

A study of Rhinoplasty Outcome Evaluation (ROE) in Endonasal Aesthetic Rhinoplasty in Secondary Cases

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Abstract

Background: Rhinoplasty is and remains one of the most complex surgical procedures facing the plastic surgeon. There was long-lasting debate between open and closed rhinoplasty approaches supporters. The rationale for this study was to explore the efficiency and safety of the endonasal approach as a reliable procedure for secondary rhinoplasty.

Methods: The study was conducted in two centers in Cairo, Egypt during the period from October 2011 to April 2016. We recruited patients with previous one primary rhinoplasty, between 18 to 50 years. All patients were evaluated by detailed history, careful physical examination and photographed pre and postoperative. All cases underwent endonasal rhinoplasty. After surgery, all cases were followed up for one year. Rhinoplasty Outcome Evaluation (ROE) instrument to assess the rhinoplasty outcomes.

Results: Seventy-five subjects were included in the analysis of this study, 29(39%) males and 46(61%) females. The mean age of presentation was 30.03(6.85) years. Forty-five cases (60%) of them had their previous surgery using open rhinoplasty technique and the other 30 cases (40%) had their previous surgery using endonasal (closed) rhinoplasty technique. Time between primary and secondary operation was at least 6 months. The mean duration of the operation was 77.13(26.10) minutes.

Postoperative assessment of the outcomes by the doctors revealed complete satisfaction with the outcome in 55(73%) of cases, moderate satisfaction in 17(23%) and low satisfaction only in 3(4%) of cases.

Patients were asked about their satisfaction using the ROE questionnaire. Statistically, there was a significant ($p < 0.001$) improvement in the ROE score before and after the operation.

The mean preoperative ROE score was 34.50(6.90). The mean postoperative ROE score was 75.28(13.71). Only three cases (4%) asked for further correction and operation. Edema was occurred in 45(60%) of cases, hematoma in 13(17%) and hematoma at donor site in 1(1%). All complications were resolved by time.

Conclusion: Finally, we can conclude that the endonasal (closed) technique rhinoplasty may be a reliable option that represents a good choice for repair of the deformities in cases requiring secondary rhinoplasty.

Keywords: Endonasal rhinoplasty; Closed rhinoplasty; Satisfaction; Complications rate.

Introduction

The anatomical framework of the nose with its three-dimensionality has a significant impact on the overall aesthetic balance of the face. Thus, it affects the overall perception of beauty. Hence, any imbalance can lead to emotional disturbance. Besides, the nose has a vital functional role in the respiration [1].

In plastic surgery, rhinoplasty is one of the most complex surgical procedures and is widely sought after by both male and female patients because of an obvious change in the aesthetics of the center facial area. It remains a challenging procedure facing the plastic surgeon. Its outcome is affected by several significant patient factors

including the quality and thickness of the skin, the quality of the cartilage, the length of the nasal bone, the nostril size and the patient's compliance with follow-up [1, 2].

There are two main approaches of rhinoplasty. The first is the open approach where the skin drape is completely lifted up from the nasal tip, and then additional incisions are made inside the nose. The second is the endonasal (closed) approach where the surgeon makes the incisions in the interior of the nose, so that skin drape remained unchanged and attached at the columella [3].

There was a long-lasting debate between both rhinoplasty approaches supporters [4]. The open approach of rhinoplasty allows for identification of small anatomic differences and structural problems as well as a better view of the cartilage structures. Thus, the surgeon can work on the nasal cartilages more efficiently in their natural position [5]. However, the drawbacks include an added length of the procedure, nasal scars, prolonged edema especially the tip, loss of the direct relation between the cartilage structures and skin coverage. The absence of this intact skin cover exposes the surgeon to a less precise overall aesthetic evaluation [5, 6].

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Principles of the modern surgery are minimal invasiveness, less operation time, preserving elasticity, natural anatomy, and aesthetic appearance without visible scars, restoration of the physiology of the anatomical structures with quicker healing. Based on these principles, endonasal rhinoplasty can be considered extremely modern [7].

The dissatisfaction with the result of the rhinoplasty and the incorrect technique or assessment of nasal anatomy, are the principal reasons behind secondary rhinoplasty operation. Here, the surgical revision is even more challenging than the primary rhinoplasty, because its main purpose is to modify the cosmetics or the functional defects after patient's dissatisfaction with a previous procedure [1].

Thus, the rationale intended for the current study was to explore the efficiency and safety of the endonasal approach as a reliable procedure for secondary rhinoplasty.

