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The effect of lidocaine and tramadol in nasal packs on pain after septoplasty

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Abstract

Purpose The aim of this study is to compare the analgesic effects of tramadol-absorbed merocel nasal packings and lidocaine-absorbed merocel nasal packings using visual analog scale (VAS) in the postoperative period in patients undergoing septoplasty operation.

Materials and methods Our study was applied as a retrospective. Informations about the patients were accessed via their medical records. Our study was performed on 122 patients aged between 18 and 50 years. Patients were divided into three groups according to the application of lidocaine, tramadol and 0.9% NaCl on merocel nasal packings. In the postoperative period, VAS (visual analog scale) scores, side effects, additional analgesic requirements were recorded for 24 h starting from PACU (post anesthetic care unit).

Results There was no difference between the number of male and female patients ($p > 0.05$). Postoperative pain was evaluated with VAS score periodically in postoperative 5 min–24 h in all groups. When we compared the groups with each other, there was a statistically significant difference between the tramadol–lidocaine and tramadol–control group ($p < 0.05$).

Conclusion Tramadol infiltrated to nasal packings decrease the need of additional analgesics in the postoperative period, increases patients' satisfaction, decreases the length of hospital stay, and as a result, reduced the rate of secondary infections.

Keywords Lidocaine · Nasal packing · Postoperative pain · Septoplasty · Tramadol

Introduction

Septoplasty is one of the most performed operations in otolaryngology clinics [1]. Pain after septoplasty operations is one of the most important problems despite improvements in surgical and algology techniques. It has been well known that appropriate management of postoperative pain decreases the length of hospital stay, the complications that associate pain, and also improves the comfort of the patient. Combined analgesic methods are the most frequently used methods to improve the efficiency of analgesia and to decrease side effects and doses of drugs used [2]. Nasal packings cause to increase the pain that associate with surgery [3]. The facial neuralgia is severe after septoplasty operations due to the excision of the deviated cartilage tissues, as well as using stitches and packings for stabilization. Pain intensity is mild-to-moderate in the postoperative period. Nonsteroidal anti inflamatuar drugs (NSAIDs) and paracetamol are used to alleviate pain in this period [4]. However, paracetamol is insufficient for analgesia; has similar adverse effects as NSAIDs and is associated with less patient comfort [5].

Tramadol is an effective opioid used for moderate-to-severe pain in various acute and chronic pain situations [2]. Tramadol is a synthetic opioid classified in amino cyclohexanol that has two isomers in different efficiencies; its local

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anesthetic effects on peripheral nerves have been shown in clinical and experimental studies [3, 6]. It has been asserted to have the same mechanism of action as lidocaine which blocks axonal transmission by Na channel blockage [7, 8]. Tramadol causes less respiratory depression and addiction than other opioids [9]. Because of its favorable properties, it has become popular for postoperative pain control [10].

The purpose of this study was to compare the analgesic effects of tramadol-absorbed merocel nasal packings and lidocaine-absorbed merocel nasal packings using visual analog scale (VAS) in the postoperative period in patients undergoing septoplasty operations.

Materials and methods

This study performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and local hospital permission was obtained. Patients older than 18 years old with nasal septum deviation who were scheduled to undergo septoplasty operations with merocel nasal packing applications at Sanliurfa Birecik State Hospital between June 2015 and October 2016 were involved in our study. Our study was applied as a retrospective. Information about the patients was obtained via their medical records. Patients with nasal pathologies other than nasal septum deviation, allergic rhinitis, nasal polyposis, chronic rhinosinusitis, topical decongestant, anxiolytic and sedative, anticoagulant, and antiallergic medication use were excluded.

Our study was performed on 122 patients aged between 18 and 50 years. Patients were divided into three groups according to the application of lidocaine, tramadol, or 0.9% NaCl on merocel nasal packings. The group that received 0.9% NaCl was regarded as the control group. There were 24 (60%) males and 16 (40%) females in the lidocaine group; 27 (65.9%) males and 14 (34.1%) females in the tramadol group; and 27 (65.9%) males and 14 (34.1%) females in the control group.

