

Factors inciting marked edema after rhinoplasty: a retrospective study

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Background

Rhinoplasty is a challenging procedure, which aims at improving the aesthetic and functional outcome of the nose. Despite its complexity, it is one of the most common plastic procedures. Severe edema after rhinoplasty is an extremely worrying condition for the patient and the surgeon. Every attempt is tried to avoid its development.

Aim

In this study, the author analyzed the possible factors for severe edema after rhinoplasty as an endeavor for expecting it beforehand.

Patients and methods

A retrospective study was performed by data collection of the same surgeon over the period from March 2018 until February 2020. All patients' photographs were reviewed before and 1 week after the surgery. Edema was graded from 0 to 4. Cases with grade 3 or 4 edema were analyzed for the possible factors. Data were summarized using mean, SD, median, minimum, and maximum for quantitative data, and using frequency (count) and relative frequency (percentage) for categorical data.

Results

A total of 70 cases were involved, of which 15 cases developed grade 3 edema. Overall, 53% were in the third decade of life. Moreover, 47% had operations on the nasal tip, roof, medial, and lateral walls, and 66% underwent approaches requiring more soft tissue dissection.

Conclusion

Severe edema after rhinoplasty could happen in cases that undergo operation on several nasal walls (roof, medial, and lateral wall), with more soft tissue dissection, and in the third decade of life. The surgeon and the patient should be well prepared if these factors are present.

Keywords:

edema in rhinoplasty, extensive edema in rhinoplasty, marked edema after rhinoplasty, severe edema after rhinoplasty

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Introduction

Rhinoplasty is one of the most common performed and challenging procedure [1]. Generally, it has very low incidence of major complications such as bleeding, hematoma, infection, numbness, scarring, and septal perforation [2]. However, the early onset of severe edema after surgery can lead to a great worry for the patient and the surgeon [3]. In addition, it can lead to affection of the cosmetic result [4].

Several measures were described by previous studies to mitigate this problem either intraoperatively, such as proper dissection plane, or postoperatively, such as steroids [5]. Nonetheless, it remains unpredicted when it will happen and who it will affect [6]. In this study, the possible causes for severe edema after rhinoplasty were inspected as an endeavor for early expectation before it happens.

Patients and methods

This study is a retrospective study, aimed at revising the rhinoplasty cases performed by the same surgeon,

over 2 years, starting from March 2018 until February 2020. All patients were consented. This study was IRB exempted as data were retrospectively retrieved from the surgeon's medical records while keeping the anonymity of the patients.

Preoperatively, all patients were subjected to history taking, assessment of the nasal shape and airflow, and photographic documentation.

Postoperatively, all patients were instructed to apply local cold compresses and underwent photography 1 week after the operation. Postoperative photographs were assessed for the extent of the edema after surgery.

Edema was graded basically according to Kara and Gökalan [7] (modified by Yücel [8]) scoring diagram but with a subtle modification as follows (Fig. 1):

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- Grade 1: iris is abutted by the eyelids.
- Grade 2: iris is partially covered by the eyelids.
- Grade 3: most of the iris is covered by the eyelids.
- Grade 4: eye is totally closed.

Patients with grade 3 or 4 edema were meticulously assessed for the possible alleged factors.

Statistical analysis

Data were coded and entered using the statistical package SPSS (Statistical Package for the Social Science; SPSS Inc., Chicago, Illinois, USA), version 25. Data were summarized using mean, SD, median, minimum, and maximum for quantitative data; and using frequency (count) and relative frequency (percentage) for categorical data.

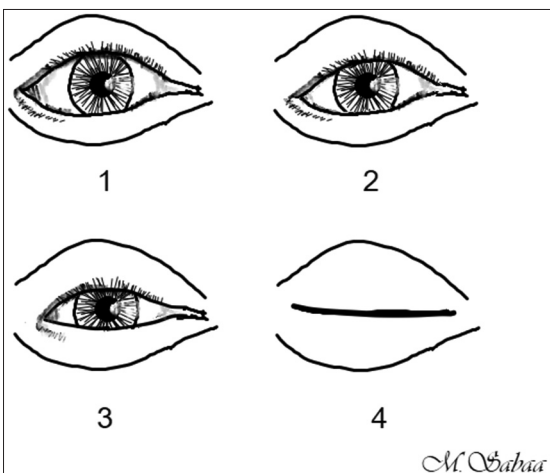
Results

This study included 70 patients. Patients' age ranged from 17 to 57 years, with a mean ± SD of 25 ± 7 years. A total of 45 (64%) patients were males, whereas 25 (36%) patients were females.