Patients and Methods

This multi-center case-series study was conducted during the period from October 2011 to April 2014 with one year follow-up period (up to April 2015) in Al Kateb Hospital and Royal Hospital, Cairo, Egypt. The goal of this study was clearly explained in the Arabic language to all subjects before their enrollment to the study, and an informed consent form was signed by and obtained from all of those enrolled.

We recruited patients with previous one primary rhinoplasty, male or female, between 18 to 50 years. Exclusion criteria included: American Society of Anesthesia score 3 or 4 (high risk for anesthesia), patients with organ failure, diabetes mellitus, and collagen vascular diseases, and patients with bleeding tendencies. Also, cases of reconstructive rhinoplasty were excluded.

Preoperative and postoperative patient assessment

All patients were evaluated by detailed history, careful physical examination and photographed pre and postoperative using Nikon d3200 DSLR Camera, 18-55 mm lens. Photography views were anterior, lateral (both sides) and basal view. Smoking was stopped at least three weeks before the procedure.

History included: age of the patient, gender, primary rhinoplasty reasons and type, duration since primary rhinoplasty. Besides, history of cardiac problems, liver disease, renal disease or recent drug intake was performed.

Adequate physical examination with stress on the following points was done: the general examination includes signs of renal failure or liver disease. A detailed examination was done to analyze the defect(s) and tell the patients how to deal with it.

We explained to the patient about the incision, the scars, the idea of the operation, discussion with him/her to know their expectations.

We used the Rhinoplasty Outcome Evaluation (ROE) instrument to assess the rhinoplasty outcomes. We made it pre and six weeks postoperative. The questionnaire consists of six questions, two for each factor considered critical to patient satisfaction (physical, emotional, and social). Each item has a score from a 0-4 scale, with 0 is the most negative and four the most positive response the minimum total score is 0, and the maximum is 24. We divided the total score by 24 and multiplying by 100 to calculate the scaled instrument score with a range 0-100, with 0 is the least, and 100 is the most patient satisfaction [8, 9]. The same questionnaire was completed by trained interviewers that translated the questions into the native language (Arabic) with the same methodology. Data analysis was conducted to compare the results before and after rhinoplasty.

Laboratory investigations

Blood samples were taken from patients as routine preoperative preparation for complete blood picture, coagulation profile and liver and kidney functions, random blood sugar.

Technique

Local anesthesia was used in all cases; however, the setting for conversion to general anesthesia was always on standby. We used combined sedation and local anesthesia by two modalities. As baseline analgesia, we used 5 mg Morphine. The used nerve blocks were supratrochlear, supraorbital, lateral nasal and labial. The sedation was done only at the time of injection and osteotomy by 100 mg Propofol and 3 mg Midazolam. Composition of local anesthesia: 0.25 ml adrenaline, 15 ml Lidocaine 2% and 10 ml Bupivacaine 0.5 % and 25 ml Normal Saline 0.9 %. We used Fentanyl increment 25 micrograms whenever pain was encountered during the procedure. Ondansetron (Zofran) 4 mg was used as antiemetic on demand. One gram of third-generation cephalosporin was injected after induction of anesthesia.

After trimming of hair from the nostrils, bilateral 1.5 mm rim incisions cephalic to the edge of the nostrils were made. After transcolumellar fixation in front of the medial crura, delivery of lower lateral cartilage was made by subcutaneous dissection. Then, dissection brought upwards in supra perio steal & Sub-SMAS plane keeping the integrity of nasal mucosa and its dorsal attachment to the osteo cartilaginous framework. After that, trimmings of the excess parts of the lower lateral cartilage and the upper lateral cartilage were made. Rasping of the dorsal hump was made after lateral L-shaped low osteotomy. After interdomal suturing, suturing of the columella by columellar strut plus intercrural sutures by proline 4/0 was made followed by closure of mucosa by vicryl 5/0, intranasal packing by vaseline gauze and external nasal splinting by orphit.

Discharged on the second day with prescription included an oral antibiotic, an analgesic, and an anti-inflammatory. The first visit would be on the 5th postoperative day to check for wounds, six weeks postoperative. The patients were invited for the second interview after Six months and then followed for one year after surgery.

Doctors' assessment of the operation was made at six weeks postoperative using a satisfaction scale from 0 to 2 where two means completely satisfied, one moderately satisfied and 0 equal not satisfied at all.

