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Research Article

Ultrasound guided single injection caudal epidural anesthesia of isobaric bupivacaine with/without dexamethasone for geriatric patients undergoing total hip replacement surgery

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KEYWORDS

Caudal anesthesia;
Geriatric;
Dexamethasone;
Isobaric bupivacaine;
Postoperative analgesia

Abstract *Background:* Dexamethasone has anti-inflammatory properties that can affect postoperative analgesia when added to caudal bupivacaine.
Methods: Seventy-two geriatric patients scheduled for elective total hip replacement under ultrasound guided caudal anesthesia were randomized blindly into two groups: Group BD received caudal isobaric bupivacaine 0.25% (20 ml) and dexamethasone 8 mg (2 ml) and Group BS received caudal isobaric bupivacaine 0.25% (20 ml) and normal saline (2 ml). Postoperative analgesia was assessed by recording time to first rescue analgesia and the analgesic doses (paracetamol and meperidine hydrochloride) required during the first 24 h postoperatively as a primary outcome. Secondary outcomes were the time taken to the onset of sensory analgesia at T10, time to the onset of complete motor block, VAS pain score at rest and on movement at 1, 2, 4, 6, 8, 12 and 24 h, and postoperative adverse events.
Results: Group BD had a significantly longer time to first rescue analgesia [402 (63) vs 213 (53)] min and significantly lower doses of paracetamol [3389 (728) vs 2833 (697)] mg meperidine hydrochloride [78 (30) vs 142 (28)] mg than Group BS. VAS scores were significantly lower in Group BD than Group BS both at rest and on movement respectively at 4, 6, 8, 12 and 24 h.
Conclusion: Adding dexamethasone with isobaric bupivacaine caudal anesthesia prolongs the duration of postoperative analgesia and decreased postoperative analgesic requirement in geriatric patients undergoing total hip replacement surgery in comparison isobaric bupivacaine alone.

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1. Introduction

Hip fracture is a common cause of perioperative morbidity and mortality in geriatric age group, 1 in 50 patients more than 60 years old suffered a fracture hip [1]. Perioperative pain management is important in geriatric patients undergoing

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hip surgery due to their decreased tolerance to stress imposed by surgery [2,3] and can be done either by neuroaxial blockade or by intravenous analgesia [4]. Unfortunately, there are little data showing the outcome of caudal analgesia in geriatric patients undergoing hip replacement surgery.

Various adjuvants have been used in combination with local anesthetics to prolong the duration of postoperative analgesia [5–8]. Dexamethasone could be used as an adjuvant to local anesthetics due to its anti-inflammatory and blocking effects of nociceptor C fiber transmission [9,10]. Ultrasound guided caudal epidural blockade might improve success rate in geriatric patients [11]. This randomized, prospective, double blinded study investigated the effect of single bolus administration of dexamethasone (8 mg) in ultrasound guided caudal blockade as an adjuvant to caudal isobaric bupivacaine (20 ml) 0.25% on postoperative analgesia in geriatric patients undergoing total hip replacement surgery.

2. Methods

The protocol was approved by our institutional review board (IRB) and patient gave written informed consent. Seventy-two patients with ASA I or II, >60 years scheduled for total hip replacement surgery in Ain shams university hospitals were included in this randomized parallel prospective double blinded study by using computer generated randomization list and patients were randomized by opening sequentially numbered opaque envelopes immediately prior to entering the operating room into one of the two groups; control group (Group BS) $n = 36$ patients and dexamethasone group (Group BD) $n = 36$ patients. Exclusion criteria included patients with coagulation or hematological disorders, patients with contraindication to regional anesthesia, history of significant coexisting diseases such as ischemic heart disease, uncontrolled hypertension, impaired renal functions, impaired liver functions, rheumatoid arthritis, psychiatric diseases, pre-existing neurological disease, infection at site of injection, patients who had a past history of reaction to study drugs, patients on previous steroid medication or non steroidal anti-inflammatory and patient refusal.

