

Rhinoplasty for the multiply revised nose

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Received 2 March 2004

Abstract

Purpose: To evaluate the problems encountered on revising a multiply operated nose and the methods used in correcting such problems.

Patients and methods: The study included 50 cases presenting for revision rhinoplasty after having had 2 or more previous rhinoplasties. An external rhinoplasty approach was used in all cases. Simultaneous septal surgery was done whenever indicated. All cases were followed for a mean period of 32 months (range, 1.5–8 years). Evaluation of the surgical result depended on clinical examination, comparison of pre- and postoperative photographs, and degree of patients' satisfaction with their aesthetic and functional outcome.

Results: Functionally, 68% suffered nasal obstruction that was mainly caused by septal deviations and nasal valve problems. Aesthetically, the most common deformities of the upper two thirds of the nose included pollybeak (64%), dorsal irregularities (54%), dorsal saddle (44%), and open roof deformity (42%), whereas the deformities of lower third included depressed tip (68%), tip contour irregularities (60%), and overrotated tip (42%). Nasal grafting was necessary in all cases; usually more than 1 type of graft was used in each case. Postoperatively, 79% of the patients, with preoperative nasal obstruction, reported improved breathing; 84% were satisfied with their aesthetic result; and only 8 cases (16%) requested further revision to correct minor deformities.

Conclusion: Revision of a multiply operated nose is a complex and technically demanding task, yet, in a good percentage of cases, aesthetic as well as functional improvement are still possible.

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Unlike primary rhinoplasty, which is mainly a reduction rhinoplasty, revision rhinoplasty is basically a restructuring procedure aimed at rebuilding the dorsal and tip support. The revision rhinoplasty, being technically more demanding, presents a constant challenge to the nasal surgeon; this challenge increases greatly with every revision procedure that the patient receives.

The multiply revised nose is usually complicated by the distorted anatomy, excessive scarring, and decreased vascularity. As a result of the excessive fibrosis and decreased vascularity, the skin soft-tissue envelope of the nose becomes less contractile and redrapes poorly over the modified bony cartilaginous framework, thus showing less details of any modifications performed. These problems make the results of any subsequent surgery highly unpredictable. Apart from the technical problems encountered, these patients usually

suffer from psychological implications of their repeated failed procedures, which makes their postoperative satisfaction even less likely. As a result of such complex technical and psychological problems, many experienced surgeons approach the repeated revisions with such anxiety that they either refuse to perform the procedure or do it with a great deal of reluctance.

On reviewing the rhinoplasty literature, a large number of excellent articles could be found on revision rhinoplasty [1–9]; however, we failed to find a single article reporting on a series of cases that had multiple previous revisions. The aim of this article is to study a series of multiply revised noses to explore the functional and aesthetic problems encountered in these cases and the methods used in correcting such problems.

1. Material and methods

The study included 50 patients presenting for revision rhinoplasty after having received 2 or more previous

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rhinoplasties. The patients' problems were classified into functional and aesthetic; the aesthetic problems were further subdivided, anatomically, into deformities affecting the upper two thirds or the lower one third of the nose.

The external rhinoplasty approach was used in all the cases, and, whenever indicated, simultaneous septal surgery was performed. The intraoperative findings were thoroughly reviewed and correlated to the presenting deformities in each case. A critical analysis of the corrective methods used and the technical difficulties encountered was performed.

All cases were followed up for a mean period of 32 months (range, 1.5–8 years) to evaluate the outcome of the performed procedure. Evaluation included periodic clinical examination, analysis of preoperative and postoperative photographs, and the reported degree of patients' satisfaction with both their aesthetic as well as functional outcome.

1.1. Technical considerations

1.1.1. Approach to the external nose

On approaching a multiply revised nose, every effort should be made to preserve the integrity of the external skin as well as of the internal mucosal lining. The external rhinoplasty approach was used in all of our cases because of the wide exposure it provides, which allows a more accurate assessment of the complex underlying problems and provides the required access for their correction. Unfortunately, the external approach, in the multiply revised nose, is not easy to perform because of the distorted anatomy and the extensive adhesions present. On performing the marginal incisions, it is common to find asymmetric alar cartilages with upward displacement of the lateral crura and/or buckling of the medial crura; thus, the incision should be performed very carefully to avoid inadvertent injury of the alar cartilages. The planning of the columellar incision is affected by the presence of previous columellar scars. In such a situation, we follow the line of the preexisting scar to avoid interrupting the blood supply of the columellar flap at multiple levels. This also avoids adding a new scar on the columella and allows for simultaneous revision of the old scar if needed.

The dorsal nasal skin is usually found to be more fibrotic, less elastic, and with borderline vascularity. The process of skin flap elevation is usually difficult because of the extensive adhesions cementing the skin to the underlying tissues. This is of especial importance in areas of bony irregularities in which the skin is found invaginated and tethered in the bony crevices by the effect of extensive scarring. In these cases, we found it helpful to take the dissection down to the deep subperiosteal plane while maintaining good countertraction of skin flap to avoid any trauma to the skin.

