Chapter 48: Special Rhinoplasty Techniques

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The nasal abnormalities to be addressed in this chapter are those that usually have some type of combined internal and external deformity and are often difficult to correct. The chapter will not address the standard or cosmetic rhinoplasty but rather will attempt to show some of the variations required in these problem cases (Converse, 1950; Farrior, 1974, 1980, 1984). Management is complex if the injury has been severe, such as when there has been loss of support because of hematoma or infection or if the nose has been operated on previously. In a nose requiring revision, particularly when an excessive amount of scarring has been created or an excessive amount of tissue has been removed, management may include a multitude of variables. Of the congenital anomalies, only the cleft-lip nose will be discussed.

These patients require the inclusion of all aspects of combined septorhinoplasty, with frequent extension and modification of the technique (Converse, 1950; Farrior, 1984). The use of implants is frequently required. Autogenous implants are advised; I use them almost exclusively, since synthetic implants when utilized for the nose have been disappointing in long-term follow-up (Converse, 1955; Dingman, 1969; Farrior, 1966a, 1966b; Peer, 1941).

These cases are particularly challenging in regard to improving the airway and gaining maximum improvement in appearance. A form of combined septorhinoplasty to correct both the external and the nasal septal deformities in one stage is virtually essential (Becker, 1951; Converse, 1950; Farrior, 1980, 1984). These noses are often twisted, and the septum cannot be adequately straightened without correcting the external deformity as well. Fig. 48-1 illustrates several nasal deviations and the anatomic components involved. Each of these deviations may be associated with a long side and a short side of the osseous and cartilaginous lateral nasal vaults, particularly when the deviation extends to the root of the nose and the deformity is of congenital origin. A plumb line should be dropped from the center of the glabella and the nasal base analyzed in relation to any deviations of the lower third of the face. If present, these facial asymmetries should be pointed out to the patient preoperatively.

Quite often there is excessive scarring, which requires the freeing of contracting forces and tension vectors on the nasal septum. The osseous dorsum and the cartilaginous dorsum are reduced before the septal surgery is performed, since these cases require extensive exposure, mobilization, and release of the tissues to allow repositioning and structural reorganization (Farrior, 1980). An experienced surgeon can "take the nose apart" and yet preserve most tissue, by "repositioning" rather than "removal".

In the traumatized nose, whether the trauma is caused by injury or previous surgery, one must determine whether tissue is simply displaced or whether it is absent (Farrior, 1984). Ideally, all tissue, particularly the septal cartilage, remains available for modification or for possible use as an implant. The surgeon must determine what structures can be left undisturbed and what can

be retained but repositioned to ensure adequate support. In addition to the structural framework, the soft tissue may contribute to the deformity through asymmetric adhesion of the overlying skin, resulting in dimpling, or through webbing of the mucosa, causing nasal obstruction.

Revisional surgery is indicated if the nose can be functionally improved, whether or not an ideal aesthetic result can be obtained (Farrior, 1974, 1980; Millard, 1969; Rees et al, 1970; Sheen, 1975b).

Analysis

A thorough examination utilizing not only observation but also detailed palpation of the nose is essential in determining preoperatively what anatomic components are actually involved in the deformity. Experience is a great factor in being able to do this at the time of the office examination. Careful examination should be coordinated with appropriate photographs, x-ray films, and facial analysis. The preoperative findings strongly influence the selection of the most appropriate surgical approach and exposure techniques.

If previous surgery has been performed by someone else and revision is required, it is most helpful in the analysis if the previous operative report can be obtained. Even with this, it is difficult to decipher precisely how much tissue remains or how much scarring may exist. Although examination by blunt-instrument palpation is helpful, actual exploration at surgery is often required to determine the amount of tissue that remains.

Coordination of the preoperative analysis with the findings at the operative table can be accomplished through either the standard intranasal rhinoplasty approaches or the external rhinoplasty approach. The external rhinoplasty approach is particularly useful in the twisted nose and the nose requiring implant materials, but I use predominantly the standard rhinoplasty approaches with only occasional use of the external technique. However, for the severely deviated nose and the cleft-lip nose, the external rhinoplasty is used with increasing frequency (Farrior, 1984; Goodman, 1981; Rees et al, 1970; Strezlow, 1984).

The pathologic anatomy is variable, and multiple techniques are required to achieve adequate correction. All components of the internal and external anatomy may be involved, and the influence of one component on the next must be taken into consideration in the repair (Farrior, 1980).

Some of the more common deformities encountered in the previously injured nose are:

1. "Relative" hump.

