Indian J Otolaryngol Head Neck Surg
(January–March 2013) 65(1):12–15; DOI 10.1007/s12070-012-0571-0

ORIGINAL ARTICLE

The Efficacy of Submucosal Tramadol in the Postoperative Treatment of Pain Following Septoplasty Operations

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Received: 11 April 2012 / Accepted: 24 August 2012 / Published online: 8 September 2012

Abstract Tramadol is a centrally acting opioid which is effective for moderate-severe pain and is being used for various acute and chronic pain scenarios. The primary endpoint of this controlled, randomized double blind study was to evaluate the effect of submucosal tramadol on VAS scores after septoplasty operations and secondary endpoint was to investigate the effects on total opioid and additional analgesic consumption and patient satisfaction. 60 patients scheduled for septoplasty under general anaesthesia were enrolled. In Group T, at the end of surgery following hemostasis, 2 mg/kg tramadol was applied as submucosal infiltration to both surgical sites, 2 ml (total 4 ml), by the surgeon. In Group P, at the end of surgery following hemostasis, 2 ml isotonic solution (total 4 ml) was applied as submucosal infiltration to both surgical sites by the surgeon. Total opioid consumption, VAS scores, patient satisfaction was evaluated at the end of 24 h VAS values were higher in Group P on the first and second postoperative hours. Patient controlled analgesia demand and delivery values were higher in Group P on the postoperative 1, 2, 4, 6, 12 and 24th hours. Patient satisfaction was higher and opioid consumption was lower in Group T compared to Group P. There was no difference in additional analgesic consumption between two groups. The results show that patients receiving tramadol had lower VAS scores compared with the placebo groups postoperatively.

Keywords Septoplasty · Submucosal tramadol · Postoperative pain · Opioids

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Introduction

Tramadol is a centrally acting opioid which is effective for moderate–severe pain and is being used for various acute and chronic pain scenarios [1]. Its weak local anaesthetic effect on peripheral nerves due to the blockage of voltage dependent Na channels has been shown in various studies [2, 3]. Following septoplasty operations facial pain due to excision of the cartilage causing the septal deviation and sutures or tampons placed for stabilization is prominent. The primary endpoint of this controlled, randomized double blind study was to evaluate the effect of submucosal tramadol on VAS scores after septoplasty operations and secondary endpoint was to investigate the effects on total opioid and additional analgesic consumption and patient satisfaction.

Materials and Methods

Following the approval of local ethics committee, 60 patients scheduled for septoplasty between 18 and 65 years of age belonging to ASA I–III risk groups were included in the study after obtaining written informed consent from the patients. Exclusion criteria were morbid obesity, anticoagulants, allergy to nonsteroid antiinflammatory drugs, serious hepatic, renal or gastric illness and history of anxiolytic or sedative drugs for the last month. All patients