Another problem encountered during skin flap elevation was the direct adhesions between the external skin and the lining mucosa because of missing cartilage secondary to previous excisions and/or resorption. The most common

areas for such adhesions, in our cases, were the lower parts of the upper lateral cartilage; sharp dissection with no. 15 blade was found helpful to avoid perforating the skin flap or the underlying mucosa, which may be a crucial occurrence in cases in which dorsal grafting is needed because of the high risk of infection and extrusion.

1.1.2. Approach to the nasal septum

Septal surgery was performed either to correct residual septal deviations or to harvest septal cartilage for nasal grafting. The approach to the nasal septum depended mainly on the site of deviation and its relation to areas of previous bony cartilaginous excisions. In cases with dorsal septal deviations, the septum can be easily accessed dorsally through the external rhinoplasty approach after separating the upper lateral cartilages from the nasal septum. If the deviation involved the caudal septum, the incision is placed directly on the caudal end of the septal cartilage followed by bilateral caudal septal membrane elevation. The cartilage is then dislocated from the maxillary crest, trimmed accordingly, and fixed in the midline by suturing it to the underlying periosteum. Unlike in dorsal and caudal deviations in which only limited septal flap elevation is needed, the correction of bony deviations and the harvesting of septal cartilage require a more wider undermining of the septal flaps. Before any septal flap elevation, every part of the septum should be instrument palpated to accurately outline the areas in which the cartilage and/or bone were previously excised. Occasionally, some areas are found stiff on palpation giving the impression that some cartilage is present but on exploration only intraseptal scarring is found. To decrease the risk of septal perforation, septal flap elevation should be avoided in areas in which the underlying cartilage or bone is missing.

It is not uncommon to find the caudal septal cartilage totally missing; in such cases, if the central part of septal cartilage was present, a high hemitransfixion incision is used, but if the central cartilage was also missing, then a more ventral approach could be adopted by extending the incision downward over the maxillary crest and the vestibular floor. The mucoperiosteum can be easily elevated off the vestibular floor and the side of maxillary crest, and then the flap elevation is continued upward to expose the thick ventral part of the septal cartilage that is attached to the maxillary crest. This part of septal cartilage was usually found intact even in cases with near total absence of septal cartilage. Harvesting such a long and thick strut of cartilage is very useful in columellar grafting.

2. Results

Out of the 50 patients included in this study, 37 were women and 13 men; their mean age was 33.5 years (range, 20–45 years). A breakdown of the patients previous

rhinoplasties showed that 26 had 2, 14 had 3, 3 had 4, 5 had 5, and 2 had 7 previous rhinoplasties. Functionally, variable degrees of nasal obstruction were found in 34 cases (68%); this was mainly caused by deviated nasal septum in 24 cases (48%) and nasal valve problems in 21 cases (42%). Other less common causes included synechia between the septum and inferior turbinate in 6 cases, alar collapse in 5 cases, and septal perforation in 5 cases.

The most common aesthetic deformities affecting the upper two thirds of the nose included pollybeak deformity in 32 cases (64%), dorsal irregularities in 27 cases (54%), dorsal saddling in 22 cases (44%), and open roof deformity in 21 cases (42%). On the other hand, the commonest deformities encountered in the lower third of the nose included depressed tip in 34 cases (68%), tip contour irregularities in 30 cases (60%), and overrotated tip in 21 cases (42%).

Septal surgery was performed in conjunction with rhinoplasty in 34 cases (68%). In these cases, the main indication for septal surgery was correction of septal deviations in 24 cases (48%), harvesting of cartilage for nasal grafting in 27 cases (54%), and closure of septal perforations in 5 cases (10%). Nasal grafting was found necessary in all cases to augment the deficient bony cartilaginous framework and to provide the structural support needed for the nasal dorsum and the nasal tip. Usually more than 1 type of graft was used in each patient, the most common grafts used were the columellar grafts, dorsal augmentation grafts, tip grafts, premaxillary grafts, spreader grafts [10], and the lateral crural strut grafts [11].

The graft material of choice, whenever available, was autogenous cartilage, which was used in 60% of the cases because of its safety, versatility, and excellent long-term results [12,13]. The used autogenous cartilage was harvested from the nasal septum and/or the auricle. Our second choice of grafting material was allografts, of which we used irradiated cartilage allografts [14] in 40% of cases and the acellular dermal allografts [15] (Alloderm; Life Cell Corporation, Branchburg, NJ) in 20% of the cases. Finally, our last resort for grafting was using alloplasts; Mersiline mesh [16] was the only alloplast used in this study and it was used in 34% of cases mainly for dorsal and/or premaxillary augmentation.