2. Wide lateral bony vault.

3. Depression of caudal nasal bone.

4. Depression of cartilaginous dorsum.

5. External twist and deviation.

6. Splayed cartilaginous dorsum and tip.

7. Loss of septal and upper lateral cartilage support.

8. Saddle deformity (cartilage and/or bone).

9. Caudal dislocation of septum.

10. Columella retraction with absence of cartilage.

11. Flattened or asymmetric nostrils.

12. Distorted or fracture lower lateral cartilages.

13. Septal deflections, spurs, lamination (fibrous and cartilaginous duplication), complex angulations, and fibrous union.

14. Intranasal scarring (a) at the limen vestibuli ("anterior web") and (b) on the floor of the nose.

15. Synechiae.

16. Septal perforations.

Incisions and soft-tissue elevation

In the intranasal rhinoplasty approach to the deviated nose, a rather generous intercartilaginous incision is made bilaterally and the soft tissue over the upper lateral cartilage is elevated. The incision is carried into a complete transfixion incision (Fig. 48-2). Alar cartilage margin incisions are made to allow delivery of the lower lateral cartilages so that they can be analyzed, especially in the face of any asymmetries, fractures, or lacerations of the cartilages. A complete transfixion incision is most often used for these deviated noses in anticipation of work on the caudal septum and anterior spine area and also to allow the insertion of a columella strut into a retrograde columella pocket. The septum is approached through this incision when correction of the caudal septum and anterior spine is required. If the caudal septum is intact and there is no dislocation, the classic Freer incision is used, leaving all anterior or caudal mucoperichondrium and cartilage undisturbed.

Although I generally use intranasal incisions for a deviated nose, the open or external rhinoplasty is being used with increasing frequency when there are severe asymmetries,

deviations, and tissue deficiencies (Fig. 48-3) (Farrior, 1984; Goodman, 1981; Rees et al, 1970; Strezlow, 1984). The incisions measure approximately 7 mm in length and have had a variety of configurations. In order to have a single point at the end of this random pattern flap, I now use the gull wing incision as opposed to the previous inverted gull wing incision (Fig. 48-4, A and B). (In this figure the incision presently used is the second one down on the right side.)

Some of the indications for use of the external rhinoplasty are as follows: (1) a nasal deformity that is difficult to precisely analyze; (2) one in which there is severe asymmetry of the lateral bony walls as well as the lower lateral cartilages; (3) when tissue deficiencies exist so that it is necessary to precisely place and suture implants in position (Farrior, 1984); (4) congenital anomalies such as the cleft-lip nose or other deformities in which profound asymmetries exist; and (5) an extremely wide bony and cartilaginous dorsum, whether or not a hump is removed.

The external approach involves a transverse midcolumella incision in a gull-wing curve rather than at a sharp angle. The incision is then extended upward along the caudal edge of the medial crus and laterally along the caudal margin of the lateral crus (Fig. 48-4). The elevation is initiated with sharp knife dissection, with the columella skin being elevated before the elevation is extended laterally over the lateral crura of the lower lateral cartilages. The technique allows incorporation of the various modifications I have developed through the years to deal with specific anatomic components (Farrior, 1974, 1980). The external incision crossing the columella leaves a barely perceptible scar and offers excellent visualization via the "degloving" of the nose.

Although the caudal septum can be exposed through the external approach by spreading the medial crura, such an approach requires extensive separation of the medial crura, columella, and membranous septum, and even then the exposure for septal surgery may be limited.

Because there is only limited elevation of the skin with the intranasal approaches, the skin redrapes easily to allow precise intraoperative analysis of the resculptured nasal framework. In the external rhinoplasty, however, the soft tissue is undermined more extensively and some distortion may result as the elevated skin is laid back down. This more extensive tissue mobilization also leads to greater tissue reaction and edema postoperatively, so that it takes slightly longer to resolve the swelling postoperatively than is the case with intranasal approaches.

Reduction of the bony and cartilaginous dorsum

It is interesting that debate remains as to whether to do the hump removal or the septal reconstruction first. Some surgeons even prefer to do the septum in an initial procedure, followed by the rhinoplasty several months later. I have long advocated a single-stage procedure for the twisted and combined internal-external deformity, and strongly prefer to reduce the nasal dorsum *before* performing the septal reconstruction.

The surgeon must first determine exactly how much, if any, hump reduction should be carried out. Quite often in the traumatized nose, a "relative" hump is created by loss of support and flattening in the cartilaginous portion of the dorsum. In these cases initial attention should

be devoted to increasing the cartilaginous projection with combined septal surgery and nasal tip surgery (Farrior, 1980).

