

External rhinoplasty: a critical analysis of 500 cases

HOSSAM M. T. FODA, M.D.

Abstract

The study presents a comprehensive statistical analysis of a series of 500 consecutive rhinoplasties of which 380 (76 per cent) were primary and 120 (24 per cent) were secondary cases. All cases were operated upon using the external rhinoplasty technique; simultaneous septal surgery was performed in 350 (70 per cent) of the cases. Deformities of the upper two-thirds of the nose that occurred significantly more in the secondary cases included; dorsal saddling, dorsal irregularities, valve collapse, open roof and pollybeak deformities. In the lower third of the nose; secondary cases showed significantly higher incidences of depressed tip, tip over-rotation, tip asymmetry, retracted columella, and alar notching. Suturing techniques were used significantly more in primary cases, while in secondary cases grafting techniques were used significantly more. The complications encountered intra-operatively included; septal flap tears (2.8 per cent) and alar cartilage injury (1.8 per cent), while post-operative complications included; nasal trauma (one per cent), epistaxis (two per cent), infection (2.4 per cent), prolonged oedema (17 per cent), and nasal obstruction (0.8 per cent). The overall patient satisfaction rate was 95.6 per cent and the transcolumellar scar was found to be unacceptable in only 0.8 per cent of the patients.

Key words: Nose; Surgical Procedures, Operative; Rhinoplasty

Introduction

The modern era of rhinoplasty started in 1887 by using 'only' intranasal incisions.^{1,2} In the early 20s the columella appealed to surgeons as presenting the best avenue of approach to the nose and many authors described using external columellar incisions for rhinoplasty.^{3–5} However, it was not until 50 years later that Goodman⁶ revived, refined, and popularized the use of the external approach in rhinoplasty. Since then, a progressive increase in popularity of the external approach has been noted as evidenced by the huge number of publications discussing indications, modifications, advantages, and expanded applications of that approach.

On reviewing the rhinoplasty literature, numerous reports^{7–10} are found presenting valuable statistical analysis of large series of rhinoplasty cases that were operated upon using the closed approach, however, it is rare to find similar reports on external rhinoplasty.

The aim of the current study is to present a comprehensive statistical analysis of a series of 500 consecutive rhinoplasty cases operated upon using the external approach.

Patients and methods

A retrospective analysis was carried out of 500 consecutive external rhinoplasties performed by the

author, between July 1994 and June 2000. The average follow-up period was 26 months (range, one year–seven years six months). Of the 500 cases, 325 (65 per cent) were females, with an average age of 25.3 years (range, 15.5–55), and 175 (35 per cent) males, with an average age of 27.5 years (range, 17–45).

Of these cases, 380 (76 per cent) were primary rhinoplasties while 120 (24 per cent) were secondary cases who had received one or more previous rhinoplasties.

The primary and secondary cases were reviewed and compared as regards duration of surgery, presenting nasal deformities, surgical techniques used, and complications encountered. The results were statistically analysed and any significant differences between both groups were calculated.

All cases were operated upon using the external rhinoplasty approach, where bilateral alar marginal incisions and an inverted V-shaped transcolumellar incision were used to expose the nasal bony cartilaginous framework. At completion of the necessary dorsal and tip modifications, the skin flap was redraped to its normal anatomical position and the external rhinoplasty incisions were closed starting with the transcolumellar incision which was closed in two layers using a deep 6/0 PDS transverse mattress suture to take the tension off the skin edges

From the Division of Facial Plastic and Reconstructive Surgery, Department of Otolaryngology, Alexandria Medical School, Alexandria, Egypt.

Accepted for publication: 11 February 2003.