All patients had received general anesthesia. Propofol (Propofol–Lipuro 1%, Melsungen, Germany) 2–3 mg/kg IV (intravenous), Fentanyl 100 mcg (Talinat, Istanbul, Turkey) and Rocuronium 0.6 mg/kg (Esmeron 50 mg/5 ml, Oss, Holland) were used for induction. Sevoflurane 2–3% (Sevorane, England) and 50% N_2O/O_2 were used for maintenance. The operations were performed by two different surgeons. Lidocaine 2% with epinephrine 1.25:100.000 was infiltrated locally before incision. At the end of surgery nasal merocel packings were applied. In tramadol group, Tramadol 3 mg/kg diluted in 10 ml of 0.9% NaCl was applied to each merocel packings in 5 ml volumes; in lidocaine group 2% lidocaine 5 ml, diluted in 10 ml of 0.9% NaCl was applied to each merocel packings in 5 ml volumes; in control group 0.9% NaCl 10 ml was applied to each merocel packings in 5 ml volumes. In the postoperative period, VAS scores, side effects, additional analgesic requirements were recorded for 24 h starting from PACU (postanaesthetic care unit). The level of postoperative pain in all groups was evaluated using a continuous visual analog scale (VAS). On the scale, 0 indicated "no pain" and ten indicated "severe pain". The patients were asked to mark their pain on the scale, and the results were recorded. The measurements VAS were repeated at 5, 10, 15, 20, 30, and 40 min, and at 1, 2, 4, 6, 8, 12, and 24 h. Additional analgesics were not given to the patients unless they needed rescue analgesics. Paracetamol and diclofenac sodium were used as rescue analgesics.

Statistical analysis

The data provided from our study were evaluated with SPSS (Statistical Package for the Social Sciences) 21 version. Descriptive statistics were indicated with numbers or percentages for categorical variables, with median, minimum, and maximum for numerical variables.

The normality of distribution of numerical values was evaluated. When the parametric test assumptions were not met, Kruskal–Wallis test was used for comparing more than two independent groups and Mann–Whitney *U* test for two independent groups. Bonferroni correction was used for post-hoc analyses. Chi-square and Fisher exact tests were used for comparison of categorical variables. For all statistical tests, $p < 0.05$ was considered significant; however, $p < 0{,}017$ was considered as significant when comparing two groups.

Results

The patients were divided into three groups. There were 41 (33.6%) patients in the control group; 40 (32%) in the lidocaine group; and 41 (33.6%) in tramadol group. There was no difference between the distribution of the three groups. Forty-four (33.6%) patients were women and 78 (36.1%) patients were men. There was no difference between the groups with respect to gender distribution ($p = 0.819$) (Table 1). Patients with other diseases were excluded from the study.

The age range of the study population was 18–50 years and the median age was 26.8 years. Age distribution was similar between the control, lidocaine, and tramadol groups, and there was not a statistically significant difference between groups ($p = 0.682$) (Table 1).

The mean duration of surgery was 25.77 min. There was no significant difference between the groups with respect to the length of surgery ($p = 0.217$) (Table 1).

Fifty-four (44.3%) of all patients needed additional analgesics while 68 (55.7%) patients did not need them. There

Table 1 Demographic data and clinical characteristics of the patients (Group C: Group Control, Group L: Group Lidocaine, Group T: Group Tramadol, min: minute)

	Group C (*n*: 41)	Group L (*n*: 40)	Group T (*n*: 41)	*p* value (three-group comparison)
Age (median ± SD)	23 ± 8.2	24 ± 9.31	24.5 ± 7.5	0.682*
Sex (M/F)	27/14	24/16	27/14	0.819**
Operation time (min)	25 ± 7.79	25 ± 7.67	20 ± 7.68	0.217*

**p* value: Kruskal–Wallis Test ($p < 0.05$)

***Pearson Chi-Square ($p < 0.05$)

was a significant difference between the groups in terms of additional analgesic requirement (Table 2). In the control group, 32 (59.3%) patients required additional analgesics, and this value is greater than the doses required in tramadol and lidocaine groups. The comparison of the groups in terms of additional analgesic requirements demonstrated a statistically significant difference between the control–lidocaine and control–tramadol groups, whereas no statistically significant difference was found between the lidocaine and tramadol groups ($p = 0.117$).