Outcome measures

The primary outcome measure was to assess the success of the endonasal approach of rhinoplasty by the subjective evaluation of functional and aesthetic results using the ROE (Rhinoplasty outcome evaluation) score and by the doctors' satisfaction with the operation. The secondary outcome measure was to quantify the short-term and long-term complications.

Statistical analysis

All statistical tests were done using a significance level of 95%. A value of $P < 0.05$ was considered statistically significant. SPSS software (Statistical Package for the Social Sciences, version 20.0, SSPS Inc, Chicago, IL, USA) was used for the statistical analyses. Data were presented as (mean \pm SD) or median (range) for continuous variables and as a frequency and percent for categorical variables. Comparisons were made using the paired t-test for continuous variables.

Results

All subjects with previous one primary rhinoplasty and aged from 18 to 50. Operations were done between October 2011 and April 2014 with a 1-year follow-up to assess the long-term result of the technique.

Baseline characteristics and operative details

Seventy-five subjects were included in the analysis of this study, 29 (39%) males, and 46 (61%) females. The mean age of presentation was 30.03 (6.85) years with a range from 19 to 45 years. Forty-five cases (60%) of them had their previous surgery using the open rhinoplasty technique, and the other 30 cases (40%) had their previous surgery using the endonasal (closed) rhinoplasty.

The most prevalent reasons for primary rhinoplasty were: nasal hump in 25 (33%), long nose 19 (25%), broad tip 12 (16%) and wide nostrils 10 (13%). Other less frequent reasons are shown in Table 1.

Table 1: Patients’ demographics and baseline characteristics

	Mean (SD)	(min-max)
Age, years	30.03 (6.85)	(19-45)
Duration of operation, min	71.13 (26.10)	(30-140)
Gender, n (%)	329 (45.93)	(285-495)
	Male	29 (39)
	Female	46 (61)
Type of primary rhinoplasty, n (%)		
	Open	45 (60)
	Closed	30 (40)
Reasons for primary rhinoplasty, n (%)		
	Nasal hump	25 (33)
	Long nose	19 (25)
	Broad tip	12 (16)
	Wide nostrils	10 (13)
	Crooked nose	5 (7)
	Wide nasal bridge	5 (7)
	Bulbous tip	3 (4)
	Cleft lip nose	3 (4)
	Saddle nose	3 (4)
	Deviated nasal septum	2 (3)
	Sagging columella	1 (1)
	Short nose	1 (1)

The mean time between primary and secondary operation was one year or less in 56 (75%) of cases and more than one year to five years in 19 (25%) cases of them. Time between primary and secondary operation was at least six months.

The most prevalent reasons for the secondary rhinoplasty were: residual nasal hump in 23 (31%), broad tip 16 (21%), deviated nasal septum 12 (16%), asymmetrical nostrils or nasal configuration 9 (12%) and visible scars 8 (11%). Other less frequent reasons are shown in Table 2.

The mean duration of the operation was 77.13 (26.10) minutes with a minimum of 30 and a maximum of 140 minutes.

Table 2: Secondary rhinoplasty: reasons and duration from primary rhinoplasty

	n (%)
Reasons for secondary rhinoplasty, n (%)	
	Residual nasal hump 23 (31)
	Broad tip 16 (21)
	Deviated nasal septum 12 (16)
	Asymmetrical nostrils or nasal configuration 9 (12)
	Visible scars 8 (11)
	Wide nostrils 7 (9)
	Prominent upper / upper lateral nasal cartilage 3 (4)
	Depressed nasal bridge 2 (3)
	Broad base 1 (1)
	Bulbous tip 1 (1)
	Perforated septum 1 (1)
	Pollybeak tip 1 (1)
	Sagging columella 1 (1)
	Short nose 1 (1)
Duration between primary and secondary rhinoplasty, n (%)	
	One year or less 56 (75)
	More than one year to five years 19 (25)

Doctors’ assessment of the outcome and patients’ satisfaction

Postoperative assessment of the outcomes by the doctors revealed complete satisfaction with the outcome in 55 (73%) of cases, moderate satisfaction in 17 (23%) and low satisfaction only in 3 (4%) of cases, as shown in Figure 1: Long-term follow-up of at least one year showed 95% success in solving the problem.