TABLE I

DISTRIBUTION OF DEFORMITIES OF THE UPPER TWO-THIRDS OF THE NOSE AMONG PRIMARY AND SECONDARY CASES. (*) SIGNIFICANT AT $p < 0.05$

Deformity	Primary cases (n = 380)		Secondary cases (n = 120)		X ²
	No.	%	No.	%	
Dorsal hump	274	72	43	36	51.71*
Dorsal saddle	34	9	48	40	64.14*
Dorsal deviation	180	47	46	38	2.84
Dorsal irregularities	110	30	68	56	26.35*
Wide bridge	258	68	62	52	10.42*
Open roof	19	5	58	48	131.45*
Pollybeak	150	39	70	58	13.94*
Valve collapse	8	2	18	15	30.76*

which were then approximated using interrupted 6/0 Prolene sutures. The marginal incisions were closed using 5/0 catgut interrupted sutures.

Post-operatively, a subjective evaluation of the degree of the patient's satisfaction was performed to assess the aesthetic as well as the functional outcome of surgery.

Results

Of the 500 cases included in this study; 380 (76 per cent) were primary cases and 120 (24 per cent) were revisions in patients who had had one or more previous rhinoplasties. The mean duration of surgery was 1.45 minutes (SD: 20 minutes) for primary cases and 2.15 minutes (SD: 28 minutes) for secondary cases. Fifty cases, who had septal perforations or cleft lip nasal deformities, were not included in the surgical duration analysis as they required additional time-consuming procedures for their repair.^{11,12}

The commonest deformities encountered in the upper two-thirds of the nose among primary cases were dorsal hump (72 per cent), wide bridge (68 per cent), and dorsal deviations (47 per cent). Meanwhile among secondary cases, the commonest deformities were pollybeak (58 per cent), dorsal irregularities (56 per cent), wide bridge (52 per cent), and an open roof (48 per cent). On comparing the rate of occurrence of each deformity among the primary and secondary cases, it was found that the secondary cases showed a significantly higher incidence of dorsal saddling, dorsal irregularities, valve collapse, open roof, and pollybeak deformities. On

the other hand, the only deformity that was significantly higher among primary cases was the dorsal hump.

The commonest deformities of the lower third of the nose among primary cases were bulbous tip (74 per cent), under-rotated tip (72 per cent), and hanging columella (46 per cent), while in secondary cases the commonest deformities were the under-projected tip (58 per cent), bulbous tip (56 per cent), and the under-rotated tip (54 per cent). The statistical analysis showed that secondary cases had a significantly higher incidence of tip underprojection, tip over-rotation, tip asymmetry, retracted columella, and alar notching.

Surgical techniques

In primary cases, the surgical techniques depended mainly on the remodelling of the intact bony cartilaginous framework, as in lowering the nasal dorsum, or using alar cartilage suturing techniques.¹³⁻¹⁹

On the other hand, techniques that were used significantly more in secondary cases were those aiming at reconstruction and augmentation of the deficient nasal framework by various grafting techniques such as dorsal grafts, tip grafts,²⁰ spreader grafts,²¹ premaxillary grafts, medial crural struts, and lateral crural struts.²²

Grafting materials

Nasal grafts were used in 360 (72 per cent) of the cases. Autogenous cartilage was the graft of choice

TABLE II

DISTRIBUTION OF DEFORMITIES OF THE LOWER THIRD OF THE NOSE AMONG PRIMARY AND SECONDARY CASES. (*) SIGNIFICANT AT $p < 0.05$

Deformity	Primary cases (n = 380)		Secondary cases (n = 120)		X ²
	No.	%	No.	%	
Overprojected tip	121	32	20	17	10.69*
Under-projected tip	164	43	70	58	8.74*
Under-rotated tip	274	72	65	54	13.44*
Over-rotated tip	7	2	14	12	19.82*
Bulbous tip	281	74	67	56	14.14*
Tip asymmetry	78	21	44	37	11.92*
Hanging columella	175	46	36	30	9.63*
Retracted columella	60	16	42	35	20.02*
Alar notching	16	4	17	14	15.90*
Wide alar base	56	15	11	9	2.64

whenever available and it was used in 78 per cent of the grafted cases. The used autogenous cartilage was harvested from the nasal septum in 94 per cent of cases and from the auricle in six per cent. The second commonest graft material used was the irradiated cartilage homograft that was used in 15 per cent of the grafted cases; these were mostly revision cases in which insufficient autogenous cartilage was found. Mersiline mesh was the only alloplastic material used in this study; it was used in 14 per cent of the grafted cases mostly for dorsal or premaxillary augmentation.

