

# Lavage With Lidocaine and Adrenaline Mixture Reduces the Early Side Effects of Septorhinoplasty

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**Background:** Pain, ecchymosis, and edema are well-known temporary consequences of septorhinoplasty procedure. They give rise to patient's complaints, discomfort, and dissatisfaction, increasing the patient's anxiety and recovery time in the early postoperative course. Several approaches have been described to reduce the level of these complaints.

The aim of this clinical study was to determine the effect of nasal lavage with lidocaine and adrenaline mixture on early postoperative levels of pain, edema, and ecchymosis in 24 hours after a septorhinoplasty procedure.

**Methods:** This study included 40 consecutive patients who underwent septorhinoplasty procedure in which nasal septum was entirely dissected and corrected. Patients were randomly divided into 2 groups of 20 patients. At the end of the operation, incisions were closed with sutures, and both blood and seroma collections beneath the flaps were sufficiently drained by means of finger pressure, and then in patients of group A (control group), 5 mL of saline solution was given under the dorsal nasal flap to make lavage and in patients of group B (study group), 5 mL of 2% lidocaine with 1:100,000 adrenaline was given to the area under the dorsal nasal flaps. Five minutes later, nasal package and splint were applied and the operation was finished.

Patients were evaluated for the level of pain sensation, degree of periorbital edema, and ecchymosis at the 1st, 3rd, 6th, 12th, and 24th hours postoperatively. Overall satisfaction scores were also determined at the 24th hour.

**Results:** A total of 40 patients (19 males and 21 females) between 18 and 42 years of age with a mean  $\pm$  standard deviation of  $24.5 \pm 4.52$  years were included in the study. Statistically significant differences were found between the A and B groups with regard to early postoperative pain, edema, ecchymosis, analgesic use, and satisfaction scores, suggesting the effectivity of the lavage with lidocaine-adrenaline mixture on the early postoperative pain, edema, and ecchymosis relief.

**Conclusions:** Lavage of nasal flaps with lidocaine-adrenaline mixture seems an effective and simple way in the control of early postoperative pain, edema, and ecchymosis in septorhinoplasty patients. In addition, it considerably reduces total analgesic consumption and patients' discomfort, leading to high level of satisfaction.

**Key Words:** lidocaine, lavage, septorhinoplasty, pain

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Pain, ecchymosis, and edema are well-known consequences of septorhinoplasty procedure that involves surgical incisions, skin and mucosa dissections, and osteotomies. They give rise to patient's complaints, discomfort, and dissatisfaction, increasing the patient's anxiety and recovery time in the early postoperative course. As pain is at maximum levels just after the surgery and subsides with time in the first 24 hours, ecchymosis and edema will increase within the first 24 hours of the surgery.<sup>1–4</sup> Several approaches have been described to reduce

pain levels after septorhinoplasty, some of which advocate to be given new or additional drugs either intraoperative or postoperative course, for example, pregabalin, dexamethasone, dexketoprofen, levobupivacaine, gabapentin, ketamine, lornoxicam, and morphine, and some of which recommend administration of different local anesthetics by means of preincisional infiltration, nerve block, and topical or intranasal route.<sup>1,2,4,5</sup> In the early postoperative period, cold pack application, intravenous pain relief, and patient-controlled analgesia are also the most widely used methods in control of pain.<sup>5–7</sup>

Ecchymosis and edema arise from surgical incisions, dissections, and osteotomy procedures, which lead to inflammation and bleeding into the soft tissue during and after the surgery. Many osteotomy techniques have been suggested to reduce them, including percutaneous and endonasal lateral osteotomies, a subperiosteal tunnel creation before osteotomy, lidocaine, and adrenaline mixture injection into the osteotomy lines.<sup>5,7</sup> In addition, another measures can be used after the septorhinoplasty such as steroid administration (preoperative and/or postoperative), pressure application on osteotomy sites, taping the nose, and periorbital cold pack application.<sup>5–7</sup>

The aim of this clinical study was to determine the effect of nasal lavage with lidocaine and adrenaline mixture on early postoperative levels of pain, edema, and ecchymosis in 24 hours after a septorhinoplasty procedure.