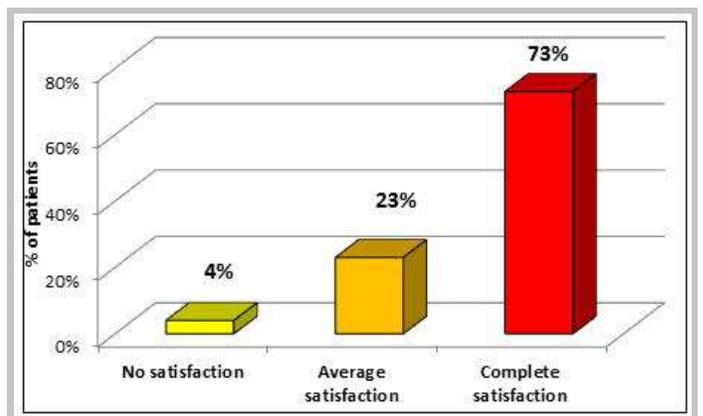


Figure 1: Doctors’ satisfaction of the procedure

Patients were asked about their satisfaction using the ROE questionnaire. Statistically, there was a significant ($p < 0.001$) improvement in the ROE score before and after the operation.

The mean preoperative ROE score was 34.50 (6.90) with a minimum of 25.00 and a maximum of 58.33. The mean postoperative ROE score was 75.28 (13.71) with a minimum of 25.00 and a maximum of 95.83, as shown in Figure 2 & Table 3. Only three cases (4%) asked for further correction and operation.

Figure 2: Patients' satisfaction using the ROE score

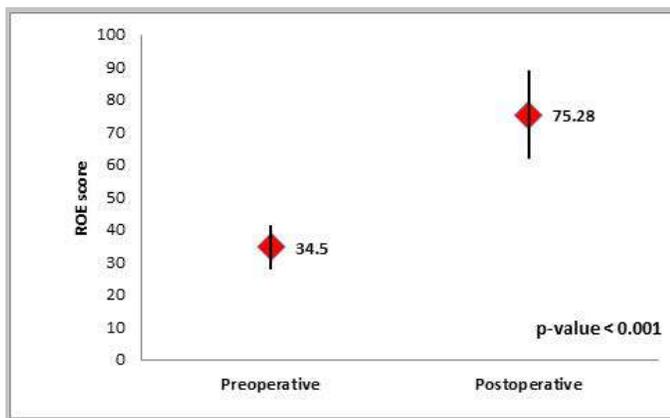


Table 3: Rhinoplasty Outcome Evaluation (ROE) score

	Preoperative	Postoperative	p-value
Mean (SD)	34.50 (6.90)	75.28 (13.71)	< 0.001
Minimum	25.00	25.00	
Median	33.33	75.00	
Maximum	58.33	95.83	

Postoperative complications

No complications detected in 17 cases (23%), edema in 45 (60%), hematoma in 13 (17%) and hematoma at donor site (ear) in 1 (1%), as shown in Table 4.

Table 4: Postoperative complications

	Number (%)
Postoperative complications	
No complications	17 (23)
Edema	45 (60)
Hematoma	13 (17)
Hematoma at donor site (ear)	1 (1)

Figure 3: (Case 1)



Figure 4: (Case 2)



Figure 5: Long peaked Nose, Broad tip, Broad base and hump (Case 3)



Figure 7: (Case 5)



Figure 6: (Case 4)



Discussion

Since the inception of nasal surgeries and the time of the father of the modern corrective rhinoplasty Mr. Joseph J (1931), the endonasal (closed) rhinoplasty was the favored approach. However, this has been changed during the last three decades toward the favor of the open rhinoplasty approach. Despite this dramatic paradigm shift in the surgical approaches to the nose, still the issue debatable [2].

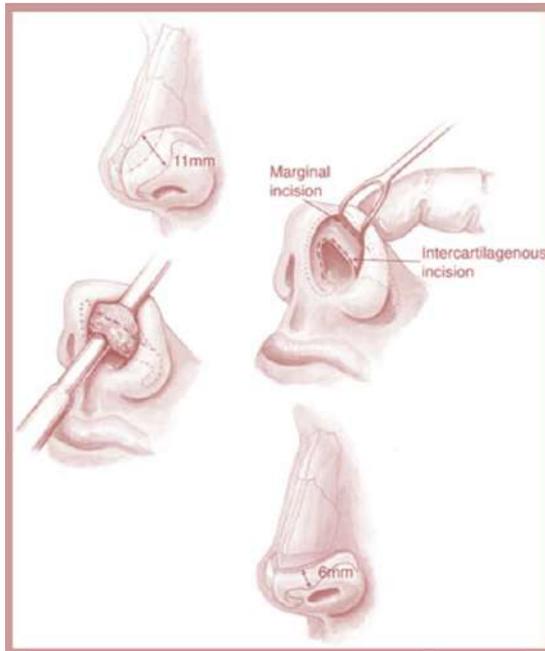
During the last decade, we have here and there some advocates of the closed rhinoplasty proposing research studies to prove the efficiency of the technique, suggest that it is not out-of-date procedure. Our research study is a contribution to this debate to investigate the efficiency of the endonasal approach of rhinoplasty. Our study is a case series analysis conducted upon patients with previous one primary rhinoplasty with a follow-up period of one 1-year. We adopted the delivery technique of the endonasal (closed) approach because it allows for a direct visualization of the cartilages, can be equivalent to the open method in most cases in that sense [Figure 8].