Complications

Intra-operatively, septal flap tears were encountered in 14 cases during correction of major septal deviations. The tears occurred mostly at the apex of large impacted bony spurs or in cases of revision septal surgery. The inadvertent injury of the caudal border of the alar cartilage occurred in nine cases (1.8 per cent) all of which were revision cases.

Early post-operative complications, within the first three weeks, included epistaxis that occurred in 10 cases (two per cent) within the first 48 hours. The lateral osteotomy was the source of bleeding in eight of the cases and the septum in the remaining two cases. All 10 cases were managed conservatively and none of them required hospitalization or blood transfusion.

Nasal trauma in the early post-operative period occurred in 30 cases (six per cent), in 25 of them the trauma was mild and had no effect on the long-term functional or cosmetic outcome. In five cases (one per cent) major trauma affected the symmetry of the bony pyramid and required emergency surgical intervention.

Post-operative infection occurred in 12 cases (2.4 per cent), six of which had mersiline mesh implants. In these cases infection resolved only after removal of the mesh implant.

The commonest late post-operative complication was the excessive and/or prolonged oedema of the nasal lobule that occurred in 85 cases (17 per cent), the incidence of such oedema was higher in cases with thick heavy nasal skin as well as in revision cases.

TABLE III
OPERATIVE AND POST-OPERATIVE COMPLICATIONS

Complication	No. of cases (n = 500)	Percent
<i>Intra-operative</i>		
Septal flap tears	14	2.8
Alar cartilage injury	9	1.8
<i>Early post-operative</i>		
Major trauma	5	1
Epistaxis	10	2
Infection	12	2.4
<i>Late post-operative</i>		
Septal perforation	0	0
Nasal obstruction	4	0.8
Prolonged oedema	85	17
Unsatisfactory result	22	4.4

TABLE IV
SUBJECTIVE EVALUATION OF THE SURGICAL RESULT

Patient satisfaction	No. of cases (n = 500)	Percent
<i>Transcolumellar scar</i>		
Unnoticeable	485	97
Noticeable but acceptable	11	2.2
Unacceptable	4	0.8
<i>Aesthetic outcome</i>		
Very satisfied	430	86
Moderately satisfied	48	9.6
Unsatisfied	22	4.4
<i>Functional outcome</i>		
Improved	335	67
Unchanged	161	32.2
Worsened	4	0.8

On subjectively evaluating the scar of the transcolumellar incision, 97 per cent (485 cases) of the patients found the scar to be unnoticeable, 2.2 per cent (11 cases) found the scar to be noticeable but acceptable, and four cases (0.8 per cent) found it to be noticeable and unacceptable. The last four cases had unlevelled scars with notching or trap-door deformities that required surgical repair.

Patients' satisfaction with the surgical outcome

Aesthetically, 478 cases (95.6 per cent) were satisfied by their aesthetic improvement, of these patients 86 per cent were very satisfied (their result met or exceeded their expectations) and 9.6 per cent were moderately satisfied (they would have hoped for more improvement but generally accepted their result and do not wish to have it revised). Finally, 22 patients (4.4 per cent) were unsatisfied with their result and underwent revision surgery. Functionally, 67 per cent reported that their breathing was improved, 32.2 per cent that it was unchanged, and 0.8 per cent worsened by the operation.

