Aesth. Plast. Surg. 22:190–195, 1998

Aesthetic Plastic Surgery

Endoscopic-Assisted Correction of the Deviated Nose

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Abstract. The approach to nasal bone classic corrective rhinoplasty is an almost-blind technique, where the results depends on feeling by the surgeon's hand. To overcome these drawbacks, endoscopic-assisted corrective rhinoplasty and septoplasty were performed for 16 cases of deviated noses between January 1995 and May 1997. The average follow-up period was 18 months. All patients were evaluated by symmetrical nasal pyramid, recurrence of the bony deflection, and septal deviation. The postoperative courses were satisfactory in most cases, with few complications. Compared with 28 cases of classic rhinoplasty, the patient satisfaction rate was high (87.5% in endoscopic-assisted rhinoplasty, 71.4% in classic rhinoplasty), and the complication and revision rate was low (0% in endoscopic assisted rhinoplasty, 14.3 and 7.1% in classic rhinoplasty). But extra time (about 40 min) and greater expense were required for endoscopic-assisted rhinoplasty. It appeared to us that endoscopic control during corrective rhinoplasty and septoplasty is a big step toward obtaining better results in bony and cartilage resection with extreme precision under monitor control and magnification. This technique is not an open approach but permits one to see more of the nasal skeleton and bony septum, the cause of the deformity, and the immediate effect of the corrective measures used. The use of an endoscope in corrective rhinoplasty for deviated noses provides an expanded field of vision, direct manipulation of lesions, and better aesthetic and functional results.

Key words: Deviated nose—Endoscope

This article was presented in part at the 14th Congress of the International Society of Aesthetic Plastic Surgery in Sao Paulo, Brazil, May 31–June 3, 1997

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Correction of the severely deviated nose is still a challenging problem in plastic surgery. The severely deviated nose represents a complex deformity of the septum, upper lateral cartilages, and bony pyramid. There is usually a cosmetic deformity as well as an airway function problem [11]. Correction requires a complete understanding of the three-dimensional pathology.

In conventional corrective rhinoplasty the structures of the nasal dorsum including the nasal bone, lateral cartilage, and septal cartilage cannot be seen, and bony hump or cartilage resection has been done by blind technique [8,16].

Blind resection of bony or cartilagenous structure with conventional techniques may be the unsatisfactory result or secondary revision.

In the correction of septal deviation that is always combined in the deviated nose, complete correction of the bony septum is important. But the bony septum is difficult to see entirely even if a head light and loupe are used. The incomplete correction of septal deviation may be one of the most common causes after treatment of septal deviation.

To avoid the blind technique of conventional rhinoplasty and septoplasty, we applied an endoscopic technique to undertake complete correction of the deviated nose with complementary resections obtained with endoscopic control after the normal rhinoplastic procedure was completed.

In primary rhinoplasty for Caucasian hump nose, the use of an endoscope as a touchup procedure of the nasal dorsum was reported by Mitz [17].

Based on a similar principle, we developed a new modification of this technique to correct the severely deviated nose. We applied the endoscopic technique in not only the rhinoplasty but also the septoplasty.

Patients and Methods

Sixteen patients have been operated on since January 1995. This group consists of 4 females and 12 males

ranging in age from 15 to 44 years. All cases were deviated noses with septal deviation. The deformities ranged from mild to severe. Deviated noses were the result of nasal trauma—six traffic accidents, four fall-down injuries, four nose injuries during football, and two injuries by fist.

Minimal time from trauma to operation room was 1 year and maximal time was 20 years. Complementary resection or trimming during endoscopic control was done in all cases after completing the normal rhinoplastic procedure. Endoscopic-assisted correction of the deviated bony and cartilagenous septum was done in all cases after completing conventional dissection of the mucoperichondreal flap. The mean follow-up period was 18 months, ranging from 10 to 28 months.

Surgical Technique

The patient is in the same position as in a usual rhinoplasty. The endotracheal tube is in the left corner of the mouth. The TV monitor is positioned in front of the patient's head.

