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THE CHALLENGING CROOKED NOSE

A Review of Literature

Wael M. Ismaeil

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By
Waél Mohammad Ismaéil,
M.B. B.ch.

Under supervision of
Prof. Dr Mohammad Zaki Helal,
Professor of Otorhinolaryngology,
Faculty of Medicine, Ain Shams University
Prof. Dr Talaat Ali El-Samny,
Professor of Otorhinolaryngology,
Faculty of Medicine, Ain Shams University
Dr Mohammad Amir Hassan,
Lecturer of Otorhinolaryngology,
Faculty of Medicine, Ain Shams University

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1

INTRODUCTION

Surgical Philosophy

Rhinoplasty -surgery to reshape the nose- is a common procedure for both cosmetic and functional requests. It is the most frequently performed surgical operation in facial plastic and reconstructive surgery, exceeded only by blepharoplasty (Tardy and Toriumi, 2000).

In the United States, approximately 50,000 cosmetic rhinoplasties are performed each year. Common requests include making a nose smaller, reducing the bridge of the nose, narrowing the nose, making changes to the nasal tip, and lifting a droopy tip. Patients seeking treatment also include those whose noses are too short, too long, too narrow, too wide, twisted, and so forth. Also, a significant number of patients who suffer nasal fractures later seek rhinoplasty (Becker, 2003).

A number of patients desire improvement in their nasal breathing and their nasal appearance. Fortunately, a number of procedures (including noncosmetic or functional rhinoplasty) allow the surgeon to substantially improve nasal breathing at the same time that cosmetic changes are made. Patients who do not like the way their noses look and who are in good physical and mental health are eligible for a rhinoplasty consultation. The next step is to meet with a skilled surgeon to see if surgery can meet their expectation (Oneal et al., 1999).

Rhinoplasty has the remarkable ability to make people feel better about themselves. Indeed, it is indisputable that rhinoplasty is a positive experience for the vast majority of patients. Many studies show that the great majority of rhinoplasty patients benefit psychologically from the operation. But, why is rhinoplasty successful? In other words, why does it produce positive psychological benefits? Many complex psychological explanations have been suggested for this, but one thinker on the subject maintained a more concrete opinion: "*We should not underrate the importance of actual beauty….. in human life*". This philosopher went on to say: "*Beauty can be a promise of complete satisfaction….. our own beauty (or lack of it) will not only figure in the image we get about ourselves, but will also figure in the image others build up about us and which will be taken back again into ourselves. The body image is the result of social life*" (Goin and Goin, 1981).

Rhinoplasty is most common in the late teens, twenties, and thirties. A significant number of patients in their forties and fifties also seek rhinoplasty. Most rhinoplastic surgeons prefer to wait until an individual has completed his or her growth spurt before performing rhinoplasty.

This means about age 16 for girls, and a little later for boys. Of course, this is a generalization and it is very important to take into consideration the individual's emotional and social maturity level. It is important for the surgeon to know what the patient wants to accomplish, and the patient must know what the surgeon envisions as a goal for the surgical result. Computer imaging is extremely useful for communicating this information (Daniel, 1993).

Careful presurgical planning is an important part of rhinoplasty. Becker (2003) typically "performs" each surgery at least 6 times: first (mentally) during the patient's first office visit, again upon additional reflection, a third time after careful review of the preoperative photography, a fourth time just prior to the actual surgery, a fifth time is the actual surgery, and then the sixth times (and possibly more) after the surgery as review, "postsurgery analysis".

Historical Review

There is no ideal surgical technique for the correction of the crooked nose. A review of the literature suggests that three surgical procedures are primarily used: (1) camouflage techniques, (2) complete deconstruction and anatomic reconstruction, or (3) a combination of both (Gürlek et al., 2006).

Historical references have shown us new methods of treatment for nasal deviation. Dieffenbach (1845) was the first to describe a method to correct a deviated nose. He separated the upper lateral cartilages (ULC) from the nasal bones and held them in position with a bandage. Trendelenburg (1889) performed lateral osteotomies through the nasal vestibule, separated the nasal bones from the frontal bone through a skin incision at the root of the nose, and replaced the nasal pyramid in the midline by digital pressure. Joseph (1907) described an intranasal approach to make lateral osteotomies, although he did not describe septal correction. Cottle (1960) made lateral osteotomies through vestibular or alar incisions and described a subperichondrial approach to extensive nasal septum surgery. Since then, several methods have been proposed to correct deviated noses (Cannistra´ et al., 1998).

