



Predictors of Patients' Satisfaction after Rhinoplasty in the Aging Nose: Strategies' for Success

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Abstract

Background: The aims of this work were to offer an approach to planning an anatomically based sequence to rhinoplasty in the aging patient and to identify predictors of unsatisfactory outcomes.

Methods: Aging patients who had submitted to primary rhinoplasty (>60 yy) between 2014 and 2019 were identified. Patients were asked to fill the Italian Version of FACE-Q rhinoplasty module and the DAS59 questionnaire pre-operatively.

Results: 91 patients with a median age of 63 (IQR: 61/66.5) years were included in the study. Sixty-four percent of patients reported being very satisfied with the results of surgery. Logistic regression resulted in a model in which being male, single and reporting higher scores in the DAS59 were independently and significantly associated with an unsatisfactory outcome (OR: 3.34 (male); OR: 5.6 (single); OR: 1.1 (DAS59 score)).

Conclusion: In our series, aging patients' satisfaction was shown to be correlated to male gender, single status and higher psychological distress.

Keywords: Elderly; Nose; Rhinoplasty; Nasal valve; Osteotomy

Introduction

Age-related changes of the nose have recently become an area of intense interest and the focus of considerable research, in parallel with the increasing acceptability of aesthetic surgery in this age group [1,2].

The facial skeleton and the overlying soft tissue undergo a gradual transformation throughout the aging process and those effects on the infrastructure of the nose have been well delineated [3-6]. The nose lengthens in its upper and middle thirds and the tip droops increasing the discrepancy with basal nasal dimension which is typical of the short basal nose [7]. The bony skeleton of the nose experiments an enlargement of the piriform aperture and a reabsorption of the anterior nasal spine, weakening the support of the lateral crura and the external nasal valve [6,8]. Simultaneously, the cartilage components exhibit a growth of medial and lateral crura and a reabsorption of the caudal septum, affecting dome projection and rotation. Speaking, then, from an histological point of view, the thinning and fragmentation of the Lower Lateral Cartilage (LLC) and the ossification of the fibrous union between the Upper Lateral Cartilage (ULC) and the LLC lead to downward migration of the LLC, reducing the nasal projection and exaggerating the already acute nasolabial angle [1,9]. Lastly, the thickening of the skin and subcutaneous tissue with concomitant increased vascularity typical of the sun-exposed aged nasal skin contribute to the increased bulkiness and weight of the tip [3].

In the light of the above considerations, aging rhinoplasty focuses on performing tip derotation with tip refinement; increasing tip projection and relative columella lengthening; decreasing the overall nasal length; correcting the dorsal hump; addressing and supporting the internal nasal valves; and correcting septal deviation and inferior turbinate hypertrophy, if present [3,10]. Briefly, aging rhinoplasty focuses on reinforcing the cartilaginous nasal skeleton.

If the search of literature yields research papers that clearly document the anthropometric changes of the aging nose and the characteristics of rhinoplasty in the elderly, there is little focus on the functional and psychological aspects related to this type of surgery.

Certainly, the majority of elderly patients seeking for rhinoplasty suffer from both a morphological deformity and functional issues. Indeed, all the above structural changes translate

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into functional deficits and manifest as nasal obstruction from internal and external valve collapse and loss of tip support. Dilator naris atrophy further reduces the patients' ability to support the nasal valve [4]. The consequent impairment of the normal nasal air flow may also aggravate the effect of aging on the lower respiratory tract with worsening of the forced vital capacity and functional residual capacity [11].

However, there is a percentage of patients suffering from identity crises who attribute all their problems to the appearance of their nose, from frustration, social discomfort, to emotional defeats. They tend to have non-specific complaints about their nose, have vague and unrealistic expectations, and pay little attention to the preoperative interview. This increases the potential for dissatisfaction with outcome, no matter the technical success of the operation [12,13].

