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Research Article

Comparison between caudal levobupivacaine versus levobupivacaine–nalbuphine for postoperative analgesia in children undergoing hernia repair: A randomized controlled double blind study

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KEYWORDS

Caudal anesthesia;
Children;
Levobupivacaine;
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Abstract *Objectives:* Caudal analgesia is widely used in children; the aim of this trial was to evaluate the efficacy of adding nalbuphine to local anesthetic in pediatric patients undergoing hernia repair.

Patients and methods: This randomized double-blind controlled trial was done in department of anesthesia, Cairo University hospitals, and 40 patients with ASA physical status classification I–II, aged 2–7 years were enrolled in this study and randomly assigned into 2 groups; group L received caudal levobupivacaine 1 ml/kg with concentration of 0.25% and group LN received caudal 0.125% levobupivacaine with volume of 1 ml/kg plus 0.2 mg/kg nalbuphine. Pain was evaluated immediately after emergence (FLACC 0 h), after 1 h in the PACU, after 2, 3, 4, 5, 6 and 12 h by the FLACC pain score (Face, Leg, Activity, Crying, Consolability). First time of rescue analgesic, total dose of rescue analgesic and side effects were observed for 12 h.

Results: FLACC pain scores were much less in LN group compared to L group (p value < 0.001) after the second hour. The first time for postoperative analgesic requirement was significantly longer in LN group (384 ± 23.1 min) compared to L group (202.20 ± 23.42 min) (p value > 0.001). The total dose of postoperative supplementary analgesia (intravenous paracetamol infusion) in the first 12 h was significantly lower in LN group (200.5 ± 65.5 mg) in comparison with L group (355.25 ± 69.9 mg) ($P < 0.05$).

Conclusions: Combining caudal anesthesia using levobupivacaine and nalbuphine provided prolonged time of analgesia with no reported side effects.

1. Introduction

It has been demonstrated that caudal analgesia is the most common regional anesthetic block practiced in children [1].

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It is proved to be effective, reliable and safe; it can be used as adjunct to general anesthesia to provide perioperative analgesia in procedures below the umbilicus as herniotomy and penile surgeries [2]. Application of single local anesthetic drug for caudal analgesia requires high dose but this may provoke side effects such as respiratory depression, hypotension and local anesthetic toxicity [3]. So more than one agent may be used to solve this problem and help using low doses of local anesthetic. Various drugs have been used with levobupivacaine to prolong its duration of action and to decrease the side effects. Levobupivacaine, a new long-acting amide local anesthetic, is the S (−)-isomer of the racemic bupivacaine. Unlike bupivacaine, it is less toxic to the central nervous system and less likely to cause myocardial depression and fatal arrhythmias [4].

Nalbuphine is a mixed κ-agonist and μ-antagonist opioid of the phenanthrene group; it is related chemically to naloxone and oxymorphone. Nalbuphine leads to activation of spinal and supraspinal opioid receptors which leads to good analgesia with minimal sedation, minimal nausea and vomiting, less respiratory depression and stable cardiovascular functions [5]. Safety and efficacy of nalbuphine have been established in the clinical field [6] and its safety and efficacy also established via the epidural route [7].

Nalbuphine being an agonist antagonist is less likely to cause side effects such as pruritus, respiratory depression, urinary retention, excessive sedation, because of its action at kappa receptors.

The aim of this study was to compare the combination of 0.125% (1 ml/kg) levobupivacaine and nalbuphine (0.2 mg/kg) with levobupivacaine 0.25% (1 ml/kg) administered caudally in young children with hernia repair surgeries for reduction in dose of both agents and prolongation of the duration of analgesia.

It was hypothesized that the addition of nalbuphine to levobupivacaine for caudal analgesia could hasten the onset of action and could prolong the duration of analgesia.

2. Patients and methods

This is a prospective randomized parallel-group controlled study with allocation ratio (1:1) conducted after obtaining written informed consent from the patients' guardians and obtaining approval from the ethical committee. A total of 40 patients aged 2–7 years, ASA physical status classification I–II undergoing elective hernia repair surgeries were enrolled. Exclusion criteria included cardiac, asthmatic patients, procedures lasting more than 90 min and allergy to any of study drugs, and Fig. 1 shows flowchart of the participants in the study. General preoperative fasting guidelines were used. The patients were randomly assigned two groups: L and LN groups. Randomization was done using computer generated random numbers inserted into opaque concealed envelopes; inside these envelopes was a number, which indicates the group to which the patient was assigned. Anesthesia was conducted using Datex-Ohmeda anesthesia workstation (Datex-Ohmeda Aspire 7100), (GE healthcare, Little Chalfont, UK). Standard monitoring including electrocardiogram (ECG), non-invasive blood pressure (NIBP), heart rate (HR) and oxygen saturation was started preoperatively. Anesthesia was induced either with intravenous propofol 1–2 mg/kg or by inhalation of

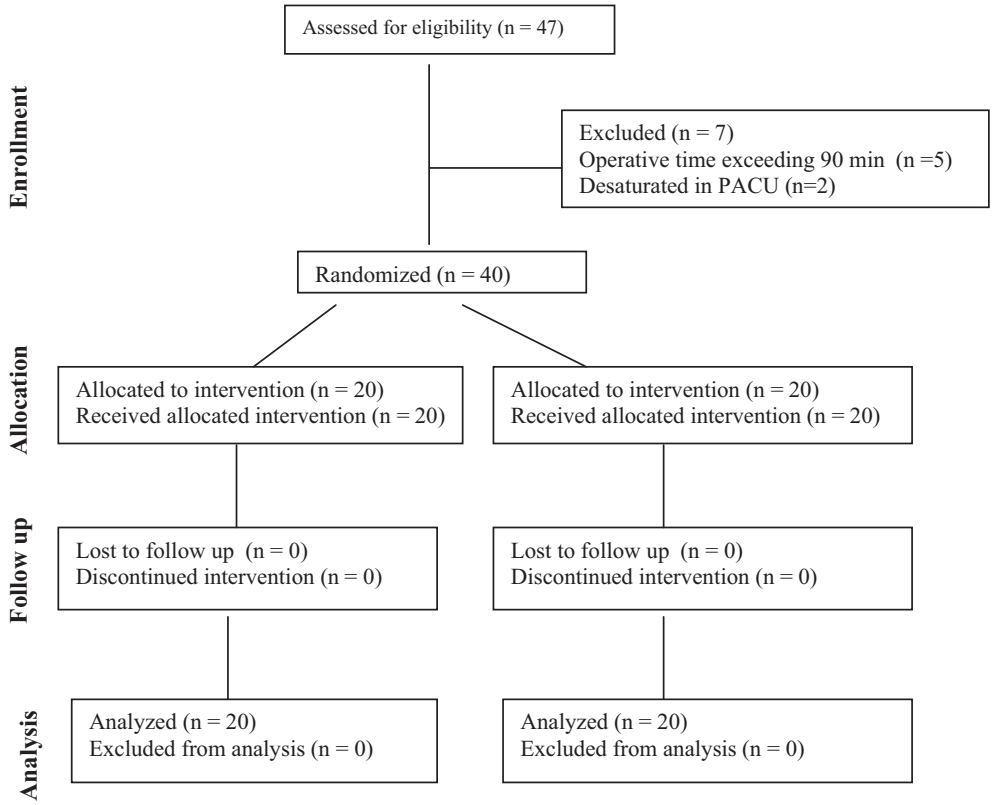

Figure 1 CONSORT flow participant diagram.