Paracetamol and Diclofenac Na were used for additional analgesic requirements. Twenty-four (19.7%) of all patients used paracetamol and 30 (24.6%) of all patients used Diclofenac Na. There was a significant difference between the groups with respect to the choice between paracetamol and diclofenac Na as additional analgesics (Table 2).

A comparison of the study groups with regard to the additional analgesic variability showed a statistically significant difference between the control–lidocaine and control–tramadol groups, whereas there was no significant difference between the lidocaine–tramadol group ($p = 0.279$). The post hoc inter-group analyses of additional analgesic requirements and analgesic variabilities revealed that these differences were caused by the control group.

Patients were categorized into four groups based on nausea and vomiting: (0) no nausea and vomiting; (1) mild nausea and vomiting (no need for therapy); (2) moderate nausea and vomiting (needed therapy); (3) severe nausea and vomiting (resistant to therapy). Thirty-seven patients had no nausea and vomiting, 47 patients had mild nausea and vomiting, 34 patients had moderate nausea and vomiting and needed therapy, and four patients had severe nausea and vomiting that were resistant to therapy. Severe nausea and vomiting was seen only in the lidocaine group. The least nausea and vomiting was observed in the control group. There was a statistically significant difference between groups in terms of nausea and vomiting (Table 3). When we compared the groups between each other in terms of nausea and vomiting, there was a statistically significant difference between control–lidocaine, and control–tramadol groups but there was not a statistically significant difference between lidocaine–tramadol groups ($p = 0.499$). The post-hoc analysis of this difference revealed that the significant difference was caused by the control group.

A comparison of the study groups with regard to VAS scores revealed that the mean score was 4.43 at 5th min; 4.41 at 10th min; 4.34 at 15th min; 4.18 at 20th min; 3.86 at 30th min; 3.67 at 40th min; 3.23 at 1st hour; 2.9 at 2nd hour; 2.45 at 4th hour; 1.87 at 8th hour; 1.18 at 16th hour; and 0.89 at 24th hour.

A comparison of the three groups demonstrated a significant difference in terms of VAS variables (VAS at 24th hour $p = 0.001$; for other VAS variables $p < 0.001$) (Table 4). Then

Table 2 Evaluation of additional analgesic need

		Group C	Group L	Group T	*p* value			
					C-L-T*	T-L**	C-L**	C-T**
Need for additional analgesics	Count	32	14	8	0.000	0.117	0.000	0.000
	% Within patients needing additional analgesics	59.3%	25.9%	14.8%				
	% Within own group	78.0%	35.0%	19.5%				
Type of analgesic drug	Paracetamol	14 (34.1%)	6 (15.0%)	4 (9.8%)	0.000	0.279	0.000	0.000
	Diclofenac Sodium	18 (43.9%)	8 (20.0%)	4 (9.8%)				

**p* value: C–L–T: three-group comparison ($p < 0.05$) Pearson Chi-Square test

***C–L, L–T, C–T: two group comparisons ($p < 0.017$) Pearson Chi-Square test

Table 3 Evaluation of vomiting–nausea scale

	Group C	Group L		Group T
No vomiting–nausea (0)	29	0		8
Mild vomiting–nausea (no need for treatment) (1)	8	25		14
Moderate vomiting–nausea (treatment needed) (2)	4	11		19
Severe vomiting–nausea (resistant to treatment) (3)	0	4		0
Vomiting–nausea scale (Median ± SD)	0.00 ± 0.66	1 ± 0.67		1 ± 0.77
	C-L-T*	T-L**	C-L**	C-T**
p value	0.000	0.499	0.000	0.000

