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# Techniques in Cosmetic Surgery

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## Rhinoplasty with Advancing Age

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Rhinoplasty in the aging patient poses a unique set of challenges to the plastic surgeon. Aging patients usually have different expectations and motivations than their younger counterparts; therefore, open communication and frank discussions are paramount to define realistic goals. Anatomically, changes in skin quality, cartilage characteristics, underlying bony framework, and the nasal airways mandate special considerations to optimize the functional and aesthetic results. This review will present a practical approach to the management of the nose in the aging patient. (*Plast. Reconstr. Surg.* 114: 1936, 2004.)

### CHANGES IN AESTHETIC FACIAL PROPORTIONS

There are standardized proportions and relationships that have been established when describing the aesthetically pleasing face.<sup>1,2</sup> In the younger patient, the face can be divided into thirds by drawing horizontal lines adjacent to the menton, nasal base, brow (at the level of the suborbital notch), and the hairline. Classically, the upper third is the least important of these subdivisions, as it can vary with the hairline and hairstyle.

In the aging patient, there is a relative shortening of the lower third secondary to muscle atrophy of the orbicularis oris, fatty tissue absorption, and maxillary alveolar hypoplasia.<sup>3-5</sup> The maxillary alveolar hypoplasia is the result of tooth loss and subsequent bony resorption. The result of this lower third shortening is a concomitant lengthening of the upper and middle thirds, including a relative lengthening of the nose (Fig. 1).

The nasal dorsum and tip also undergo aesthetic changes throughout the life cycle. In youth, the nasal dorsum is usually concave with a slight upturned tip. As an adult, the dorsum straightens with a normally forward-projecting tip. With age, however, the nasal dorsum takes

on a more convex character secondary to the downward rotation of the lobule and relative columellar retraction (Fig. 2).<sup>6</sup>

### SKIN QUALITY

The skin quality of the face and nose changes with advancing age.<sup>7</sup> Intrinsic cellular changes combined with prolonged exposure to the sun and other elements results in actinic changes and diminished skin elasticity.<sup>3</sup> On a microscopic level, the dermis becomes thinner with decreased dermal collagen and an increase in disorganized elastin and fibrillin.<sup>8-11</sup>

Frequently the alae and tip take on a fuller, less natural-appearing character. This is the result of an increased density of sebaceous glands and can be especially prominent in the male patient, leading to the development of rhinophyma.

The result of these changes is that external skin incisions in the areas of thickening lead to prominent scarring. Incisions where the skin is thinner, such as the columella and dorsum, however, generally heal with minimal scarring. The decreased skin elasticity and generalized skin redundancy mandate wider nasal skin undermining and more significant underlying structural alteration to affect a noticeable aesthetic result.<sup>12</sup>

### THE NASAL TIP COMPLEX

The nasal tip undergoes perhaps the most significant changes in the aging patient, which, in turn, affects the remainder of the nasal aesthetics.<sup>13,14</sup> Therefore it usually is the area that needs the most refinement. Specifically, the tip

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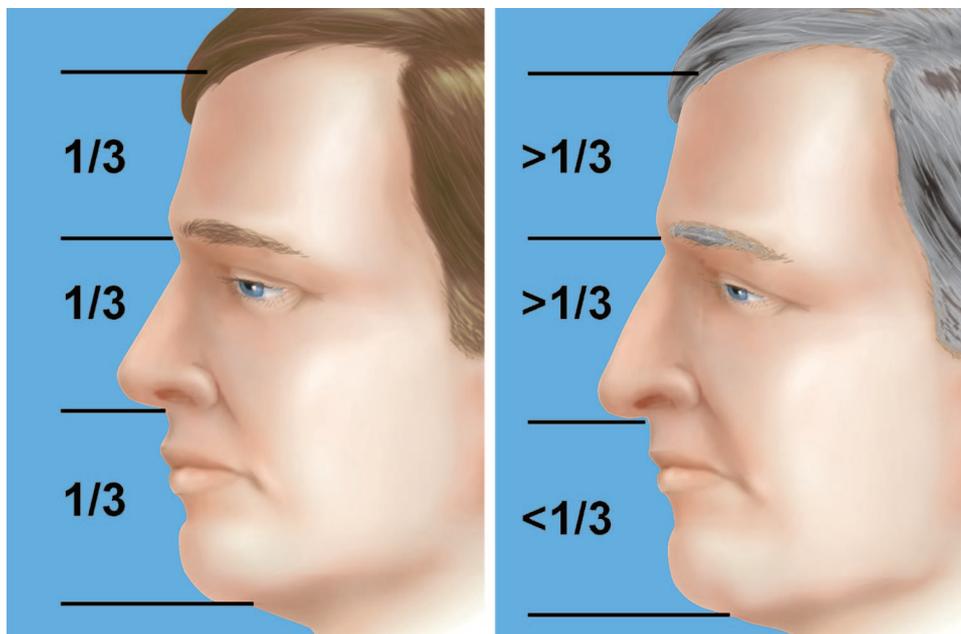


