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Prospective Evaluation of Aesthetic and Functional Outcomes following Video-Assisted Rhino-Septoplasty

Thomas Radulesco[1] · Dario Ebode[1] · Charbel Medawar[2] · Martin Penicaud[3] · Justin Michel[1]

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Abstract

Background Conservative techniques have been developed in the field of rhinoplasty, focusing on limited tissue resection while emphasizing the reshaping of nasal structural elements.

Objectives We aimed to prospectively evaluate aesthetic and functional outcomes following Video-Assisted Rhino-Septoplasty (VARS) using validated tools.

Methods Patients' self-reported outcomes were assessed before and 6 months after surgery. Aesthetic evaluations used FACE-Q Rhinoplasty modules (FQRM) *Satisfaction with Nose* and *Nostrils.* Functional evaluations were performed with NOSE scores. *T*-tests were used to determine the significance of the change in scores before and after surgery. p value < 0.05 was considered statistically significant.

Results Fifty patients were included (sex ratio = 0.16, mean age = 30 y.o., 78% primary cases). All patients had associated septoplasties, and 32 had inferior turbinate reductions. Mean FQRM *Nose* scores were 28.1 ± 16.3 before vs. 83.4 ± 17.2/100 after surgery. Mean FQRM *Nostrils* scores were 61.5 ± 28.6 before vs. 85 ± 21/100 after surgery. Mean NOSE scores were 49.5 ± 36.3 before vs. 14.8 ± 16.6/100 after surgery. All $p < 0.001$. We found no correlation between FQRM *Nose* and NOSE scores after surgery ($\rho = -0.1553$, IC95% (−0.41;0.12), $p = 0.28$).

Conclusion Our study showed that VARS is an effective technique, yielding high patient satisfaction in both aesthetic and functional outcomes.

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Keywords Endoscope · Closed rhinoplasty · Preservation · Nosejob · Patient-reported outcomes

Introduction

Rhinoplasty is a challenging procedure and is considered to be one of the most complex aesthetic surgeries [1]. Patient expectations have been rising steadily, driven in part by constant exposure to an idealized self-image on social media [2].

In this context, rhinoplasty specialists have striven to achieve the safest and most reproducible outcomes possible. Over recent years, conservative techniques have been developed, focusing on limited tissue resection while emphasizing the reshaping of nasal structural elements. Among these surgical techniques, Video-Assisted Rhino-Septoplasty (VARS) has been introduced as a feature of preservation approaches [3]. Through a restricted closed approach, this structural technique allows precise dissection and anatomic reconstruction of the middle third using spreader flaps performed endoscopically, under visual control. In addition to its evident educational benefits for novice rhinoplasty surgeons and residents, VARS has been

✉ Thomas Radulesco
Thomas.radulesco@ap-hm.fr

[1] Aix Marseille Univ, APHM, CNRS, IUSTI, La Conception University Hospital, ENT-HNS, Department, Marseille, France

[2] Style Beauty Clinic, Sin el Fil, Beirut, Lebanon

[3] Department of Oto-Rhino-Laryngology and Head and Neck Surgery, La Conception University Hospital, 147 Bd Baille, 13005 Marseille, France

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developed with the hope of achieving highly reproducible aesthetic and functional results, both being linked to final patient satisfaction [4].

Understanding and addressing the patient's concerns are pivotal in tailoring the surgical approach and achieving optimal results. In light of the rising significance of patient satisfaction, growing emphasis has been placed on integrating patient-reported outcomes (PROMs) in assessments of the success of such procedures [5].

Our primary objective was to prospectively evaluate aesthetic and functional outcomes following VARS using two validated PROMs tools: FACE-Q Rhinoplasty modules and the NOSE questionnaire.

Methods

Ethical Considerations

Patients provided written consent for the use of their images. All patients who contributed to the development of this study gave written consent before participating. The study was carried out in accordance with the Declaration of Helsinki. Authorization to conduct the study was obtained from the ethical committee of our institution (N°2017-14-12-005).

Sample

We performed a prospective single-centre study in an ENT department of a University Hospital. All patients operated on by two surgeons (TR and JM) by primary or secondary VARS between January 2022 and January 2023 were eligible. Inferior turbinate resections were proposed whenever preoperative four-phase rhinomanometry revealed improvement after vasoconstriction.