On evaluating the degree of patient satisfaction, functionally, 79% of the cases with preoperative nasal obstruction reported an improvement in breathing. On the other hand, 42 cases (84%) were satisfied with their aesthetic improvement; the remaining 8 cases (16%) requested further revision for correction of minor deformities (3 hanging columella, 2 dorsal irregularity, 2 nostril asymmetry, 1 depressed tip).

3. Discussion

Operating on a patient who had multiple previous rhinoplasties presents the ultimate challenge for any rhino-

plastic surgeon. Before the operation, the surgeon should clearly understand the degree of patient's concern with each and every one of his deformities. This enables the surgeon to direct his surgical plan to meet the patient's priorities; because in some cases, it is virtually impossible to solve all the complex functional and cosmetic problems encountered.

In the current study, 68% of the cases suffered of variable degrees of nasal obstruction, which was most commonly caused by residual septal deviations. The most symptomatic type of septal deviations was that involving the dorsal cartilaginous septum in the nasal valve area. In these cases, the septum was approached dorsally through the external rhinoplasty approach by separating the upper lateral cartilages from the septum without cutting through the nasal mucosa. A series of vertical partial thickness cartilaginous incisions are made on the concave side to straighten the cartilage, which is then maintained in its corrected position by splinting it by a flat bony graft [21].

The second most common cause of obstruction, after the deviated nasal septum, was nasal valve problems including valve collapse and/or obliteration of valve area by adhesions. The nasal valve collapse was found in 11 cases (22%) with pinched middle third of the nose because of partially excised, resected, or scarred down upper lateral cartilages. This was corrected by placing a spreader graft [10,17] between the septum and the upper lateral cartilage on each side, which opens the nasal valve area and correct the pinched look of the middle third of the nasal vault.

Adhesions obliterating the valve area were seen in 20% of cases and was secondary to excessive scarring at the junction of the intercartilaginous and the full transfixion incisions, which can be easily prevented by meticulous suturing of the used intranasal incisions. In these cases, the adhesions were released with a no. 15 blade followed by hemostasis with suction diathermy, then a sheet of thin silastic was interposed between the raw surfaces, and fixed in place for 2 to 3 weeks to prevent readhesion.

In cases in which aggressive resection of the lateral crura was performed, alar collapse was found to be the cause of nasal obstruction and was managed by using lateral crural strut grafts [11]. Finally, in 5 cases the nasal obstruction was caused by anterior septal perforations, which were repaired by interposing a dermal allograft (Alloderm) between the septal flaps after their advancement and repair [18,19].

The external deformities encountered, in the multiply operated nose, are usually complex and difficult to diagnose; this is mainly because of the distorted anatomy and excessive scarring resulting from prior surgeries. The wide exposure provided by the external rhinoplasty approach [20,21] proved to be very helpful in these cases; however, meticulous execution of the approach is necessary to avoid injury of the external skin or the lining mucosa which may increase the risk of infection and extrusion of any dorsal grafts especially if alloplasts were to be used. In

the current study, the most common aesthetic deformities involving the upper two thirds of the nose included pollybeak (64%), dorsal irregularities (54%), dorsal saddle (44%), and the open roof deformity (42%).

The pollybeak deformity encountered was found to have more than one contributing factor including the depressed tip with poor tip support [22,23], the inadequate lowering of the anterior septal angle, and finally the excess scar tissue in the supratip area. The pollybeak deformity was managed by increasing the nasal tip support and projection through splinting the weak and buckled medial crura to a strong columellar strut, and then the dorsal cartilaginous septum and, less commonly, the upper

lateral cartilages were lowered if needed. Conservative debulking of any excessive supratip scar tissue was usually performed in conjunction with the previously mentioned procedures.

The dorsal irregularities, which were found in more than half of our cases, were mainly caused by comminuted nasal bones during hump reduction or osteotomies, asymmetric excisions of upper lateral cartilages, and malpositioned or displaced dorsal grafts. Such irregularities were managed by bony rasping or cartilage shaving; if the irregularities were still palpable, a layer of crushed cartilage or Alloderm was used to cover the residual irregularities especially in cases with thin nasal skin.



Fig. 1. (A, C, and E) Preoperative views of a patient who had 2 previous rhinoplasties, showing bony dorsal irregularities with thin nasal skin, open roof deformity with projecting bony nasal septum, narrow middle third with bilateral valve collapse, and tip contour irregularity with left bossa formation. The profile view shows a cartilaginous pollybeak, droopy tip, alar notching, and excessive columellar show. (B, D, and F) Five-year postoperative views of the same patient after having an external rhinoplasty with closure of the open roof, rasping of bony irregularities, lowering the cartilaginous dorsum, bilateral spreader grafts, and lateral crural strut grafts to correct the alar notching. The medial crura were advanced onto the caudal septum in a tongue-in-groove [26] fashion to rotate the tip upward and decrease columellar show, and a left alar cartilage setback [25] was performed to eliminate the tip bossa.