In the externally deviated nose there is usually an inequality of the lateral vaults, both bony and cartilaginous. This may be corrected with an asymmetric hump removal, with more bone and cartilage being removed on the longer side (Fig. 48-5). In some cases it is desirable to section the mucosa as well as the bone or cartilage during hump removal. This is particularly true when a large hump has been removed; the redundant mucosa beneath the dorsum can herniate upward beneath the skin and result in an undesirable dorsal fullness.

In some cases the nose should be straightened before the final trimming of the long side, since it may be best to add an implant to the short side rather than additionally reducing the long side.

Revisions of the dorsal profile line often involve the simple correction of specific irregularities caused by bone spicules or prominent cartilages. The supratip area is a subject unto itself; correction of deformities there requires correction of dorsal framework deformities and reduction of soft-tissue thickening and fibrosis.

Supratip swelling that results in a fullness and rounding of the tip with healing - that is, a "pollybeak" deformity - can result from several factors. The most common are excessive postoperative fibrosis between the skin and the septal angle and simply insufficient lowering of the dorsal margins of the septum and/or upper lateral cartilages. In correcting the pollybeak deformity, the surgeon should slightly overcorrect the cartilaginous framework to allow for recurring fibrosis in the supratip area (Fig. 48-6). Any excessive scar tissue should be removed, although it often recurs. I do not advocate the use of steroid injection into the supratip area.

Supratip swelling may also result from an excess of mucosa herniating upward beneath the dorsal skin (Fig. 48-7). This is likely to occur when an extensive reduction has been done and an extramucosal approach has been used, preserving all of the mucosa in the valve area.

Perhaps the most common secondary deformity of the nasal dorsum is created when too much bone has been removed, so that implants of one type or another must be inserted. Fascia inserted beneath the skin is effective in masking slight irregularities of the dorsum (Guerrerosantos, 1984). This may be the only implant needed, particularly for small soft-tissue defects. The fascia temporalis is readily available for this purpose, but fascia lata can also be used.

The open rhinoplasty offers an opportunity to suture either cartilage implants or fascia implants precisely into position. When wide elevation is not required to perform the rhinoplasty, a limited pocket is made for the implant to allow precise positioning. Draw sutures carried out through the skin aid in positioning the implant, and may be left in place until the end of the procedure to stabilize the implant until the dressing is completed. For longer-term stability, the draw sutures may be secured over a thin plastic polyethylene bolus on the dorsal skin and left

in place for several days.

Modification of the lower lateral cartilages

It is not my purpose to discuss all aspects of surgery of the nasal tip, especially as it relates to cosmetic surgery, but rather to consider correction of severe asymmetries and deficiencies that occur in the traumatized or congenitally deformed nose. For these noses wide exposure of the lower lateral cartilages is absolutely essential, and may be achieved either through delivery of the cartilages (Fig. 48-8), or via the external approach.

When there are severe asymmetries of the lower lateral cartilages, management usually requires modification of the more normal cartilage as well as the more abnormal side if one is to achieve a symmetric tip. The cephalic portion of the lower lateral cartilage is an excellent implant to be used for the nasal tip to overlie angulations or fill small depressions, or for splinting a cartilage by direct suturing. When more sturdy cartilage is necessary, sculptured or laminated septal or auricular cartilage is useful (Fig. 48-9). In the tip these implants may be combined and sutured directly to a columella strut or to the domes of the lower lateral cartilages. If there is marked distortion with associated soft-tissue contracture, it may be necessary to free the lateral crus of the lower lateral cartilage on the involved side of both dorsal and vestibular skin, and then advance the lateral crus into the nasal tip between the two skin layers as in the technique used in the cleft-lip nose repair (Fig. 48-10).

The septum is an ideal source of grafts to be placed in the nasal tip. Such an implant has the effect of stabilizing the medial crura and domes in proper relationship and giving some increased tip projection. This technique is useful in both the severely traumatized tip and the previously operated nose, in which all too often too much tissue has been removed from the lower lateral cartilages (Fig. 48-11). We have used for a number of years reinforcing plates, now commonly referred to as *shields.* The plates should be sutured directly to the lower lateral cartilages. This may be accomplished readily through intranasal incisions or can be placed with greater ease and less chance of dislodgment through an external rhinoplasty (Fig. 48-12). Migration of the shields has been the major problem with their use, and direct suturing will prevent this displacement. By removal of a wedge from the inferior border of the shield, two points are created along the inferior border, which assists in stabilization to prevent rotation or movement.

