Egyptian Journal of Anaesthesia xxx (xxxx) xxx–xxx

HOSTED BY

ELSEVIER

Contents lists available at ScienceDirect

Egyptian Journal of Anaesthesia

journal homepage: www.elsevier.com/locate/egja

Research article

Bilateral suprazygomatic maxillary nerve block versus palatal block for cleft palate repair in children: A randomized controlled trial

Mohamed M. Abu Elyazed, Shaimaa F. Mostafa*

Department of Anesthesia and Surgical ICU, Faculty of Medicine, Tanta University, Egypt

ARTICLE INFO

Keywords:
Cleft palate
Maxillary
Postoperative pain

ABSTRACT

Background and objectives: Airway obstruction and respiratory compromise are frequently encountered complications of cleft palate (CP) repair. We compared the analgesic efficacy of bilateral suprazygomatic maxillary nerve block (SMB) versus palatal block (PB) in pediatric patients undergoing CP repair.

Methods: 90 patients aged 3–24 months were allocated into three groups: **Control group (C):** patients received general anesthesia only. **Maxillary block group (M):** patients received ultrasound-guided bilateral SMB using 0.15 ml/kg bupivacaine 0.25%. **Palatal block group (P):** 0.5 ml bupivacaine 0.25% was injected bilaterally at greater, lesser and nasopalatine foraminae. CHIPPS score, rescue analgesic consumption and time till tolerance of oral feed were assessed.

Results: On admission to PACU till 8 h postoperative, CHIPPS score was lower in M and P groups compared to C group. At 6 h and 8 h, CHIPPS score was lower in M group compared to P group. Postoperative rescue analgesic consumption was decreased in M and P groups (0.72 ± 2.22 mg) and (3.73 ± 5.92 mg) compared to C group (8.07 ± 5.47 mg) with significantly lower values in M group compared to P group. Time to first request of rescue analgesia was significantly prolonged in M and P groups (482.50 ± 38.62 min) and (260.00 ± 31.62 min) compared to C group (79.71 ± 30.34 min). Time to feed was lower in M and P groups compared to C group.

Conclusion: Ultrasound-guided bilateral SMB provided better postoperative analgesia and decreased rescue analgesic consumption and time to tolerate oral feeding compared to PB without increased side effects.

1. Introduction

Cleft lip and/or palate are considered to be the most frequently encountered craniofacial malformation [1,2]. Early surgical intervention for cleft palate (CP) repair is essential for proper feeding and phonation as well as reduction of complications such as frequent sinusitis and other respiratory tract infections [3,4].

The surgical procedure can be complicated by airway obstruction and respiratory complications [2,5]. Systemic analgesia using opioids has been associated with increased risk of airway obstruction and respiratory dysfunction [2,6].

Postoperative analgesia can be successfully achieved in infants and neonates using regional anesthesia without additional risk of respiratory depression [7].

When performed within the pterygopalatine fossa, maxillary nerve block can provide intra-operative and postoperative analgesia of both hard and soft palate [8].

Greater palatine (GP) nerve innervates the posterior part of the hard palate, lesser palatine (LP) nerve supplies the soft palate and nasopalatine (NP) nerve supplies the soft and hard tissues of the palate from canine to canine. Post palatoplasty analgesia can be successfully achieved by blocking these nerves [9].

The aim of this study was to compare the effects of ultrasound-guided bilateral suprazygomatic maxillary nerve block (SMB) versus palatal block (PB) on the perioperative systemic analgesic consumption as well as the duration of analgesia in pediatric patients undergoing CP repair.

2. Materials and methods

The study was approved by the Hospital Ethics Committee in Faculty of Medicine, Tanta University, Egypt (protocol number 31586/06/17 on 01/06/2017) and registered in the Pan African Clinical Trial Registry (PACTR201710002695410). After informed written parental consent, 90 pediatric patients aged 3 months to 2 years, of either gender, ASA I-II, scheduled for surgical CP repair in the department of

Peer review under responsibility of Egyptian Society of Anesthesiologists.

* Corresponding author at Moheb Street, Almahalla Alkobra, Egypt.
E-mail address: shaimaafarouk7777@yahoo.com (S.F. Mostafa).

https://doi.org/10.1016/j.egja.2018.05.003
Received 5 February 2018; Received in revised form 18 May 2018; Accepted 25 May 2018

pediatric surgery, Tanta University Hospital were enrolled in the study. The study was carried out between June and November 2017.

Exclusion criteria: Lack of parental consent, patients with a history of allergy to local anesthetic (LA) or cutaneous infection around the sites of the blocks were excluded from the study.

Any unexpected complication encountered during the course of the research were disclosed to the participants' parents as well as the ethical committee on time. Every patient's guardians received a thorough explanation for the purpose of the study during the preoperative visit.

Patients were randomly allocated into three groups of 30 patients each. Patients were randomized using computer-generated randomization numbers in sealed opaque envelopes. The envelope was chosen by each patient's parent which determined his group.

All children were premedicated with oral midazolam (0.5 mg/kg) 30 min prior to surgery. Monitoring, included pulse oximetry, non-invasive blood pressure and body temperature measurement, electrocardiography, and end-tidal CO_2 ($PECO_2$). General anesthesia was induced in all children using 4–6% sevoflurane and intravenous fentanyl (1 μg/kg). After endotracheal intubation, mechanical ventilation was initiated and ventilator parameters were adjusted according to patient's age so that $PECO_2$ was maintained at 4.6 ± 0.25 kPa (35 ± 2 mmHg). Anesthesia was maintained with 50% oxygen in air and 1 minimum alveolar concentration of sevoflurane.

Group I: Control group (C): Patients received general anesthesia only.