Discussion

Selection of the approach to be used in a case of rhinoplasty should depend mainly on the nasal deformities present. The closed rhinoplasty approach can adequately handle most of the common straightforward nasal deformities such as a high dorsal hump, wide nasal bridge, and broad nasal tip. However, in more complex nasal deformities, the wide exposure provided by the external approach allows for more precise evaluation of the deformities and improves the surgical control over the corrective manoeuvres employed. In the current study, the exposure provided by the external approach had clear-cut advantages in correcting nasal tip deformities, straightening of crooked noses, proper placement and suture fixation of nasal grafts, as well as in revision rhinoplasties, which comprised 24 per cent of the cases.

The duration of surgery in revision cases was significantly more than in primary cases. This was mainly attributed to the difficulty encountered in the skin flap elevation as a result of the fibrosis and adhesions that obliterated the normal dissection

planes. Additionally, the use of nasal grafts, which was significantly more in revision cases, required extra time to harvest, fashion, and suture the grafts in place.

- **This is a review of 500 consecutive cases of external rhinoplasty**
- **76 per cent were operated upon primarily and 24 per cent were revision cases**
- **Suturing techniques were used more frequently in primary cases and grafting was more prevalent in secondary cases**
- **Patient satisfaction was high (95.6 per cent) and the transcolumellar scar was acceptable in the majority of cases**
- **There is no new technique contained within this paper but it represents an interesting summary of the outcome of external rhinoplasty**

On analysing the presenting nasal deformities, it was found that certain deformities occurred significantly more in revision cases (Tables I and II). These deformities can be aetiologically divided into two groups, the first of which is a direct result of over-resection or asymmetric excisions of the bony cartilaginous framework leading to deformities such as dorsal saddling, short over-rotated nose, open roof, and dorsal irregularities. The second group of deformities were healing related, due to excessive scarring or contracture forces that resulted in the distortion of the inadequately supported nasal framework, leading to deformities such as valve collapse, alar notching, columellar retraction, tip drop, tip asymmetries, and soft tissue pollybeak deformity.

On reviewing the literature, most authors^{7,9,10,23} reported pollybeak to be the most common deformity in revision cases, while only a few^{8,24} found tip deformities to be the primary cause for revision. In the current study, the commonest deformities found in revision cases were pollybeak and dropped tip, followed by dorsal irregularities and bulbous tip. The pollybeak deformity encountered in our cases was mainly secondary to the post-operative loss of tip projection due to inadequate tip support especially in cases with thick heavy nasal skin. Other factors that were found to contribute to the development of pollybeak included failure of the original surgeon to adequately lower the cartilaginous dorsum as well as excessive scarring in the supratip area. The dorsal irregularities in our revision cases were found to be due to multiple factors including comminuted nasal bones secondary to hump reduction or osteotomies, asymmetric excisions of upper lateral cartilages, and malpositioned or displaced dorsal grafts. Nasal grafts were used in 70 per cent of the cases with a significantly higher incidence in revision cases. Whenever available, autogenous septal cartilage

was the graft of choice, followed by irradiated cartilage homograft that was used in 54 cases who were mostly revision cases in whom no useable septal cartilage was found. In these cases, using irradiated cartilage provided excellent structural support with no infection, extrusion, or resorption encountered throughout the full range of the follow-up period. The only alloplast used in this study was mersiline mesh that was used in 50 cases and provided excellent results as a filler graft for dorsal and premaxillary augmentation with no significant resorption on long-term follow-up. The only complication associated with the use of mersiline mesh was infection that occurred in six cases (12 per cent) and resolved only after removal of the mesh implant. This infection rate was greatly reduced by soaking the implant in antibiotic solution for a few minutes prior to insertion and by avoiding any communication between the implant pocket and the intranasal cavity.

Of the 362 cases that underwent septal surgery, inadvertent tears in the mucoperichondrial flap occurred in 14 cases; eight of which had large bony cartilaginous spurs with atrophic mucosa at the apex of the spur, and the other six cases had previous septal surgeries with residual deviations. None of these tears resulted in septal perforations, as whenever a tear occurred in one of the flaps, every effort was made to keep the contralateral flap intact, then the tear was sutured and a piece of cartilage was crushed and placed between the two flaps before mattressing the flaps together by a running 4/0 chromic suture.

