commentary on Implications for Practice in Rehabilitation

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The aim of this commentary is to discuss from a rehabilitation perspective the published Cochrane Review "Peripheral nerve blocks for hip fractures in adults" by Guay and Kopps[1] (https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD001159.pub3/full), under the direct supervision of Cochrane Review Group. This Cochrane Corner is produced in agreement with the *American Journal of PM&R* by Cochrane Rehabilitation.

BACKGROUND

Hip fractures (HFs) are associated with functional decline, worsened quality of life, and high mortality rates; their incidence increases exponentially with age, and their worldwide annual incidence is expected to reach 4.5 million by 2050 (National Hip Fracture database 2019, http://www.nhfd.co.uk), with increasing direct and indirect costs. Severe pain is a clinical feature of HF that associates with worse clinical and functional outcomes, such as delayed mobilization, longer hospital stay, worse quality of life, and higher delirium rates; the onset of delirium after HF is also independently associated with dementia, institutionalization, and mortality.[2] Although there is consistent evidence that effective analgesia reduces delirium in HFs, pain in elderly HF patients is still undertreated. Indeed, HFs often select frail elderly patients who are more likely to have impaired abilities to communicate pain and are more vulnerable to drug-related adverse events. Actually, in second line to paracetamol, opioids are consistently recommended for HF preoperative and postoperative pain control, but elderly frail patients are at higher risk of opioid accumulation, and this, in turn, may lead to respiratory depression, hypoxia, pulmonary infections, increasing risk of brain damage, and death.[3] Opioids have been also associated with delirium, as well as undertreated pain, thus balancing opioids' administration in this population is often a complex clinical challenge.

In search of better options to provide both safe and effective analgesia to HF patients, increasing attention has then focused on regional anesthesia and analgesia, either as an alternative or an adjunct to systemic analgesia. Regional blockade refers to injection of local anesthetic around neural structures, to temporarily interrupt nociceptive transmission to the brain; in peripheral nerve blocks (PNBs) the local anesthetic is applied around the nerves. Peripheral nerve blocks are used both as a replacement for general anesthesia during surgery and as adjunctive treatment for perioperative pain, and they may be delivered either as a single-injection or as a prolonged infusion though a catheter. Peripheral nerve blocks provide site-specific and rapid analgesia and may reduce the need of systemic antalgic therapy: a 2017 Cochrane review, updating previous works on the effects of PNBs in adults with HF, reported high-quality evidence of PNBs to reduce pain on movement within 30 mins of injection; moderate-quality evidence of reduced risk for chest infections, decreased time to first mobilization, and cost reduction of the analgesic regimen for single-injection blocks was also reported, whereas insufficient information was found for acute confusional state, myocardial ischemia, and death within 6 mos from HFs.[4] The International Societies Guidelines have been recently published, recommending the use of PNBs in treating HF patients' pain, but this practice is still not as widespread than recommended. For all these reasons, an update of the former Cochrane review was deemed necessary.

Any intervention reducing pain, delirium, and other clinical complications after HF is highly relevant to short- and long-term HF rehabilitation outcomes. Indeed, despite progress in surgery, clinical care, and rehabilitation pathways, HF is still a catastrophic event, burdened with a high risk of mortality and residual disability: approximately one third of HF patients are institutionalized, and approximately half of them experience a permanent postfracture disability, whereas most report a worsened quality of life.[5] Clinical complexity and chronic and acute cognitive impairment predict rehabilitation failure, thus identifying care pathways that reduce clinical complications and improve mobility of HP fracture patients, while containing direct and indirect HF costs, is of vital importance to potentially improve rehabilitation processes and outcomes.[6]

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PERIPHERAL NERVE BLOCKS FOR HIP FRACTURES IN ADULTS

What Is the Aim of This Cochrane Review?

The aim of this Cochrane review was to update previous reviews comparing PNBs used as preoperative analgesia, as postoperative analgesia, or as an adjunct to general anesthesia versus no nerve block or sham block for adults with HF.

What Was Studied in the Cochrane Review?

The population addressed in this review included was adults (age >16) and older adults. The interventions studied were PNBs, used as preoperative analgesia, as postoperative analgesia, or as a supplement to general anesthesia. The intervention was compared with no nerve block or sham block. The outcomes studied were pain on movement at 30 mins after block placement; the occurrence 0–30 days of acute confusional state, myocardial infarction, and chest infection; and death within 6 mos from HF, time to first mobilization, and costs of an analgesic regimen for single-injection blocks.

Search Methodology and Up-To-Dateness of the Cochrane Review?

The review authors searched for studies that had been published up to November 2019 in the Cochrane Central Register of Controlled Trials (CENTRAL, 2019, Issue 11), the Cochrane Library, MEDLINE (Ovid SP, 1966 to November 2019), Embase (Ovid SP, 1974 to November 2019), and the Cumulative Index to Nursing and Allied Health Literature (EBSCO, 1982 to November 2019). They also searched trial registers and reference lists of relevant articles. Only randomized controlled trials comparing use of PNBs with no nerve block (or sham block) for persons 16 yrs and older with HF were included. The certainty of evidence was rated using the Grading of Recommendations, Assessment, Development and Evaluations approach.