Inclusion criteria for the study were: age over 16 years, the presence of a septal deviation, a desire for aesthetic and functional improvement, and patient's signed written consent for participation in the study. Exclusion criteria were: any other cause of nasal obstruction (choanal atresia, adenoids, tumours, etc.), a nasal fracture in the past 6 months, surgical procedures requiring extensive reconstructions such as costal grafts. This technique can be applied across all indications for rhinoplasty, making it suitable for various nose types, whether in primary surgeries or revisions. The VARS technique (Video 1) is applicable to both bony and middle third nasal surgeries. Additionally, if required, a surgical step for nasal tip refinement via an extended marginal approach can be added to the procedure.

Scales Analysis

Two validated PROMs tools were used to evaluate patients pre- and postoperatively: the NOSE questionnaire for the functional analysis and the FACE-Q Rhinoplasty module (*Satisfaction with Nose and Satisfaction with Nostrils*) for the aesthetic analysis [6, 7]. Both self-questionnaires were submitted in the patients' native language [8, 9].

FACE-Q Rhinoplasty Modules (FQRM)

FQRM *Satisfaction with Nose* scale (10 items) was derived from the FACE-Q questionnaire, retaining the best subset of items based on psychometric tests and clinical importance. Items could be scored from 1 to 4 points: very dissatisfied (1 point), somewhat dissatisfied (2 points), somewhat satisfied (3 points), and very satisfied (4 points), giving scores from 15 to 40 points. To make scoring more understandable, the scores were converted to a scale ranging from 0 to 100, according to authors' recommendations. The higher the score, the greater the patient's satisfaction with their nose. Forty-seven over 100 was the threshold value for a satisfying aesthetic evaluation [10]. The FACE-Q questionnaire was completed by the patient during the preoperative consultation and 6 months after surgery. We also used the FQRM *Satisfaction with Nostrils* scales (5 items) applying the same scoring system and converted the score over 100 as recommended. No normal values were available in the literature. The higher the score, the greater the patient's satisfaction with their nostrils.

The NOSE Questionnaire

NOSE (Nasal Obstruction Symptom Evaluation) is a graduated 20-point scale, which is multiplied by 5 to give a final total out of 100. A score of 100 indicates complete nasal obstruction. A NOSE score under 25 is considered normal; a score between 25 and 50 denotes low nasal obstruction and a score above 50 severe nasal obstruction. The NOSE questionnaire was completed by the patient during the preoperative consultation and 6 months after surgery.

Outcomes Measurements

Our primary outcome was to evaluate aesthetic and functional PROMs following VARS. Our secondary outcome was to seek correlations between aesthetic and functional outcomes.

Statistics

T-tests were used to determine the significance of the change in scores before and after surgery. The statistical search for correlations between aesthetic and functional results was made using the Pearson correlation coefficient. Results were analysed with Microsoft Office Excel 2007. Statistical calculations were made with PAST software (Oyvind Hammer, Natural History Museum, University of Oslo, Norway). A p value < 0.05 was considered statistically significant.

Results

Analysis of the Overall Population (Table 1)

Fifty-six patients met the inclusion criteria and were included in this prospective study. Six patients did not attend their 6 months postoperative examination and were excluded from the analysis. Total number of patients included was 50 (43 women, 7 men (SR = 0.16)). Mean age was 30.4±12 years (range 17-61). Thirty-nine patients underwent primary procedures, and 11 received revision procedures. Most indications were dorsal hump reduction (96%). No nostrils surgery was performed, but 39 patients had associated marginal incisions for tip shape or position modifications. All patients had associated septoplasties, and 32 had inferior turbinate reductions. Inferior turbinate reductions were performed submucosally using a 2.9-mm shaver. No severe complication (nasal bleeding, infection, skin necrosis, etc.) was observed in our series.

Table 1 Characteristics of population.

Characteristics	*n*	%
Female	43	86
Male	7	14
Primary rhinoplasty	39	78
Revision surgery	11	22
Aesthetic indication		
Deviation	12	24
Dorsal hump	48	96
Tip abnormality (shape and/or position)	29	58
Saddle nose	1	2
Functional procedure		
Septoplasty	50	100
Inferior turbinate reduction	32	64

FQRM Satisfaction with Nose

Before surgery, mean score was 28.1±16.3/100 (range 0-54). After surgery, mean score was 83.4±17.2/100 (range 10–100). The difference was statistically significant ($p<0.001$). Before surgery, 46 (92%) patients had a score lower than or equal to 47/100 (considered unsatisfactory). After surgery, 1 patient had a score lower than or equal to 47/100. The FQRM *Satisfaction with Nose* score improved in all patients (Fig. 1). Details of items are presented in Fig. 2.

FQRM Satisfaction with Nostrils

Before surgery, mean score was 61.5±28.6/100 (range 0-100). After surgery, mean score was 85±21/100 (range 24–100). The difference was statistically significant ($p<0.001$). The FQRM *Satisfaction with Nostrils* score improved in all patients (Fig. 2).