If the concept of "the simpler, the safer, the better" is always true, it is even truer for rhinoplasty in elderly patients, where I need to perform a safe procedure to achieve a natural-looking nose with stable results and to reduce the risk of performing secondary revisional procedures [14].

The aim of this work was to offer the surgeon an approach to planning an anatomically based restorative sequence to rhinoplasty in the aging patient and to identify the predictors of an unsatisfactory outcome after the surgical procedure.

Materials and Methods

Study design

The present study is a single-center observational retrospective review of prospectively collected data. All patients aged 60 years or greater who underwent rhinoplasty, either esthetic or functional, by the senior author (G.G.) between 2014 and 2019 with a minimum follow up of 1 year were identified.

Exclusion criteria included previous nasal or septal surgeries and patients with intranasal pathology or with a history of previous nasal trauma.

The work has been reported in line with STROBE guidelines [15]. No donor or funder had a role in the design or conduct of the study, the collection or analyses of the data, or the preparation of the manuscript. The study was performed in accordance with the 1964 Declaration of Helsinki and its later amendments.

Pre-operative evaluation

Data on demographic variables (age, gender), level of education, occupation, and marital status of the participants were collected.

Pre-operative consultation included a complete patient's medical history (including eventual previous plastic or rhinoplastic surgeries) and an in-depth objective examination to verify the presence and the degree of morphological and functional alterations.

All patients underwent a preoperative CT scan, full series of preoperative photographs (full face in frontal, three-fourths and lateral views; close-up views of the nose in the same projections, full basal and cephalic view). Objective measurement of nasal airflow was assessed using rhinomanometry. The subjective symptoms of nasal obstruction were measured using the validated disease-specific quality-of-life outcomes measure, the NOSE questionnaire. This measure contains 5 questions related to nasal obstruction along a 5-point Likert scale, with higher score indicating severe nasal obstruction [16-18].

Participants were asked to fill in the Italian Version of FACE-Q rhinoplasty module [19]. The FACE-Q rhinoplasty module is an instrument designed to evaluate Patient-Reported Outcomes (PRO) before and after undergoing rhinoplasty and to assess adverse effects regarding the nose. It has also been suggested to be the most suitable instrument to evaluate aesthetic outcome [20]. Rasch transformation was used to transform the results into a score from 0 to 100, with higher scores indicating greater satisfaction with appearance or quality of life.

Lastly, all patients filled the Derriford Appearance Scale (DAS59) questionnaire [21]. DAS59 was specifically designed to measure the psychosocial adjustment in patients with appearance problems, demonstrating excellent reliability and validity. It generates six measures of psychological distress and dysfunction (an overall, full-scale score and five factorial scores) as well as a measure of physical distress and dysfunction. Higher scores indicate greater distress and dysfunction in living with a problem of appearance.

A signed consent form was obtained from all the patients who participated in the study prior to surgery.

Surgical strategy

An open rhinoplasty approach was used in all cases. The surgery began with a stair-stepped transcolumellar incision that was joined with a marginal incision within each naris. A careful supra-perichondrium dissection was made at the level of the lower alar cartilage; then a subperichondrium dissection was performed preserving bone and cartilaginous vault and nasal function [14].

Quick tip: Protecting the nasal Superficial Musculoaponeurotic System (SMAS) is essential to avoid injuries to the already fragile vascular system and to facilitate the postoperative healing process. In addition, a soft tissue layer must be preserved over the skeleton, hiding eventual postoperative irregularities.

Component separation was done with a semi-sharp suction elevator, as described by Rohrich [22,23]. The anterior septal angle was initially approached by scissor dissection between the medial crura to identify the caudal septum. After raising mucoperichondrial flaps, the upper lateral cartilages were separated from the septum using suction elevator in a submucosal plane up to the nasal vault. Attention should be paid to the fragile and thin mucoperichondrial flaps and, when possible, the middle vault can be left intact. The septoplasty was then performed harvesting central septal cartilage and leaving a sizable and stable dorsal and caudal L strut for dorsal septal support.