Septal reconstruction

The full range of septal reconstructive techniques must be used in the twisted nose. The specific techniques required are determined by the amount of cartilage that remains, and how angulated or dislocated it is (Farrior, 1974, 1980, 1984) (Fig. 48-13).

The subject of septal surgery is discussed in detail in Chapter 46. It is impossible, however, to discuss correction of the difficult nasal deformity without addressing surgery of the involved septum. Once the incisions are made, elevation of the mucoperichondrial flaps is

frequently quite difficult because of fibrosis through fracture sites and overlapping or lamination of the cartilage itself.

In the previously operated nose, a practical approach involves beginning the elevation of the mucoperichondrium beneath the dorsum, since this area is often virginal. The elevation then proceeds downward toward the previous operative site, where cartilage and bone may have been removed.

For the severely deviated or previously operated nose, it is usually necessary to elevate the mucoperichondrium on both sides of the septal cartilage, although it is preferable whenever possible to leave it attached on one side as the bone and cartilaginous angulations are corrected. Freeing fibrous contractions and septal angulations is essential in allowing the septal framework to straighten. The extent to which cartilage and bone must be removed or repositioned is dictated by the particular deformity encountered and the direction of the angulations. Generally, incision or removal of thin strips of cartilage along the existing angulations is required to achieve straightening (Fig. 48-14). Release of all tension vectors allows a buckled septum to straighten. Determination of the final position of the septum may not be possible until osteotomies have been performed, particularly if the nasal bones and upper lateral cartilages are severely deviated from the midline. A final determination of what, if anything, more needs to be done to the septum therefore must sometimes await the completion of medial and lateral osteotomies, when the entire nose is positioned in the midline.

Transseptal coaptation sutures, which bring the two mucoperichondrial flaps together and pass between angulations or cartilage pedicles to prevent overlap, are great aids in this surgery (Figs. 48-15 and 48-16). Polyethylene plates have been used for a number of years to stabilize the septum in the early postoperative period and also prevent the development of synechiae, particularly when turbinate surgery has been performed (Fig. 48-17). Two through-and-through sutures are always placed through the polyethylene plates. These are placed so that one arm of the suture goes between cartilage pedicles or beneath the septal cartilage for support. One may splint the septum further at a major angulation with a straight portion of thin perpendicular plate of the ethmoid.

When it is necessary to reposition the caudal portion of the septum, it is usually necessary to free the mucoperichondrium on both sides to release all extrinsic tension on the cartilage. The septal cartilage is then detached from the underlying anterior nasal spine, and intrinsic tension is relieved by scoring, cross-hatching, wedging, and so forth. This then allows the septal cartilage to swing into the midline. Once this caudal pedicle is freed of the tension vectors, it may be maintained in the midline by sutures that go around the anterior spine or through a burr hole in the spine (Fig. 48-18). To further prevent dislocation, an additional suture may be passed through the two mucoperichondrial flaps and between the bone of the spine and the cartilage. The cartilage pedicle then is not only attached directly to the spine, but the two mucoperichondrial flaps when sutured together add further stability. When necessary, the caudal edge of the septum may be held in proper relationship to the columella with interrupted sutures or direct through-and-through septocolumellar sutures (Fig. 48-19).

The working *columella strut* is intended to give strength to the medial crura, and has also often been used as a splint for the caudal edge of the septum when there are horizontal angulations or fractures of the caudal margin of the septum (Farrior, 1980) (Fig. 48-20). The columella strut is sutured directly to the caudal septum so that the whole complex prevents caudal angulation of the septum and strengthens tip support.

The main source for the columella strut is the cartilaginous spur from the nasal septum where it is angled or dislocated from the maxillary crest. This prism-shaped inferior portion of the septum is useful because of its considerable strength (Fig. 48-21). The strut may be inserted either under direct vision in an external rhinoplasty or into a retrograde columella pocket in the intranasal rhinoplasty (Fig. 48-22). The cartilaginous strut is then sutured directly to the medial crura, and the septocolumellar draw sutures are passed to hold the strut forward in the columella (Fig. 48-23). As the sutures progress toward the tip of the nose, they pass through the columella strut and medial crura.

The septum must be considered also as an ideal donor site for cartilage and bone implants. When adequate material is available, it is an excellent implant for the nasal dorsum, for the "working" columella strut, for the shield implant to the tip, or as a filler for depression in the area of the upper lateral cartilages. In the latter instance, the implant should be precisely sutured into position.