Overall, 15 (21%) patients (out of 70) were scored as grade 3 edema (Table 1 and Fig.2), but no patients scored grade 4 edema in this study. Eight (53%) of them were in the age group 21–30 years (Table 2). Eleven (73%) cases were males, whereas four (27%) cases were females.

Considering the approach, seven cases underwent open approach, five cases underwent closed approach, and three cases underwent semi-open approach, which included marginal incision with intact columella and full dissection of the skin envelope until the radix.

Figure 1



Different grades of edema after rhinoplasty operation.

Regarding the operation's complexity, seven (47%) patients were subjected to modification of all of the following: the septum, the tip, the dorsum, and the bony side walls (osteotomies) in the surgery. The remaining patients underwent only two to three of the previous steps. Details of the surgeries performed for the 15 cases are summarized in Table 3. Hump was removed in 13 (87%) cases, osteotomies and septoplasty were performed in 12 (80%) patients, whereas eight (53%) cases had tip modification.

Discussion

Rhinoplasty is a challenging procedure which aims at improving the aesthetic and functional outcome of

Table 1 Grades of edema among the studied population

	Frequency	Percent
Edema grade		
1	21	30
2	34	49
3	15	21
4	0	0
Total	70	100

Table 2 Distribution of age among grade 3 edema in the study

	Count edema grade 3
Age (years)	
18	1
19	2
21	2
22	1
23	1
24	1
25	3
33	2
38	1
40	1
Total	15

Figure 2



Example of one patient who was graded as grade 3 edema.

Table 3 Summary of operative details for all the cases with grade 3 edema in the study

Cases	Operation's summary
1	Septoplasty, bilateral median and lateral osteotomies, left intermediate osteotomy
2	Removal of nasal hump, lateral osteotomies
3	Septoplasty, rasping of dorsal hump, right median and lateral osteotomies, left intermediate and lateral osteotomies, dorsal onlay cartilage
4	Humpectomy, bilateral lateral osteotomies, dorsal cartilage graft, columellar strut, septoplasty, turbinate cauterization
5	Open approach. septoplasty. Humpectomy. Bilateral median guarded osteotomies. Bilateral lateral guarded osteotomies. Right intermediate guarded osteotomy
6	Septoplasty. Open approach. Humpectomy. Columellar strut. Inter and intradomal suturing. Lateral crura spanning suture. Two medial crura sutures (apex and base). Lateral crura steal suture. Cephalic trimming of the LLC. Sheen graft
7	Bilateral intermediate and lateral guarded osteotomies. Lateral crura spanning suture. Medial crura sutures
8	Septoplasty and shortening of caudal edge. Humpectomy. Rasping. Transdomal suture. LLC cephalic trimming. Medial crura splitting and suturing. Lateral crura spanning suture. Bilateral median guarded osteotomies and bilateral lateral osteotomies
9	Septoplasty. Left intercartilaginous incision. Hump rasping. Bilateral median and lateral guarded osteotomies. Right intermediate osteotomies. Supratip diced cartilage
10	Septoplasty. Left intercartilaginous incision. Minimal hump rasping. bilateral median and lateral guarded osteotomies. Supratip diced cartilage
11	Septoplasty, open approach. Bilateral lateral crura strut. Inter and transdomal sutures, right LLC steal suture, tip graft, columellar strut, right LLC onlay camouflage graft, right maxilla multiple layer cartilage and bone augmentation
12	Revision rhinoplasty, revision septoplasty, left intercartilaginous incision, hump rasping, onlay diced cartilage and bones, bilateral turbinate cauterization
13	Revision septoplasty, open approach, columellar strut, hump removal, bilateral median and lateral guarded osteotomies
14	Left intercartilaginous incision, humpectomy, septoplasty, nasofrontal augmentation, columellar strut, left spreader, bilateral median and lateral guarded osteotomies
15	Septoplasty, open approach, hump rasping, columellar strut, bilateral median and lateral guarded osteotomies

LLC, lower lateral cartilage.

the nose. Despite its complexity, it is one of the most common plastic procedures in the United States with more than 215 000 operations done in 2017. In 2016, more than 780 000 operations were done worldwide according to the International Society of Aesthetic Plastic Surgery [2].