*p value: C–L–T: three-group comparison ($p < 0.05$) Kruskal–Wallis test

**C–L, L–T, C–T: two group comparisons ($p < 0.017$) Mann–Whitney U test

Table 4 Visual analog score (VAS) scores at postoperative period

	Group C			Group L			Group T			*p* value			
	Median	Minimum	Maximum	Median	Minimum	Maximum	Median	Minimum	Maximum	C–L–T*	T–L**	C–L**	C–T**
5 min	5.00[a]	2	9	4.50[b]	1	9	3.00	1	7	0.000	0.005	0.080	0.000
10 min	6.00	2	9	4.00	1	9	3.00	1	7	0.000	0.003	0.015	0.000
15 min	6.00[a]	2	8	4.00[b]	1	9	3.00	0	7	0.000	0.003	0.023	0.000
20 min	5.00	2	8	4.00	1	9	3.00	0	6	0.000	0.004	0.005	0.000
30 min	5.00	1	7	4.00	1	7	3.00	0	6	0.000	0.001	0.005	0.000
40 min	5.00	1	7	3.00	0	7	3.00	0	5	0.000	0.003	0.003	0.000
1 h	4.00	1	7	3.00	0	6	2.00	0	5	0.000	0.000	0.002	0.000
2 h	4.00	1	7	3.00	0	5	2.00	0	4	0.000	0.000	0.008	0.000
4 h	3.00[a]	0	7	2.00[b]	0	6	2.00	0	5	0.000	0.000	0.072	0.000
8 h	2.00[a]	0	5	2.00[b]	0	6	1.00	0	3	0.000	0.000	0.699	0.000
16 h	1.00[a]	0	5	1.00[b]	0	4	1.00	0	2	0.000	0.001	0.772	0.001
24 h	1.00[a]	0	3	1.00[b]	0	2	1.00	0	2	0.001	0.001	0.758	0.001

Our numerical variables did not meet parametric assumptions according to our assessment, thus they do not fit the normal distribution curve. In this case it was appropriate to use median, minimum, and maximum values instead of mean and standard deviation

*p value: C–L–T: three-group comparison ($p < 0.05$) Kruskal–Wallis Test

**C–L, L–T, C–T: two-group comparison ($p < 0.017$) Mann–Whitney U Test

[a]No a significant difference versus lidocaine group

[b]No a significant difference versus control group

the groups with significantly different VAS variables were compared using the Mann–Whitney U test.

While comparing the groups between each other, $p < 0.017$ was evaluated as statistically significant. There was a statistically significant difference between control–lidocaine groups in 10th, 20th, 30th, 40th min., 1st, 2nd hour. There was also a statistically significant difference in all VAS variables between control–tramadol, and lidocaine–tramadol groups. When evaluating VAS variables in 5th, 15th min., 4th, 8th, 16th, 24th hour there was not a statistically significant difference in control–lidocaine groups ($p = 0.080$, $p = 0.23$, $p = 0.072$, $p = 0.699$, $p = 0.772$, $p = 0.758$ respectively) while there was a statistically significant difference in control–tramadol ($p = 0.000$, $p = 0.000$, $p = 0.000$, $p = 0.000$, $p = 0.001$, $p = 0.001$ respectively) and lidocaine–tramadol group ($p = 0.005$, $p = 0.003$, $p = 0.000$, $p = 0.000$, $p = 0.001$, $p = 0.001$ respectively). Post-hoc analysis revealed that this difference is caused by tramadol group. A significant difference was found in all analyses of the tramadol group. In other VAS variables at 10th, 20th, 30th, 40th min and 1st and 2nd hour, there was a statistically significant difference between the tramadol and control groups ($p = 0.000$, $p = 0.000$, $p = 0.000$, $p = 0.000$, $p = 0.000$ respectively), between the tramadol and lidocaine ($p = 0.003$, $p = 0.004$, $p = 0.001$, $p = 0.003$, $p = 0.000$, $p = 0.000$ respectively) groups, and between the lidocaine and control ($p = 0.015$, $p = 0.005$, $p = 0.005$, $p = 0.003$, $p = 0.002$, $p = 0.008$ respectively) groups. When evaluating VAS variables, scores were higher in control group and the highest VAS values were observed at 10th and 15th min in the control group, and at 5th and 10th min in

the lidocaine and tramadol groups (Table 4). Pain and as a result VAS values were decreased as time passed after surgery (Fig. 1).