FIG. 1. Changes in aesthetic facial proportions with age.



FIG. 2. Changes in nasal characteristics with age.

takes on a drooping character with an elongated tip. The underlying structural etiology of this is multifactorial<sup>3,5,15,16</sup>:

- Attenuation, fragmentation, and potential ossification of the fibroelastic attachments between the upper and lower lateral cartilages with resultant downward migration of the lateral crura (Fig. 3).
- Weakening or loss of suspensory ligament support with loss of medial crural support (Fig. 4).
- Thickening and possible ossification of the cartilages, leading to greater prominence.
- Thickening of the overlying skin and subcutaneous tissue with concomitant increased vascularity, leading to increased bulkiness and weight of the tip.
- Maxillary alveolar hypoplasia with resultant divergence of the medial crural feet and columellar shortening.

All of the above factors contribute to downward rotation of the lobule, creating an acute columellar-lobule angle and a shortening of the vertical dimension of the lower third of the face.<sup>17,18</sup> The aesthetic result is a relatively longer nasal length and a droopy tip appearance (Fig. 5).

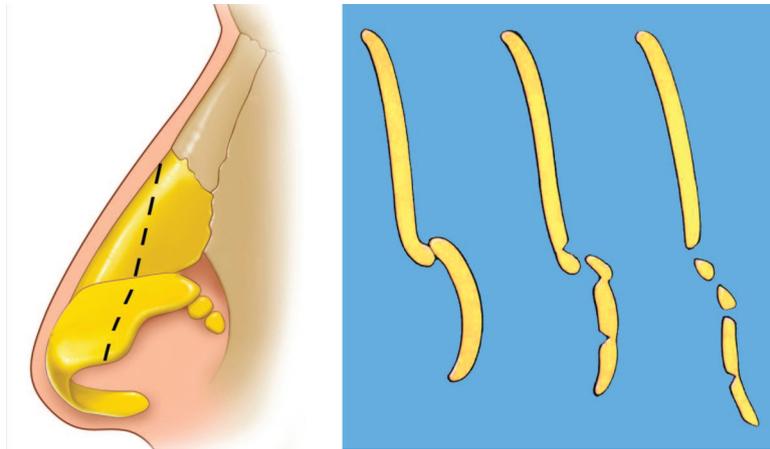


FIG. 3. Migration/separation of the lower lateral cartilage from the upper lateral cartilage with aging.

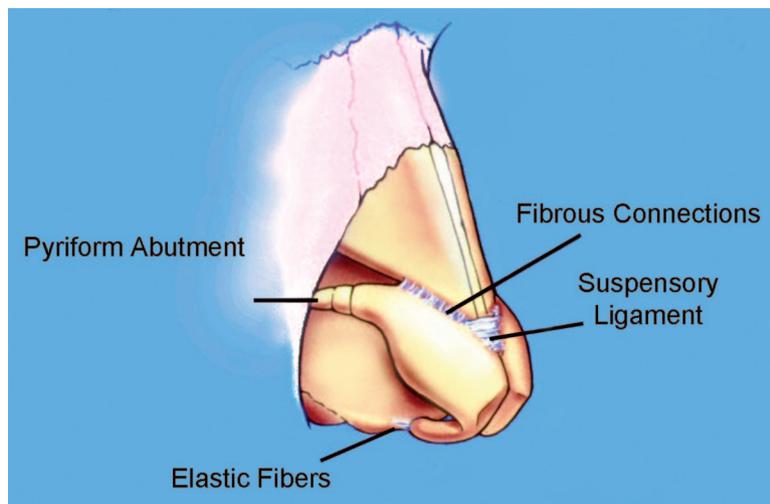


FIG. 4. Ligamentous/fibrous tissue support of the cartilaginous framework.

