Classification of the Deviated Nose and Its Treatment

Yong Ju Jang, MD; Jong Hwan Wang, MD; Bong-Jae Lee, MD

Objective: To present a simplified classification of the deviated nose and the associated treatment outcome.

Design: Retrospective analysis.

Setting: Tertiary care rhinology clinic.

Patients: Seventy-five individuals (49 males and 26 females) who underwent rhinoplasty for a deviated nose with minimum follow-up of 36 months.

Main Outcome Measures: Depending on the orientation of 2 horizontal subunits (the bony pyramid and the cartilaginous vault) with respect to the facial midline, the nasal deviations are classified into 5 types: I, a straight tilted bony pyramid with a straight tilted cartilaginous vault in the opposite direction; II, a straight tilted bony pyramid with a concavely or convexly bent cartilaginous vault; III, a straight bony pyramid with a tilted cartilaginous vault; IV, a straight bony pyramid with a bent cartilaginous vault, and V, a straight tilted bony pyramid and a tilted cartilaginous dorsum in the same direction.

Results: Deformities of types I through V occurred in 24 (32%), 19 (25%), 19 (25%), 7 (9%), and 6 (8%) patients, respectively, in whom 1, 3, 2, 1, and 1 unsuccessful outcomes were found. Four of the 8 failed cases had been approached endonasally.

Conclusion: The proposed classification for the deviated nose could serve as a valuable adjunct in the treatment of these patients.


Surgical management of the deviated nose is a challenging problem even for experienced rhinologic surgeons, and aesthetic and functional failures in correcting this problem are not uncommon. The proper management of this condition requires a thorough preoperative or intraoperative analysis of the shapes and relationships of the anatomical components of the nasal skeleton, and the surgical maneuvers should be executed in a precise manner. The terms deviated nose, crooked nose, and scoliotic nose encompass a multiplicity of deformities that require specific maneuvers to be corrected precisely. Thus, diagnosing and treating patients with a deviated nose would be greatly helped by a classification system that would enable individualization of the treatment plan according to the specific type of deviation. There are only a few reports of such classification systems, and in our practice, we identified patients whose nasal deviations do not fit exactly into the classification systems proposed previously. Herein we describe a new classification of the deviated nose and present a breakdown of our cases according to this classification.

METHODS

PATIENTS

Seventy-five patients (49 males and 26 females) who underwent septorhinoplasty for the correction of a deviated nose between January 1, 2002, and October 31, 2003, were analyzed. Patient ages ranged from 17 to 66 years (mean, 33.5 years). Minimum follow-up was 36 months. All preoperative and postoperative photographs were analyzed by 2 independent rhinoplastic surgeons. The postoperative outcome in terms of deviation correction was classified as excellent, good, fair, no change, or poor/worsening 12 months postoperatively. No change and poor/worsening were defined as unsuccessful outcomes.

CLASSIFICATION

To classify the deviated nose, we focused primarily on the dorsal deformity observable on a frontal view, and we did not incorporate caudal nasal deformities into the classification system. The nasal dorsum is divided into 2 hori-
Horizontal subunits: the bony pyramid and the cartilaginous vault. The nasal deviations are classified into 5 types on the basis of the orientation of each subunit with respect to the facial midline (Figure 1 and Table 1): I, a straight tilted bony pyramid with a straight tilted cartilaginous vault in the opposite direction (Figure 2); II, a straight tilted bony pyramid with a concavely or convexly bent cartilaginous vault (Figure 3); III, a straight bony pyramid parallel to the facial midline and a tilted cartilaginous vault (Figure 4); IV, a straight bony pyramid parallel to the facial midline and a bent cartilaginous vault (Figure 5); and V, a straight tilted bony pyramid and a tilted cartilaginous dorsum in the same direction (Figure 6). Figure 7 shows the algorithm for the classification and management of the deviated nose.

### Table 1. Classification of the Deviated Nose Into 5 Types

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
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<tbody>
<tr>
<td>I</td>
<td>Straight tilted bony pyramid with tilted cartilaginous vault in the opposite direction</td>
</tr>
<tr>
<td>II</td>
<td>Straight tilted bony pyramid with concavely or convexly bent cartilaginous vault</td>
</tr>
<tr>
<td>III</td>
<td>Straight bony pyramid with tilted cartilaginous vault</td>
</tr>
<tr>
<td>IV</td>
<td>Straight bony pyramid with bent cartilaginous vault</td>
</tr>
<tr>
<td>V</td>
<td>Straight tilted bony pyramid and tilted cartilaginous dorsum in the same direction</td>
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**Figure 1.** Classification of the deviated nose. For explanation of the 5 types, see the “Classification” subsection of the “Methods” section.