Immediately after admission, patients were instructed to use a 10-point linear Visual analogue scale (VAS) and were asked to record his or her level of perceived pain intensity on the scale from 0 to 10, with the zero representing no pain and the 10 representing the worst pain possible preoperatively. On arrival to the operating room an intravenous access was established using 18 gauge intravenous cannula and patients preloaded with ringer acetate 500 cc intravenous. Patients were monitored using standard monitoring (pulse oximetry, electrocardiogram and noninvasive arterial blood pressure monitoring). Oxygen at 5 L/min was given via a facemask during surgery, and ketamine 0.25 mg/kg and propofol 1 mg/kg were given intravenously 5 min before patient positioning. The high frequency curved ultrasound probe (7–12 MHz) connected to a portable ultrasound unit (Sonoscape) was inserted at first in the transverse plane to detect the sacral cornua (frog sign) and sacral hiatus with the patients in the lateral decubitus position, with the fractured site up then the ultrasound probe was rotated 90° and a 20 gauge spinal needle attached with tubing system to a syringe filled with the local anesthetic solution was inserted in plane in real time visualization of the needle after local skin infiltration with 2 ml lidocaine 2% and passed through the sacrococcygeal ligament (4–6 cm distance) into the sacral canal with the feeling of characteristic click. The needle was advanced only a few millimeters after the penetration of the sacrococcygeal membrane to reduce the risk of dural puncture. After negative aspiration for CSF or blood 3 ml test dose of 1.5% lidocaine HCl was administered at least 5 min prior to local anesthetic required for caudal epidural block which was injected more than 2–3 min and detected by ultrasound turbulence in the sacral canal. Surgery was started 15 min after performing the caudal block with complete motor and sensory block. The bilateral pin prick method was used to detect the sensory level and bromage scale [12] (0 = no motor block, 1 = inability to raise extended leg, 2 = inability to flex knee and 3 = inability to flex ankle and foot) was used to assess caudal blockade at 5, 10, 15 min after caudal epidural administration of drugs.

Hemodynamic parameters were continuously monitored every 5 min till 30 min, every 10 min up to next 30 min and every 15 min thereafter. Hypotension was defined as a decrease in the systolic blood pressure <20% from the baseline treated with 10 mg ephedrine single bolus and bolus administration of 250 ml of lactated Ringer's solution more than 10 min. Ephedrine 10 mg and 250 ml bolus of lactated ringer solution were repeated if the blood pressure remained low. Bradycardia was defined as heart rate <50 beat per minute treated with 0.3 mg atropine. Patients were randomly included into two groups: Group BD included patients who were given caudal bupivacaine 0.25% (20 ml) and dexamethasone 8 mg (2 ml) and Group BS who were given caudal bupivacaine 0.25% (20 ml) and normal saline (2 ml). All patients in this study were anesthetized by the same team of anesthesiologist and surgeons who were unaware of the study medications.

Both groups were compared as regards patients' characteristics, hemodynamics, time required to achieve T10 sensory level, onset of complete motor block and use of atropine and ephedrine. Intraoperative complications such as bradycardia, hypotension, nausea, vomiting and shivering were recorded and 4 mg ondansetron was given for patients complaining from nausea or vomiting, whereas 25 mg meperidine hydrochloride was given for attack of shivering. Patients with failed caudal block were excluded from the study and received general anesthesia.

Postoperative analgesia was assessed by a blinded observer using VAS [13]. VAS was recorded after surgery at 1, 2, 4, 6, 8, 12, and 24 h. Patients were evaluated at rest and with passive movement of the operated leg. Postoperatively intravenous paracetamol (1 gm) was administrated every 6 h during the 24 h after surgery (when the VAS score was 4 or more), maximum daily dose: 4 g/day. If VAS >4 persisted for 20 min after paracetamol infusion, meperidine hydrochloride (50 mg) rescue analgesic was given intravenous infusion more than one hour. The duration of effective analgesia was recorded as the time from completion of surgery until the first analgesic dose was required. The analgesic doses (paracetamol and meperidine hydrochloride) required during the first 24 h postoperatively were recorded .Postoperative adverse events as nausea and vomiting, shivering, hyperglycemic episodes (defined as increase in the random blood glucose level >200 mg/dl), or uncontrolled hypertension (defined as increase in the systolic blood pressure >20% from the baseline) were also recorded.

Primary outcome of the study was time to first rescue analgesia and the analgesic doses (paracetamol and meperidine hydrochloride) required during the first 24 h postoperatively,