Once access to the nasal skeleton was complete, a graduated approach to the correction of the nasal dorsum was done if an intrinsic dorsal aesthetic deformity was evident, emphasizing the integrity of the Upper Lateral Cartilages (ULC) when performing dorsal reduction [24]. A conservative correction of the dorsal bone hump with a fine rasp was performed (in alternative a Piezo instrument could be employed), preserving the integrity of the deep nasal bone periosteum, the perichondrium of the ULCs and the strong anatomical attachment of those structure (the so called K area) [24].

Quick tip: Preventing unintended damage to the key-stone area during aging rhinoplasty is essential. Indeed, the length and the rigidity of the ULC in relationship to the septum govern the functionality of the valve, already weakened with age. Poorly supported ULC may require upper lateral cartilage tension sparing

suture techniques; this approach reduces the need for spreader grafts or flaps in primary rhinoplasty procedures unless the dorsal reduction is greater than 5 mm [28]. However, as it often happens in aging and crooked nose, if spreader flaps or grafts are necessary, a more natural dorsal aesthetic line can be created by suturing the ULC over the dorsum using tension sparing sutures that cover the spreader grafts. Simultaneously, this maneuver widens the internal and external valve and reduces nasal airway obstruction.

Lateral osteotomies were avoided as bony nasal pyramid are more fragile and they may favor unpredictable results. When necessary, the percutaneous external technique using a sharp osteotome was chosen. The path for the lateral osteotomy was a “high-low-high” path [25]. The osteotomy was initiated “high” on the pyriform aperture, slightly above the attachment of the inferior turbinate; then was continued cephalically along a “low” path within the nasofacial groove until the level of the medial canthus. Finally, the osteotomy was curved superiorly and anteriorly in a “high” path into the thinner aspect of the nasal bone till the glabella. Medial osteotomies were never performed. When dealing with a crooked nose, strategically planned osteotomies were used to address the anatomical configuration of the nasal bone and provide a deviation of the bony vault (in-out fractures).

Quick tip: The percutaneous approach provides a direct visualization of the path of the desired osteotomy, reducing the incidence of damage to vestibular mucosa and preserving the periosteal attachments of the nasal bones. Moreover, it reduces the anatomical death space and the related incidence of fall of the fractured bones [29]. The intent of the high-low-high path is to preserve the opening of the nasal aperture, already enlarged with aging and the attachment of the pyriform ligament. Greenstick fractures are acceptable in the older patient and can often provide the desired effect with decreased postoperative risk of medial displacement.

The nasal tip was managed using conservative cephalic trim and a columella strut placed between the medial and lateral crura in combination with inter and intra dome-binding sutures. Lateral crura release from the underlying vestibular skin provided complete control of nasal tip position and contour by moving the domes medially or laterally.

Alar batten grafts were used to stabilize the inferior third of the nose, especially for patients with short nasal bones and long ULC. If needed, they were carved to less than 1.5 mm thick and placed at the pyriform aperture to resist internal nasal valve collapse [5]. If conservative dorsal hump removal had been done, a lateral crura overlay technique was frequently adopted in order to increase the nasal tip rotation and to correct the basal short nose. When necessary, a caudal septal extension graft was attached to the caudal end of the septum.

Quick tip: These maneuvers address several age-related deformities like the ptotic nasal tip and the short basal nose. The overlay technique reduces long and thin ULCs while the added surface area to the caudal septal angle allows deprojection, reprojection and rotation of the nasal tip, promoting postoperative resilience and preserving the elasticity of the nasal tip.

For additional projection and refinement, a soft cartilage onlay tip graft was sutured horizontally over the domes as described by Daniel [26] retaining an ideal tip configuration resembling a “gentle opened diamond”.

Quick tip: All cartilage grafts should be harvested preferentially

from the septum or auricular concha because, in elderly, costal cartilage may be calcified.