With the evolution of modern rhinoplasty, many pioneer surgeons recognized that septal surgery played a pivotal role in the correction of the deviated nose and hence combined septal and corrective rhinoplasty

in one procedure. The one-stage septorhinoplasty has become the standard line of management for crooked noses (Foda 2005).

The first procedure for correction of the septum, septoplasty, was described by Metzenbaum (1929). This "swinging door" technique was modified by Seltzer (1944). Gubisch (1995) dissects and resects the septum completely, then divides it into straight pieces, suturing these to each other to obtain a straight configuration. He strengthens this using a perpendicular plate of fenestrated ethmoid bone as a splint before reinsertion. In addition to septoplasty, Sheen and Sheen (1987) and Constantian (1989) have suggested camouflage techniques for correction of the crooked nose and for maintaining the strength of the supporting structures as much as possible.

Tardy (1999) has suggested using cartilage grafts to camouflage minimal asymmetries in cases wherein the airways already have been corrected. Toriumi and Ries (1993) proposed a new technique involving the reinsertion of a planoconvex spreader graft on the concave side to restore both respiratory function and the aesthetic view. In larger C-shaped deformities, Toriumi and Ries have suggested using ethmoid bone stenting grafts to straighten the deformed dorsal segment of the L-strut after cross-hatching it. Guyuron et al. (1999), after scoring the concave side of the L-strut, places the spreader grafts anteriorly on one or both sides and extramucosal stents posteriorly to guide cartilage memory. Rohrich (1999) also suggests the unilateral spreader graft technique, stressing its importance in the correction of high dorsal septal deviations.

Byrd et al. (1998), Foda (2005) insert a septal extension graft as a spreader graft on the concave side, thus also making it possible to control tip projection, rotation, and shape.

All these techniques have been very effective in correcting crooked noses with minimal deformities, but the recurrence rate has been high, and airway problem with more significant deformities could not be solved (Gürlek et al., 2006).

The use of spreader grafts was first described by Sheen (1984), and this method is the most common for the correction of nasal valves. Widened nasal valves normalize nasal airflow. On the other hand, these grafts are useful in the correction of dorsal deformities such as the inverted-V deformity and collapse of the middle vault. In the beginning, single side bone and cartilage extended grafts may provide correction for

the deformity. However, scar contracture and cartilage memory may cause partial or total recurrence over time (Rohrich et al., 2002).

Pontius and Leach (2004) classified crooked noses into five groups and suggested treatment methods. Their technique depends on (1) release of the deforming forces, (2) correction of the septum, ULCs and lower lateral cartilages (LLC) , (3) insertion of single- or double-side symmetric or asymmetric spreader grafts, and (4) suture fixation of the corrected parts, septum, ULCs, LLCs and spreader grafts to each other. Their idea is innovative and simulates the normal anatomy, but after suture resorption, unresolved scar contracture and cartilage memory become the leading problems.

Recently, Mendelsohn (2005) and Gürlek et al. (2006) used a pair of custom-made high density porous polyethyline (HDPP) extended spreader grafts to maintain corrections of the septum and overcome cartilage memory and scar contractures. HDPP is readily available, requires no additional surgery for graft harvesting, therefore avoids donor area problems, and is commonly used in facial reconstruction and restoration. It is nonallergenic, nonantigenic, nonabsorbable, highly stable, and available in a wide variety of preformed shapes for implant material. This material is suitable for use as a custom made spreader and extended spreader graft, and its clinical safety is well documented.

The use of HDPP grafts provides the external nose with straightness and strength to reduce the effect of contracture, “elastic memory” of the cartilage, scar, and trauma (Mendelsohn, 2005).

Aim of The Work:

We are doing a review of the literature to demonstrate how difficult the crooked nose is and explore efforts of the rhinoplasty surgeons to encounter such a challenge. New trends, and the recently introduced grafts and implants in the evolution of modern rhinoplasty are to be considered.

2

NASAL ANALYSIS

The Ideal Nose

The “ideal” nose is one that is in harmony with the other favorable features of a patient’s face. The “ideal” shape for a male or female nose is an aesthetic concept that has its roots in our perception of beauty. This cannot be completely boiled down to lines and numbers - there is always an indescribable “artistic” element. However, by studying beauty, and faces that are universally felt to be beautiful, artists and plastic surgeons can arrive at some guidelines or proportions that represent the “aesthetic ideal”. Leonardo da Vinci was among the first to make such studies of beauty and aesthetic proportions. He and other artists have been joined in this pursuit by facial plastic surgeons, whose profession entails understanding beauty and then making changes that enhance the beauty of their patients (Tardy, 1997).