**Figure 2.** Preoperative (A) and 12-month postoperative (B) frontal views of a patient with a type I deviation (includes deformities having a straight tilted bony pyramid with a straight tilted cartilaginous dorsum in the opposite direction).

**Figure 3.** Preoperative (A) and 12-month postoperative (B) frontal views of a patient with a type II deviation (includes a variety of deformities having a straight tilted bony pyramid with a concavely or convexly bent cartilaginous vault).

### SURGICAL TECHNIQUES

Surgery was performed via an endonasal or external rhinoplasty approach. An endonasal approach is performed in selected cases of type I or II deviations with less severe deformities. If necessary, medial and lateral osteotomies are combined via an endonasal route. However, in most patients, an open approach is preferred to provide better exposure of the nasal dorsum and improved maneuverability of the graft.

### MANAGEMENT OF THE BONY PYRAMID

Deviation of the bony pyramid is managed by medial and lateral osteotomies to bring the nose back to the midline. In the case of removal of the associated hump, medial osteotomies are rarely performed. When there is residual deviation of the midline axis of the nasal bone, we use a 2-mm micro-osteotome to perform a percutaneous transverse root osteotomy between the 2 medial osteotomies just inferior to the nasal root crossing the midline.

### MANAGEMENT OF THE CARTILAGINOUS DORSUM

After septal degloving, extramucosal division of the upper lateral cartilage from the nasal septum is performed to reorient the cartilaginous dorsum and allow it to assume a midline position. We then resect the middle portion of the quadrangular cartilage, leaving a dorsal and caudal strut of quadrangular cartilage of at least 10 mm. Any deviation in the perpendicular plate of the ethmoid and the vomer plate is resected, and any remaining deviation in the maxillary crest is resected or reposi-
tioned. When a significant residual deviation of the dorsal border of the septum exists or a widening of the valve angle is required, we use bilateral spreader grafts to splint the dorsal septum into a straight configuration and correct any airway compromise. We apply a slightly larger and thicker spreader graft to the concave side to help efface the deficiency in the upper lateral cartilage. In some patients with types III and V deviations in which straight septal tilt is an important pathologic abnormality, we sever the dorsal strip of the L-strut and overlap the proximal and distal segments, and then we fixate them together using 5-0 polydioxanone sutures. This maneuver reduces the tilt, foreshortens the dorsum, and rotates the tip cephalically, and the associated weakening effect of the dorsal strut can easily be compensated for by a bilateral spreader graft.

**MANAGEMENT OF THE CAUDAL SEPTAL DEVIATION**

A swinging-door maneuver and fixation suture are used for mild caudal septal deflections in which the caudal septum is subluxated off the maxillary spine anteriorly. When there is residual convexity in the caudal strut or the risk of a weakened caudal strut, we apply a septal batten-type graft either on the convex or bilaterally. The septal batten graft is sutured to the caudal septum using 5-0 polydioxanone sutures.

**RESULTS**

Type I was the most common deformity in this series, occurring in 24 patients (32%). The second most common deformities were types II and III, which were each observed in 19 patients (25%). The type IV deviation was found in 7 patients (9%), and 6 patients (8%) had type V deformity.

For the treatment of type I deviation, the endonasal approach was selected in 9 patients and the open rhinoplasty approach was chosen in the remaining 15. Of these
24 patients, 1 who underwent the endonasal approach had an unsuccessful outcome. In 19 type II deviations, all 3 patients who were operated on via the endonasal approach had unsuccessful corrections of their original deformity. All the patients with deviations of types III, IV, and V underwent an open rhinoplasty approach; 4 experienced unsuccessful outcomes (Table 2).

**Table 2. Surgical Approaches and Treatment Outcomes**

<table>
<thead>
<tr>
<th>Classification Type</th>
<th>Approach, No.</th>
<th>Unsuccessful Outcomes, No.</th>
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<tbody>
<tr>
<td>I</td>
<td>Open 15, Endonasal 9, Total 24</td>
<td>1</td>
</tr>
<tr>
<td>II</td>
<td>Open 16, Endonasal 3, Total 19</td>
<td>3</td>
</tr>
<tr>
<td>III</td>
<td>Open 19, Endonasal 0, Total 19</td>
<td>2</td>
</tr>
<tr>
<td>IV</td>
<td>Open 7, Endonasal 0, Total 7</td>
<td>1</td>
</tr>
<tr>
<td>V</td>
<td>Open 6, Endonasal 0, Total 6</td>
<td>1</td>
</tr>
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</table>

Treatment of the deviated nose should involve the recognition and correction of all underlying deformities, and preoperative planning is facilitated and rendered more accurate through an awareness of the pathologic features. A simple and descriptive classification of the deviated nose would be of great benefit to the analysis and characterization of the pathologic abnormalities. Ellis and Gilbert used 3 categories of nasal deviation: (1) at the nasion, (2) at the level of the rhinion, and (3) combinations of the two. Rohrich et al. also suggested 3 basic types of nasal deviation: (1) caudal septal deviations, (2) concave dorsal deformities, and (3) concave/convex dorsal deformities. The most common type of dorsal deviation in their study was their type 2, of which there were 2 subtypes: C-shaped deformity, with left-sided concavity, and reverse C-shaped deformity, with right-sided concavity. The least common type in their classification was the concave/convex deformity, which is also known as an S-shaped dorsal deformity with bony pyramid deviations.