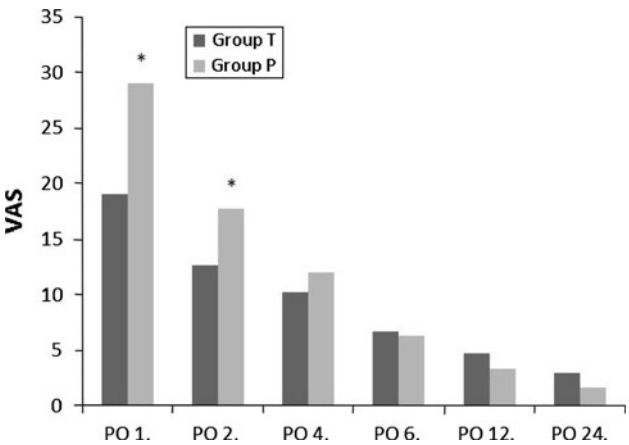
were premedicated using 0.03 mg/kg midazolam (Dormicum, Fontenay, France) intravenously 10 min prior to surgery. Propofol 2–3 mg/kg (Propofol–Lipuro 1 %, Melsungen, Germany), tramadol 50 mg (Contramal, Istanbul, Turkey) and rocuronium 0.6 mg/kg (Esmeron 50 mg/5 ml, Oss, Holland) was used for induction. Sevoflurane 2–3 % (Sevorane, England) and 50 % N_2O/O_2 was used for maintenance. The patients were randomized to two groups using closed envelope system. Lidocaine 2 % + epinephrine 1.25:100,000 (Jetocaine amp, Turkey) 5 ml was used for intranasal infiltration preincissionally by the surgeon. All the operations were performed by the same surgeon who was blinded to group of the patient and the patients were evaluated in the postoperative period by the same anaesthesiologist who was blinded to the study. In Group T, at the end of surgery following hemostasis, 2 mg/kg tramadol was applied as submucosal infiltration to both surgical sites, 2 ml (total 4 ml), by the surgeon. In Group P, at the end of surgery following hemostasis, 2 ml isotonic solution (total 4 ml) was applied as submucosal infiltration to both surgical sites by the surgeon. Killian septoplasty was carried out in all patients included in the study, no surgical intervention was done to sinuses and/or conchae. Merosel nasal pack was placed at the end of surgery and these were taken out at the end of 48 h. Prior to the tampon extraction lidocaine 10 % nasal spray (Xylocaine 10 % pump, Sweden) was applied to both nasal cavities and mucosal analgesia was achieved. All the patients were given Patient controlled analgesia (PCA) with 4 mg/ml concentration, 10 mg/h infusion, 20 mg bolus, 15 min lock-out time. Total opioid consumption was calculated by multiplying the number of boluses with the amount of opioid in each bolus in milligrams at the end of 24 h. Following extubation, patients were transferred to the recovery room and mean arterial pressure, VAS score, PCA demand and delivery values, side effects (hypotension, bradycardia, nausea, vomiting, pruritus) and additional analgesic consumption were recorded at 20, 40, 60 min and 2nd, 4th, 6th, 12th and 24th hours by an anaesthesiologist who was blinded to the groups, parallel to previous studies [4–7]. The patients were asked to rate their satisfaction according to Likert scale (1: Completely comfortable, 2: Very comfortable, 3: Slight discomfort, 4: Painful, 5: Very painful) at the end of 24 h. The patients were also evaluated for a burning sensation and bleeding in the nose. The patients were discharged at the end of 24 h and were prescribed oral paracetamol 500 mg three times a day.

SPSS for Windows 15.0 program was used for statistical calculations. Numerical variables were shown using average, standard deviation and quantitative variables were shown using percentages. Significance in numerical values among groups was evaluated Mann–Whitney test and significance in quantitative variables was evaluated using Chi squared test. Changes in heart rate and MAP values were evaluated using variance analysis. Significance in VAS, demand and delivery was evaluated using Mann–Whitney test while intergroup changes were evaluated using Friedman test. Significance levels were set at $p = 0.05$.

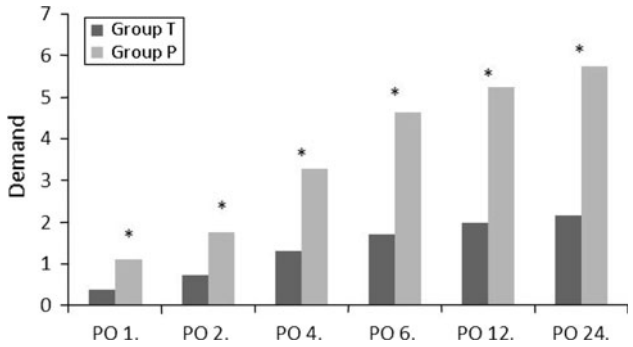
Sample size calculation was based on an expected difference of 13 mm in the VAS measurement of pain between group means, based on a reported value of minimal clinically important differences in acute pain, on a standard deviation of 15, obtained from previous studies [7] with Power = 0.90 and $\alpha = 0.05$. A sample size of 30 patients per group was obtained.