Discussion

Septoplasty operations are characterized with mild-to-moderate pain in the postoperative period. Nonsteroidal anti-inflammatory drugs (NSAIDs) and paracetamol are the most commonly used drugs in this period [4]. Paracetamol usually causes insufficient analgesia, causes similar side effects with NSAIDs, and is associated with less patient comfort [5]. Tramadol is an important opioid used for moderate-to-severe pain in various acute and chronic pain situations [2]. Tramadol is a synthetic opioid classified in amino cyclohexanol that has two isomers in different efficiencies; its local anesthetic effects on peripheral nerves have been shown in clinical and experimental studies [3, 6]. It has been asserted to have the same mechanism of action as lidocaine which blocks axonal transmission by Na channel blockage [7, 8].

In our study, we aimed to evaluate the local effect of pain control of tramadol and lidocaine after septoplasty operations. When we compared the groups according to postoperative pain relief, we observed that tramadol was superior to the other two groups. It was seen that the transmucosal application of tramadol causes better pain control than lidocaine group and control group.

In a study of 40 patients divided into two groups, Altunkaya et al. [2] demonstrated a lidocaine-like effect of submucosal tramadol in minor surgery. Intramuscular tramadol is absorbed totally and fast, maximum dose in serum concentration is reached within 45 min and efficient serum concentration in minor surgery for pain control is reached within approximately 7 min [11, 12]. Demiraran et al. [13] infiltrated 2 mg/kg of tramadol into the wound in 75 herniotomy patients and when compared with intramuscular tramadol, infiltrating tramadol caused 2 h longer analgesia.

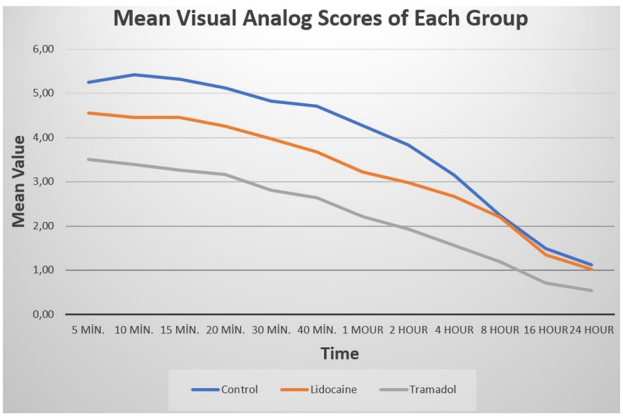

Fig. 1 Mean visual analog scores of each group (mean value). The control group: pain scores remained stable in the first 30 min and then dropped steadily. Pain scores of lidocaine group remained stable in the first 30 min and then dropped steadily. Tramadol group pain scores remained stable in the first 20 min and after dropped rapidly. (*H* hour, *min* minute)

NSAIDs used for postoperative analgesia may cause bleeding, gastrointestinal irritation while opioids may cause nausea and vomiting [14]. In the study, they demonstrated that submucosal tramadol decrease opioid consumption and side effects. Facial pain followed by septoplasty operations are caused by the excision of the cartilage that cause septal deviation, as well as stitches and the packings used for stabilization. The main objective of this study was to evaluate the efficiency of submucosal tramadol on postoperative visual analogue scale (VAS); the second main objective was to investigate postoperative analgesic consumption and patient comfort [15].

In our study, in terms of VAS variables, a significant difference was observed between the tramadol group and the lidocaine group and between the tramadol group and the control group. There was also a statistically significant difference between the control group and the lidocaine group in terms of VAS variables in times except from for 5th min, 15th min, 4th hour, 8th hour, 16th hour and 24th hour. Moreover, additional analgesic consumption was least common in the tramadol group. It was statistically significant when compared with the control group, while not statistically significant when compared with the lidocaine group.

Postoperative pain is caused by the surgical wound, settling of the flap, and the nasal packings used to prevent postoperative bleeding. Kuo et al. reported that lignocaine ointment administration to the nasal packings with petroleum jelly alleviate pain after septoplasty operations. Postoperative analgesic consumption was less common in the lidocaine infused nasal packings with petroleum jelly group. In this group, pain in the postoperative 3 h period was significantly less intense. This is due to the short acting time of lidocaine [16]. In their study with 57 patients, Buchanan et al. [17] administered 0.9% NaCl infused merocel packings to one nasal cavity and bupivacaine infused merocel packings to the other nasal cavity. Postoperative pain in the first 6 h was less intense in the bupivacaine group.

