International Journal of Pediatric Otorhinolaryngology (2007) 71, 83—87

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International Journal of Pediatric Otorhinolaryngology

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Comparison of bupivacaine and ropivacaine on postoperative pain after tonsillectomy in paediatric patients

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Received 15 May 2006; received in revised form 7 September 2006; accepted 8 September 2006

KEYWORDS
Tonsillectomy;
Postoperative pain;
Bupivacaine;
Ropivacaine;
Infiltration anaesthesia

Summary

Background: We aimed to compare the effects of peritonsillar bupivacaine and ropivacaine infiltration on pain after tonsillectomy in children.
Method: Sixty patients were randomly allocated to three groups: pertonsillar infiltration with bupivacaine (group B), ropivacaine (group R) and normal saline (group S). Pain scores with visual analogue scale (VAS) and sedation scores were assessed during postoperative 24 h. Choice of additional analgesic was acetaminophen for all patients.
Results: VAS was significantly lower in groups B and R, during the first half hour, while it was lower in group B than those in groups R and S at postoperative second and sixth hours. Time to first analgesic treatment was significantly longer in groups B and R. Total acetaminophen consumption was lower in group B than those in group S. Sedation scores were higher in group B than in groups R and S until postoperative second hour but there were significant difference only at postoperative fifth minutes.
Conclusion: Peritonsillar bupivacaine infiltration is, however, insufficient to control postoperative pain, it is more effective than ropivacaine for reducing postoperative analgesic requirement.

1. Introduction

Sustained spinal cord hyperexcitability produced by nociceptive impulses during surgery could contribute to postoperative pain, even under general

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0165-5876/$ — see front matter
doi:10.1016/j.ijporl.2006.09.005

anaesthesia [1,2]. Both postoperative pain and analgesic consumption might be reduced by pharmacological blockade of neuronal pathways [3,4]. After tonsillectomy, the patients usually suffer from mild to severe pain for three postoperative days and the pain gradually decreases in the following 4 days [5]. Non-steroidal anti-inflammatory drugs (NSAID's) and opioid analgesics are frequently used for postoperative pain treatment [6]. Peritonsillar local anaesthetic infiltrations, especially bupivacaine with long acting activity, are also widely used for this purpose [7]. Ropivacaine is a new synthetic, long acting amide type local anaesthetic with high lipid solubility and protein binding capacity. Compared with racemic bupivacaine, ropivacaine has equivalent anaesthetic properties but less cardiotoxic effects [8].

We compared the effects of the two local anaesthetic agents on postoperative pain measurements in children undergoing tonsillectomy.

2. Methods

A prospective, randomized, double blind study of 60 ASA physical status I—II children, aged 4—17 years scheduled for tonsillectomy, was performed with the approval from the Medical Ethics Committee of Gazi University School of Medicine and informed consent was obtained from the parents. Patients with severe systemic disease, allergic to any of the drugs used in the study, under chronic analgesic treatment and who had received any analgesic drug during the last 24 h before surgery were excluded from the study. The operation was carried out by the same surgeon using standard electrocautory technique.

Without any premedication all patients had inhalation induction with sevoflurane (inspired concentration of 7—8%). Remifentanil infusion was started at a rate of 0.1 $\mu g\ kg^{-1}\ min^{-1}$ and atracurium besilate (0.5 $mg\ kg^{-1}$) was used to facilitate endotracheal intubation. Anaesthesia was maintained with sevoflurane (inspired concentration 2—3% in air/oxygen mixture (FiO_2: 33%) and remifentanil infusion (0.1 $\mu g\ kg^{-1}\ min^{-1}$). None of the patients received additional analgesic during surgery.

After induction of anaesthesia and proper positioning the patients were randomly allocated to one of the three study groups using a sealed envelope technique. Bilateral peritonsillar infiltration of 0.25% bupivacaine, 0.2% ropivacine and normal saline were performed with 3—5 mL solutions containing epinephrine (1:200.000) in groups B, R and S, respectively. Surgery was initiated 5 min after the injection. After surgery and efficient haemostasis, sevoflurane and remifentanil were discontinued. Extubation was performed after reversal of neuromuscular blocking agent and patients were transferred to the postanaesthesia care unit.

The staff involved in the postoperative evaluation were unaware of the drug to which the patients were treated. The intensity of postoperative pain was assessed using a visual analogue scale (VAS) (0: no pain, 10: worst pain) at 1, 5, 10, 15, 30 and 60th minutes, 2, 6, 12 and 24th hours after extubation. Also each patient's level of sedation was scored using a graded scale (1: wide awake, 2: dozing, 3: asleep but easily aroused by talking or gentle shaking 4: asleep and aroused with difficulty) at the same time intervals. Postoperative pain was treated according to the same protocol in the three groups. A 5 $mg\ kg^{-1}$ acetaminophen (oral route) given at VAS was higher than 4. Time to first administration of acetaminophen and total acetaminophen consumption during the first 24 h was recorded.

Data are presented as mean values (mean ± S.D.), median values [(25—75%) (minimum—maximum)] and numbers (n). Repeated measurements (visual analogue scale (VAS)) were analysed by using repeated-measures analysis of variance (ANOVA). One-way ANOVA was used to compare other parametric data, followed by post hoc Student's t-tests with Bonferroni adjustment. Sedation scores and time to first analgesic, a non-parametric analysis of variance was performed using Kruskall—Wallis test. The Mann—Whitney U-test was used to determine statistical significance for independent samples. Nominal data (gender) of groups were compared by using the chi-square or Fischer's exact test. p value of <0.05 was considered significant.

Table 1 Patient group characteristics

	Group B (n = 20)	Group R (n = 20)	Group S (n = 20)
Age (year)	7.5 ± 3.1	7.2 ± 2.3	8.2 ± 2.9
Height (cm)	122.7 ± 21.3	124.0 ± 23.8	124.7 ± 17.8
Weight (kg)	28.9 ± 13.5	26.9 ± 9.8	28.0 ± 8.8
Gender (male/female)	18/2	14/6	16/4
Duration of anaesthesia (min)	56.4 ± 25.8	48.9 ± 20.1	46.2 ± 18.3

Define statistics (mean ± S.D., n).