Results

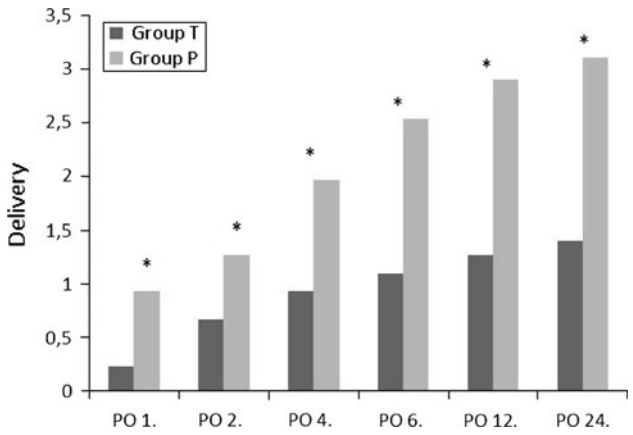
Sixty patients were enrolled in the study. No patients were excluded from the study. Two groups were similar concerning demographic data, time of surgery and anaesthesia. There were no differences in postoperative heart rate, blood pressure, side effects and additional analgesic consumption. In the postoperative period 3 patients had nausea and 1 patient vomitted and this was treated using ondansetron 8 mg. One patient complained of nausea in Group P ($p = 0.237$). VAS values were higher in Group P on the first and second postoperative hours (PO first hour VAS 19 ± 15.4 in Group T vs. 29 ± 16.5 in Group P, $p = 0.017$, PO second hour 12.7 ± 11.7 in Group P vs. 17.7 ± 10.4 in Group P, $p = 0.045$) (Graph 1). PCA demand and delivery values were higher in Group P on the postoperative 1, 2, 4, 6,12 and 24th hours (Graphs 2, 3). Patient satisfaction was higher and opioid consumption was lower in Group T compared to Group P (Group T: 268 ± 22 mg, Group P: 302 ± 78 mg, $p = 0.027$). There was no difference in additional analgesic consumption between two groups (Table 1).



Graph 1 VAS scores



Graph 2 PCA demand values



Graph 3 PCA delivery values

Discussion

The effects of submucosal tramadol on postoperative analgesia duration and analgesic consumption following septoplasty operations was investigated in this study. The primary endpoint of this controlled, randomized double blind study was to evaluate the effect of submucosal tramadol on VAS scores after septoplasty operations and secondary endpoint was to investigate the effects on total opioid and additional analgesic consumption and patient satisfaction.

Septoplasty operations, which are considered as day care operations, are characterized with mild to moderate facial pain in the postoperative period. In this period nonsteroid antiinflammatory drugs (NSAID), paracetamol is often used [7]. Paracetamol usually provides inadequate analgesia and the side effects of agents like NSAIDs and opioids decrease patient satisfaction [8]. Intravenous PCA provides suitable and safe analgesia in the postoperative period and is superior to conventional analgesia methods [9]. In our clinic, PCA is utilized for effective and continous analgesia and patient comfort in the first 24 h following septoplasty.

Tramadol is a synthetic opioid which belongs to the aminocyclohexanol group and consists of two isomeres with different effect spectrums [10] and has a local anaesthetic effect on peripheral nerves which was shown in clinic and laboratory studies [11, 12]. It has been proposed that tramadol has a lidocaine-like mechanism of action which involves voltage dependent sodium channels causing axonal blockade [2, 3, 13]. Altunkaya et al. [1] have shown that subcutaneous tramadol in minor surgery has a lidocaine-like effect in their study which was conducted on forty patients divided into two groups.

Following intramuscular injection tramadol is absorbed quickly and fully, reaches peak serum concentration in 45 min [14, 15] and sufficient serum concentration for minor pain treatment in approximately 7 min [15]. In a study conducted on 75 pediatric herniotomy patients by Demiraran et al. [16], 2 mg/kg tramadol used for wound infiltration provides approximately 2 h more analgesia compared to intramuscular tramadol. Similarly, it has been shown that 2 mg/kg tramadol used in peritonsillar infiltration prolongs the postoperative analgesia duration and reduces the need for additional analgesics and the incidence of side effects [4–6]. This study has showed that tramadol decreases VAS scores and opioid consumption in a statistically and clinically significant manner in the first 24 h when compared to placebo in the first postoperative 2 h in Group T following local infiltration at the end of surgery.

In a study conducted by Kapral et al. [17], adding 100 mg tramadol to 40 ml 1 % mepivacaine in axillary brachial plexus block, it was shown that tramadol prolongs the duration of sensory and motor block without causing any significant side effects, this can be given as an example to the peripheral action of tramadol which was mentioned above.

NSAID and opioids, which are used for postoperative analgesia have side effects such as bleeding, gastrointestinal irritation, nausea and vomiting [18]. This study has demonstrated that submucosal tramadol did not increase

Table 1 Demographic data

	Group T ($n = 30$)	Group P ($n = 30$)	p
Age (median ± SD)	33.7 ± 11.2	36.3 ± 12.5	0.405
Height (median ± SD)	169.7 ± 6.6	168.7 ± 7.9	0.585
Weight (median ± SD)	73.6 ± 13.7	72.9 ± 17.3	0.856
Sex (M/F)	10/20 (33.3 %/66.7 %)	15/15 (50 %/50 %)	0.295

the incidence of side effects while decreasing the usage of systemic opioid.