Karaman et al. [1] compared the topical effects of different local anesthetics administered to nasal packings with each other and the 0.9% NaCl control group. The hypothesis of this study was similar to our study; the local anesthetics that infused to nasal packings have topical effects on surgical area and provide analgesia by diffusion. When the local anesthetics are insufficient, parenteral NSAIDs can cause analgesia via bloodstream and diffusion to the surgical area. Patients in the control group needed the NSAIDs the most. Patients in ropivacaine group needed the same amount of NSAIDs as the bupivacaine group and less NSAIDs than

the lidocaine plus adrenaline group. There was no difference between groups about postoperative bleeding. According to this study, local anesthetics are not suggested for bleeding control. These findings revealed that bupivacaine, ropivacaine, and lidocaine with adrenaline are sufficient for pain control after septoplasty operations. Ropivacaine's effect was not like bupivacaine as expected, but it was more efficient than lidocaine with adrenaline in the late period. Bupivacaine was shown to decrease the need for additional analgesics and provide a better pain control than ropivacaine and lidocaine with adrenaline in the first 8 h postoperatively.

Patients were divided into two groups in another study. Patients' anxiety levels were recorded according to Hamilton anxiety scale at preoperative 24th and postoperative 48th hour. The postoperative 48th hour anxiety levels were recorded when injecting lidocaine to one group's merocel nasal packs and saline to the other group's merocel nasal packs and after 15 min of injection while taking the merocel nasal packs out. Injecting lidocaine to merocel nasal packs significantly reduced pain according to VAS score and anxiety levels ($p < 0.001$) [18].

In another study by Mutlu et al. patients were divided into four groups. 0.9% NaCl, 2% lidocaine plus adrenaline, 2% tetracaine and 4% articaine plus adrenaline were injected to merocel nasal packs and pain levels were recorded according to VAS in the first 24th hour postoperatively. Articaine plus adrenaline group had lower pain scores than the other groups and the control group during all these time periods, and lidocaine plus adrenaline group had better pain scores. The result of this study suggested that merocel nasal packs injected with local anesthetics, especially with articaine plus adrenaline provide better analgesia in the first postoperative day after nasal surgery, and also reduce hemorrhage while not causing any complications [19].

Apuhan et al. [20] showed that merocel nasal packings injected tramadol provided an efficient analgesia were well tolerated and reduced the need for additional analgesics. Removal of nasal packings is a painful and disturbing process. Pain level was evaluated during the removal of nasal packings. Tramadol administration by nasal packings is an ideal method for postoperative pain control compared to intravenous tramadol.

In our study, it was seen that tramadol creates faster and more efficient analgesia. In addition, when we compared the groups according to nausea and vomiting, there was not a statistically significant difference between the tramadol and lidocaine group ($p > 0.05$). But there was a statistically significant difference between the control group and the other two groups ($p < 0.05$). Nausea and vomiting was least in the control group.

Several studies have demonstrated the analgesic effects of lidocaine after septoplasty operations. Fewer studies have investigated the analgesic effects of tramadol used intravenously or injected on merocel nasal packs after septoplasty operations. In our study, we compared the analgesic effects of lidocaine and tramadol that were injected on merocel nasal packs after septoplasty operations; such a study has never been performed before. In our study, it was found that tramadol provides better analgesia than lidocaine; and it was also shown that it was more appropriate to use tramadol as topical medication after septoplasty. This study provided information about a new and superior alternative to conventional local anesthetic applications with the form of topical tramadol application. In the future, we also believe that after these kinds of studies, tramadol and its derivatives drugs can replace local anesthetics which are used more commonly for pain control after septoplasty operations.

Conclusions

Our study can be criticized for a small sample size. We need larger studies to search the effects of applying local tramadol in the future. Our study showed that the transmucosal application of tramadol provides better analgesia than lidocaine and control groups. As a result, less additional systemic analgesics were used and less side effects of systemic analgesics were observed in the tramadol group.

We suggest that tramadol infiltrated to nasal packings decrease the need of additional analgesics in the postoperative period, increases the patient satisfaction, decreases the length of hospital stay, and as a consequence, reduce the rate of secondary infections.

Compliance with ethical standards

Conflict of interest The authors of this manuscript declare no conflict of interest.

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