The septum is infiltrated with 0.5% xylocaine with 1/20,000,000 of epinephrine, and a topical cocaine solution with epinephrine is applied to the nasal mucosa.

The endoscope is a straight Stryker tube, 4.5 mm in diameter, with a 30° angled tip. A special sterile bag protects the endoscope, allows camera insertion at the back of the endoscope, and wraps around the connecting lines to the TV monitor light source.

Rhinoplasty for the deviated nose starts as in a standard rhinoplasty technique, including an extramucosal approach. On the separation of the soft tissue from the nasal skeleton, it is time for the endoscope. The nasal endoscopic instrument is initially used for a careful and detailed diagnosis of the possible anomalies of the deviated septum and the deviated nasal bone (Fig. 1). The surgeon's assistant keeps the skin elevated with a clean Aufricht elevator and moves according to the surgeon's needs by watching the TV. An aspirating tube gets rid of blood, small particles, and secretions. The surgeon holds the endoscope with the left hand and evaluates the deformities and abnormalities of the dorsum. The endoscope is first located above the septum, then follows it. The cutting, rasping, and chiseling instruments are held in the right hand. They are mostly angled scissors, rasps, and chisels that can remove or flatten the hypertrophic callus or overlying bony fragment of the deviated dorsum. These instruments allow for perfect cartilaginous, fibrous, and bony adjustments.

We do not use the endoscope for medial and lateral osteotomy and splitting, but this may be done when appropriate instruments become available. Everything that has been removed from the nose (alar excess cartilage, hump, septal excess) is carefully preserved in a cup filled with saline.

The complementary resections are performed and recorded by watching the TV to obtain good adjustment of the nasal skeleton, both the bony and the cartilaginous framework. Exact positioning of the endoscope and cutting instruments allows one to do this work through the nostril. Thus, there is no need for an open rhinoplasty.

The corrective rhinoplasty starts earlier than the septoplasty. Sometimes the septoplasty starts earlier than the rhinoplasty, when the septal deformity is severe.

The septal cartilage is exposed throughout a 2-cm-access vertical incision, close to the membranous septum. The initial optical cavity is developed utilizing a periosteal elevator. Once the initial pocket has been developed with the assistance of a head light, the endoscope is inserted and the dissection progresses to the deviated bony septum because the deviated bony septum is difficult to see entirely with the assistance of a head light. Upon completion of dissection of the mucoperichondreal and mucoperiosteal flap on one side, abnormalities of the deviated cartilagenous and bony septum are evaluated with the assistance of endoscope (Fig. 1E).

The specific corrective technique is performed by location of the septal deformity, for example, a ''swinging door'' flap, excision to the point of angulation, morselization or another weakening procedure, and external septal splinting, repositioning the septum on the vomer. Resection of the deviated bony septum such as the ethmoid plate or vomer can be done with the assistance of endoscope.

After final inspection of the nasal dorsum and septum, further resections or touchup procedures are accomplished at the nasal dorsum and septum, if necessary. Postoperative splinting and dressing are the same as with routine corrective rhinoplasty procedures.

Results

Figures 1–3 show typical results of this technique. None of the sixteen patients needed a revision of the dorsal aspect of the nose and revision of the septum. In no case did problems arise from bony dorsal excess, movement and dislocation of grafts, an excess of replaced cartilage, a persistent small hump that had to be rasped, or septal irregularity that showed under the skin.

In all 16 cases the nasal deviation was corrected, a straight appearance of the nose was achieved, and the deviation did not recur during the follow-up period (Figs. 1–3). We compared the results of endoscopic-assisted rhinoplasty with those of 28 cases of classic rhinoplasty, including the length of the incision line, operation time, satisfaction rate of patients, complication and revision rate, and expense (Table 1). The length of the incision line was the same. The extra time needed for the endoscopic procedure is about 40 min. Only two patients (12.5%) were not satisfied with the endoscopic-assisted rhinoplasty, but eight patients (28.6%) were not satisfied with classic rhinoplasty. We have not encountered any complications or revisions yet from the use of the endoscope, but four complications and two revision cases were encountered with classic rhinoplasty. Greater expense was required for endoscopic-assisted rhinoplasty.

