A new classification system of nasal contractures

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Background: The nasal contracture is one of the most severe complications that follow rhinoplasty. The proposed reasons for this complication are a capsular contraction from the silicone implant, pressure necrosis of the lower lateral cartilage due to the long nasal implant, and inflammation after alloplastic implantation. The severity and extent of nasal contracture vary depending on the cause and duration. Treatment of nasal contractures is very challenging and different from normal rhinoplasty procedures. To the best of our knowledge, an established classification has yet to be introduced for effective treatment.

Objective: To introduce a system for the classification of nasal contractures, for effective treatment decision-making.

Methods: Data from 245 nasal contractures were reviewed retrospectively. Pre-operatively, a complete rhinological examination including photographs was performed and a prior surgical history was taken. Two hundred forty-five patients had surgical treatments with various procedures. The authors classified the 245 cases according to severity and analyzed the patients' data, including previous implants, infection history, and surgical procedures.

Results: Nasal contractures were classified into 6 categories. Type II (symmetric type, 42.4%) and Type III (asymmetric type, 33.5%) were the most common. A previous silicone implant was found in 77% of all cases of nasal contractures. A previous infection occurred in 56% of the cases. Extended spreader graft and strut graft were used for surgical treatment in 87% of the cases.

Conclusion: The authors have presented a new classification system of nasal contractures. Histories of a previous infection and previous silicone implant could be relevant parameters, however, it is not clear if they are direct causative factors. There was no significant correlation between the surgical management and type of nasal contracture.

Level of evidence: 3

Keywords: rhinoplasty; nasal contracture; classification; extended spreader graft; strut graft; alar retraction

Introduction

The nasal contracture is one of the most severe complications that follow a rhinoplasty. The nasal contracture causes the distortion such as nasal shortening or asymmetry and its surgical treatment is also more difficult than normal rhinoplasty and the most challenging aspect. The cause of nasal contractures has not been elucidated, but repeated surgery and inflammation are considered to be the predisposing factors. Other possible factors include a capsular contraction from the silicone

implant, pressure necrosis of the lower lateral cartilage resulting from the long nasal implant, trauma, and an immunological mechanism [1,2]. The nasal contracture causes changes in the soft tissue, as well as in the supportive structures of the nose, resulting in deformity such as the shortening or asymmetry of the nose and retraction of part of the soft tissue [2]. Specifically, the nasal tip is supported only by cartilage, so deformity of the nose by the contracture is relatively more severe than the nasal bridge. The nasal contracture causes various forms and degrees of deformity depending on the cause, the site of tissue damage,

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and the period of injury. Different treatment methods should be applied depending on each condition. Since there has yet to be clear classification criteria for nasal contractures, there have been difficulties in classifying patients, establishing treatment plans, or reporting treatment outcomes to the academic world. The purpose of this study is to present a new classification standard for nasal contractures and to provide a unified standard for research and the classification and treatment of patients.

Materials and methods

From June 2011 to June 2015, the study was carried out on

245 patients who underwent surgery for nasal contracture. Before surgery, the prior surgical history (previous surgeries and the period until reoperation, types of implants used in prior surgeries, and infection history) was examined and a rhinological examination, including photographs, was conducted. Each patient received surgical treatment using a variety of surgical techniques and was retrospectively analyzed through a chart review after surgery.

Results

The age of the patients ranged from 20 to 69 years old with an

Table 1. patient analysis

2011.6–2015.6	245 patients
Age	37.3±12.1 (20–69)
M:F	36:209
Previous infection	137/245 (56%)
First Op. (year ago)	9.3±8.6
Last Op. (year ago)	3.4±5.8

Table 2. Classification of nasal contracture

Type I	Partial contraction
Type II	Symmetric contraction
Type III	Asymmetric contraction
Type IV	General contraction
Type V	Contraction with skin deformity
Type VI	Destructive contraction

Fig. 1. Classification of nasal contracture. (A) Type I: partial contraction, (B) Type II: symmetric contraction, (C) Type III: asymmetric contraction, (D) Type IV: general contraction, (E) Type V: contraction with skin deformity, (F) Type VI: destructive contraction.

average age of 37.3 ± 12.1 . The male to female ratio was 36:209, with an overwhelming majority of women. The period from the initial surgery to the surgery at our clinic was 9.3 ± 8.6 years. On average from the amount of time between the patient's last surgery to surgery at our clinic was 3.4 ± 5.8 years (Table 1).

Two hundred forty-five nasal contractures were classified into 6 types according to the deformed nasal shape and its severity; Type I is a partial contracture that shows a partial retraction of the skin. Type II is a symmetric contracture that shows a shortening of the nose tip, while the symmetry of the nose is maintained. Type III is an asymmetric contracture and shortening. Type IV is a general contracture that causes an overall deformity across the nasal tip and the nasal bridge. Type V involves deformity of the skin accompanied by a severe external skin defect with cartilage damage that requires external skin excision or minor flap surgery. Type VI is a destructive contracture accompanied by the loss of the normal structures of the nose that requires nasal reconstruction (Table 2, Fig. 1).

Two hundred forty-five cases were classified into 6 types. Type II (symmetric type, 42.4%) was the most common, followed by type III (asymmetric type, 33.5%) (Fig. 2).

