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Comparison of nasal senses following open and closed rhinoplasty

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Background/aim: The objective of this study was to compare the postoperative changes taking place in the nasal senses of patients who underwent a rhinoplasty through the open or closed incision method.

Materials and methods: In a prospective study, 15 patients had a closed rhinoplasty surgery and 15 others had an open one. By pinpointing 9 spots in the nose, a sensory assessment was made by means of Semmes–Weinstein monofilaments prior to the surgery and 1 week and 1, 3, and 6 months after the surgery.

Results: In the open and closed groups, there was hypoesthesia 1 week after the surgery compared with the preoperative period ($P = 0.01$ and $P = 0.016$). In the first week a sense reduction in the upper columella was observed in the open group when compared with the closed one ($P = 0.035$). There were no other significant differences between the groups in the nasal regions at other times.

Conclusion: It was ascertained that there was reduced sensation in the upper columella in the open incision group in the first postoperative week. The sensation was reduced in both groups in the first postoperative week. The nasal sensation recovered after the first month.

Key words: Rhinoplasty, septorhinoplasty, nasal sense, open rhinoplasty, closed rhinoplasty

1. Introduction

Numbness of the nose is a common complication following rhinoplasty (1). Normal sensation is usually recovered within 1 year (1–3). It has been reported that after open rhinoplasty, the sensation in the nose tip and the upper end of the columella diminishes by the third week postsurgery (2,4). Although this sense alteration is resolved within 6 months to 1 year, the decrease in sensation with open rhinoplasty has not been compared with that in closed rhinoplasty (2,4). Moreover, little is known about nasal sensation alterations in the initial few months after surgery.

The sensations to the nasal skin are produced by the external nasal nerve, infratrochlear nerve, and infraorbital nerve branches. Damage in these nerve branches during surgery results in reduced sensation of the nasal skin. Recovery of the numbness may occur through axonal regeneration of the severed nerve or through collateral sprouting from the nerve supplying the adjacent areas of skin (5,6).

In rhinoplasty, a closed incision provides momentum and convenience, while an open incision allows for easy access to the tissues and a detailed readjustment. The aim of the present study was to investigate changes in nasal sensation during the first 6 months postsurgery in patients undergoing rhinoplasty by means of open or closed incisions.

2. Materials and methods

2.1. Patients and the surgery

This prospective study included a total of 30 patients (15 in the open and 15 in the closed incision group) ranging in age from 18 to 35 years who had elected to undergo primary rhinoplasty or septorhinoplasty; the patients had no previous history of trauma or any disease that might affect their facial sensations.

In the closed incision group (composed of 5 male and 10 female patients, with a mean age of 22.6 ± 5.4 years), intercartilaginous and transfixion incisions were performed. No dissection over or incision of the alar cartilage was performed on these patients. Those patients

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requiring an alar cartilage resection or reduction or sutures for alar cartilages were excluded from this group.

In the open incision group (composed of 4 male and 11 female patients with a mean age of 27.4 ± 5.1), inverted V and marginal incisions were performed on the columella.

None of the patients in the present study received a subcutaneous tissue excision in their noses. Following the incisions, dissections were performed right over the perichondrium and the periosteum. We included patients that required only an osteotomy incision; patients with other needs, such as nasal wing reduction, were excluded.

2.2. Semmes–Weinstein monofilament testing

A sensory test was performed using Semmes–Weinstein (SW) monofilaments on 9 spots of the patients' noses. This test was performed prior to surgery and at 1 week and 1, 3, and 6 months after surgery. These spots were the nasion, rhinion, right and left nasal borders, right and left alar wings, nasal tip, upper end of the columella, and columellar base (Figure).

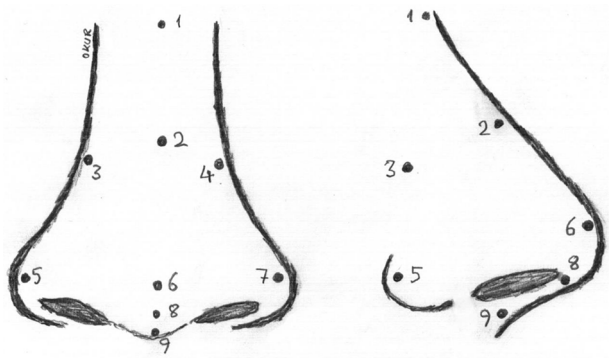

Figure. Spots where sensory control was performed: 1. nasion, 2. rhinion, 3. right nasal border, 4. left nasal border, 5. right alar wing, 6. nasal tip, 7. left alar wing, 8. upper end of columella, and 9. columellar base.