Shortening the caudal septum

For the traumatized nose with a drooping tip and columella retraction, the entire septocolumellar complex must be critically evaluated. In correcting the drooping tip, the lower lateral cartilages must be rotated cephalically and strong tip support is needed. Both the caudal septum and the soft tissue may need modification to achieve this (Fig. 48-24). Frequently there is an associated columella retraction as well, resulting in an acute nasolabial angle. Correction of the retraction requires strengthening the caudal septum and placement of plumping grafts (Fig. 48-25). Some limited resection of the caudal edge of the septum may be necessary to remove a portion of deformed septum that is dislocated off the anterior spine and projecting into one nostril. When the caudal edge of the septal cartilage is severely dislocated, it often creates distortion and retraction of the columella even though adequate cartilage is present. Straightening and repositioning of the caudal septum within the columella sometimes will correct the retraction (Fig. 48-26). Rarely is it necessary to shorten the upper lateral cartilages, although reduction of the scroll along their caudal border may be necessary to reduce excessive width in that area.

The septocolumella complex

The columella and caudal septum must often be addressed in rhinoplasty. There may be columellar retraction caused by retraction of the caudal septum as previously discussed, or there may be other abnormalities of the septum and columella that distract from the appearance of the nose. Ptotic lower lateral cartilages with a convex caudal margin can cause increased columellar show. This may also be exacerbated by prominent caudal margin of the septum and/or excessive

membranous septum. These deformities can be addressed by trimming or sculpturing as demonstrated in Fig. 48-27. Other structures that may contribute to the perceived or actual abnormalities of the caudal septum and columella include either ptosis of the lateral crus or the lower lateral cartilage, causing what appears to be a retracted columella, or retraction of the ala resulting in excessive columella show. These abnormalities must be corrected when addressing the lower lateral cartilages, either through reduction or augmentation. Repositioning of the anterior maxillary spine, division of the depressor nasi muscle, sectioning of the frenulum, and defatting or augmentation of the nasolabial angle may also be necessary in addressing the caudal septum and columella (Farrior and Farrior, 1991).

The nasal valve area

The nasal airway immediately beneath the upper lateral cartilages is of particular importance functionally. This valve area requires special consideration when there is inward collapse of the upper or lower lateral cartilages at the level of the limen vestibuli. Here it may be necessary to place cartilage implants from the auricle or the septum, shaped into an outward convexity to create a flying buttress effect. The cephalic portion of the lower lateral cartilages with its vestibular skin may be rotated into a supratip defect. Often both skin and cartilage are required, and the natural curvature of the concha of the auricle with its thin anterior skin is an ideal composite graft to use in the valve area (Fig. 48-28).

Nasal osteotomies

The medial osteotomies are performed first (Farrior, 1978, 1980, 1984). If there is to be an intermediate osteotomy halfway between the medial and lateral osteotomies, it is done second. The lateral osteotomy is performed last (Fig. 48-29). If there is a thick plate of bone just at the upper edge of the now-open roof, it may act as a fulcrum over which the nasal bones rock outward at the nasion as the lower border is moved medially. This wedge of bone is removed with an osteotome, with an incision being made in the plane of the septum and then in the plane of the nasal bones (Farrior, 1978, 1980). Following this the medial osteotomies are extended to the radix, either in a plane paralleling the nasal septum or curving laterally toward the position where the upper end of the lateral osteotomy will be (Fig. 48-30). Extending the bone incision to the radix is considered to complete osteotomy and is often essential in a twisted nose, particularly if the deviation extends up to the radix. When this is required, the osteotome is reinserted into the medial osteotomy after completion of the medial and lateral osteotomies and carried into the firm bone of the radix, where a strong fulcrum for the osteotome is developed, and the osteotome is used to fracture the nasal bone and perpendicular plate of the ethmoid toward the midline (Fig. 48-31). This is not an outfracturing maneuver but rather a fracturing of the central portion of the superior nasal complex to include the midline root of the nasal bones and perpendicular plate of the ethmoid.

In the wide flat nose in which it is necessary to change the profile line, the flat roof of the bony vault and of the upper lateral cartilages must be narrowed. The intermediate osteotomy is useful in narrowing such a nose (Fig. 48-32). The intermediate osteotomy is carried out

through the intercartilaginous incision above the upper lateral cartilages. The Neivert osteotome with its flat guard, which serves as a periosteal elevator, is used to carry the osteotomy superiorly to the radix.

In the deviated nose the lateral osteotomy follows the curvature of the nasofacial groove - that is, against the face of the maxilla - and with rotation of the osteotome it curves upward to join the medial osteotomy. Provided the medial osteotomy has been done first as recommended, back fracture and bony spicules are rare (Farrior, 1980); Wright, 1961). High osteotomies - that is, away from the maxillary face - are satisfactory for some cosmetic rhinoplasties, but with deviated external noses, low complete osteotomies are advised. These require the creation of a transverse fracture that joins the medial and lateral osteotomies at their cephalic ends.