This aesthetic “ideal” is simply a goal or a frame of reference that must be modified to reflect the realities of a particular patient's facial features. The lines and measurements outlined here are a general guideline for facial plastic surgeons that is applied to each patient individually. When a patient presents for a rhinoplasty consultation, the experienced surgeon makes mental note of a “first impression” e.g., too big, twisted, large hump, an over-operated or revision nose. This first impression is important, because the odds are that this is what is bothersome to the patient as well. Often the surgeon will also ask the patient early on what it is that bothers the patient about his or her nose (Becker, 2003).

Topographic landmarks of the nose

A thorough understanding of the involved basic anatomy is fundamental to any surgical procedure. To the rhinoplasty surgeon, familiarity with the nuances of nasal anatomy is essential to ensure a pleasing, long-term result. Indeed, the ultimate outcome of any nasal surgery reflects the patient's subtle anatomy, the surgeon's recognition of each individual's variation, as well as the ability of the surgeon to deal with them (Daniel, 1993).

Just as the nose itself represents an aesthetic unit located centrally within the other aesthetic regional units of the face, upon the nasal surface, one can identify several distinct anatomic topographic subunits. Nasal subunits, which may be individually overdeveloped or understated in different noses, consist of the nasal dorsum, the nasal sidewalls, the

nasal tip (including the infratip lobule and columella), the alar lobules and the depressions of the supra-alar facets (Tardy, 1991).

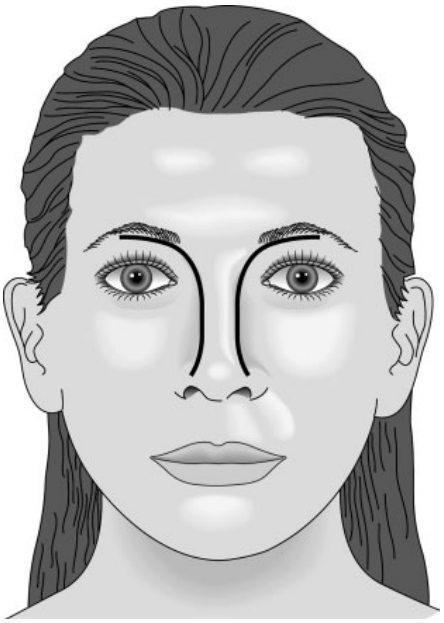

Fig. 2.1: Frontal view of the nose, the dorsum assumes a soft curve originating from the medial brows. ***(Kim and Toriumi, 2004)***

From the frontal view, the dorsum assumes a soft curve originating from the medial brows. The narrowest part of the bony vault is at the level of the medial canthus then it broadens at the osteocartilaginous vault junction (the rhinion). The gentle curve continues and terminates at the tip-defining point that is created by the prominence of the dome of the alar cartilage (Fig. 2.1). The lobule can be defined as an area including the tip of the nose and bounded by a line connecting the upper edge of nostrils, the supra-tip breakpoint and the anterior half of the lateral alar wall. The lobule is subdivided into the tip, supratip and infratip lobule (Oneal et al., 1999).

On the lateral view, the tip of the nose is the apex of the lobule and ideally the most defined element on the profile. In non-Caucasians, the tip tends to lack definition. The infratip lobule is between the tip and the apex of the nostril. The configuration of the infratip lobule depends on the middle crus of the alar cartilage. The supratip lobule is just cephalic to the prominence of the pronasale. In an aesthetically pleasing nose, the columella projects as a gentle curve below the alar margin. In the non-caucasian nose, a common variation is for the ala to overhang the

columella posteriorly. The columella and infratip lobule projection are influenced by the configuration of the medial and middle crura. Because of the thin, adherent asymmetries or prominences of these structures are easily visible in external configuration. In addition, projections of the caudal edge of the septum can produce a prominence of the columella as well (Oneal et al., 1999).

On the basal view, the flaring of the caudal edges of the medial and middle crura is noted. The degree of flare plus the lateral curve of the medial crural footplates determine the width of the columella and the infratip lobule (Fig. 2.5). Columellar deviations and asymmetries frequently are due to deflections in the caudal septum. Medially, note the relationship of the anterior nasal spine to the depressor septi muscle and laterally, the alar part of the nasalis muscle (Oneal et al., 1999).

Physical examination and Analysis:

Precise analysis of the crooked nose is the first step in determining optimal management strategies. However, prior to addressing the nose, facial asymmetries must be elucidated and considered. To analyze the face, a vertical line is drawn from the exact midpoint between the medial canthi, and a horizontal line is drawn that passes through both medial canthi. From these 2 reference lines, facial asymmetries become obvious (Vuyk , 1997).