## MATERIALS AND METHODS

This clinical study included 40 consecutive patients who underwent septorhinoplasty procedure in which nasal septum was entirely dissected and corrected by means of scoring, cutting the deformed cartilage and bone areas, freeing from maxillary crest, removing deviated parts, and replacing the reconstructed parts of it.

Patients were randomly divided into 2 groups of 20 patients, using a computer-based randomization system. Group A (control group) consisted of 11 male and 9 female patients with an age range of 19 to 42 years. Group B included 8 male and 12 female patients with a range of 18 to 26 years. After the study was approved by the local ethics committee, written and oral consents were obtained from all patients and it was conducted in accordance with the ethical principles described by the Declaration of Helsinki. Exclusion criteria covered the patients who did not receive nasal septal correction and had a history of peptic ulcer, hypertension, diabetes, coronary artery and valve disease, psychiatric problems, chronic pain, chronic alcohol intake, and drug allergy to lidocaine.

Closed rhinoplasty technique was used under general anesthesia and the same surgical procedures, such as incisions, soft tissue dissections, dorsal hump resection, and osteotomies were performed on every patient. Intraoperatively, 5 minutes before the incisions, 5 mL of 2% lidocaine with 1:100,000 adrenaline was injected to the incision lines, dorsal nasal area, anterior septal mucosa, and lateral osteotomy sides in all patients of group A and B. Two-sided low to high lateral osteotomy and hump resection were made similarly in every patient of group A and B. At the end of the operation, incisions were closed with sutures, and then blood and seroma collections beneath the skin and mucosa flaps were sufficiently drained by means of finger pressure. Afterward, in patients of group B, an additional 5 mL of 2%

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**TABLE 1.** Descriptive and Statistical Results of the Groups

Variables and Scores	Group A(Control)	Group B	P
Sex, male/female	11/9	8/12	0.264
Age, y	25.9 ± 5.63	23.1 ± 2.51	0.171
VAS 1st h	5.75 ± 1.25	2.75 ± 1.44	<b>0.001</b>
VAS 3rd h	4.25 ± 1.44	2.05 ± 1.50	<b>0.001</b>
VAS 6th h	3.30 ± 1.38	1.50 ± 1.14	<b>0.009</b>
VAS 12th h	2.25 ± 1.58	1.25 ± 1.65	0.215
VAS 24th h	0.9 ± 1.20	0.30 ± 0.73	0.205
Edema 1st h	1.25 ± 0.63	0.70 ± 0.47	<b>0.009</b>
Edema 3rd h	1.65 ± 0.67	0.90 ± 0.71	<b>0.002</b>
Edema 6th h	1.75 ± 0.78	1.15 ± 0.81	<b>0.002</b>
Edema 12th h	2.15 ± 0.98	1.70 ± 0.92	0.099
Edema 24th h	2.10 ± 1.02	1.70 ± 0.80	0.137
Ecchymosis 1st h	1.00 ± 0.64	0.70 ± 0.47	0.103
Ecchymosis 3rd h	1.75 ± 1.01	0.70 ± 0.47	<b>P &lt; 0.001</b>
Ecchymosis 6th h	2.35 ± 0.93	1.40 ± 0.75	<b>0.019</b>
Ecchymosis 12th h	2.90 ± 0.96	2.30 ± 0.80	0.062
Ecchymosis 24th h	3.20 ± 1.10	2.95 ± 0.75	<b>0.021</b>
Satisfaction	1.75 ± 0.96	1.60 ± 0.50	<b>P &lt; 0.001</b>
Analgesic, mg	1850 ± 489	4000 ± 502	<b>P &lt; 0.001</b>

Bold indicates  $P < 0.05$ .

lidocaine with 1:100,000 adrenaline was given to the area under the dorsal nasal flap, by inserting a thin cannula between the stitches. In patients of group A, 5 mL of saline solution was given with the same way to the same area. Five minutes later, fluid collection under the skin and mucosa flaps was entirely evacuated by means of gentle finger pressure, then nasal package and splint were applied, and the operation was finished. In the postoperative course, although antibiotics were given to all patients, steroids were not used and patients' heads were kept elevated 45° above the horizontal plane. Cold compress application was started intermittently over the cheeks and continued in the first 12 hours postoperatively.