Debate still exists as to the benefits of elevating the periosteum overlying the osteotomy to preserve it or simply performing the osteotomy through the periosteum. I am a firm believer in the subperiosteal approach. This is an avascular plane, and with minimal elevation laterally a periosteal blanket is preserved to drape over the osteotomy site. Without the periosteal elevation, the edge of the osteotome will lacerate the periosteum and perhaps traumatize the subcutaneous tissue as well. The lateral osteotomy may be performed through a horizontal intranasal incision at the piriform rim, an intraoral incision, or an alar detachment if this has been done. For the cases under discussion, in which there is often already a great deal of intranasal scarring resulting from mucosal trauma or extensive earlier surgery, I prefer to approach through the buccal sulcus, avoiding additional intranasal incisions and possible circumferential scarring.

In *revisional surgery* when there is prominence of the previous osteotomy site, multiple osteotomies or fragmentation over this site seems to produce a more acceptable result than simply rasping the area or repeating the single osteotomy.

Making the final septal assessment

It is not until all septal reconstructive surgery and the osteotomies are completed that the final analysis of the position of the septum can be made. This position is particularly critical to the junction of the bony and cartilaginous portions of the nose, both internally and externally. At this point, the surgeon can determine whether adequate dorsal support has been maintained. Should there be any tendency for the cartilaginous dorsum to sink inward, a draw suture can be passed through the sin to pick up either the septum alone or the upper lateral cartilages and the septum along the dorsum (Fig. 48-33). The suture is passed upward through the skin and held in position while all coapting and supporting sutures are placed and packing is completed. The draw suture can be passed through a thin external metal splint and tied over a bolus to remain in place for a week until the splint is removed.

Intranasal dressing

I am a strong proponent of precise combined internal and external splinting of the nose. I feel that attention should be pain to carefully suturing the septal flaps and then placing a limited

amount of packing in the nose. This intranasal dressing assists in preventing bleeding and postoperative edema. The use of coaptation sutures has eliminated the absolute need for packing, especially for cosmetic rhinoplasty or cases in which limited septal surgery is done. In cases in which there has been major septal reconstruction and bilateral mucoperichondrial elevation, packing and in special instances the use of polyethylene plates may be required. With materials available at this time, packing consists of folded Telfa sheeting into which strips of nasal tampon are inserted. The strips are used because discomfort and bleeding are minimal when they are carefully removed one at a time. Unfolding long strips of gauze or a wider wad of tampon is not advised.

Implants

Over a 30-year period the use of any synthetic material for nasal implantation has been disappointing in regard to long-term results. I prefer using only autogenous materials in the nose, and preferably nasal tissue (Bull and MacKay, 1984; Converse, 1955; Dingman, 1969; Dingman and Walter, 1969; Farrior, 1966a, 1966b; Gibson et al, 1958; Guerrerosantos, 1984; Sheen, 1975a; Walter and Brunt, 1982). If there is not enough material available from the nose, auricular cartilage is the second choice; it can be used for lesser defects, in which support is not a major factor. If a strong columella strut remains after septal reconstruction to assist in tip support, sculptured auricular cartilage frequently will prove to be adequate. For the severe saddle nose deformity, autogenous cancellous bone from the hip is used for the dorsum and cartilage is used for the columella strut (Figs. 48-34 and 48-35). Homograft costal cartilage that has been irradiated to 3 million rads is readily carved and is well tolerated in the nose. I suggest that the reader give irradiated cartilage consideration, along with calcium triphosphate (Ossoplast) (Bull and MacKay, 1984; Walter and Brunt, 1982). For lamination of smaller cartilage implants and positioning of implants, tissue glue (butyl-cyanoacrylate) may prove to have a useful clinical application (Sachs, 1985; Staindl, 1985; Vinazzer, 1985).

For the saddle nose deformity in which extensive septal surgery and osteotomies are required, it is sometimes best to stage the procedure, with the implants being placed at a second operation. Extensive septal reconstruction may be essential in completely straightening the nose and in increasing the vertical height, thereby making the required size of the implant smaller (Fig. 48-36). In the saddle nose the anterior valve is frequently circular rather than oval or piriform, and the septal reconstruction should be combined with intranasal Z-plasties to release the scar contractures and open the anterior valve areas.

