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Prevalence and Causes of Nasal Obstruction after Rhinoplasty

Irina Meitel [1] ; http://orcid.org/0000-0003-3221-9640
E-mail: irina_babaeva@inbox.ru

Liana Karapetian [1] ; http://orcid.org/0000-0002-3376-3747

[1] Department of Otorhinolaryngology, I.M. Sechenov First Moscow State Medical University, Moscow, Russian Federation

ABSTRACT

BACKGROUND

In recent years rhinoplasty has enjoyed greater popularity. About 68% of patients manifest nasal obstruction after rhinoplasty. The epidemiology of post-rhinoplasty complications remains obscure. The aim was to study and analyze the impact of rhinoplasty on nose respiratory function.

METHODS

The intervention group consisted of 137 patients who underwent rhinoplasty in the I.M. Sechenov First Moscow State Medical University ENT clinic between 2010 and 2014 and the control group consisted of 30 healthy individuals. 57% of the patients were female and 43% males, mean age (±SD) 28±3 years old. The intervention group was divided into those without any postoperative complications (n=77), those with issues after primary (n=39) and revision (n=21) operations; then they underwent objective assessment, namely, anterior rhinoscopy, acoustic rhinometry (AR), and anterior active rhinomanometry (AARM).

RESULTS

The results of rhinoscopy revealed 5 cases of septal deviation, 2 cases of septal perforations, and 1 case of nasal synechiae. All cases were found in the group with issues after primary operations. A total nasal inspiratory flow and a total nasal respiratory resistance were found in 72% in the group without any postoperative complications. In the patients with issues after primary operations these parameters were insignificant and expressed bellow in 47% and 40% respectively. The minimal cross-sectional area 1 was normal in 61% in the group without any postoperative complications. But it was insignificant and expressed bellow in 50% and 3% in the group with issues after primary operations, and 46% and 1% in the group after revision operations.

CONCLUSION

It was found that the nasal valve incompetence is the most common functional rhinoplasty outcome, and it was diagnosed even in the group without any postoperative complications. The majority of patients' subjective complaints to nasal respiration after rhinoplasty correspond to objective results of respiratory nose function examination. Revision operations considerably improved nasal breathing as compared to primary results.

KEYWORDS

Nasal Obstruction, Plastic Surgery, Nose Deformities, Postoperative Complications, Patient Satisfaction

INTRODUCTION

Rhinoplasty is one of the most difficult aesthetic surgery procedures, with a high rate of revisions [1]. The difficulty and variable anatomy, highly visible position of the nose, and distinct patient requires precise consideration to both form and function [2, 3]. Rhinoplasty, the quintessential "nose job," is considered the most complex and challenging cosmetic procedure in aesthetic surgery today [4, 5]. Still, it remains an extremely popular surgery: the fourth most common procedure in women and the second most common procedure in men [3]. Its popularity has increased over the years [2, 6]. While from 15 to 40 % of all patients consult a doctor for a revision [4, 7] and about 68% of patients persistently note nasal obstruction after operation [8].

Rhinoplasty deals in micrometers rather than inches and involves a structure that is strategically placed in the middle of the face where any mistake can be extremely obvious [9]. To make matters more challenging, there is certainly no cookbook method that can work for all noses [4, 10]. It is important to have a systematic method for evaluating the nose and planning treatment, but a dogmatic protocol is impossible to create, since the nose comprises a mixture of various skin types, cartilaginous shapes, and bony deformities that can challenge even the most experienced surgeon [9, 11].

The nose serves a multitude of physiological functions: respiratory, immunology, olfactory [12, 13, 14]. But rhinoplasty, in most cases, leads to disturbance or incomplete restoration of nose breathing [16, 17].
Airway compromise is a frequent problem which must be addressed in secondary rhinoplasty [1, 5, 18]. So, it is important to understand the main reasons for respiratory function insufficiency and ways of their elimination.

And there is extremely small information about the prevalence and causes of the nose respiratory function insufficiency after rhinoplasty. The basic principles of rhinoplasty have barely changed over the years, although the techniques have been refined through a greater understanding of nasal anatomy and morphology, as well as of facial balance and

respiratory physiology [16, 17].

The aim of the research was to study the impact of rhinoplasty of the nose respiratory function.
The goals were to estimate respiratory function of nose after rhinoplasty, to find out the most common rhinoplasty functional complication.

