CRITICALLY APPRAISED TOPICS

Do femoral nerve blocks improve acute pain control in adults with isolated hip fractures?

Articles chosen

1. Fletcher AK, Rigby AS, Heyes FL. Three-in-one femoral nerve block as analgesia for fractured neck of femur in the emergency department: a randomized, controlled trial. Ann Emerg Med 2003;41(2):227-33.
2. Haddad FS, Williams RL. Femoral nerve block in extracapsular femoral neck fractures. J Bone Joint Surg Br 1995;77(6):922-3.

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Clinical bottom line

Femoral nerve blocks provide faster pain relief than systemic analgesia and decrease opiate requirements. This technique can be performed by physicians in the emergency department (ED).

Literature search

Using MEDLINE (1966 to Apr. 11, 2004), Search ("nerve block" [MeSH] AND "hip fractures" [MeSH]) AND (clinical [title/abstract] AND trial [title/abstract]) OR clinical trials [MeSH terms] OR clinical trial [publication type] OR random* [title/abstract] OR random allocation [MeSH terms] OR therapeutic use [MeSH subheading]).

Limits: All adult: 19+ years, human
Yield: 27 results

Studies that used other types of nerve blocks such as subcostal, lateral cutaneous and psoas blocks were excluded. A 2004 Cochrane Review update,[1] "Nerve blocks (subcostal, lateral cutaneous, femoral, triple, psoas) for hip fractures," was excluded for this reason as well, although the references were examined for relevant articles. Studies that described the use of nerve blocks in the operative and postoperative settings were excluded for probable lack of generalizability to the emergency setting.

The evidence

Design

Prospective, randomized controlled trials each conducted in a single UK hospital ED.

Fletcher and colleagues recruited consecutive patients over a 6-month period. Patients were randomized using a random number generator, concealing allocation using a sealed opaque envelope. Patients were not blinded as to their treatment. Admitting staff surgeons, nurses and the data abstractor were blinded to treatment allocation.

Haddad and Williams recruited 50 consecutive patients who presented to the ED with extracapsular femoral fractures and used sealed envelopes to conceal the random allocation to treatment. The randomization method was not specified, nor was envelope opacity. Patients were not blinded as to treatment allocation. The authors did not specify whether the assessing clinician was blinded, although admitting surgeons and nursing staff were not aware of patient treatment in the ED.

Population

Fifty adult patients with femoral neck fractures (Article 1; Fletcher and colleagues) and 50 adult patients with extracapsular femoral fractures (Article 2; Haddad and Williams). Fractures were confirmed radiographically. Patients with dementia or confusion were excluded from the study analysis. The Fletcher group also excluded patients with a bleeding diathesis, patients on anticoagulants, those with local or systemic infection and those with hypersensitivity to local anesthetics.

Intervention

Fletcher and colleagues randomized patients to either 3-in-

1 femoral nerve block with bupivacaine plus intravenous (IV) morphine or IV morphine alone. All ED physicians were trained in the technique and administration of the femoral nerve block. Haddad and Williams randomized patients to femoral nerve block plus systemic analgesia or systemic analgesia alone. All femoral nerve blocks were administered by the first author (F.S.H.). Systemic analgesia was available on an "as needed" basis and included oral Co-dydramol (acetaminophen and codeine), intramuscular Voltarol (diclofenac) and intramuscular Pethidine (meperidine). These studies used different techniques to administer the nerve blocks and different systemic analgesics, otherwise the studies treated their groups similarly.

Outcomes measured

The Fletcher and colleagues study used a 4-point numeric rating scale on arrival and at 1, 4, 8, 12, 16 and 24 h after randomization. The Haddad and Williams study used a 0-to-10 visual analog scale (VAS) to measure pain pre-block, and at 15 min, 2 h and 8 h after the block. Both studies reported analgesia requirements, procedural complications, postoperative complications and mortality.