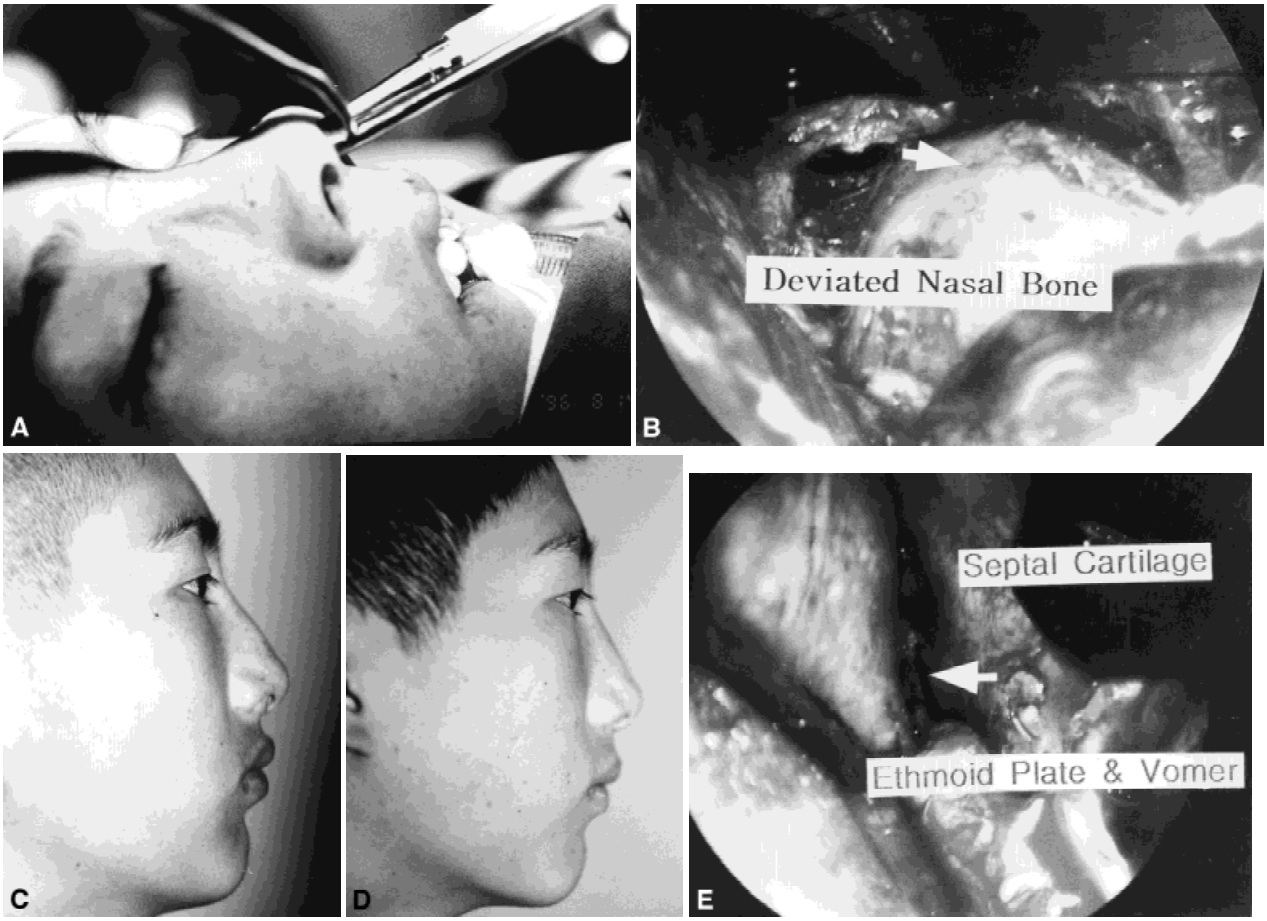

Fig. 1. Endoscopic control during rhinoplasty and septoplasty for correction of the deviated nose. **(A)** The use of a 30°-angle endoscope 4.5 mm in diameter allows easy introduction to the nasal bone and nasal septum during standard rhinoplasty and septoplasty. **(B)** Endoscopic view of the deviated nasal bone. Working with instruments through the transcartilaginous approach gives perfect visualization of the bony radix and deviated nasal bone. **(C)** Preoperative lateral view of a 16-year-old male patient (case 6) with a deviated nose, dorsal hump, and deviated septum. **(D)** Lateral view after endoscopically assisted correction with complementary trimming of the hump (bony excess) and septal irregularities. **(E)** Endoscopic view of the septum. Working with instruments through the hemitransfixation incision gives perfect visualization of the septal cartilage, ethmoid plate, and vomer.

Discussion

The deviated or traumatic nose requires accurate diagnosis of the abnormality and careful realignment of nasal structures. Reliable and stable long-term correction of the severely deviated nose is still a difficult problem, even when recent techniques are used [26]. Some factors that lead to incomplete correction or recurrence are related to the closed technique of the conventional rhinoplasty [14]. The closed technique is essentially done ''blind,'' and most of the work is guided by tactile sensation. The surgeon generally does not know precisely