One of the difficulties of rhinoplasty, and especially of revision rhinoplasty, is ensuring a smooth contour over the nasal dorsum. This can be especially difficult in thin-skinned patients when implants are used. Where there are skin irregularities and scarring or cicatricial adhesions to the underlying framework, it is necessary to prevent recurrence once elevated. Sculpted laminated autogenous cartilage implants of any sort may leave irregular edges or an irregular surface. One way of softening these edges and other irregularities involves draping a piece of temporalis fascia over the entire nasal framework, both bony and cartilaginous. The temporalis fascia graft can be placed through either an intercartilaginous incision or an open rhinoplasty

approach. The graft is secured in position with a tiny stay suture tied over a bolus in the vicinity of the nasofrontal angle and with direct suturing at the inferior aspect. Precise, direct suturing can be accomplished through the open rhinoplasty approach. Temporalis fascia has been shown not to resorb significantly in vivo (Miller, 1988) and donor site morbidity is minimal. This fascial graft technique is an important part of the surgical armamentarium, particularly for revision rhinoplasty, dorsal irregularities, scars, and overlying implants (Fig. 48-37).

Nasal Base Modifications

There are numerous modifications of the Weir procedure, which involve the excision of triangles, wedges, or crescents from the alar base on either side. These are usually done to narrow the nasal base and are usually combined with procedures to increase tip projection through added columella support and lengthening. The technique used most often for the extremely wide nose combines narrowing the nasal base and reducing the length of the ala. For all of these procedures, a subcutaneous suture is placed to reduce tension on the repositioned ala and maintain it in its new position. Modification of the alar base is, of course, a major consideration in both the unilateral and the bilateral cleft-lip nasal deformity, as will be discussed later (Figs. 48-38 and 48-39).

Alar Soft-Tissue Sculpturing

The procedures described earlier may be combined with surgery for the thick inferior border of the ala, which requires excision and thinning (Fig. 48-40). Further sculpturing may be required to arch the ala in correcting alar hooding. In sculpturing or thinning the ala or nostril margin, one should make the excision slightly toward the nostril side. This not only makes the scar less visible but also creates a more natural roll to the border. The procedure is usually combined with a columella strut or other procedure to create greater columella "show" relative to the alar margin. Other techniques may be used to create greater columella prominence, such as the use of a composite auricular graft or skin and cartilage transposition flaps from the cephalic border of the lower lateral cartilages.

The Extramucosal Approach

Preservation of an intact mucosal lining wherever possible is an important principle, especially beneath the nasal dorsum. This is readily accomplished when the external rhinoplasty approach is used and may be achieved in the standard rhinoplasty when submucosal tunnels are created under the upper lateral cartilages. With this intranasal degloving, mucosa can be preserved to provide additional mucosa for the closure of perforations or for lengthening the nose. However, when a major reduction rhinoplasty has been performed the extra mucosa may create problems by herniating into the dorsum. Also, when there is a severely twisted nose or when there is extensive intranasal scarring and contracture, it may be necessary to completely separate the upper lateral cartilages and their mucosa from the septum. No complications have been observed when this is done, and there can be advantages in trimming the upper lateral cartilage and mucosa on the long lateral vault of the deviated nose (Fairbanks and Fairbanks, 1980;

Goodman, 1981).

The retracted or elevated alar margin may be quite difficult to correct. Strips of cartilage from the cephalic segment of the lower lateral cartilages or the septum may be inserted into an incision within the vestibule of the nose to serve as a filler and support (Figs. 48-41 and 48-42). These implants are held in position with transalar monofilament nylon sutures carried over a thin plastic film or the external surface. A strip of composite graft including the thin skin of the anterior surface of the auricle may be necessary if there is a deficiency of lining skin.

The Cleft-Lip Nose

The cleft-lip nasal deformity requires special attention to the asymmetric and retrodisplaced lower lateral cartilage in the unilateral cleft and to the depressed tip with a relatively short columella in the bilateral cleft. Associated with the deformity is hypoplasia of the maxilla on the cleft side or bilaterally, with midfacial hypoplasia resulting from the lack of mesodermal penetration (Fig. 48-43).

The unilateral cleft-lip nasal deformity is asymmetric and complex, and one drawing cannot bring out all three-dimensional aspects of the deformity. Major characteristics include the retrodisplacement of the lower lateral cartilage on the involved side, with an S-shaped deformity of the cartilage and soft tissue. There is thickening of the ala laterally, and the alar base is laterally and inferiorly displaced with a loss of the alar-facial angle. Classically the caudal end of the septum is dislocated toward the normal side, along with the anterior nasal spine and columella base. Internally, there is often a large posterior spur extending into the cleft side. The maxilla is underdeveloped on the involved side because of the lack of mesodermal development and penetration. The dome of the lower lateral cartilage on the cleft side is depressed, resulting in a lack of tip projection on that side. There is usually an excessively wide nasal floor on the cleft side, although stenosis may occur following childhood surgical repair of the lip and nasal floor.