In case of dorsal saddling, our first choice for dorsal augmentation was to use autogenous septal or conchal cartilage. However, in cases with massive saddling, previously resected septal cartilage, or patients refusing the ear cartilage harvest, our second choice was to use irradiated costal cartilage homografts or Mersiline mesh. Compared with irradiated cartilage, Mersiline mesh showed much earlier fixation and tissue integration but infection occurred in 2 of our first 5 cases; this was later avoided by soaking the mesh implant in antibiotic solution before its insertion and, more importantly, by mak-

ing sure that no direct communication exists between the implanted mesh and the intranasal cavity. No cases of infection were associated with the use of irradiated costal cartilage homografts but, on long-term follow-up, the irradiated cartilage showed a slightly higher degree of resorption than the Mersiline mesh; however, 8 years after surgery, sufficient dorsal augmentation was maintained by both implants.

Open roof deformity usually follows hump removal with inadequate medialization of the lateral nasal walls, which may be caused by an incomplete lateral osteotomy,



Fig. 2. Preoperative views (A and B), of a patient who had 5 previous rhinoplasties, showing a small overresected nose with a right-sided C-shaped dorsal deviation and depressed left upper lateral cartilage. The lateral view shows a short nose with an overexcised bony dorsum, soft-tissue pollybeak, acute nasolabial angle, and depressed tip secondary to resected caudal septum. (C and D) One-year postoperative views after septoplasty to correct the dorsal cartilaginous septal deviation, an external augmentation rhinoplasty using mersiline mesh for dorsal and premaxillary augmentation, and an irradiated cartilage caudal septum replacement graft to increase tip support and projection. Some postoperative loss of tip projection occurred (D), which led to partial recurrence of the pollybeak deformity. (E and F) Three years after performing a minor revision in which an onlay-type tip graft was added through a small rim incision to eliminate the pollybeak by increasing the tip projection.

a green-stick fracture preventing complete mobilization, or presence of a superior bony wedge between the septum and the lateral wall. Open roof usually presents with a wide bridge that can be easily corrected by proper osteotomies and splinting. However, in some cases, the perpendicular plate of ethmoid is found high and protruding through the open roof, thus leading to a very narrow nasal bridge (Fig. 1A). This type of open roof is more difficult to fix because osteotomies may make the perpendicular plate of ethmoid more prominent as the mobilized lateral walls tends to move slightly posterior with their medialization. On the other hand, lowering the projecting ethmoidal plate will result in a disproportionately wide bridge. We found the best solution for that problem is to conservatively lower the projecting bony septum followed by closing the open roof with a convex dorsal cartilage graft to result in a smooth natural looking dorsum (Fig. 1B, D, and F).

In the current study, the most common aesthetic deformities affecting the lower third of the nose included depressed tip (68%) and tip contour irregularities (60%). All cases of depressed nasal tip were found to be secondary to inadequate nasal tip support as a result of previous excisions of tip cartilages and/or caudal septal cartilage. In these cases, increasing the tip support should start at the bony platform of the premaxilla and proceed upward until reaching the domes of the alar cartilages [24]. In cases with deficient premaxilla and acute nasolabial angle, premaxillary augmentation was done using Mersiline mesh. The medial crura, which are usually found weak and buckled, were splinted to a strong columellar strut resulting in a strong and stable medial crura-columellar strut complex that provides an excellent foundation for tip graft fixation in case further tip projection is desired. This increase in tip projection may be all that is needed to correct some cases of pollybeak deformity (Fig. 2E and F).

Tip contour irregularities were found in 60% of our cases, and the most common forms included pinched tip and bossa formation. The pinched tip was found in cases in which excessive narrowing or splitting of the domes was performed and was managed by using an onlay-type tip graft [27]. On the other hand, bossa formation results from a sharply angulated dome, which was displaced during the healing process. This was managed by repositioning of the displaced dome and suturing the domes together in the midline, which was facilitated by widely undermining of the underlying vestibular skin on both sides of the offending dome to eliminate its tethering effect on domal repositioning. In cases with severely overprojected bossa (Fig. 1A and C), the alar cartilage setback technique [25] was used to retrodisplace the offending dome, without disrupting its integrity, by shortening the medial and lateral crura (Fig. 1B and D). This eliminated the risk of visible irregularities that may be associated with the usage of other corrective techniques [3,5,28-30] that depend on shaving or trimming of the domal cartilage.

Although revising a multiply operated nose is a very complex and technically demanding task, the results of the current study are encouraging; functionally, 79% of the patients, with preoperative nasal obstruction, reported an improvement in their breathing, whereas aesthetically, 84% were satisfied with their cosmetic result.

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