The measurements were made by utilizing the quinary Baseline tactile SW filaments. Within this set there were filaments of the 2.83 level and 0.07 g/mm^2, 3.61 level and 0.4 g/mm^2, 4.31 level and 2.0 g/mm^2, 4.60 level and 4.0 g/mm^2, and 6.65 level and 300 g/mm^2. The sensory examination started with the thinnest filament, gradually proceeding to thicker filaments until the sense of touch was felt by the patient. The examination was performed by pressing each spot with a filament for 1.5 s. The thinnest filament that produced a sense of touch was recorded.

2.3. Statistics

Data collected from follow-up patient questionnaires were incorporated into an electronic database using SPSS 15.00, and statistical analyses were performed. Nonparametric tests were preferred as the number of examples within the groups was less than 50. In the pairwise group comparisons (open and closed nasal surgery), the Mann–Whitney U test from the independent samples group (pairwise comparison) was utilized. For the group comparisons with more than two variables (e.g., comparison of the regions and times) the Kruskal–Wallis test was used. $P < 0.05$ was considered significant.

3. Results

Prior to surgery, one patient in each group reported a sense of touch in the rhinion region in response to a 3.61 level (0.4 g/mm^2) SW filament. The remainder of the patients reported feeling a sensation at the 2.83 level (0.07 g/mm^2), which was the thinnest filament.

Following surgery, there was a decreased sensation in the rhinion region in patients in both groups; however, a reduced sensation in the tip of the nose and in the upper columella was only detected in the open group (Table).

Table. The average sensory values received through the SW filaments according to nasal region and time (g/mm^2): a = preoperative values are significantly different from postoperative ones in the same group and same spot; b = the closed group values are significantly different from the open group ones at the first week in the upper columella region ($P = 0.035$).

	Nasion	Rhinion	Tip	Right nasal border	Left nasal border	Right alar wing	Left alar wing	Upper columella	Lower columella
Open, preoperative	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Closed, preoperative	0.07	0.092	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Open, 1 week	0.07	0.114 [a]	0.114 [a]	0.07	0.07	0.07	0.07	0.158 [ab]	0.07
Closed, 1 week	0.07	0.136 [a]	0.07	0.07	0.198	0.07	0.07	0.07 [b]	0.07
Open, 1 month	0.07	0.092	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Closed, 1 month	0.07	0.114	0.07	0.07	0.092	0.07	0.07	0.07	0.07
Open, 3 months	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Closed, 3 months	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Open, 6 months	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Closed, 6 months	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07

In a patient from the closed group, a decrease in sensation at the 4.31 level on the left nasal border was observed during the first week after surgery. In the 1st month this symptom decreased, and by the 3rd month it was undetectable.

No reduced sensation in the nasion, right nasal border, right and left alar wings, and columella base was found in either group during pre- and postsurgery testing. During measurements performed in the 3rd and the 6th month after surgery, a sense of touch was reported with the thinnest filament on all the measured spots in all the study patients.

Comparison of nasal sensation before and after surgery showed that the open group had reduced sensation in the first week after surgery compared with the closed group ($P = 0.01$, Kruskal–Wallis test). No intergroup significant difference was found in the 1st, 3rd, and 6th months ($P > 0.05$). Likewise, compared with the preoperative period, the first week postsurgery showed a reduction in sensation in the closed group ($P = 0.016$). There was no significant difference at any of the other time points.

Assessment of the nasal regions, tested in both the open and closed groups, showed that the sensation in the upper end of the columella decreased in the open group compared with the closed group during the first week after surgery ($P = 0.035$). No significant difference in the nasal regions between the two groups was found at any of the other tested times ($P > 0.05$).