Generally, complications in rhinoplasty are low. Yet, their incidence is variable in the literature, as they range from 1.7 to 18%. They can be classified into bleeding, infection, functional, aesthetic, traumatic, and soft tissue-related complications [9].

One of the soft tissue-related complications is edema, which is considered as one of the main problems after the operation[5] and is considered by some authors as a sequela to the surgery. Moreover, severe edema can affect the healing, leading to disappointing results [10].

Edema causes could be attributed to the high vascularity of the nose with subsequent release of inflammatory mediators and extravasation of exudates [11]. Moreover, other causes include soft tissue dissection, large dead space, osteotomies, duration of the surgery with more steps taken, and even the thickness of nasal bone [4–6].

Kara and Gökalan[7] proposed a graded scale for the evaluation of the edema after surgery. Later, this scale was modified by Yücel [8]. The author found some difficulty to abide by this scale perfectly; thus, a subtle modification was applied as mentioned in the methodology.

In this study, 15 patients developed grade 3 edema after surgery, whereas none developed grade 4 edema. In accordance with the mentioned studies, the important factors related to the development of edema were the extent of the procedure particularly in relation to the nasal walls and the extent of the tissue dissection. Nearly half of the patients were subjected to modification of all: the nasal septum (the medial wall), the lateral wall of the nose, the tip, and the nasal dorsum (the roof). The most frequent steps in these patients were hump removal in 13 (83%), followed by osteotomies and septoplasty in 12 (80%), and finally tip modification in eight (53%).

Surprisingly, most of the cases that developed severe edema were performed through closed approach in eight (53%), whereas seven (47%) cases underwent open approach. However, further stratification of the closed approach cases revealed three of them were performed by semi-open approach which entailed marginal incision and dissection of the soft tissue until the radix. Consequently, the pure closed cases could be considered in five (33%), and those involved with more soft tissue dissection and dead space could be considered in 10 (66%).

Furthermore, in this study, most of the cases with grade 3 edema were males (11 patients; 73%) and the most common affected age group was 21–30 years (eight patients; 53%). This age group could have exaggerated response to trauma induced by the surgery. Similarly, Misra *et al.*[12] described in their paper about angioedema that all age groups

were susceptible to. However, the peak incidence was in the third decade of life. In contrast to this study's finding, the females were more prone to edema in their study. It was incomprehensible why the males were more affected by grade 3 edema in this study. The proposed solution was their increased proportion in the number of the operations performed. Therefore, if compared to their total number in the study, results would be comparable as the males with grade 3 edema would constitute 11/45 (24%), whereas the females would form 4/25 (16%).

Several recommendations were described by various studies to mitigate this problem. During the operation, working in a subdermal, subperichondrial, and subperiosteal plane is recommended as well as injection of steroids, cold saline-soaked compression, and the use of special devices such as piezoelectric devices [5,13]. Postoperatively, several authors advised massage, steroids (local or systemic), and taping [1,3,4,7,10]. In this study, all the patients were given 15 mg/day dose of prednisolone postoperatively for 1 week. All the cases were reduced to grade 2 or 1 edema by the second week.

It is worth mentioning that severe edema after rhinoplasty is an extremely worrying condition for the patient and the surgeon. Every attempt is tried to avoid its development. However, with all the precautions taken, it can still develop [6]. Therefore, it would be better if the surgeon and the patient are well-prepared for it beforehand, as this will allow better patient's counseling as well as using different measures to reduce its development.

The incidence of rhinoplasty complications is low, hence, collecting large number of cases for statistical analysis was a limiting factor in this study. The author recommends multisurgeon and multicenter future studies to recruit more patients. Additionally, daily observation of edema over the first postoperative week would be an interesting point of future research.

Conclusion

Severe edema after rhinoplasty could happen in cases who undergo operation on several nasal walls (roof, medial, and lateral wall), with more soft tissue dissection, and in the third decade of life. The surgeon and the patient should be well prepared if these factors are present.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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