what subtle manipulation produces a particular desirable effect. In the closed (transnostril) approach, the nasal skeleton, both cartilage and bone, is frequently aggressively resected, with little, if any, effort made toward recreating the structural integrity of the nose. Without a stable nasal skeleton, the nasal tip projection is seldom maintained and is usually decreased as the cartilaginous lower third of the nose settles toward the face.

Anticipating this loss of tip projection, which may not be evident in the operating room, the surgeon may execute a compensatory overcorrection of the nasal dorsum. A disparity between the size of the overcorrected nasal skeleton and its skin–soft tissue envelope results after treatment of the deviated nose via the transnostril approach. The surgeon assumes that the skin–soft tissue envelope will condense to take the shape of the underlying reduced nasal skeleton.

The difference in size between the nasal skeleton and the overlying skin–soft tissue envelope, combined with the loss of structural integrity, leads to a poor aesthetic result—the skin–soft tissue envelope undergoes scar contracture; and because the nasal skeleton has neither the projection nor the strength to resist these forces,

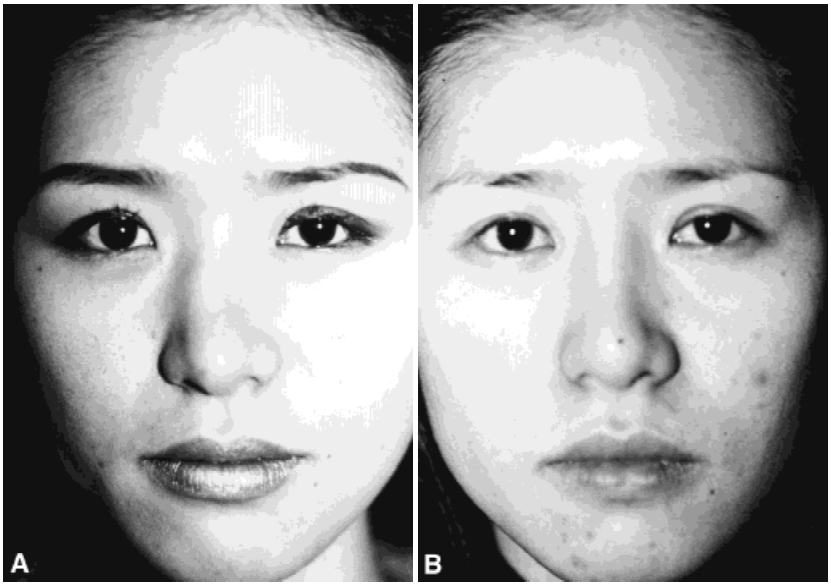

Fig. 2. Case 1. **(A)** Preoperative view of a 27-year-old woman with a deviated nose. **(B)** After corrective rhinoplasty and septoplasty with the assistance of an endoscope, the nasal dorsum shows a straight appearance.