NOSE Scores

Before surgery, mean NOSE score was 49.5±36.3/100 (range 0–100). After surgery, mean NOSE score was 14.8±16.6/100 (range 0–60). There was a statistical difference between pre- and postoperative values ($p<0.001$). Twenty-four patients (48%) had preoperative NOSE scores higher than 50/100 reflecting severe obstruction. One patient (2%) had a postoperative NOSE evaluated at 60/100 and two (4%) at 50/100. There were no differences in pre- or postoperative NOSE scores in patients undergoing inferior turbinate reduction, or not (preoperative mean = 55 vs 40.7/100, $p = 0.24$; postoperative mean = 16.2vs11.9/100, $p = 0.37$).

Correlations Between Aesthetic and Functional Analyses

We found no correlation between FQRM *Satisfaction with Nose* and NOSE scores after surgery ($\rho = -0.1553$, IC95% (-0.41;0.12), $p = 0.28$).

Discussion

Synopsis of New Findings

In this prospective study, we aimed to evaluate aesthetic and functional outcomes of the VARS procedure. Using two validated assessment tools, we observed highly satisfactory self-reported outcomes concerning both aesthetic and functional aspects 6 months after surgery.

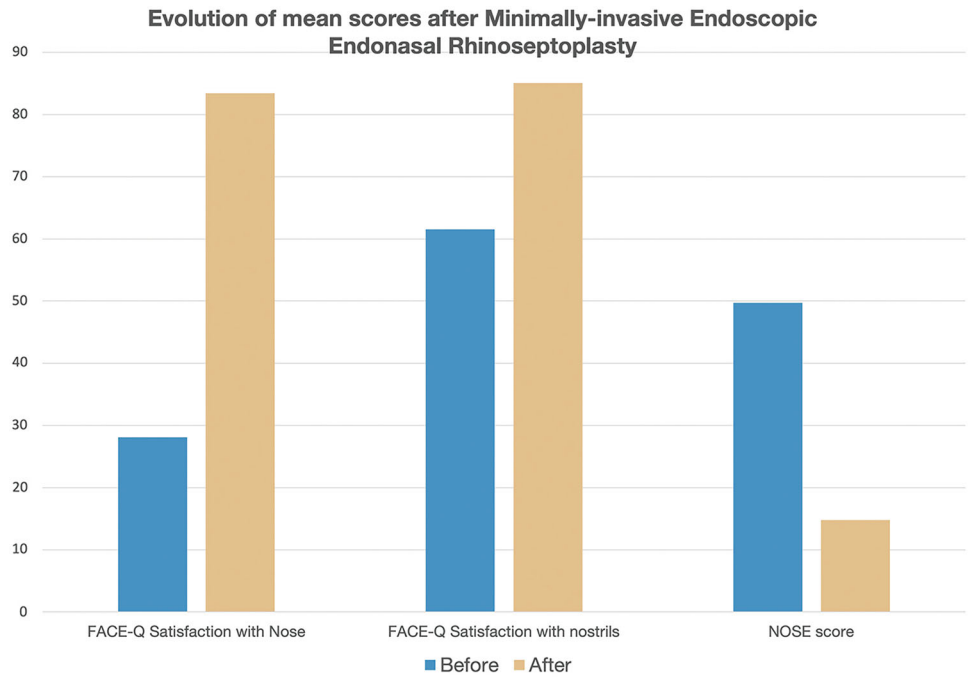


Fig. 1 Evolution of aesthetic and functional scores before and after Video-Assisted Rhino-Septoplasty. All changes were statistically significant ($p<0.001$).

Aesthetic Evaluation

Regarding the aesthetic analysis, we used the FQRM modules revealing a significant increase in both *Satisfaction with Nose* and *Nostrils* scores, including 98% of patients exceeding the recommended threshold value for satisfaction. Although our series included a relatively small number of patients and the absence of long-term evaluation, the satisfaction rates typically described in the literature are often lower, which encourages us to continue along this path [11, 12]. The FQRM is a widely used tool for assessing results after rhinoplasty [13]. Items pertaining to the dorsal hump and the middle third specifically suggested that VARS enabled precise hump resection in line with the patients' desires and ensured a high-quality and controlled anatomical reconstruction of the middle third, thus preventing 1. midvault narrowing, leading to potential V deformity, and 2. midvault widening, thanks to transfixing incision of upper lateral cartilages for spreader flap modelling (Fig. 1, Fig. 3). In the spirit of preservation techniques, VARS could have an advantage over dorsal preservation procedures, a frequent criticism of which, precisely, involves postsurgical widening of the midvault [14].