Submucosal tramadol provides efficient analgesia, reduces intravenous opioid consumption and increases patient satisfaction without increasing the side effects in ambulatory surgery. Future studies may be designed to find the optimal dosage and new application techniques of submucosal tramadol.

References

1. Altunkaya H, Ozer Y, Kargi E, Ozkocak I, Hosnuter M, Demirel CB et al (2004) The postoperative analgesic effect of tramadol when used as subcutaneous local anesthetic. Anesth Analg 99:1461–1464
2. Mert T, Gunes Y, Guven M, Gunay I, Gocmen C (2003) Differential effects of lidocaine and tramadol on modified nerve impulse by 4-aminopyridine in rats. Pharmacology 69:68–73
3. Mert T, Gunes Y, Gunay I (2007) Local analgesic efficacy of tramadol following intraplantar injection. Eur J Pharmacol 558:68–72
4. Akkaya T, Bedirli N, Ceylan T, Matkap E, Gulen G, Elverici O et al (2009) Comparison of intravenous and peritonsillar infiltration of tramadol for postoperative pain relief in children following adenotonsillectomy. Eur J Anaesthesiol 26:333–337
5. Ugur MB, Yilmaz M, Altunkaya H, Cinar F, Ozer Y, Beder L (2008) Effects of intramuscular and peritonsillar injection of tramadol before tonsillectomy: a double blind, randomized, placebo-controlled clinical trial. Int J Pediatr Otorhinolaryngol 72:241–248
6. Atef A, Fawaz AA (2008) Peritonsillar infiltration with tramadol improves pediatric tonsillectomy pain. Eur Arch Otorhinolaryngol 265:571–574
7. Sener M, Yılmazer C, Yılmaz I, Bozdogan N, Ozer C, Dönmez A et al (2008) Efficacy of lornoxicam for acute postoperative pain relief after septoplasty: a comparison with diclofenac, ketoprofen, and dipyrone. J Clin Anesth 20:103–108
8. White PF (2005) The changing role of non-opioid analgesic techniques in the management of postoperative pain. Anesth Analg 101:5–22
9. Hudcova J, McNicol E, Quah C, Lau J, Carr DB (2006) Patient controlled opioid analgesia versus conventional opioid analgesia for postoperative pain. Cochrane Database Syst Rev 4:CD003348
10. Vickers MD, O'Flaherty D, Szekely SM, Read M, Yoshizumi J (1992) Tramadol: pain relief by an opioid without depression of respiration. Anaesthesia 47:291–296
11. Pang WW, Huang PY, Chang DP, Huang MH (1999) The peripheral analgesic effect of tramadol in reducing propofol injection pain: a comparison with lidocaine. Reg Anesth Pain Med 24:246–249
12. Wagner LE 2nd, Eaton M, Sabnis SS, Gingrich KJ (1999) Meperidine and lidocaine block of recombinant voltage-dependent Na+ channels: evidence that meperidine is a local anesthetic. Anesthesiology 91:1481–1490
13. Jou IM, Chu KS, Chen HH, Chang PJ, Tsai YC (2003) The effects of intrathecal tramadol on spinal somatosensory-evoked potentials and motor-evoked responses in rats. Anesth Analg 96:783–788
14. Radbruch L, Grond S, Lehmann KA (1996) A risk-benefit assessment of tramadol in the management of pain. Drug Saf 15:8–29
15. Lintz W, Beier H (1999) Bioavailability of tramadol after i.m. injection in comparison to i.v. infusion. Int J Clin Pharmacol Ther 37:175–183
16. Demiraran Y, Ilce Z, Kocaman B, Bozkurt P (2006) Does tramadol wound infiltration offer an advantage over bupivacaine for postoperative analgesia in children following herniotomy? Pediatr Anaesth 16:1047–1050
17. Kapral S, Gollmann G, Waltl B, Likar R, Sladen RN, Weinstabl C et al (1999) Tramadol added to mepivacaine prolongs the duration of an axillary brachial plexus blockade. Anesth Analg 88:853–856
18. Holdgate A, Pollock T (2004) Systematic review of the relative efficacy of non-steroidal anti-inflammatory drugs and opioids in the treatment of acute renal colic. BMJ 328:1401