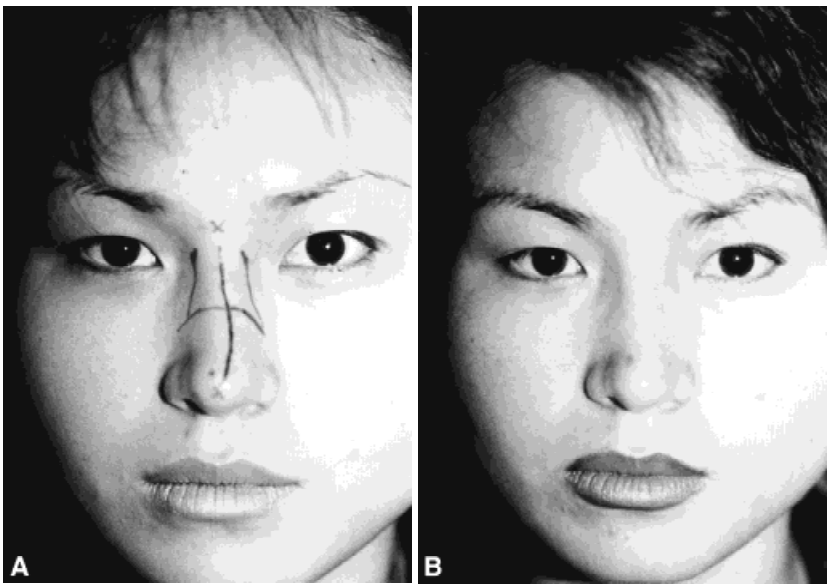

Fig. 3. Case 2. **(A)** Appearance of a 30-year-old woman with a deviated nose and deviated septum. **(B)** Postoperative view.

some degree of distortion of the nose ensues even if sufficient nasal bone and septal mobilization is performed.

Recognizing the difficulties inherent in closed rhinoplasty techniques for correction of the deviated nose, we suggest a different approach. Endoscopic-assisted rhinoplasty combines the transnostril (closed) approach to rhinoplasty with innovative nasal restructuring techniques with the endoscope under monitor control and magnification.

The endoscopic technique has revolutionized current, surgical techniques and has now been introduced to plastic surgical procedures [3–6,9,10,13,23–25,29,30].

In craniomaxillofacial surgery, endoscopy has been used in Lefort osteotomy, rhinoplasty, forehead contouring, and treatment of facial bone fractures [1,2,15,18–21,27,28].

Thirty patients have undergone primary and secondary rhinoplasties, with complementary resections in all cases obtained with endoscopic control after the normal rhinoplastic procedure was completed by Mitz [17]. Mitz insisted that endoscopic control during rhinoplasty is an advance that permits the surgeon to obtain better results in cartilage and bony resections and should decrease the number of secondary nasal revisions for small cartilaginous or bony irregularities.

A new instrument for endoscopic nasal surgery has been developed. A newly developed instrument specifically designed for nasal procedures was used clinically with success in the treatment of 10 patients with severe septal deviation by Hochberg et al. in 1995 [12].

Correa Marco [7] developed a nasal scope and also modified the traditional nasal set of instruments by reducing the sizes of its tips to one-third.

