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MAIN ARTICLE

Comparison of peritonsillar infiltration of tramadol and lidocaine for the relief of post-tonsillectomy pain

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Abstract

Background: Several studies have reported the use of peritonsillar infiltrations of local anaesthetics and/or locally active analgesic drugs for the relief of post-tonsillectomy pain, with variable results in terms of quality and duration of analgesia. We aimed to compare the effects of peritonsillar infiltration of lidocaine versus tramadol versus placebo on post-tonsillectomy pain.

Methods: Sixty patients over the age of 10 years undergoing bilateral elective tonsillectomy under general anaesthesia were randomised into three groups. The first group received peritonsillar infiltration of tramadol, the second 2 per cent lidocaine and the third normal saline. In all groups, peritonsillar infiltration was carried out after tonsillectomy but prior to tracheal extubation. Post-operative comparisons were made to assess the quality of pain control and the patients' analgesic requirements.

Results: Peritonsillar infiltration of tramadol provided an analgesic effect comparable to that of lidocaine in the first 6 hours post-operation, as reflected by visual analogue scale pain scores and opioid requirements, which were lower compared with the placebo group.

Conclusion: Peritonsillar infiltration of tramadol provided pain control in the first 6 hours post-tonsillectomy which was comparable to that of lidocaine.

Key words: Tonsillectomy; Postoperative Pain; Lidocaine; Tramadol

Introduction

Tonsillectomy is one of the most commonly performed operations, and pain following tonsillectomy remains a frequent and frustrating problem.[1] Post-operative pain can affect the duration of in-patient care, analgesic consumption, oral intake, ambulation and return to regular activity.[2] Relief of pain following tonsillectomy is thus a major concern when striving to improve patient quality of life in the post-operative period.[3]

The oropharynx and the tonsillar fossae are exquisitely sensitive. They are well innervated locally by the branches of the trigeminal and glossopharyngeal nerves, and are well represented in the somatic cerebral cortex.[4]

Many treatment modalities have been used for post-tonsillectomy pain, ranging from systemic opioids, to different surgical techniques, to radiation.[5] There has been a renewed interest in local anaesthetic techniques as an effective means of post-operative pain control because of the absence of any associated respiratory depressant effect.[4]

A previous study utilising lidocaine 1 per cent topical spray (4 mg/kg), evenly distributed on the tonsillar beds, showed improved pain scores in the immediate post-tonsillectomy period compared with intra-muscular codeine (1.5 mg/kg).[6]

Tramadol is a centrally acting drug that is effective in the treatment of moderate to severe pain.[7] In addition to its systemic action, the local anaesthetic effect of tramadol on the peripheral nerves has been shown in both laboratory and clinical studies.[8,9]

Peritonsillar infiltration with tramadol has been shown to improve paediatric tonsillectomy pain.[10] However, only a few studies have evaluated the analgesic effect of peritonsillar infiltration of lidocaine and tramadol in the relief of post-tonsillectomy pain. Furthermore, to the best of our knowledge, there has been no examination of the comparative differences between these two drugs using this route of administration.

This study aimed to compare the effects of peritonsillar infiltration of lidocaine versus tramadol versus placebo on post-tonsillectomy pain.

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Materials and methods

We employed 60 healthy patients in this double-blind, randomised study, all of whom were awaiting elective bilateral tonsillectomy surgery. Patients were aged 12–20 years, with an American Society of Anesthesiology physical status classification of 1–2. Patients were excluded if they had hepatic or renal disease, a history of drug or alcohol abuse, chronic pain, or received a daily intake of opioids.

Informed parental or patient consent was obtained for all patients, and the study was approved by the local ethics committee.