#### THE NASAL AIRWAY

Functional nasal airway obstruction is a common complaint in the aging patient.<sup>19–23</sup> The usual causes of obstruction, namely septal abnormalities and inferior turbinate hypertrophy, can be seen in this age group. Other anatomic changes associated with advanced age can produce obstructive symptoms. The drooping nasal tip complex results in a more superior redistribution of airflow within the vestibule (Fig. 6).<sup>5,12,24</sup> This change in flow dynamics can produce obstructive symptoms. Furthermore, internal nasal valve collapse secondary to downward migration and separation of the upper and lower lateral cartilages can also produce symptoms.

The operative goals of correction of nasal airway obstruction are no different in the aging

patient than in the younger adult. Specifically, the septum and inferior turbinates are addressed appropriately. It should be noted that the mucoperichondrium abutting the septum becomes thin and fragile with advancing age, making it more difficult to cleanly dissect without perforation. Furthermore, bleeding can be an issue in these patients, not only because of increased vessel fragility but also because these patients frequently have underlying hypertension, which must be controlled preoperatively, intraoperatively, and postoperatively. Inferior turbinate surgery is usually performed utilizing an extramucosal technique, rather than raising mucosal flaps, to minimize postoperative bleeding and scarring.<sup>25</sup>

Aside from the septum and inferior turbinates, the drooping tip and collapsed internal

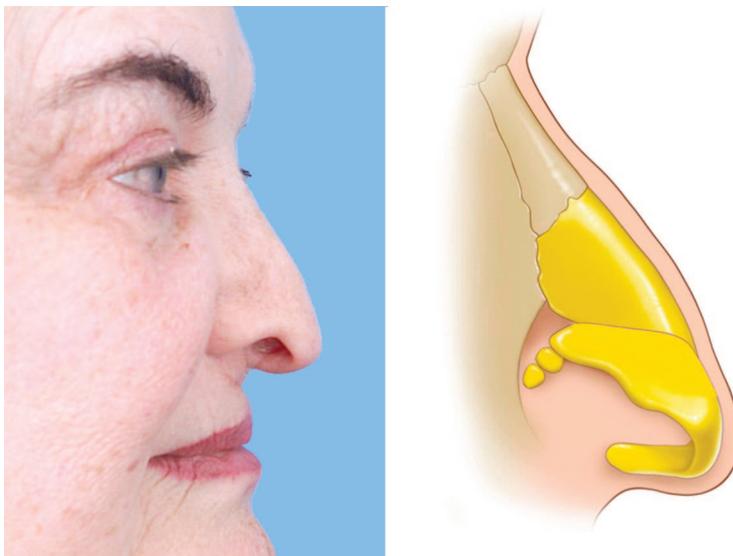


FIG. 5. Demonstration of the relative dorsal hump with increased nasal length and droopy tip with age (*left*, photograph; *right*, illustration).

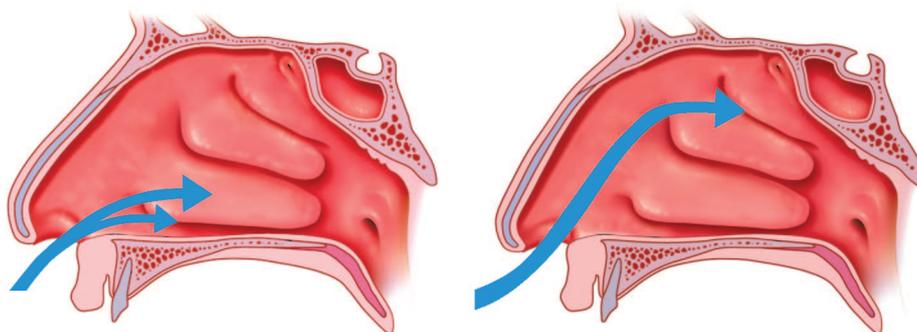


FIG. 6. Changes of nasal airflow dynamics with age. (*Left*) Youthful nose: predisposition for inferior third airflow; (*right*) advancing age: downward rotation of tip displaces airflow superiorly.

nasal valve must also be addressed. To restore proper airway flow dynamics, the tip needs to be cephalically rotated. This can be accomplished utilizing the technique described below. Furthermore, dorsal spreader grafts can be used, if needed, to address the collapsed internal nasal valve (Fig. 7).<sup>26-28</sup>

#### THE BONY VAULT

In general, the midface retrudes with age relative to the rest of the craniofacial skeleton because of differential remodeling.<sup>29</sup> This leads to a posterior displacement of the pyriform aperture. As the pyriform aperture serves as the scaffolding for the nasal pyramid, posterior displacement of this structure leads to a concomitant retruded nasal profile. Furthermore, the loss of pyriform height can distort the alar base-columellar relationship. These changes

must be taken into account when analyzing the facial proportions for rhinoplasty.