Nasal analysis begins with noting the deviation of the nose from the midline of the face. Beginning with the upper third of the nose, the width of the bony pyramid is assessed as are the length of the nasal bones. The length of each nasal bone should be assessed individually because asymmetric nasal bones will require asymmetric hump reduction to prevent foreshortening of the more vertically oriented nasal bone on the side of the convexity (Porter and Toriumi, 2002).

Analysis continues with evaluation of symmetry of the middle third of the nose. One attempts to determine the relationship of the upper lateral cartilage with the nasal bones, particularly if there is any narrowing, step-off deformity, or skewing. Scarring or warping in the middle vault is also assessed. The lower third of the nose includes the medial, middle, and lateral crura of the lower lateral cartilages. Asymmetry from septal deformity in this area is appreciated by skewing of the tip-defining points from the horizontal. The caudal edge of the septum may be apparent because it protrudes into one nostril or the other.

The lower lateral cartilages may have intrinsic deformities that lead to asymmetry (Pontinus and Leach, 2004).

A history of trauma is particularly pertinent and if present whether it occurred early or later in life. Even minor trauma in early life can lead to marked deformation with continued chondrocyte growth (Ramirez and Pozner, 1996).

Physical examination consists of inspection and palpation of the external nose. The relationship of the nasal size to the face should be determined. Specifically, attention should be given to the horizontal thirds and vertical fifths. A midline plane from the glabella to the central incisors should be envisioned, and deviations from the midline are noted. Occlusion and chin position are determined. Bony step-offs and nasal tip support should be assessed. Palpation of a displaced anterior septal angle indicates a severe septal deviation. A prominent dorsal hump or saddle deformity should be noted (Terkonda and Sykes, 1999).

Assessing the "recoil mechanism" of the tip during examination of the nose imparts valuable information regarding tip support mechanisms and their relative influence in the patient to be operated upon. While palpating the size and attitude of the alar cartilage, pressure applied to the tip with the index finger will be helpful in determining the resistance to tip retrodisplacement and the degree of "recoil" and forward thrust of which that particular tip is capable (Fig. 2.2). The surgeon's plan of attack is clearly influenced by an assessment of this anatomic-dynamic feature of the nose (Tardy, 1991).

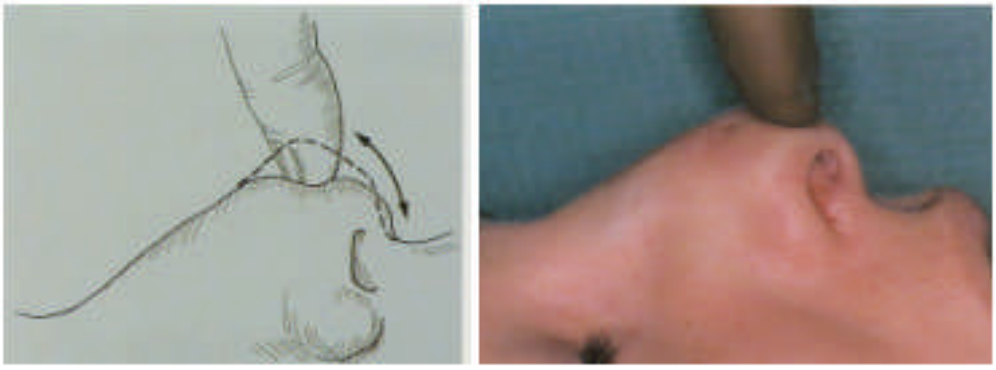

Fig. 2.2: Recoil mechanism upon plapation of the nasal tip by which one can assess the degree of strength of the nasal tip support mechanisms. ***(Tardy, 1991)***

Fig. 2.3. A,B: Topographic key landmarks and designations for frontal and oblique views of the nose. ***(Tardy, 1991)***

Key: Fig. 2.3

1 Glabella
2 Nasion; nasofrontal angle
3 Rhinion (osteocartilaginous junction)
4 Tip-defining point
5 Infratip lobule
6 Columella
7 Columella-labial junction
8 Facet
9 Alar sidewall
10 Alar-facial junction
11 Medial crural footplate
12 Supra-alar crease
13 Alar margin
14 Philtrum
15 Philtral crest
16 Supratip dorsum

Internally, the septum is analyzed for deviations, particularly those deflections that are high dorsal or caudal. Of high importance in this region is the area of the internal nasal valve, which is formed by the caudal free edge of the upper lateral cartilage, the septum, and the nasal floor. Any angle at less than 10° may result in nasal airway obstruction (Sheen and Sheen 1998).