Although it is virtually impossible to prep the nose as a sterile field, the infection rates following septorhinoplasty are reported to be around three per cent.²⁵ This is mainly due to the excellent blood supply of the region. In the current study, post-operative infection occurred in 12 cases (2.2 per cent). Emergency treatment of all infected cases was started immediately to avoid local destruction of nasal cartilages, skin necrosis, or regional spread of infection. Such complications may not only be aesthetically devastating but also potentially life-threatening.

Out of the 12 infected cases, six had mersiline mesh implants and their infection resolved only after removal of the mesh implant. In the other six cases, three were managed conservatively, and the other three cases required surgical drainage of the resultant collection as soon as it developed.

Excessive and/or prolonged oedema of the nasal lobule was by far the commonest complication that occurred in (17 per cent) of the cases. The incidence was higher in cases with thick heavy nasal skin as well as in revision cases. Local injection with steroids (triamcinolone) proved very effective in the management of these cases, injected areas included the supratip, tip, and the columellar segment above the transcolumellar incision. The number of injections depended on the patient's response and ranged from one to five injections. To avoid complications, injections were never started before the sixth post-

operative week, a minimum of three to four weeks was allowed before repeating the injection, the injection was done in the deep subcutaneous plane, and no concentration higher than 20 mg/cc was used in the first two months, however, higher concentrations were used later.

The cosmetic result of the transcolumellar scar was very favourable, as it was reported to be imperceptible in the vast majority of cases (97 per cent). This was mainly due to the meticulous multilayered closure of the incision. The scar was slightly raised in 11 cases (2.2 per cent) but eventually evened out with time, however, no keloid formation was encountered, not even in the four cases who had history of keloids elsewhere. Surgical revision of the transcolumellar scar was done in four cases (0.8 per cent) with unlevelled scars; this was performed at a minimum of nine months post-operatively.

Regarding the aesthetic result of the operation, the overall satisfaction rate was 95.6 per cent. The remaining 4.4 per cent (22 patients) were unhappy with their results and required revision surgery to correct deformities such as dorsal irregularities, tip asymmetries, excessive columellar show, pollybeak, or columellar scar problems. These deformities were mostly corrected through the closed (endonasal) approach. As a general rule, one year was allowed before revising cases that were operated on elsewhere. However, a shorter interval was allowed for our personal revisions because of the minor nature of the required procedure and the complete knowledge of the previously used techniques.

Functionally, some authors reported the rate of persistent nasal obstruction following rhinoplasty to be as high as 10 per cent.²⁶ In the current study, this complication occurred in only 0.8 per cent of the cases. This relatively low rate of post-operative nasal obstruction may be due to many factors; the first of which is that using the external approach eliminated the need for endonasal mucosal incisions that may have resulted in subsequent scarring and nasal obstruction especially if the nasal valve area was breached. Another important factor is that septoplasty was combined with rhinoplasty to correct any minor septal deviations, even if they were asymptomatic pre-operatively, as such deviations may result in post-operative obstruction after narrowing the airway by hump reduction and/or infracturing the lateral walls by osteotomies. Finally, any necessary excisions of the upper or lower lateral cartilages were done in a very conservative manner to preserve the role of these cartilages in providing the structural support needed to avoid alar or nasal valve collapse.