The bony nasal pyramid itself also becomes more brittle and fragile as a result of natural processes in aging. The clinical implications of this are that osteotomies become more unpredictable in their outcome, as they are more prone to comminution.<sup>28</sup> Therefore, osteotomies should be avoided, if possible, in the aging nose. If they are performed, it should be done in low-to-low fashion using the percutaneous external technique,<sup>30,31</sup> and should be complete, rather than in greenstick fashion, to give a more regular break.

#### THE DORSUM

The prominent dorsal hump often seen in the aging nose may be a relative finding owing to the drooping nasal tip. Therefore, the tip

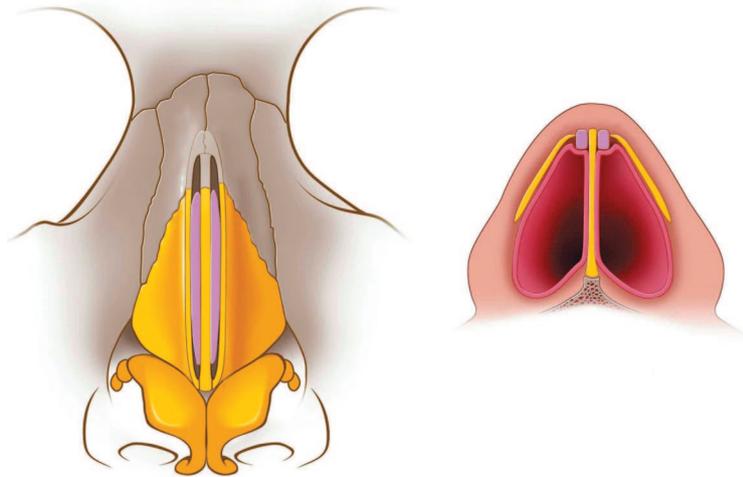


FIG. 7. Illustration of spreader grafts used to maintain the internal nasal valve, restore the dorsal aesthetic lines, and prevent visible demarcation from the bony vault to the middle vault (*left*, dorsal view; *right*, basal view).

should be addressed before any dorsal hump reduction is performed.<sup>28</sup> Otherwise, there would be a propensity for overresection of the dorsum, with a subsequent open roof deformity. Because osteotomies are usually needed to address the open roof and osteotomies are to be avoided, if possible, in the aging nose, this would result in a likely suboptimal outcome.

If intrinsic dorsal aesthetic deformities still persist after tip complex modification, an open approach with component nasal dorsum surgical technique is employed.<sup>32,33</sup> Skeletonization is performed with special care taken to maintain the periosteal attachment to the bony sidewalls, as this provides needed external support for the nasal pyramid after osteotomy. Extramucosal hump excision/reduction is performed to avoid internal nasal valve dysfunction and also to preserve a closed space for the placement of dorsal or spreader grafts.

Simple rasping is used to address smaller (<3 mm) dorsal hump reductions. Occasionally, trimming of the upper lateral cartilages can be performed to help avoid lateral fullness. Larger reductions (>3 mm), however, necessitate the creation of submucous tunneling and sharp release of the upper lateral cartilages from the septum. This technique helps to avoid injury to the cartilage and/or mucoperichondrium. As the skin is thinner in these

patients, underlying irregularities in the dorsum are more apparent. If irregularities need to be addressed, it can be done using morselized onlay septal cartilage grafts. Other potential sources include temporalis fascia grafts, conchal cartilage grafts, or allograft.

#### THE CONSULTATION

Aging patients frequently have a distinct set of psychological stressors and motivations that drive the patient to seek rhinoplasty at their stage in the life cycle. These stressors must be elucidated preoperatively to define realistic goals and choose the appropriate surgical candidates.