These previous classifications of the deviated nose were not applicable to some of the present patients, so we devised a new classification system. To develop a simplified and more practical classification system better describing the morphologic characteristics of the deviated nose, we adopted the traditional distinction of the nasal dorsum into 2 parts: the upper (bony) and lower (cartilaginous) portions. The present classification facilitates conceptualization of the often complex deviation by simply dividing the nose into 2 horizontal parts and examining each part in relation to the facial midline. The upper part corresponds to the bony pyramid, and the lower part encompasses the dorsal septum and conjoined upper lateral cartilages. Each part is categorized as being on the midline or deviating to the right or left side. Moreover, the deviation of the cartilaginous vault is analyzed whether it is straight tilted or convexly bent. The rationale for us to make a distinction between the deviation into straight tilt and bending was that both types may differ in the required surgical techniques. For example, use of the spreader graft is of utmost importance when the cartilaginous vault is bent concavely or convexly. Thus, the division into 2 subunits not only facilitates the analysis but is also of practical importance in selecting surgical treatment options.

In this study, type I deformity, which may correspond to the C-shaped or reverse C-shaped concave dorsal deformity and concave/convex deformity of Rohrich et al., was the most common deformity, accounting for 32% of the cases. The type II classification may also include the concave dorsal deformity and concave/convex dorsal deformity of Rohrich and colleagues, although ours differs in that it includes only cases in which the cartilaginous vault is bent in a concave or convex manner. This type of deviation is most difficult to treat because of the strong cartilage memory resisting the use of any conservative corrective measures, so a strong bilateral spreader graft is applied after scoring on the concave side of the dorsal strut. In fact, we experienced 3 cases of unsatisfactory correction in this type II deviation, which were treated less aggressively via an endonasal approach.

Types III and V deviations in this series may correspond to the straight septal tilt caudal deviation of Rohrich and colleagues. The essential difference between the 2 classification systems is that ours considers only the final shape of the dorsum irrespective of the caudal septal deformity. We believe that the nose can appear quite normal in the presence of most types of caudal deviation; thus, this classification seems to be more realistic in describing the deformity.

Types III and IV deformities are less common and are characterized by an isolated deformity in the cartilaginous vault, whereas the bony pyramid is relatively straight and parallel to the facial midline. Except in patients with a broad nose, osteotomies are generally not indicated for these types of deformities.

Surgical management of the deviated nose involves septal correction, separation of both upper lateral cartilages from the septum, and bony pyramid manipulation after osteotomies. Of these, correction of the septal deviation constitutes a key element in surgical management of the deviated nose. When we correct the deviated nose, the general surgical principles suggested by previous researchers are followed.

In our series of the deviated nose, failures occurred in 8 of 75 patients (11%). Possible reasons for these failures may include improper preoperative evaluation, failure to understand and compensate for the dynamics of the cartilage, and faulty surgical execution. Half of the failures were attributable to the conservatism of an endonasal approach. Thus, for the proper management of the deviated nose, we recommend a more aggressive approach through an open rhinoplasty incision, which provides for a better intraoperative diagnosis and more precise execution of the various maneuvers required to correct the deviated nose.

It is obvious from the literature and our experience that the deformities present in the deviated nose can differ substantially between patients, and hence, there is no one method that should be used for every deviated nose. However, the present categorization of the pathologic abnormalities allows the surgical techniques to be speci-
fied for the different types of deviations. There may be cases of deformities that are too complex to be described by this simple classification. In addition, this classification does not relate to the situation when the nasal tip itself is asymmetrical or crooked, which often creates the picture of a crooked nose notwithstanding the bony and cartilaginous pyramid being straight. Furthermore, more delicate and innovative procedures may be required for the proper correction of the deviated nose. However, we have found that this classification system simplifies the preoperative analysis of the abnormalities and subsequent surgical planning. Moreover, we found that it facilitates communication with the patient and between physicians. We therefore conclude that our classification could serve as a valuable adjunct in the treatment of patients with a deviated nose.

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Author Contributions: Drs Jang, Wang, and Lee had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Jang and Wang. Analysis and interpretation of data: Lee. Drafting of the manuscript: Wang. Critical revision of the manuscript for important intellectual content: Jang and Lee. Administrative, technical, and material support: Wang and Lee. Study supervision: Jang.

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REFERENCES