The silicone implant was the most common (77%) implant used in a previous surgery. The results of the analysis of each type showed that the silicone implant was the most common

material used in previous surgeries, followed by e-PTFE (9%) and costal cartilage (6%) (Fig. 3, Table 3).

Of all the patients, one hundred thirty-seven patients (56%) had a previous infection history associated with surgery after the previous surgery (Table 4).

Each patient underwent surgery by the authors for the treatment of nasal contracture. For the surgical procedures used, an extended spreader graft (ESG) and strut graft using costal cartilage was used to extend the nasal tip in 87% (213 cases) and septal reconstruction was carried out to improve the supporting force of the septum in 10% (25 cases). The patients of approximately 3% (7 cases) of the cases extended their nasal tip using the "X-graft," which uses the combination of a caudal septal extension graft and strut graft instead of an ESG and strut graft (Figs. 4, 5).

Treatment for alar retraction was performed in 35% of all the patients (Table 5, Fig. 6).

Discussion

With the increase in cosmetic surgery, the incidence of complications or reoperation is also increasing. It is also true that the nasal contracture, which is one of the most severe complications following rhinoplasty, is difficult to treat because it causes

Fig. 2. Classification of nasal contracture.

Fig. 3. Previous implant materials.

Table 3. Previous implant materials

	Type I	Type II	Type III	Type IV	Type V	Type VI	Total
Silicone	3 (75%)	81 (78%)	65 (79%)	19 (76%)	18 (75%)	2 (33%)	188 (77%)
e-PTFE	0 (0%)	11 (10.5%)	9 (11%)	0 (0%)	2 (8.3%)	0 (0%)	22 (9%)
Medpore	1 (25%)	5 (4.8%)	4 (5%)	4 (16%)	1 (4.2%)	1 (17%)	16 (6.5%)
Alloderm	0 (0%)	2 (1.9%)	1 (1.2%)	0 (0%)	1 (4.2%)	0 (0%)	4 (1.5%)
Rib cart.	0 (0%)	5 (4.8%)	3 (3.8%)	2 (8%)	2 (8.3%)	3 (50%)	15 (6%)
Total	4	104	82	25	24	6	245

Table 4. Previous infection history

	Type I	Type II	Type III	Type IV	Type V	Type VI	Total
Infection(+)	4 (100%)	54 (52%)	41 (50%)	23 (92%)	11 (46%)	4 (66%)	137
Infection(-)	0 (0%)	50 (48%)	41 (50%)	2 (8%)	13 (54%)	2 (34%)	108
Total	4	104	82	25	24	6	245

Fig. 4. Nasal tip supporting methods.

a deformity of the soft tissue and supporting structures of the nose, deforming the shape of the nose [2]. The fact that 209 (85%) of the 245 patients were female does not represent a high incidence of nasal contracture in women. Although the number of cases of men's plastic surgery has increased in the recent years, the rate of rhinoplasty in women is still much higher than that of men; therefore, the rate of side effects is also high and this study is considered to have reflected this phenomenon as well.

Type I (partial type, 1.6%) is a partial retraction of the skin due to a partial contracture change of the nose. If there is no damage to the epidermis, soft tissue or cartilage can be used to correct it from the underside of the skin (camouflage technique). If there is an accompanying deformity of the epidermis, it is often necessary to perform a correction using flap surgery [3].

Type II (symmetric type, 42.4%) and type III (asymmetric type, 33.5%) were the most common, accounting for 75.9% of the total. This means that most of the nasal contractures are accompanied by a shortening of the nose tip. In most cases of surgical treatment (90%), shortening of the nose tip was corrected using nasal ESG (ESG+strut 87%, X-graft 3%) [4,5]. Type II (symmetric type) was distinguished from type III (asymmetric type) because in the case of an asymmetric contracture (Type III, asymmetric type), it is often necessary to simultaneously correct the alar retraction.

Approximately 35% of all subjects had alar retraction or asymmetry of the nostrils that were corrected at the time of the surgical treatment. Mild, moderate, and severe alar retractions were

Fig. 5. Tip grafts for contracted nose. (A) Costal cartilage, (B) ESG+strut graft, (C) septal reconstruction, (D) caudal septal extension graft+strut graft (X-graft).

corrected using an alar projection graft, composite graft from the ear, and an alar rotation flap, respectively [5,6]. Correction of the asymmetry of the nostrils or alar retraction, as well as extension of the nasal tip is a very important issue in the treatment of nasal contractures. However, correction of an alar retraction

Table 5. Management of alar retraction

	Type I	Type II	Type III	Type IV	Type V	Type VI	Total
Correction(+)	0 (0%)	46 (44%)	24 (29%)	8 (33%)	6 (25%)	2 (33%)	86 (35%)
Correction(-)	4 (100%)	58 (56%)	58 (71%)	17 (67%)	18 (75%)	4 (67%)	159 (65%)
Total	4	104	82	25	24	6	245

Fig. 6. Treatment of alar retraction. (A) Alar projection graft, (B) composit graft, (C) alar rotation flap.

is not considered to be specifically related to each type of nasal contracture. This should be performed at the discretion of the surgeon, depending on the need for surgical treatment of the nasal contracture. In conclusion, the authors have suggested a new classification system in order to effectively classify and treat nasal contractures. Although silicone implants and inflammation are important factors that are often preceded or accompanied by contractures, additional studies, including histologic

examinations, are necessary in order to determine the exact association.

Conflicts of interest

The authors have nothing to disclose.

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