Patients were evaluated for the level of pain sensation, degree of periorbital edema, and ecchymosis at the 1st, 3rd, 6th, 12th, and 24th hours postoperatively by a physician or a nurse who was unaware of which patient received additional lidocaine-adrenaline mixture. Overall satisfaction scores were also determined at the 24th hours postoperatively, before the discharge of the patients. One gram of paracetamol infusion was given when patients complained of pain in the postoperative period, and the total amount of analgesic was calculated in every patient in the first 24 hours after surgery. Pain was assessed using a visual analog scale (VAS) of 0 to 10, where 0 indicated no pain and 10 indicated the worst imaginable pain. Evaluation of eyelid edema was made as 0 (none), 1+ (minimal), 2+ (extending onto the iris), 3+ (covering the iris), and 4+ (massive edema with the eyelid swollen shut). Periorbital ecchymosis was scored as 0 (none), 1+ (medial), 2+ (extending to the pupil), 3+ (past the pupil), and 4+ (to the lateral cantus). In the evaluation of patient satisfaction scores in 24 hours, a 5-point scale was used as 1 (very satisfied), 2 (satisfied), 3 (neither satisfied nor unsatisfied), 4 (unsatisfied), and 5 (very unsatisfied).

Statistical analysis was performed between the group A and B with the Statistical Package for Social Sciences (SPSS/PC 18.0). Comparisons between the groups were made using the  $\chi^2$  test, as sample sizes of groups were lower than 30 persons. The data are presented as the mean ± standard deviation for the continuous variables, the median (minimum–maximum) for the ordinal ones, and the frequency with percent for the categorical ones. A  $P$  value of less than 0.05 was considered statistically significant.

## RESULTS

A total of 40 patients (19 males and 21 females) between 18 and 42 years of age with a mean ± standard deviation of 24.5 ± 4.52 years were included in the study. There were no statistically significant differences between the groups in terms of age and sex ( $P > 0.05$ ). Statistically significant differences were found between the A and B groups with regard to early postoperative pain, edema, ecchymosis, analgesic use, and satisfaction scores, suggesting the effectivity of the lavage with lidocaine-adrenaline mixture on the early postoperative pain, edema, and ecchymosis relief (Table 1).

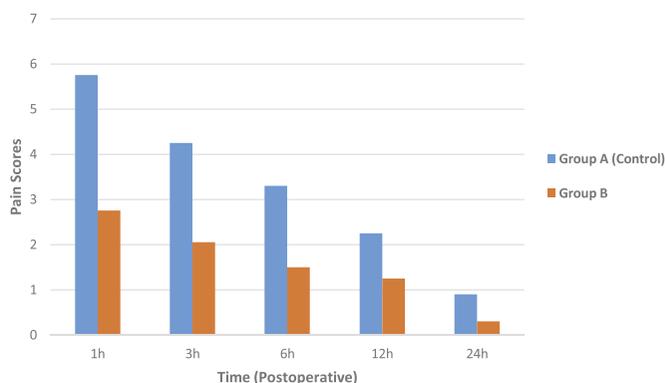
Pain scores were significantly different between the groups at the 1st, 3rd, and 6th hours, showing lower values in the group B than in the group A. There were no statistical differences between them at the 12th and 24th hours postoperatively (Fig. 1).

Edema scores were significantly lower in the group B compared with the control group at the 1st, 3rd, and 6th hours, pointing out statistically significant difference between the groups, but no statistical differences were determined in the edema scores at the 12th and 24th hours (Fig. 2). Although an increase in the degree of ecchymosis and edema was seen with time, grade 4 edema and ecchymosis were not observed in any patient. As degree of ecchymosis in all patients was low at the 1st hour after surgery, statistically significant difference between the groups was not found. However, there was a significant difference at 3rd, 6th, and 24th hours and difference was insignificant at 12th hour.