What Are the Main Results of the Cochrane Review?

The authors included 49 studies (3061 participants: 1553 randomized to PNBs and 1508 to no nerve block [or sham block] vs. 31 trials and 1760 participants of the former 2017 review). Participants' age ranged from 59 to 89 yrs; most trials excluded patients with dementia.

The review reports high-certainty evidence that PNBs reduced:

- Pain on movement within 30 mins of block placement, by 2.5 points on a 0- to 10-pain scale on average, with an effect size that was proportionate to the concentration of local anesthetic
- The risk of acute confusional state (1 person less over 12 treated for HF will become confused with PNBs)

Moderate-certainty evidence was found for PNBs to reduce:

- Chest infection (1 person less over 7 treated for HF will develop chest infection with PNBs)
- Time to first mobilization (by 10 hours on average)

Because of few studies and reduced number of participants, only low-certainty evidence was found as to PNBs reducing:

- The risk of myocardial infarction
- Mortality within 6 mos
- The cost of analgesic regimen for single-injection block (only one trial, small reduction for single-injection block)

How Did the Authors Conclude?

The authors concluded PNBs reduce pain on movement within 30 mins after block placement and risk of acute confusional state and probably also reduce the risk of chest infection and time to first mobilization. There may be a small reduction in the cost of analgesic drugs for single-injection PNBs.

As the numbers of participants were insufficient, only low-quality evidence suggested a PNBs' associated reduction of myocardial infarction and mortality. The authors also state that their review confirms other finding of low risks of permanent injury associated with PNBs, although randomized controlled trials are not the most appropriate study design to the purpose of investigating this issue. In their opinion, although high-quality nonrandomized studies are recommended to further clarify the relationship of PNBs with myocardial infarction and death in this population, "it is unclear whether any further randomized controlled trials should be registered, given the benefits found."

What Are the Implications of the Cochrane Evidence for Practice in Rehabilitation?

Rehabilitation is crucial for the functional recovery of elderly patients with HF, and the key contribution of clinical complexity and care processes to the final functional outcome has been acknowledged: comorbidity, particularly pain and acute/chronic cognitive impairment, is consistently associated with worse rehabilitation outcomes; severe pain carries higher risks of clinical complications, including delirium. Both pain and delirium may also delay mobilization and impair communication, reducing HF patients' participation to their rehabilitation process.[5,6] Thus, any effort to improve HF operative and perioperative pain control may achieve better short as well and long-term functional outcomes, while mitigating HF-related deterioration of quality of life.

This review states that there is now consistent high-quality evidence that PNBs, used preoperatively, postoperatively, and in adjunct to systemic analgesia for adults with HP, may not only reduce pain associated with HF 30 mins after block placing, but also, probably by better pain control, PNBs reduce the risk of the occurrence of acute confusional state within 30 days from HF, while probably reducing also time to first mobilization, risk of chest infection within 30 days from HF, and cost of antalgic treatment for single-shot block.

Actually, the authors come to the statement that in view of existing evidence for the benefits of PNBs, they no longer considerate appropriate to propose placebo or sham intervention instead of PNBs, when this procedure is indicated, accepted by the patient and available, and are thus reluctant to encourage any further randomized controlled trial on this specific topic. On the other hand, they support further research by

good-quality nonrandomized studies to further investigate the effects of PNBs on myocardial infarction and mortality.

In the face of this mounting evidence, the recent official recommendation by the National and International Societies of Anesthetists and Orthopedic Surgeons is further supported, but their translation into clinical practice has still no easy way. Clinical decision needs to be judged on a case-by-case basis, but, overall, the risk of permanent injury associated with PNBs, especially if performed with ultrasound guidance, seems to be low. Thus, the reasons for this delay are probably more related to organizational problems, such as the availability of trained staff and equipment, including regional blockade kits, in the emergency department, and also to cultural/behavioral barriers to provide a systematic and reliable pain assessment, especially in elderly patients with cognitive and/or communication impairment, and to shift from the common practice of exclusive reliance on parenteral and oral opioids to treat acute pain in the elderly patients. Targeted education and training programs, as well as definition of integrated care pathways for treating pain in elderly HF patients, are needed to effectively translate evidence-based recommendations into the integration of PNBs into routine multimodal acute pain management protocols for HFs.[7]

Although this change will progressively take place, PNBs widespread use in HF patients promises to deeply affect rehabilitation processes and outcomes: improved perioperative and operative pain control, while probably reducing systemic analgesia, the occurrence of delirium, and probably chest infection within 30 days from HF, in the time frame when intensive postacute rehabilitation generally achieves most of its goals, whereas the likely reduction of time to first mobilization may accelerate the rehabilitation process. All these benefits of PNBs can improve HF patients' participation in rehabilitation and increase their probability of reaching higher function and quality of life in a shorter time and at lower costs.

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