Some aging patients have had long-standing desires for changes in their nasal aesthetic appearance.<sup>12</sup> Because dramatic changes are often implausible in the aging patient, these specific, but unrealistic, desires must be tempered with realistic expectations of what can be safely performed in this population subgroup. Furthermore, specific stressors, such as the recent loss of a spouse or divorce, must be identified preoperatively so that surgery can be delayed until a more appropriate, psychologically stable time.

To maximize postoperative satisfaction with the aesthetic result, it is important to choose an appropriately motivated patient.<sup>12,34,35</sup> Examples of motivations of the ideal candidate include enhanced economic independence,

midlife career change, nasal airway obstruction, a history of nasal trauma/fracture, and a previous unsatisfactory rhinoplasty.<sup>28</sup>

After the patient history, a specific nasal history is taken, including any history of nasal trauma, allergies, sinus problems, history of previous nasal surgery, and current medications. The nasal examination is subsequently performed after the mucosa is shrunk with oxymetazoline spray. Special attention is paid to possible septal deviation, inferior turbinate hypertrophy, the internal nasal valves, and the mucosa itself.

Standardized nasal digital photographs are obtained and computer imaging is utilized. The role of computer imaging is invaluable in this subpopulation because of its ability to help the patient visualize the often-subtle changes of aging and also to help better educate the patient on what realistic changes can be expected.

The second preoperative consultation is used to review expectations and computer images, answer questions, and develop an appropriate surgical plan.

#### OPERATIVE GOALS AND TECHNIQUES

Although each operative plan should be specifically tailored to each individual patient, there are certain common goals in performing rhinoplasty in the older nose<sup>28</sup>: perform tip derotation with tip refinement; increase tip projection and relative columellar lengthening; decrease the overall nasal length; correct the dorsal hump; address and support the internal nasal valves; and correct septal deviation and inferior turbinate hypertrophy, if present.

To achieve these endpoints, certain operative tenets should be followed:

- Wide skin undermining to offset decreased skin elasticity and redundancy.
- Tip suturing to alter the nasal tip (medial crural, interdomal, transdomal)<sup>36,37</sup> rather than more destructive methods (Fig. 8).
- Conservative dorsal hump removal (and only after the tip has been initially addressed to prevent overresection).
- Restoration of proper nasofacial proportions.
- Autogenous septal grafts, if needed (columellar strut, dorsal spreader grafts); harvest with care because of thin mucoperichondrium.
- A conservative cephalic trim, with at least a 6-mm rim strip.
- Minimal osteotomies.
- Extramucosal inferior turbinate resection to minimize bleeding.

The authors' preferred operative sequence is similar to that of a primary rhinoplasty: (1) general anesthesia (although some surgeons may prefer intravenous sedation, depending on the patient's general condition and comorbidities); (2) infiltration with local anesthetic; (3) transcolumellar stairstep incision for an open approach; (4) septal harvest and reconstruction; (5) inferior turbinate resection/outfracture; (6) initial tip adjustment with suture techniques (derotation/increase projection); (7) dorsal hump reduction/possible onlay grafting; (8) final tip refinement; (9) controlled percutaneous osteotomies, if necessary; (10) closure of incision; and (11) internal and external nasal splints.

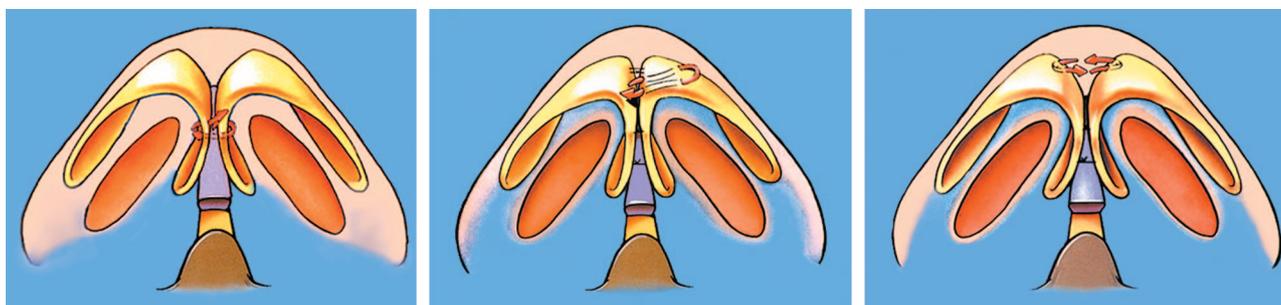


FIG. 8. Tip suturing techniques. (*Left*) Medial crural-septal suture to stabilize and unify the columellar strut and medial crura; (*center*) transdomal suture to refine the tip and increase projection; (*right*) interdomal suture to correct domal asymmetry.