Functional nasal airway obstruction was approached addressing the septum and inferior turbinate appropriately, by privileging an extramucosal technique to minimize bleeding and scarring [3]. A weak ULC support at the mid vault narrows the internal nasal valve upon inspiration, exacerbating the obstruction caused by an existing septal deformity. The septoplasty and the correction of the drooping tip and of the collapsed internal nasal valve, as described above, contributed to restore proper airway flow dynamics.

In presence of a thick, sebaceous skin, an alar base thickness excision with subcutaneous fat tissue debulking may help to achieve better results, besides cartilage tip grafting.

Quick tip: Augmentation rhinoplasty plays a fundamental role in the remodeling of the osteocartilaginous framework in order to support the ptosis and the abundance of hard thick skin, especially in over 65-year-old patients.

Outcome evaluation

Patients completed the FACE-Q and NOSE scales at postoperative follow-up visits in an outpatient setting. For patients who completed the FACE-Q scales at multiple postoperative visits, only the most recent FACE-Q scale completion was used for data analysis.

Statistical analysis

Categorical data are presented as counts (percentages). Normality of distributions was tested using Shapiro-Wilk test. Since continuous numeric variables were not normally distributed, they are presented as medians (Interquartile Ranges [IQR]).

In the primary analysis, the existence of an association between patient satisfaction (dependent variable) and the independent variables collected (age, sex, marital status, occupational status, educational level, functional disorders evaluated with NOSE scales, personality trait evaluated with DAS59) has been studied. In order to “quantify” patients’ satisfaction based on FACE-Q, as the Minimal Clinically Important Difference (MCID) for the FACE-Q scores have not been established in the literature, this value was approximated using one-half of the mean baseline Standard Deviation (SD) as has been previously described [27]. Chi-square (χ^2) test was used for categorical data; the Mann-Whitney U test was used for numeric variables.

In the secondary analysis, logistic regression analysis was performed to identify univariate predictors for patients’ satisfaction with surgery. Variables that were significant in univariate analysis were included in a multivariate logistic regression analysis to search for independent predictors. A two-sided P value of less than 0.05 was considered to indicate statistical significance. All the analyses were performed using R statistical software, version 3.5.0 (R Foundation for Statistical Computing).

Results

A total of 91 patients (M:F=3:1) with a median age of 63 (IQR: 61/66.5) years were identified and included in the study. Mean (SD) time of last follow-up was 34.2 (18.9) months (range: 12 to 60). Demographic data are summarized. Median pre-operative DAS59 score was 145 (IQR: 134/148). All patients complained subjective respiratory symptoms with a median pre-operative NOSE score of 35 (IQR: 25/55).

FACE-Q Satisfaction with Nose, Satisfaction with Nostrils, and Social Functioning scores showed a significant improvement from baseline at time of last follow-up, with a mean (SD) change of the total score of 32.8 (26.8) points ($p < 0.05$) and no significant difference between the postoperative time points, as supported by the data reported.

When satisfaction at the last time of follow-up was examined, 64% of patients reported being very satisfied with the overall results of surgery.

The results from Chi-square (χ^2) test (categorical data) and Mann-Whitney U test (numeric variables) showed statistically significant association between all the independent variables collected and patients' satisfaction with surgery. Specifically, the "satisfied group" seemed to gather younger patients, with higher educational level, married or with a partner, with higher pre-operative DAS59 scores and lower NOSE scores.

Logistic regression for patient-rated satisfaction resulted in a final model in which being male, single and reporting higher scores in the pre-operative DAS59 questionnaire were independently and significantly associated with an unsatisfactory outcome after rhinoplasty (OR: 3.34 (male); OR: 5.6 (single); OR: 1.1 (DAS59 score).