Patients were instructed pre-operatively how to use a 100-mm visual analogue scale (VAS) for pain (0 = no pain, 100 = worst pain).[11]

All patients were fasted and unpremedicated. Routine monitoring devices were utilised, including an electrocardiogram machine, non-invasive blood pressure cuff, oxygen saturation monitor and end-tidal carbon dioxide detector. Anaesthesia was induced with intravenous (IV) administration of atropine 0.02 mg/kg, thiopentone 5 mg/kg and fentanyl 1 μg/kg. Succinylcholine 1 mg/kg was used to facilitate tracheal intubation. Anaesthesia was maintained with 60 per cent nitrous oxide, 40 per cent oxygen and 1 per cent isoflurane. All patients were allowed to breathe spontaneously throughout the surgical procedure.

All tonsillectomies were performed using the same (Boyle–Davies) blunt dissection technique. Once the tonsillectomy had been completed and haemostasis had been achieved using bipolar diathermy, patients were randomly allocated (with a sealed envelope) to one of three groups ($n = 20$) for peritonsillar infiltration. The first group received 2 mg/kg tramadol in 8 ml of normal saline (4 ml per tonsil). The second group received 2 mg/kg lidocaine 2 per cent in 8 ml of normal saline. For both of these groups, the injection volume was 8 ml, which contained 1/200 000 adrenaline. The third group received 8 ml normal saline only.

The infiltration solution was prepared in a room separated from the surgical suite, and only the attending anaesthetist knew which solution was administered. The volume of solution given was similar for each group.

The tonsillar bed and peritonsillar tissues were infiltrated on both sides using the same technique, with fanwise injections from the superior and inferior poles of the fossa. The investigator responsible for the infiltration had no contact with the patients in the post-operative period.

All patients were extubated when awake. With their gag reflex intact, patients were transferred to the post-anaesthesia care unit, and observed by nursing staff who were unaware of the treatment each patient had received.

Assessments were performed at the time of admission, 30 minutes following surgery, and immediately prior to discharge from the post-anaesthesia care unit. Visual analogue scales were completed by patients when they were awake. Patient pain continued to be assessed on the ward every hour, for the following 5 hours.

Post-operative supplementary analgesia was available to patients in the form of pethidine 1 mg/kg, which was administered intravenously if the recorded VAS score was 50 or more.

The period of bearable pain was considered as the time from full recovery to the first requirement of pethidine. Total pethidine consumption during the first 6 hours was recorded. No other analgesics were administered.

The occurrence of side effects, such as hypotension, bradycardia, nausea, vomiting and sedation, was recorded for each patient at the same time points that the VAS assessments were made.

Statistical analysis

Data were analysed using the Statistical Package for the Social Sciences version 12 software program (SPSS Inc, Chicago, Illinois, USA). Data relating to patient characteristics, operation time, and the time delay between peritonsillar infiltration and supplementary analgesic administration were analysed using two-tailed unpaired *t*-tests. Repeated-measures analysis of variance was used to analyse differences in pain scores and total pethidine consumption between the groups, and to compare changes within each group. The results were reported as mean values ± standard deviations. A p value of less than 0.05 was accepted as statistically significant.

Results

With regards to patient demographics, there were no significant differences in mean age, weight, sex distribution, American Society of Anesthesiology physical status classification or duration of surgery among the three groups (as seen in Table I).

Post-operatively, pain scores (Figure 1) were significantly higher in the saline group than in the other two

TABLE I
PATIENT DEMOGRAPHICS

Parameter	Group		
	T*	L*	S*
Age (mean ± SD; y)	15.3 ± 2.2	14.9 ± 2.5	15.2 ± 2.3
Weight (mean ± SD; kg)	38.2 ± 3.1	37.3 ± 3.2	38.1 ± 3.1
Sex (*n*)			
– M	11	10	12
– F	9	10	8
ASA (*n*)			
– 1	13	14	12
– 2	7	6	8
Surg dur (mean ± SD; min)	27 ± 9	30 ± 4	29 ± 5

*$n = 20$. No significant difference between the three groups for any parameter. T = tramadol; L = lidocaine; S = saline; SD = standard deviation; y = years; M = male; F = female; ASA = American Society of Anesthesiology physical status classification; Surg dur = duration of surgery