Table 1. Comparison of the results between classic and endoscopic-assisted rhinoplasty

	Classic rhinoplasty	Endoscopic-assisted rhinoplasty
Number of cases	16	28
Length of incision line	Same as with endoscopic-assisted rhinoplasty	Same as with classic rhinoplasty
Operation time	2 h 40 min (average)	3 h 20 min (average)
Satisfaction rate of patients	87.5% (14/16)	71.4% (20/28)
Complication rate	0% (0/16)	14.3% (4/28)
Revision	0% (0/16)	7.1% (2/28)
Expense	Moderate	Relatively high

The use of endoscopy in nasal surgery is gradually becoming a reality with the development of new instruments and the refinement of techniques. The goals are precision in diagnosis and treatment and improvement of the teaching capabilities in nasal surgery, which have always been a challenge with the blind traditional techniques.

The endoscopic approach to rhinoplasty provides the exposure necessary to diagnose the deformities present as well as to execute the required maneuvers of open structure rhinoplasty. With monitor control under magnification, the bony/cartilaginous framework is brought into full view with its components undisturbed, in their true anatomic position. Bony/cartilaginous deformities and asymmetries are apparent; therefore, the surgeon quickly learns to correlate the surface topography with the underlying skeletal anatomy.

In endoscopic-assisted rhinoplasty, more emphasis is placed on reshaping the nasal contour than on refining the nasal dorsum. The idea is to do only what is necessary either by subracting or by adding to the nasal structure where indicated. The endoscopic approach affords the exposure required to make these precise structural modifications.

The endoscopic approach provides optimal exposure of the lower lateral and upper lateral cartilages. Asymmetry of these cartilages in relation to the fixed bony structures of the nose can be corrected. Access to high septal deviations is crucial for straightening many twisted noses. With the endoscopic approach, septal deviations along the dorsum can be seen and may be corrected by cartilage graft.

The endoscopic technique is valuable mostly for providing control of the dorsum of the nose, adequate bony and cartilaginous symmetry, and perfect recontouring and rasping under magnification by watching the monitor.

This technique is not used during dissection but as a complementary tool to obtain an operative field as perfect as possible. It is possible to use endoscopy on nasal bones, lateral cartilage, the bony and cartilaginous septum, and adhesions between the dermis and the periosteum or perichondrium. The hypertrophic callus or overlying fragment in the traumatically deviated nasal bone can be removed by the endoscopic technique. There are fewer secondary touchups, tiny bone pikes, and cartilaginous dystopias as a result of the control under magnification. This endoscopic technique seems to diminish the cost of the operations for the patient and justify the investment in the new technology by reducing the secondary procedures.

Finally, the endoscopic technique has provided a superior means of teaching aesthetic surgery of the nose. Residents and fellows who learn via the endoscopic approach will have a superior understanding of rhinoplasty and may produce better results in a shorter period.

One may argue that the endoscopic approach to rhinoplasty is a more conservative method of gaining access to the nose than the open rhinoplasty technique. Although an intercartilaginous incision is used, no transcolumellar incision is made, and tip-supporting structures damaged by open rhinoplasty are preserved in the endoscopic approach.

Endoscopic-assisted rhinoplasty has its disadvantages. The procedure is more time-consuming, mainly because of the nasal restructuring maneuvers and extra time required for inserting and taking out the endoscope. Other disadvantages include the need for new instrumentation, relatively high cost, and training. But the benefits of the endoscopic approach in well-defined corrective rhinoplasty for the deviated nose far outweighs the disadvantages.

Experience remains an essential element; however, less time is required to learn the mechanics of rhinoplasty. Efficient craftsmanship and artistic judgment take on greater importance as structure techniques become more sophisticated.

Conclusion

Adequate treatment of the deviated nose requires detailed evaluation of the deformity present. From the almost-blind technique in classic corrective rhinoplasty technique for the deviated nose, where the results depend on feeling by the surgeon's hands, we are now able to visualize the nasal bone and septum under magnification on a video montior and operate with precision, as well as to demonstrate the technique.

The dissection and resection of bone and cartilage in septoplasty and rhinoplasty can be done with extreme precision under monitor control and magnification. Even

if this technique is inferior to classic rhinoplasty in expense and operation time, the endoscopic-assisted technique could decrease the number of complications and secondary nose revisions for recurrence and the satisfaction rate of patients.

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