Results

Fletcher and colleagues accounted for all patients recruited into the study, analyzing the groups in an intention-to-treat fashion. Patients in both groups were similar with respect to age, sex, type of fracture, mean time to surgery and mean pain score on arrival. Twenty-four patients were randomized to the control group, and 26 were randomized to the nerve-block group. The nerve-block group achieved their lowest pain score faster (2.88 h v. 5.81 h in the control group). The mean difference is –2.93 h, 95% confidence interval (CI) –5.48 to –0.38 h. The nerve-block group required less IV morphine per hour than the control group (mean 0.49 mg/h v. 1.17 mg/h). The mean difference was –0.68 mg/h, 95% CI –1.23 to –0.12 mg/h. There were no adverse events related to the nerve block. At 6 months, 3 patients in each group had died, and there were 2 respiratory infections in the nerve-block group and 4 in the control group.

Haddad and Williams did not account for all randomized patients and did not perform an intention-to-treat analysis. The only patient characteristics reported were gender and pre-block pain score, and they were similar. Twenty-five patients were randomized to each group. All but 1 nerve block was considered to have worked. The femoral nerve block provided effective early analgesia (pain score at 15 min, 4.8 v. 6.4 in control group, $p < 0.05$; pain score at 2 h, 3.7 v. 5.9 in control group, $p < 0.01$). The femoral nerve block group required significantly less intramuscular opiate analgesia ($p < 0.05$). One patient in the treatment group died, and 4 patients in the control group died, although the authors fail to report the duration of follow-up. There were significantly fewer early respiratory infections in the femoral nerve block group ($p < 0.05$).

The number needed to treat cannot be calculated from the data provided in these articles.

Comments

A variety of nerve blocks have been shown to reduce the need for postoperative systemic analgesia in hip fractures. The 3-in-1 nerve block described in Fletcher and colleagues' study is a technique whereby local anesthetic tracks along the femoral sheath to anesthetize not only the femoral nerve but also the obturator, lateral femoral cutaneous nerve of the thigh and the lower cords of the lumbar plexus. The block was inserted 1 cm lateral to the femoral pulse, using the presence of paresthesias to confirm location. The injection was inserted in a cranial direction with the application of pressure immediately distal to the injection site to prevent distal tracking. Although ultrasound guidance has been suggested by some to improve the success rate of this block, all members of this ED successfully applied the technique after a 30-minute training session using a mannequin, followed by witnessed patient injections. Haddad and Williams' results are less generalizable because Haddad performed all blocks himself.

The minimum clinically important difference in a 10-cm VAS is 9–13 mm.[2–4] This was achieved in Haddad and Williams' nerve-block group at 15 min and 2 h. Although the Fletcher group reported mean pain scores in the pre-block groups, they did not provide data on post-block pain scores. Time to maximal pain relief in both nerve-block groups was greater than 2 h and longer in the control groups, suggesting that neither group had adequate parenteral analgesia. Additionally, given the expected onset of analgesia with an effective nerve block, incomplete pain relief may reflect inappropriate use of the technique (e.g., in intracapsular fractures), incomplete nerve block due to poor technique, or partial pain mediation by other nerves. Because of the latter concern, some experts recommend other nerve blocks (i.e., subcostal, lateral femoral cutaneous, femoral and psoas) to reduce hip fracture pain.[4]

Because the patients in these studies were not blinded (it was felt that a placebo injection would be ethically unacceptable), the placebo effect cannot be quantified. Additionally, in the absence of blinding, patients could have revealed their allocation group to their assessors, further biasing the results.

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No patient in either study suffered adverse consequences as a result of the nerve block, although the nerve block for 1 patient was unsuccessful. Reported complications include intravascular injection of anesthetic, infection, masking of compartment syndrome, nerve damage and prolonged motor blockade.

Although evidence for the use of femoral nerve blocks in the ED is limited, these studies support the hypothesis that use of the femoral nerve block provides better early analgesia in adult patients with hip fractures. More aggressive systemic analgesia may be able to achieve the same end-point with the inherent risks carried by increased opiate use such as respiratory depression. Both studies cite a reduced need for systemic analgesia in femoral nerve block. However, it is not known whether this end-point alone is clinically significant in terms of patient outcomes.

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Key words: hip fracture; analgesia

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