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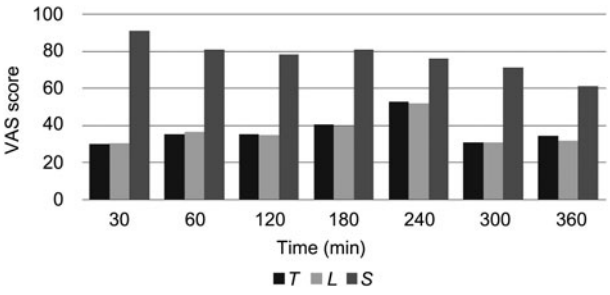

FIG. 1

Mean visual analogue scale pain scores post-tonsillectomy. T = tramadol; L = lidocaine; S = saline

groups ($p < 0.05$). The tramadol and lidocaine groups had comparable pain scores, with no significant difference between them ($p > 0.05$).

The time of bearable pain (i.e. the time until the first post-operative analgesic request) was longer for the tramadol and lidocaine groups than the saline group: 134 ± 18 minutes for the tramadol group, 135 ± 15 minutes for the lidocaine group and 34 ± 11 minutes for the saline group ($p < 0.01$; Figure 2).

During the first 6 hours post-surgery, the intake of supplementary pethidine was similar for the tramadol and lidocaine groups (Figure 3). Five patients in the tramadol group and seven patients in the lidocaine group each received one dose of pethidine (giving a mean consumption of 35 ± 11 mg and 33 ± 15 mg, respectively), a non-significant difference ($p > 0.05$). However, the intake of supplementary analgesic was significantly greater ($p < 0.01$) in the saline group (mean pethidine consumption was 75 ± 14 mg).

No side effects were reported during the first 6 hours following surgery. Heart rate and arterial blood pressure did not change significantly. There were no patient complaints of nausea, vomiting, sedation or other side effects.

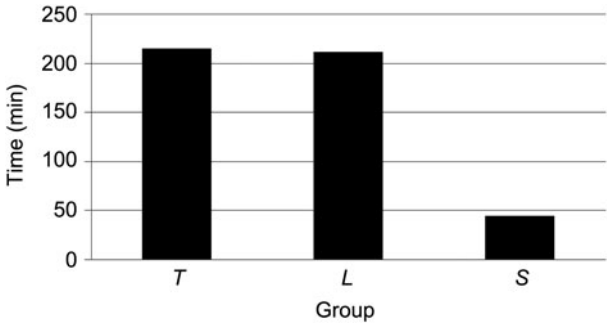

FIG. 2

Mean time to first analgesic request post-tonsillectomy. T = tramadol; L = lidocaine; S = saline

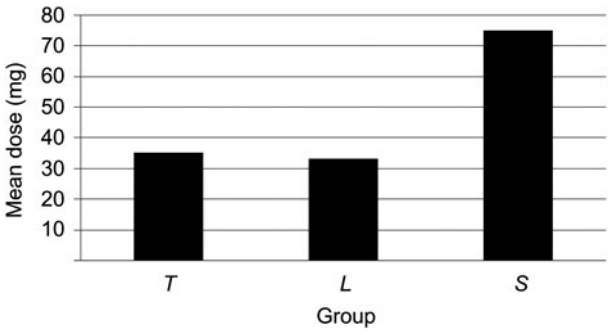

FIG. 3

Mean pethidine consumption during the first 6 hours post-tonsillectomy. T = tramadol; L = lidocaine; S = saline

Discussion

Post-operative pain and its sequelae are universal complaints of tonsillectomy patients, and post-tonsillectomy pain remains a considerable clinical problem.

This study demonstrates that post-tonsillectomy infiltration of tramadol or lidocaine (2 mg/kg in 8 ml of normal saline, 4 ml per tonsil, containing 1/200 000 adrenaline) can reduce immediate post-operative pain, compared with a placebo.