Group II: Maxillary block group (M): Patients received bilateral ultrasound-guided SMB using 0.25% bupivacaine 0.15 ml/kg over 20 s after induction of general anesthesia.

2.1. Technique of ultrasound-guided SMB [10]: (Fig. 1)

SMB was performed after induction of general anesthesia before starting the surgical procedure using a 25 gauge 50-mm Sprote needle (Nanoline; Pajunk, Geisingen, Germany), following previously established anatomic landmarks which include zygomatic arch, posterior orbital rim, greater wing of sphenoid and most importantly the temporal muscle [5,11].

A high frequency 8–13 MHz linear transducer (SonoScape SSI 6600-China) was applied over the maxilla in the infrazygomatic area. The needle was inserted perpendicularly at the angle between the posterior orbital rim and the superior border of the zygomatic arch then advanced using the out-of-plane approach about 20 mm towards the greater wing of the sphenoid. Reorientation and advancement of the needle for 35–45 mm deep to the pterygopalatine fossa were then performed. The needle direction and depth of insertion were independent of patient age [11]. After negative aspiration, 0.15 ml/kg bupivacaine 0.25% was injected bilaterally.

Group III: Palatal block group (P): After induction of general anesthesia, greater palatine, lesser palatine and naso palatine nerves were blocked bilaterally at their corresponding foraminae using 0.5 ml bupivacaine 0.25% at each point with a total volume of 2.5 ml bupivacaine 0.25%.

2.2. Technique of PB [9]: (Fig. 2)

A cotton swab was pressed opposite the first molar tooth then moved posteriorly until it fell into a depression, the GP foramen, situated at the junction of alveolar and palatine bone. A 23G needle was used to block GPN bilaterally just anterior to the GP foramen by injecting 0.5 ml local anesthetic solution 1 cm medial to 1st / 2nd maxillary molar at a depth < 1 cm without entering the canal. 0.5 ml local anesthetic solution was injected bilaterally to block LPN at the LP foramen, identified just lower and lateral to GP foramen, at a depth of less than 1 cm. NPN was blocked lateral to the incisive papilla using 0.5 ml of the solution at a depth of < 1 cm. A single injection was sufficient to achieve bilateral block. In case of a complete cleft, the block was performed at the incisive papilla as the vessels will be emerging from the incisive foramen (IF).

No submucosal or peri-incisional local anesthetic infiltration was administered.

Intraoperatively, fentanyl (0.5 μg/kg) was injected intravenously when more than 15% increase in the preoperative mean arterial pressure or heart rate was noted. Fentanyl boluses were recorded. At the end of surgery, patients were extubated following prompt reversal with neostigmine (0.05 mg/kg) and atropine (0.02 mg/kg) then admitted to the PACU.

Any encountered side effects e.g. nausea, vomiting, failed block, LA toxicity, hematoma, sedation, pupil alteration or ocular injury were recorded.

Children and Infants Postoperative Pain Scale (CHIPPS) score [12] was recorded on admission to PACU, at 1 h, 2 h, 4 h, 6 h, 8 h, 12 h, 18 h and 24 h to assess the quality of analgesia. The score consists of 5 points; crying, facial expression, posture of the trunk, leg posture and motor restlessness each scored from 0 to 2 with a total score of 0–10.

Routine postoperative analgesia in the form of IV paracetamol (perfalgan) 15 mg/kg/ 6 h was administered to all patients. IV pethidine (0.5 mg/kg) was given as rescue analgesia for patients if CHIPPS was > 3/10. Time to first request of rescue analgesia as well as total pethidine consumption were recorded. Patients' parents satisfaction was also recorded on a 3-point scale where 1 = satisfied, 2 = fair and 3 = unsatisfied.

The primary outcome was the total 24 h postoperative rescue

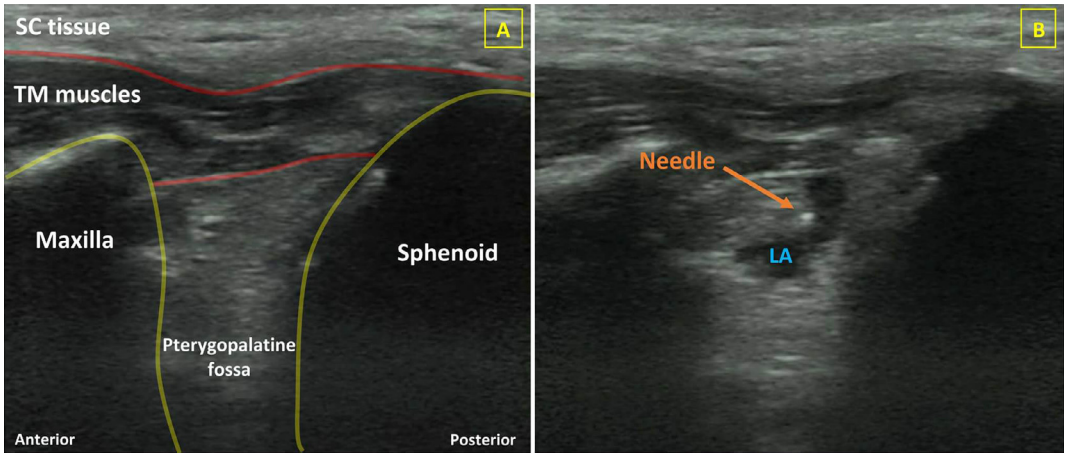

Fig. 1. Ultrasound guided demonstration of suprazygomatic maxillary nerve block: (A) sonographic anatomy of pterygopalatine fossa. TM: tempromaxillary muscle. (B) needle location indicated by an arrow with local anesthetic (LA) deposited within the pterygopalatine fossa.