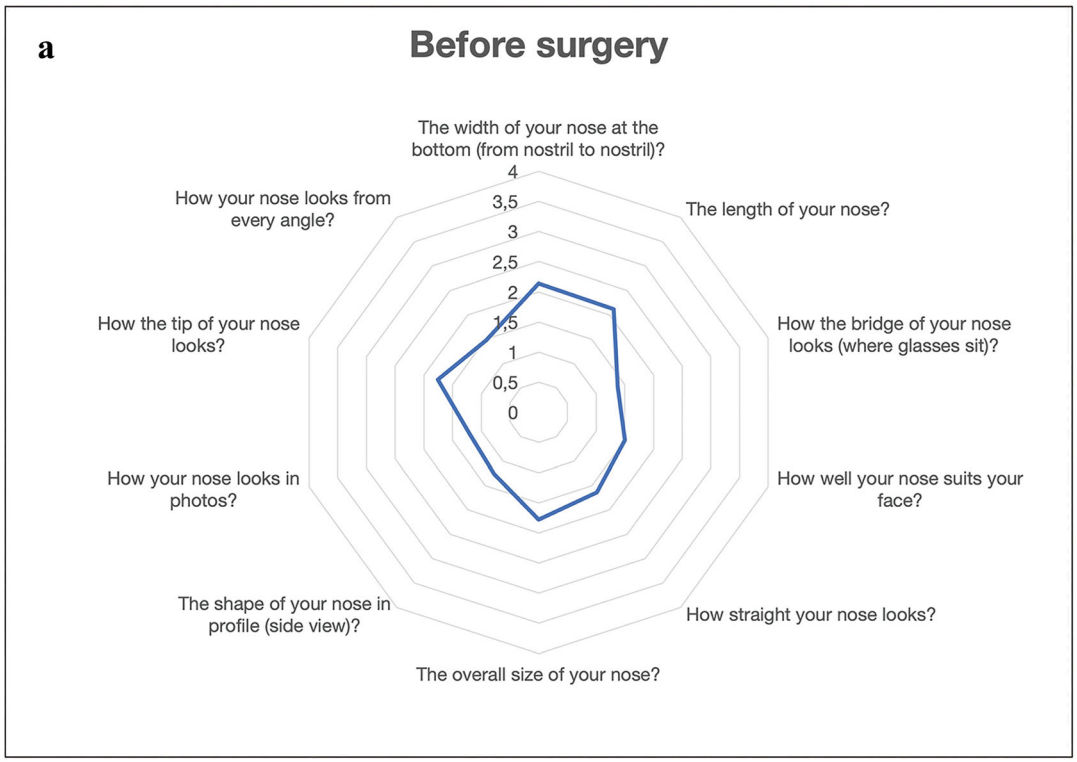
The VARS procedure does not include nostrils correction. The improvement in FQRM *Satisfaction with Nostrils* can be ascribed to an overall improvement in nasal proportions, notably regarding nasal tip projection impinging on nostril shape.

Functional Evaluation

The success of the surgical technique lies not only in achieving aesthetic improvements but also in addressing functional concerns. Our findings showed significant improvements in NOSE scores with a notable improvement in obstruction symptoms. In our study, patients may have had various causes of nasal obstruction limiting evaluation of the intrinsic functional impact of spreader flaps. However, postoperative data suggest that VARS is not only compatible with the treatment of all causes of architectural nasal obstruction, e.g. septal deviations and inferior turbinate hypertrophies, but also preserves and/or treats internal nasal valve disorders. It is widely recognized that internal nasal valves can be compromised in structural rhinoplasties when inadequately preserved. Among surgical procedures designed to manage the internal nasal valve, spreader flaps have shown great efficiency and reproducibility [15, 16]. VARS ensures optimal respiratory comfort and thus facilitates placement of such flaps thanks to its closed approach under visual control.