Although the use of IV pethidine was lower in the tramadol and lidocaine infiltration groups, pain scores were higher than 50 after about 4 hours; these scores necessitated the administration of supplementary analgesia in accordance with the study protocol. This would suggest that the clinical analgesic effect of the infiltrated tramadol or lidocaine was limited to about 4 hours post-tonsillectomy. After this time, pain assessment may have become unreliable because of the effects of the systemic analgesia.

Our findings are in agreement with the results of a previous study,[10] wherein peritonsillar infiltration of tramadol provided superior post-operative analgesia in paediatric patients 4 hours after surgery, compared with a placebo. In addition, in that study, the placebo group required a significantly greater number of doses of paracetamol than the tramadol group in order to maintain analgesia in the first 12 hours after recovery from anaesthesia.[10]

In another study,[12] the post-operative analgesic effect of tramadol used as a subcutaneous local anaesthetic was compared with lidocaine. It was found that the duration of post-operative analgesia provided by subcutaneous tramadol was significantly longer compared with a lidocaine injection (tramadol group 4.9 ± 0.3 hours, lidocaine group 4.4 ± 0.7 hours). In addition, the total amount of analgesic consumed in the post-operative period was considerably less for patients in the tramadol group.[12]

Tramadol is thought to produce its anti-nociceptive and analgesic effects through spinal and supraspinal sites, rather than via a local anaesthetic action. However, several clinical studies have shown that tramadol might have local, peripheral anaesthetic effects.[9,12] When tramadol was directly applied to the sciatic nerve in rats, it was shown to exert a local anaesthetic effect.[7]

In the present study, tramadol had a local anaesthetic action similar to that of lidocaine, and because of its

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anti-nociceptive effect, the post-operative pain-free period was extended.

When the concentration of extracellular sodium decreases, the nerve fibre becomes sensitive to local anaesthetics.[13] Jou *et al.*[8] suggested that tramadol affects sensory and motor nerve conduction in a manner similar to lidocaine, which acts on the voltage-dependent sodium channel, leading to axonal blockage. However, Mert *et al.*[14] proposed that tramadol might have a different mechanism to lidocaine for producing conduction blocks. Specifically, these authors suggest that the presence of a large calcium concentration in the external medium increases tramadol's activity, whereas it decreases lidocaine's activity.

Akbay *et al.*[15] studied the effects of topical tramadol on post-operative pain and morbidity in children undergoing tonsillectomy. They concluded that topical 5 per cent tramadol had a local anaesthetic effect, and seemed to be an easy, safe and comfortable approach for pain management in children undergoing tonsillectomy.

Another study[16] investigated the efficacy of intramuscular injection and peritonsillar infiltration of tramadol to prevent pain in children undergoing tonsillectomy. It was concluded that peritonsillar infiltration with tramadol provided less post-operative pain on awakening and lower analgesic requirement within the first hour following surgery.

- **This study compared peritonsillar infiltration of tramadol and lidocaine for post-tonsillectomy pain relief**
- **The pain-free period for tramadol (2 mg/kg) was longer and less subsequent analgesia was required, compared with placebo**
- **The analgesic effects of lidocaine (2 mg/kg) were comparable**
- **Peritonsillar infiltration with tramadol and with lidocaine provided comparable pain relief for 6 hours post-operation**

Nausea and vomiting are major side effects of tramadol used for post-operative analgesia. The incidence of these side effects seems primarily related to the peak serum concentrations: one study[17] found that an initial IV loading dose of 3 mg/kg caused more symptoms than a subsequent infusion or patient-controlled analgesia. Another study[18] compared the post-operative analgesic efficacy and side-effects of IV tramadol with peritonsillar infiltration of tramadol in children undergoing adenotonsillectomy. The findings demonstrated that peritonsillar infiltration of tramadol resulted in sustained pain relief and a lower incidence of nausea and vomiting, compared with IV tramadol.

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