The bilateral cleft-lip nasal deformity is much more complex than the unilateral deformity. There is frequently underdevelopment of the entire premaxilla and prolabium, with a short caudal septum as well as a short columella. Further, in the secondary deformity, there is flattening of the ala with little tip angulation or projection and bilateral widening of the nasal floor and flattening of the alar-facial angle.

Although soft-tissue repair can be readily accomplished at the time of initial lip repair or as revisional surgery, reconstruction will always be inadequate if the asymmetry of cartilage and bone is not addressed.

We frequently use the external approach for both the unilateral and the bilateral cleft-lip nasal deformities (Farrior, 1962, 1977). In the unilateral cleft-lip nasal deformity, the lateral crus of the lower lateral cartilage on the cleft side is dissected free of both surface and vestibular skin, and the cartilage is advanced medially to match the normal side. The position is maintained with

sutures to the opposite dome to project the tip on the cleft side, along with sutures through the vestibular skin, cartilage, and surface skin (Fig. 48-440. These transfer sutures of 5-0 monofilament nylon are tied over a thin flap plastic bolus on the surface skin side only. With the open rhinoplasty it is possible, under direct vision, to stabilize the involved lateral crus further by suturing it directly to the upper lateral cartilage or septum (Fig. 48-45). This is particularly important when the cleft side is caudally displaced, resulting in a hooding deformity.

In the unilateral cleft-lip deformity, particular attention must be paid to the dislocation of the caudal septum toward the normal side and the posterior nasal septal spur on the cleft side. All septorhinoplasty techniques may be useful in correcting the cleft-lip nasal deformity, and onlay grafts are frequently necessary beneath the alar base on the cleft side (Figs. 48-46 and 48-47). In the bilateral cleft-lip deformity, the cartilages can be precisely sculptured bilaterally and dissected free of both skin surfaces to allow medial recruitment and suturing to project the tip (Fig. 48-48).

Grafts are combined with high LeFort I osteotomies to advance the maxilla in severe deformities associated with both unilateral and bilateral cleft lip (Obwegeser, 1969). Both maxillary and mandibular osteotomies may be required. There is some choice between suspension and intermaxillary wiring and mini-plate fixation (Farrior and Pennington, 1991). Occlusion must be precise and is combined with interdental splinting and fixation. Bone grafts are placed between the advanced maxilla and the pterygoid plates, over the face of the maxilla, and about the piriform rim (Figs. 48-49 and 48-50).

For the bilateral cleft-lip deformity, a variety of columella-lengthening procedures have been developed. Selection depends on the severity of the deformity and what previous surgery has been performed. The most commonly used procedures for lengthening the skin of the columella are the forked flap of Millard (Fig. 48-51) (Millard, 1958) and the advancement flap from the floor of the nose of Brauer and Cronin (Fig. 48-52) (Cronin, 1958). Both of these procedures provide augmentation of the columella and, when combined with techniques to project the domes of the lower lateral cartilages, result in a marked improvement in the patient's appearance.

When *stenosis* of the nasal airway is present, the above techniques can be utilized for managing the lower lateral cartilage and septal and alar deformities, but the alar attachment must be displaced laterally to open the airway. The floor is widened with a V to Y advancement laterally (Fig. 48-53).

Summary

This chapter is intended to emphasize the great variety of nasal and nasal septal deformities that can occur and the many surgical techniques that may be required to correct them. The combined internal and external deviations, dislocations, and twists require combined internal and external surgical correction. To achieve adequate correction, the surgeon's armamentarium must include the full spectrum of advanced and sophisticated techniques for septal reconstruction

and corrective rhinoplasty.

The stigma of the cleft lip is often accentuated by a residual nasal deformity. As soft-tissue techniques improve, it is often the nasal deformity that draws attention to the lip. Because of the distortions created by a lack of mesodermal penetration, there will frequently be persistent nasal deformities no mater how well the lip and nasal abnormalities are repaired at the time of primary repair. The cleft-lip nasal deformity presents unique surgical problems, which may be very difficult to solve. Utilization of both intranasal and external rhinoplasty techniques have been discussed.

The patient with a severe nasal deformity should not leave the surgeon's care breathing less well than he did before the operation. These patients with complicated nasal deformities deserve the surgeon's critical attention to function as well as appearance during the planning of surgical correction. In the majority of cases the aesthetic appearance is markedly improved even when a major reorganization of the nasal framework is required.