METHODS

A prospective nonrandomized study included the intervention group that consisted of 137 patients who underwent rhinoplasty in the I.M. Sechenov First Moscow State Medical University ENT clinic between 2010 and 2014 and the control group that consisted of 30 healthy individuals. 57% of the patients were female and 43% males, mean age (±SD) 28±3 years old. The intervention group was divided into those without any postoperative complications (n=77), those with issues after primary (n=39) and revision (n=21) operations.

Exclusion criteria included the following: 1) cases of sinonasal malignancy; 2) radiotherapy to the head and neck; 3) craniofacial syndrome; 4) acute nasal trauma or fracture in the past 3 months; 5) sarcoidosis; 6) Wegener granulomatosis.

An open and closed rhinoplasty were carried out, someone were combined with intranasal surgery: septoplasty, turbinoplasty, endoscopic sinus surgery, correction of septal perforation, nasal synechiae and nasal valve dysfunction.

For subjective assessment patients responded to the questionnaire NOSE (nasal obstruction symptom evaluation) [11]. Special adapt NOSE included 4 criteria: nose blocked, frequent cold, blockage with exercise and sleeping problems. Patients estimated every criterion as the insignificant (1 or 2 points) or expressed concern (3 or 4 points).

For objective assessment patients underwent anterior rhinoscopy, Cottle test, mucociliary transport assessment (test with Methylenum coeruleum), active anterior rhinomanometry (Figure 1), acoustic rhinometry (Figure 2) - methods allowing to define permeability of nasal courses for air at respiration and the area of nose transversal section in the nasal valve field [8, 11, 17].

Figure1. Anterior active rhinomanometry procedure

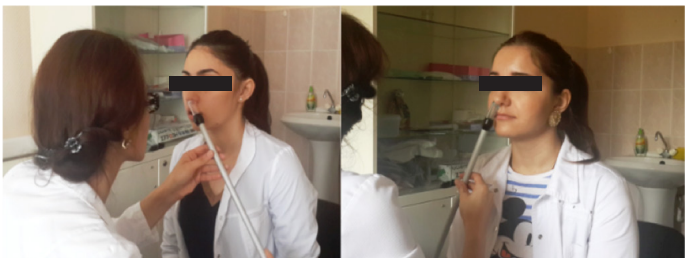

Figure 2. Acoustic rhinometry procedure

RESULTS

The results of questionnaire NOSE (Figure 3, A) revealed that all criteria were noted as insignificant or absent problem in the patients without any postoperative complications. The patients with issues after primary operations noted the majority of criteria as expressed problem, but the patients after revision operations noted all of criteria as insignificant except blockage with exercise. The most common problem was blockage with exercise.

The results of rhinoscopy revealed 5 cases of septal deviation, 2 cases of septal perforation, and 1 case of nasal synechiae. All cases were found in the group with issues after primary operations. Cottle test was positive in 48% of the patients without any postoperative complications, 74% in the patients with issues after primary operations and 63% in the patients after revision operations.

The results of mucociliary transport assessment: mucociliary transport time had an average duration of 7. 2 ± 0. 6 min. Decreasing of mucociliary transport revealed in 5% of the patients.

During carrying out active anterior rhinomanometry (Figure 3, B) we observed the following indicators: a total nasal inspiratory flow (TNIF) and a total nasal respiratory resistance (NAR). These indicators help to estimate permeability of nasal courses for air and to define decreasing of the air flow.

TNIF and NAR were found in 72% in the group without any postoperative complications. In the patients with issues after primary operations these parameters were insignificant and expressed bellow in 47% and 40% respectively. In the group after revision operations the results were better than in the group with issues after primary operations. TNIF had average mean 422. 98 ± 21. 39 sm3/sec, NAR - 1. 91 ± 0. 31 Pa/sm3/sec ($p<0.05$).

During carrying out acoustic rhinometry (Figure 3, C) we observed the following indicators: the minimal cross-sectional area 1 (MCA1) at the nasal valve that corresponds to level of 22 mm from an entrance to the nose and the angle between the nasal septum and the caudal margin of the lateral nasal cartilage - area of

