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Role of postoperative continuous subfascial bupivacaine infusion after posterior cervical laminectomy: Randomized control study

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Abstract *Introduction:* One of the major drawbacks of posterior cervical decompression and rigid internal fixation is the severe postoperative neck pain created by extensive soft tissue and muscular dissection. The usual management of acute postsurgical pain consists of systemic opioids or non-steroidal anti-inflammatory drugs. Another satisfying method of postoperative pain relief is continuous local infusion of analgesic agents in posterior subfascial paravertebral space on both sides of the wound using epidural catheters.

Methods: Sixty patients scheduled for cervical laminectomy with fixation surgery via the posterior midline approach with postoperative epidural catheters placed subfascially on both sides of the wound. They were randomly divided into two groups, bupivacaine group with local infiltration of 0.5% bupivacaine at the rate 2 ml/h, and control group with saline infusion at a rate 2 ml/h. The patient controlled analgesia device (PCA) was given to all patients and set to deliver IV morphine in 1 mg boluses with a lock out at 10 min and a 4 h maximum 10 mg.

Results: The visual analog score was statistically significant lower in bupivacaine group compared to control group during the first 60 h postoperatively. While in 66 and 72 h postoperatively there was no statistical significant difference was observed between the two groups. The total doses of morphine delivered by PCA in the three postoperative days were statistically significantly higher

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in control group than bupivacaine group. The incidence of side effects related to narcotics was higher in control than bupivacaine group.

Conclusion: Bilateral subfascial continuous 0.5% bupivacaine infiltration through an ordinary epidural catheter at the rate 2 ml/h for three successive postoperative days is associated with better pain control, reduced narcotics, early ambulation and no serious side effects in the postoperative period in patients undergoing posterior cervical fixation.

1. Introduction

Decompression and rigid internal fixation of the cervical spine is a well-accepted treatment for patients with spastic intractable symptoms related to degenerative disc disease [1]. It allows early patient mobilization with reduced need for external immobilization [2]. However, one of the major drawbacks of posterior cervical instrumentation is the severe neck pain created by extensive soft tissue and muscular dissection which is necessary to expose the appropriate anatomy. Prolonged muscle retraction intra-operatively leads to tissue ischemia and muscle denervation and lead to high incidence of new axial neck pain, which can be debilitating to the patients [3]. Delayed mobilization contributes to increased risk of medical complications such as pneumonia, deep vein thrombosis, urinary tract infections and psychological distress [4].

Most patients complain of severe pain at rest during the first 12 h after surgery. This pain increases considerably with mobilization because of the reflex spasm of paraspinal muscles that is triggered by the primary wound pain. During the following 48–72 h, postoperative back pain is generally moderate at rest, whereas it remains severe on movement and produces discomfort that can interfere with patient mobilization and, possibly, with discharge time [5].

The usual management of acute postsurgical pain consists of systemic opioids which can be administered parenterally (intramuscularly and intravenously), subcutaneously and epidurally. It can be provided continuously when needed or via patient-controlled analgesia (PCA). The other choice was non-steroidal anti-inflammatory drugs (NSAIDs) which may contribute to cardiovascular toxicity and impaired bone healing. Neither opiates nor NSAIDs are completely effective alone, and they carry a lot of side effects, particularly with prolonged or repeated doses [6].

Epidural analgesia with local anesthetics or opioids is performed routinely after major thoracic, abdominal and orthopedic surgery, and proven to be superior to conventional intravenous analgesia providing the same or better pain control with fewer side effects [7]. Cervical epidural anesthetic is not an easily performed technique, and it is difficult to limit the anesthesia to the brachial dermatomes, thus it can lead to phrenic or intercostals nerve paralysis [8].

Local anesthetic infiltration of the surgical wound is a useful method in the treatment of postoperative pain after various surgical procedures [9–12]. Postoperative bolus injection of local anesthetic into the local environment alleviates pain at its source. However, the duration of therapeutic benefit is limited by the biological half-life of the analgesic agent, with loss of effect once the drug is cleared. Continuous local infusion of analgesic agents for postoperative pain relief has been previously described with significant beneficial results [13,14].

This randomized placebo control double blinded study aims to determine the efficacy and safety of continuous infusion of local anesthetic (bupivacaine 0.5%) through epidural catheter placed subfascially on both sides of the wound after posterior cervical laminectomy and fixation surgery.

2. Patients and methods

After approval of the ethical committee and written consent, 60 patients in Kasr Aini hospital proved to suffer from cervical spinal instability and scheduled for cervical laminectomy with fixation surgery via the posterior midline approach which was performed by the same surgical team. They were randomly divided according to computer randomization list into two groups, 30 patients in each group (control group and bupivacaine group) the patients selected between 20 and 60 years old with American Society of Anesthesiologists (ASA) I & II and Malanpatti 1&2.

The patient's exclusion criteria included (ASA) physical status III and IV, morbid obesity, coagulation disorders and drug abuse.

The patients, surgical team and data collector were blinded to the randomization. The day before surgery, patients were trained to use the 0–10 cm visual analog scale (VAS) on which 0 = "no pain" and 10 = "the worst imaginable pain ". Patients were also instructed how to use patient control analgesia system (PCA).

All patients received midazolam 2–3 mg IV as a premedication 20–30 min before surgery. For stabilization of the neck, all patients wear a neck collar. General anesthesia was induced with fentanyl 2 μg/kg, propofol 1–2 mg/kg and atracurium 0.5 mg/kg for intubation using fibro-optic technique to avoid any movements of the neck and subsequent increments doses of muscle relaxant every 20 min, then maintained with isoflurane 1.5% inspired concentration. Monitors included electrocardiography (ECG), pulse oximetry, non-invasive arterial blood pressure and end tidal CO_2 analyzer. All patients were operated on prone position with 20° head up, the neck in flexed position and the face resting in cotton padded Mayfield (horseshoe) headrest.

After wound closure and insertion of suction drains, all patients remained in the prone position for placement of paravertebral multiport epidural catheters. Under complete aseptic technique, the anesthesiologist inserts a 17 gauge Touhy needle into the paraspinal muscle under the cervico-dorsal fascia parallel to the wound. The bevel of Touhy needle was directed toward the wound; the point of entry was 2 cm inferior and 2 cm lateral to the wound. The needle was inserted 2–4 cm deep from the skin according to subcutaneous fat. The trochar was removed and the 19 gauge catheter (with three lateral holes and closed end) was inserted in place. The same