The incision is made along the caudal border of the lower lateral crura extending medially on each side to the medial crus. It may continue along the columella as required for exposure keeping in mind not to violate the soft tissue triangle deep to the domes in order to prevent the postoperative notching of the nostril. For the sake of the modification of the tip, we made an inter-cartilaginous incision to allow a bi-pediced flap to be delivered into the operative field. The alar cartilages may now be refined with cephalic trim, intra-domal, and inter-domal sutures, and selectively weakened with cross hatching techniques [2].

The results of our study showed that this approach is successful in 95% of cases with a highly significant improvement in the patients'

ROE score as a subjective measure of satisfaction added to the doctors' assessment. All adverse events experienced were transient and resolved by time. In our study, secondary rhinoplasty was mostly satisfactory in the patients' opinion. The technique gives us the ability of good exposure with preservation of columella without interruption. All our patients were primarily operated not by us; however, the least time between the primary operation and our interference was six months. The average operative time was 90 minutes. The technique proved useful in all cases of secondary rhinoplasty which is by nature difficult to attack due to fibrosis seen caused by the previous operation.

Figure 8: Delivery techniques [2].



With the development of the non-transcolumellar open technique, described by Holmstrom H. and Luzi F. (1996) and Asuman et al. (2006), it is possible to obtain a good view of the nasal cartilage structures and to avoid cutaneous scars [10, 11]. This is possible by using a marginal bilateral incision described in 1990 by Guerrerosantos, which uses a two-sided circular incision permitting complete dissection of the alar cartilages and the overhead skin cover of the columella [12].

This approach, together with the extra-mucous technique, allows full exposure of the skin and nasal septum without a columella incision. However, they suggested that the method is suitable for primary rhinoplasty cases and negates the use of open rhinoplasty especially cases with significant anatomic alteration of the tip with expected excellent aesthetic results [10].

Many research studies proposed the open rhinoplasty for secondary rhinoplasty operation. In the year 2000, Vuyk HD et al. had published a study about revision rhinoplasty, in which they did 110 cases over a five-year period. They analyzed the problem using six views photography (frontal, basal, left lateral, right lateral, left three-quarter lateral and right three-quarter). They performed 93% of cases as open technique, while 7% as closed approach [13]. Also, in less than 3 and half years study duration, Jiann-Jy C et al. in 2010 had published

that 27 patients underwent secondary rhinoplasty using the open technique, as they said, because of unclear anatomies and scar tissues in revision rhinoplasty [14].

We have another opinion contrary to Douglas H. who had published an article in which he wrote that the closed approach to rhinoplasty has fallen out of favor due to the misconception that the nasal tip cannot be symmetrically molded except by direct vision through a divided columella [15].

In the current study, we did not conduct a diagnostic nasal endoscopy or evaluation for nasal obstruction by questionnaires (NOSE/ SNOT22). We rely upon x-ray and clinical examinations for primary cases, and CT nose and paranasal sinuses for secondary cases.

In our study, in secondary cases, there was a large number of deviated nasal septum (DNS) due to fibrosis and retraction during the healing process after the primary operation. In all cases with DNS, we made a septoplasty. In addition, we did not use spreader nor add on grafts.

Finally, we think that this technique of endonasal (closed) rhinoplasty showed success in revision surgeries as evaluated by the surgeons and by the overall satisfaction of patients which makes the technique is a reliable option for those kinds of patients.

However, further studying of the factors affecting the success of the operation is mandatory. Moreover, we warrant studying the technique in secondary rhinoplasty in each class of patients according to the reason for the revision surgery to select which patient is a candidate for this technique with success and without complications.

Conclusion

We can conclude that the endonasal (closed) technique rhinoplasty may be a reliable option that represents a good choice for repair of the deformities in cases requiring secondary rhinoplasty. A further large-sample study is recommended to allow a real evidence and quantification of the success of this operation.

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