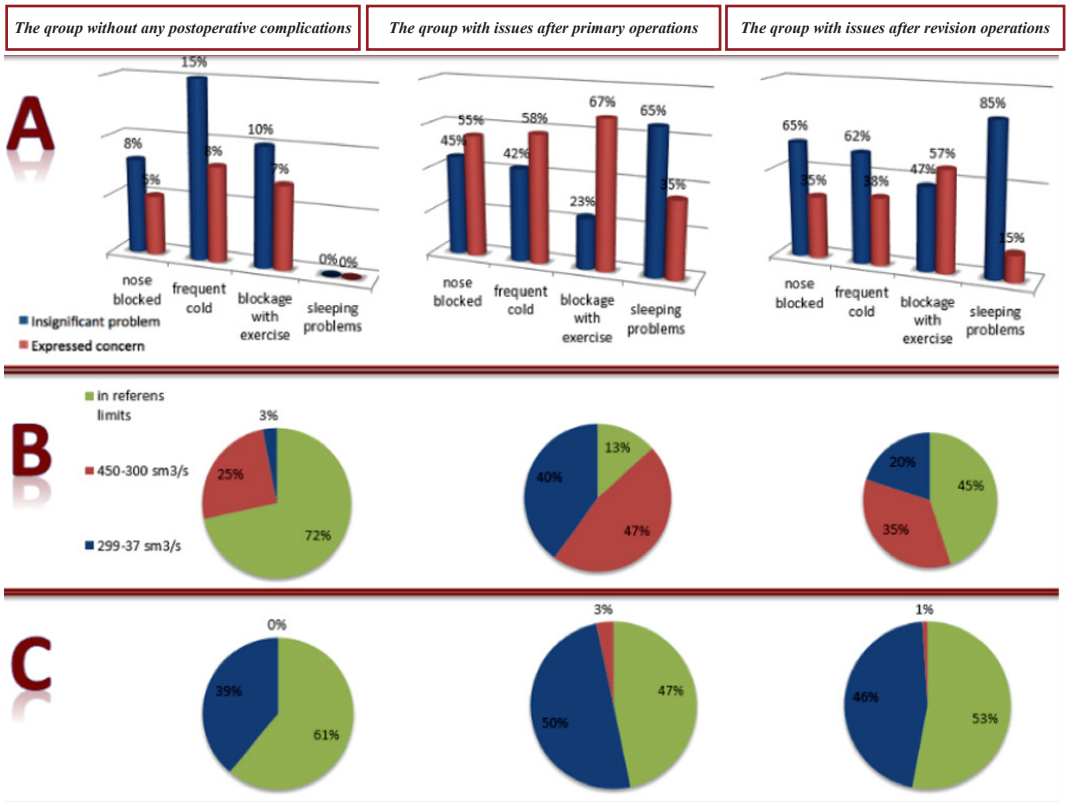

Figure 3. Results of questionnaire NOSE (A), anterior active rhinomanometry (B), acoustic rhinometry (C)

the external nasal valve.
MCA 1 was normal in 61% in the group without any postoperative complications. But it was insignificant and expressed bellow in 50% and 3% in the group with issues after primary operations, and 46% and 1% in the group after revision operations. MCA1 had average mean 0. 86 ± 0. 12 sm^2 ($p<0.05$).

All parameters were normal in the control group.

DISCUSSION AND CONCLUSION

Statistical analysis of the study showed 43% of patients had nasal obstruction after rhinoplasty. 16% out of the intervention group had revision cases during 5-year period in ENT-clinic. Patients estimated their own nose breathing better after revision operations if they had any issues after primary operations.

The one question of the discussion was about the most common functional rhinoplasty outcome. The most frequent complaint was blockage with exercise that indicates to external nasal valve incompetence.

The Cottle test, the specific test for diagnostic the nasal valve incompetence, was positive in 74% of the intervention group. The air flow is lowered at 83% and 55% after primary and revision operations respectively.
The nasal valve dysfunction (Figure 4) was diagnosed to 74% of patient especially in primary operation group.

Therefore, it was found that the nasal valve incompetence is the most common functional rhinoplasty outcome, and it was diagnosed even in the group without any postoperative complications. The majority of patients' subjective complaints to nasal respiration after rhinoplasty correspond to objective results of respiratory nose function examination. Revision operations considerably improved nasal breathing as compared to primary results.

Figure 4. Patient with the external nasal valve incompetence

In the present study, we have shown that rhinoplasty is one of the most difficult aesthetic surgery procedures with a high rate of revisions; patients estimated their own nose breathing better after revision operations if they had any concerns after primary one; the most frequent complaint was blockage with exercise; the nasal valve incompetence is the most common functional rhinoplasty outcome and it was diagnosed

even in the group without any postoperative complications.

Finally, rhinoplasty in most cases leads to disturbance or incomplete restoration of nose breathing. It is possible to considerable increase rate of unsatisfactory results after rhinoplasty by using statistic data in postoperative complications and its prevention.

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