Discussion

Although no study in literature specifies an age to serve as a dividing between "young" and "old" nomenclature, the majority of papers dealing with aging nose includes patients older than 65 years. Nevertheless, according to a review of the literature regarding rhinoplasty in old patients, several studies showed little change in cartilage character during rhinoplasty until over age fifty [10,28,29]. Consequently, we decided to widen the range of inclusion to include patients over 60.

It is well known that the knowledge and respect of nasal anatomy is fundamental for surgeons who approach rhinoplasty. This concept is even more critical when performing a rhinoplasty with advancing age, aiming to achieve a natural-looking nose with stable results and avoiding secondary deformities and the related revision surgeries. The authors' preferred structural sequential primary rhinoplasty is therefore based on the concept of "Open, Watch and Do" and is super impossible to the surgical principles of component separation already described in previous papers but with a focus on the specific aspects of the aging nose [30-32].

Next to this technical consideration, understanding the expectations and concerns of aging patients is critical to accomplish satisfactory results.

Literature offers several articles describing the negative predictors for satisfaction in patients seeking facial cosmetic surgery [33]. Male sex is frequently described as a risk for poor outcome, especially in combination with ageless than 40 years. The acronym SIMON stands for single and immature male who is overly expectant and Narcissistic and was presented by Gorney in 2003 [23,34,35]. Male patients who comply with this acronym are potentially problematic patients. With specific regard to rhinoplasty, Honigman et al. [36] reviewed the literature on psychological and psychosocial outcomes for individuals undergoing cosmetic rhinoplasty to address whether it improved psychological well-being and psychosocial functioning. They concluded that patients generally appeared satisfied with the outcome, although some exhibited transient psychological

disturbance. Again, male sex, young age, unrealistic expectations, minimal deformities, demanding patients, "surgiholics," relational or familial disturbances, an obsessive personality, and a narcissistic personality as well as a history of depression, anxiety, or personality disorder were identified as negative predictors.

We decided to focus our attention on the elderly population who seek for rhinoplasty, trying to identify possible predictive factors for unsatisfactory outcome. Indeed, the procedure in this patient population is more demanding because of the already known coexistence of multiple complicating psychological and anatomical factors and a possible middle-aged crisis related to divorce or the death of a spouse [10].

First, the association analysis showed somewhat results that are coherent with the ones already reported in literature for the population seeking for rhinoplasty without restricting the field to old age. Specifically, the male gender, the single status and a higher psychological distress and dysfunction (measured with DAS59) were associated with unsatisfactory outcome. In addition, the older patients get after 50 years of age, the less they are satisfied, and this may be explained with a greater difficulty accepting the outcome having consolidated their image over time. Conversely, patients mainly complaining about functional disorders seem to more favorable in terms of postoperative satisfaction, reasonably because surgical procedure is seen as a method to solve a problem and not as a mere aesthetic operation.

If we then wanted to look for independent predictive factors, multivariate analysis adds that the male gender, a single status and higher preoperative DAS59 scores could be used as predictors for patients' satisfaction after rhinoplasty.

The strength of our work is that it is the first study, to our knowledge, to examine the contribution of demographic, functional and psychological factors to postoperative satisfaction after rhinoplasty in aging nose in a prospective analysis.

Limitations include the circumstance that this study reflects a single surgeon's experience in one surgical practice. Thus, the generalizability of the results of this study cannot be certain. Also, the sample was over-whelmingly composed of men. Although these demographics reflect the nature of cosmetic rhinoplasty consumers in the aging population, it could be a selection bias.

Conclusion

In aging population, different psychological circumstances and particular anatomic characteristics mandate careful attention. To best address patient's wishes, surgeons must possess a sound understanding of the atrophic changes associate with the aging nose and pay more attention during presurgical consultations and clear communication should be prioritized. Knowing negative predictors for satisfaction (male gender, single status and higher psychological distress and dysfunction) and ruling out patients with body dysmorphic disorder or patients with unrealistic expectations may put the surgeon in a more comfortable and safe position together with higher satisfaction and lower number of revision cases.

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