Total amount of analgesic use in the first 24 hours after surgery was statistically significant between the groups, as analgesic consumption was significantly lower in the group B than in the control group. Twelve of 20 group B patients did not receive any analgesic medication in the first day after surgery and the other 8 patients were given only one time of 1 gram of paracetamol infusion (Fig. 2). Overall satisfaction scores revealed a statistically significant difference between the groups, but none of the patients reported the choice of grade 4 (unsatisfied) or 5 (very unsatisfied).

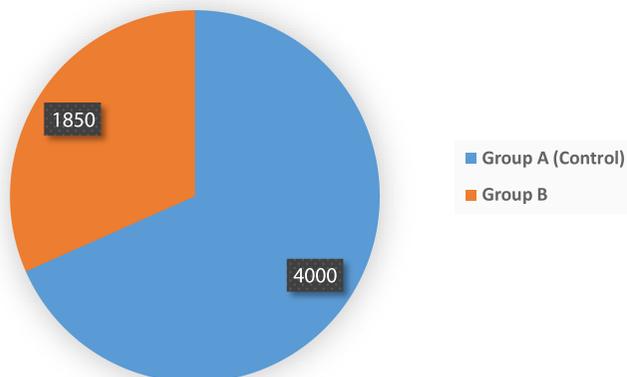
## DISCUSSION

Pain, ecchymosis, and edema are the main complaints of nasal surgery in the first 24 hours, resulting in severe discomfort, dissatisfaction, and anxiety. After the pain relieving, patient's comfort and satisfaction will considerably increase with time, but ecchymosis and edema continue to make discomfort for a while. Many medications have been advocated as an effective agent in reducing early complaints of rhinoplasty, such as pregabalin, dexamethasone, dexketoprofen, levobupivacaine, gabapentin, ketamine, lornoxicam, cocaine, and morphine; most of which were suggested to use in combination with lidocaine and adrenalin mixture (LAM) of which infiltration has been



**FIGURE 1.** Schematic illustration of changes in pain scores with time. Pain scores were statistically different between the groups at the 1st, 3rd, and 6th hours.

## Analgesic Use (Mean)



**FIGURE 2.** Mean analgesic consumption was significantly lower in the group B (1850 mg) than in the control group (4000 mg), showing statistically significant difference between the groups.

routinely used in many types of nasal surgery for a long time.<sup>2,4,5</sup> Before the surgery, injection of LAM is usually given into the incision, dissection, and osteotomy sites to make dissection easy and bloodless during the operation. It is also known as beneficial for relieving pain during and just after the surgery and for decreasing the degree of edema and ecchymosis.<sup>1-4</sup> In this study, effect of LAM was supported and prolonged with topical application of an additional dose for which 5-mL solution of LAM was given into the space under nasal flaps. Solution spread all over the skin and mucosal dissection areas, incision sites, and even osteotomy lines, having the capacity to make the most extensive effect on the nose. This technique differed from simply injecting lidocaine/epinephrine solution along the nasal tip and dorsum after completion of the operation, by means of contacting the anesthetic solution to all surfaces of surgical dissection and osteotomy sites. Simple LAM injection affects injection sites only, not osteotomy lines, cartilage surfaces, and septal mucosal flaps, also may carry a risk for disturbing the blood perfusion of nasal skin and mucosal flaps if it is given directly into the dissected skin or mucosal flaps at the end of the operation. Therefore, simple LAM injection seems to have a more limited and lower effect on reducing the consequences of septorhinoplasty when compared with the LAM lavage. Pain scores of group B were significantly different from control group in the first 6 hours after surgery, showing the potency of lidocaine as a pain reliever. Lower level of pain perception reduced the need of analgesic consumption in the group B patients, and 12 patients of group B did not take any pain killer in the first day after surgery, making the amount of analgesic use in the first 24 hours statistically significant between the groups. Difference of the pain scores was mainly related to the duration characteristics of epinephrine-containing solution of lidocaine, of which action can last up to 120 to 360 minutes when used for infiltration anesthesia.<sup>8,9</sup> In a study by Thomson and Lalonde,<sup>10</sup> duration of action of 2% lidocaine with 1:100,000 epinephrine was 10.4 hours, when skin had completely regained normal sensation.