VARS: Precision and Reproducibility

We applied VARS in all patients, whatever the initial aesthetic dysmorphosis, making it highly reproducible and adaptable to a variety of cases. Moreover, thanks to its use of endoscopic visualization, this approach provides septoplasty and turbinate procedures with optimal conditions. The current trend in functional endoscopic sinus surgery recommends using endoscopes to achieve better outcomes



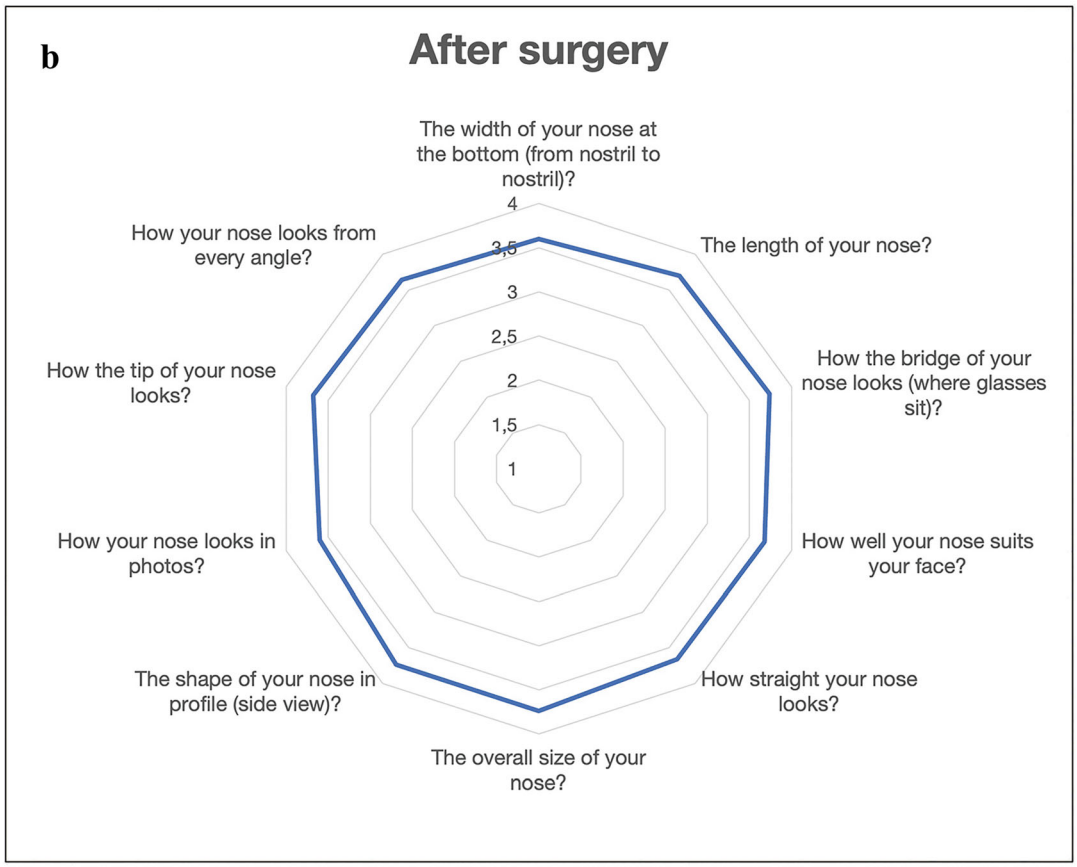


Fig. 2 Mean values of the "Face Q Rhinoplasty *Satisfaction with Nose"* items before (**a**) and after (**b**) Video-Assisted Rhino-Septoplasty.

Fig. 3 25-year-old female patient before (**a** to **d**) and after (**e** to **h**) Video-Assisted Rhino-Septoplasty (VARS) procedure in facial, 3/4, right lateral and basal views. VARS sought to correct the profile line while preserving the middle third. No tip surgery was performed in this patient.

[17, 18]. The versatility and efficiency of the technique offer a comprehensive solution for a wide range of patients, ensuring successful outcomes and patient satisfaction across different nasal conditions. As discussed in the literature, we truly believe that VARS is a major innovation in the field of rhinoplasty [19].

Limitations and Future Directions

Despite promising results, some limitations should be acknowledged. Our study was conducted in a single centre, which might limit the generalizability of the findings. Additionally, the relatively short six-month follow-up period may not fully reveal long-term outcomes and potential changes over time. Further research with larger cohorts and longer follow-up periods will be valuable to validate and enhance our findings. While widely used, self-report questionnaires may be influenced by individual perceptions and biases, potentially affecting the study's outcomes. Future research could consider incorporating objective measurements or crowdsourcing evaluations to enhance data reliability and comprehensiveness, thus improving the overall robustness of findings.

Conclusion

Our study suggests that VARS is an effective technique, yielding high patient satisfaction in both aesthetic and functional outcomes. We believe the introduction of VARS in rhinoplasty surgery represents a significant advance towards achieving optimal and reproducible outcomes for patients seeking natural aesthetic improvements through minimally invasive approaches.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s00266-024-04146-3.

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Declarations

Conflict of interest All authors have nothing to disclose. There is no conflict of interest.

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