References

- Roe JO. The deformity termed "Pug Nose" and its correction, by a simple operation. *Medical Record* 1887;**31**:621-3
- Roe JO. The correction of angular deformities of the nose by a subcutaneous operation. *Medical Record* 1891;**40**:57-9
- Gillies HD. *Plastic Surgery of the Face*. London: Oxford University Press, 1920
- Rethi A. Operation to shorten an excessively long nose. *Rev Chir Plast* 1934;**2**:85-7
- Sercer A. Dekortikation der nose. *Cir Maxillofac Plast* 1958;**1**:149-52
- Goodman WS. External approach to rhinoplasty. *Can J Otolaryngol* 1973;**2**:207-10
- Swanepoel PE, Eisenberg I. Current concepts in cosmetic rhinoplasty. *S Afr Med J* 1981;**60**:536-44
- McKinney P, Cook JQ. A critical evaluation of 200 rhinoplasties. *Ann Plast Surg* 1981;**7**:357-61
- Kamer FM, McQuown SA. Revision rhinoplasty: Analysis and treatment. *Arch Otolaryngol Head Neck Surg* 1988;**114**:257-66
- Parkes ML, Kanodia R, Machida BK. Revision rhinoplasty: An analysis of aesthetic deformities. *Arch Otolaryngol Head Neck Surg* 1992;**118**:695-701
- Foda HMT. The one-stage rhinoplasty septal perforation repair. *J Laryngol Otol* 1999;**113**:728-33
- Foda HMT, Bassyouni K. Rhinoplasty in unilateral cleft lip nasal deformity. *J Laryngol Otol* 2000;**114**:189-93
- Foda HMT. Management of the droopy tip: a comparison of three alar cartilage modifying techniques. *Plast Reconstr Surg* (in press)
- Foda HMT, Kridel RWH. Lateral crural steal and lateral crural overlay: An objective evaluation. *Arch Otolaryngol Head Neck Surg* 1999;**125**:1365-70
- Foda HMT. Alar setback technique: A controlled method of nasal tip deprojection. *Arch Otolaryngol Head Neck Surg* 2001;**127**:1341-6
- Kridel RWH, Scott BA, Foda HMT. The tongue-in-groove technique in septorhinoplasty: A ten year experience. *Arch Facial Plast Surg* 1999;**14**:246-56
- Konior RJ, Kridel RWH. Lateral crural techniques for repositioning of the nasal tip. *Otolaryngol Head Neck Surg* 1990;**1**:158-65
- Kridel RWH, Konior RJ, Shumrick KA, Wright WK. Advances in nasal tip surgery: The lateral crural steal. *Arch Otolaryngol Head Neck Surg* 1989;**115**:1206-12
- McCullough EG, English JL. A new twist in nasal tip surgery: An alternative to the Goldman Tip for the wide or bulbous lobule. *Arch Otolaryngol Head Neck Surg* 1985;**111**:524-9
- Sheen JH, Sheen AP. *Aesthetic Rhinoplasty*, 1st edn. St. Louis: C. V. Mosby, 1978
- Sheen JH. Spreader graft: A method of reconstructing the roof of the middle nasal vault following rhinoplasty. *Plast Reconstr Surg* 1984;**73**:230-7
- Gunter J, Friedman RM. Lateral crural strut graft: Technique and clinical applications in rhinoplasty. *Plast Reconstr Surg* 1997;**99**:943-52
- O'Conner GB, McGregor MW. Secondary rhinoplasties: Their cause and prevention. *Plast Reconstr Surg* 1955;**15**:404-10
- Stucker FJ, Bryarly RC, Shockley WW. The failed rhinoplasty. In: Gates GA, ed. *Current Therapy in Otolaryngology - Head and Neck Surgery* Philadelphia, Pa: BC Decker, 1984, 129-34
- Holt GR, Garner ET, McLarey D. Postoperative sequelae and complications of rhinoplasty. *Otolaryngol Clin North Am* 1987;**29**:853-76
- Beekhuis GJ. Nasal obstruction after rhinoplasty: Etiology and techniques for correction. *Laryngoscope* 1976;**76**:540-8

Address for correspondence:
Hossam M. T. Foda, M.D.,
P. O. Box 372 Sidi Gaber,
Alexandria,
Egypt.

E-mail: hfoda@dataxprs.com.eg

H. Foda, M.D. takes responsibility for the integrity of the content of the paper.
Competing interests: None declared