4. Discussion

The SW monofilament testing is an appropriate method of assessment of nasal sensation. Static and moving two-point discrimination tests are inappropriate because of the limited surface of the columellar area. The flexibility of nasal cartilages may be altered during surgery; therefore, quantitative vibrating thresholds may be inaccurate in the nasal region (2).

In our study, nasal sensation decreased in both groups in the first week after surgery compared with preoperative values. However, starting at the first month, the sensation returned to its preoperative values in both groups.

Comparing the two groups, we found that there was decreased sensation in the upper end of the columella in the open group in the first week. During open rhinoplasty, there might be reduced sensation in the upper end of the columella and the lower half of the nasal tip because sensory nerves coming from the infraorbital nerve, passing through the columella, and branching out in the upper columella and the tip of the nose are incised.

In the open incision group, the decreased sensation observed in the nose tip and upper columella in the first week cleared up in the first month (Table). There were some patients in both groups with decreased sensation in the rhinion region, which continued into the first month. These conditions were completely resolved in the third month.

The recovery of sensation following surgery might take place through collateral sprouting of the adjacent nerve (5,6). When the nose is sutured during surgery, the nerve ends in the columella or the ends of other incised nerves within the nose are in close proximity to each other. Typically, the distance between them is less than 1 mm. Therefore, we should consider the possibility that recovery will take place through axonal regeneration of the severed nerve(s).

Three previous studies carried out with patients who underwent an open incision showed that the sense in the upper end of the columella and the nose tip diminished in the third week after surgery and returned to normal 6 months to 1 year after surgery (2,4,7). In surgeries performed through open incision, a subcutaneous tissue excision did not cause extra changes in the nasal tip sensation (4). A closed incision group was not included in these studies. In our study, we found that the decrease in nasal sensation, observed in both the open and the closed groups in the 1st week postsurgery, cleared up in the 1st month and returned to its normal state in all the measured spots by the 3rd and 6th months.

While sensation in the nasal columellar base is provided by infraorbital nerve branches, sensation in the nasal tip is attributed to the external nasal nerve (8). The upper columella is the transition zone for these nerves. Reduced sensation in the upper columella and in the tip of the nose in the open group showed that the sensory nerves of these regions pass mainly through the columellar base from the infraorbital nerve.

In one patient from the closed group, we observed a considerable amount of reduced sensation (SW level 4.31) on the left nasal border in the first week. The loss of sense diminished in the 1st month (SW level 3.61), and the senses returned to their normal state in the 3rd month. This sense alteration was probably because the sensory branches provided by the infraorbital nerve for the nasal border might have been damaged in the course of osteotomy performed with a saw during surgery. This observation was reported in a previous study in which a complete and irreversible seizure of the infraorbital nerve occurred during osteotomy with a saw (10).

In a study by Thompson, 3 patients in a group of 75 patients experienced numbness even 2 years after the surgery (1). In order to avoid sensory damage, it is essential to perform the dissection, excision, and grafting with great care, keeping in mind that the external nasal nerve in the rhinion region is 6.5–8.5 mm away from the midline (9). It is recommended that, in order to protect the infraorbital nerve truncus or branches, osteotomy be

performed only with a chisel, and that if a saw is required, it should be placed with the help of an elevator and remain in the right tunnel (10). In the present study, no sensory changes in the nasion, right nasal border, alar wings, and lower end of the columella were observed in either group before and after surgery.

Our study has some limitations. While patients in the open group underwent cartilage dissection, this was not the case, specifically with respect to the alar cartilages, for patients in the closed group. Although this dissection was made right over the perichondrium, it could have potentially changed the nasal sensation.

To the best of our knowledge, the patients in the present study had no history of drug use or any medical condition that might have changed the nasal senses prior to surgery. Furthermore, no drug or material that could cause sensation loss was used during the present study. However, it is quite possible that the patients could have been exposed to some such stimulus without our knowledge.

In summary, our results showed that in the first week after rhinoplasty there was a decrease in nasal sensation in the upper end of the columella in the open incision group, but not in the closed incision group. We also found that during the first week after surgery both groups had decreased nasal sensation compared with their preoperative values, but nasal sensation in both groups returned to the normal state by the first month postsurgery.

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