There were no statistical differences between the pain scores of groups at the 12th and 24th hours postoperatively, because of the duration of action of lidocaine that gradually decreases with time after the topical application and possibly ends in most instances 6 hours later. It is important to relieve early postoperative pain for reducing patient's

anxiety and discomfort, as VAS values are the highest in the postoperative 6 to 10 hours in our study and the other studies of the literature.<sup>4,11,12</sup> Analgesic consumption has also been showed to be higher in the early hours of surgery.<sup>13</sup> Demiraran et al<sup>13</sup> has determined in their study that VAS values were the highest in all groups of nasal surgery at 30 mins, 1, and 2 hours postoperatively and decreased at the 8th hour after surgery. The need for analgesia has been found out to be significantly lower in groups with lower VAS. Cekic et al<sup>12</sup> has also showed that pain scores were the highest in just a few hours after surgery and then gradually decreased within 12 hours. In our study, early postoperative pain considerably reduced with the topical application of LAM and analgesic consumption was significantly lower in the group B than in the control group, showing the effectivity of the procedure in subsiding early pain sensation of the patients.

Periorbital edema and ecchymosis commonly occur as a result of inflammation and bleeding of the soft tissues after nasal surgery. Although many surgical factors contribute to severity of postoperative edema and ecchymosis such as number of surgical incisions, extent of dissections, type of osteotomy procedures, and duration of the surgery, some important precautions have been taken to experience the lesser degree of them in daily clinical practice, for example, LAM injection, steroid administration, pressure application with nasal splint, and pack, taping the nose and cold pack application.<sup>5-7</sup> However, all patients inevitably experience some degree of edema and ecchymosis after septorhinoplasty.

In the present study, edema scores were significantly lower in the group B at the 1st, 3rd, and 6th hours, pointing out statistically significant difference between the groups. This result must arise from vasoconstrictor effect of additional adrenaline on nasal vascular structures. As well known, adrenaline is a potent vasoconstrictor agent that makes blood and fluid leakage from vessels lesser in the time of potency, decreasing surgical inflammation, edema, and bleeding in the tissues.<sup>5,8,9</sup> However, edema scores at the 12th and 24th hours were not different between the groups, as the effect of adrenaline ended with time, and statistical difference of early hours disappeared at the 12th and 24th hours.

Similarly, Gun et al<sup>5</sup> advise not to expect that the application of lidocaine-adrenaline combination reduces edema and ecchymosis in rhinoplasty patients after finishing their study on 48 patients that investigated the effect of lidocaine-adrenaline combination injection on postoperative edema and ecchymosis in rhinoplasty on the 1st, 3rd, and 7th days.<sup>5</sup> Kalantar-Hormozi et al<sup>3</sup> claimed that injection of epinephrine during rhinoplasty did not reduce bleeding or post-surgical edema and ecchymosis. Infiltration of LAM in the rhinoplasty has been considered as an ineffective measure to avoid edema and ecchymosis during the days after surgery; however, in the present study, topical application of it has been found to be effective in reducing them in the first a few hours of the surgery.

Scores of ecchymosis in all patients were low at the first hour after surgery, so there was no statistically significant difference between the groups, possibly because of the time interval in which bleeding could not become evident through skin as an ecchymosis in the first hour after the intervention. However, there was a significant difference at the 3rd, 6th, and 24th hours because of the strong vasoconstrictor effect of adrenaline that reduces bleeding arising from soft tissue and osteotomy lines. Statistical difference was insignificant at 12th hour, possibly because of the number of the patients that might be statistically insufficient to show significant difference.

Overall satisfaction scores were statistically significant between the groups and varied between grade 1 and 3, and none of the patients were unsatisfied (grade 4) or very unsatisfied (grade 5). Difference in satisfaction might result from less sensation of pain, edema, and ecchymosis in the first few hours of the surgery.

The main limitation of this study was small number of patients, causing in less convincing statistical outcomes.

In conclusion, topical application of LAM seems an effective and simple way in the control of early postoperative pain, edema, and ecchymosis in septorhinoplasty patients. In addition, it considerably reduces total analgesic consumption and patients' discomfort, leading to high level of satisfaction.

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