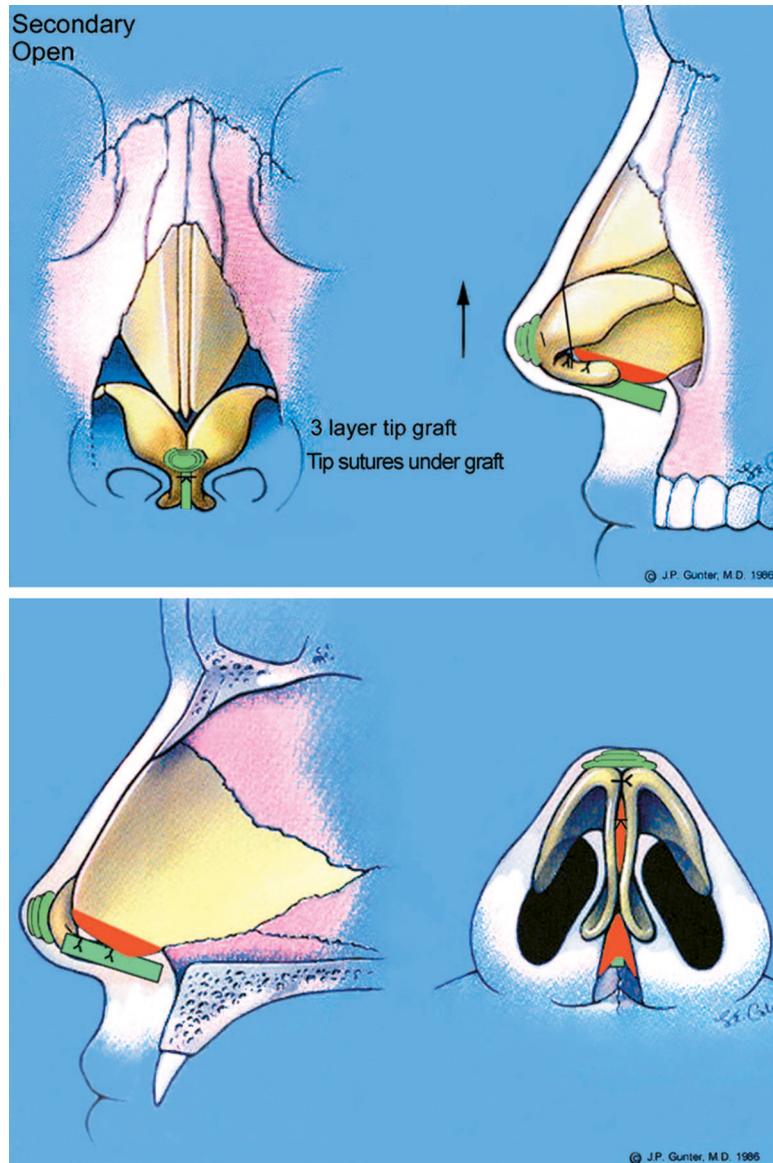


FIG. 9. Gunter graphic operative diagrams.

#### CASE ANALYSIS

This 71-year-old woman with a history of cleft lip and palate and two previous rhinoplasties presented with complaints of a plunging nasal tip and a dorsal hump. Nasal analysis confirmed a relative dorsal hump with increased nasal length, severe plunging nasal tip, nasolabial angle less than 85 degrees, and left alar base collapse consistent with history of cleft lip.

The operative goals were (Fig. 9) upward tip rotation/refinement and simultaneous nasal shortening, an increased nasolabial angle (to 90 degrees), and no osteotomies.

The operative sequence included the following: an open approach with stairstep transcolumellar approach; resection of old scar tissue; placement of a columellar strut with medial crural-septal spanning suture to rotate the tip and increase the nasolabial angle to 90 degrees; placement of interdomal and transdomal sutures to refine the tip; placement of a three-layer infratip lobular septal cartilage graft to increase projection and

increase tip definition; 3-mm caudal septal resection; no osteotomies; and closure/external contouring splint (Fig. 10).

#### CONCLUSIONS

Rhinoplasty in advancing age presents a unique set of challenges to the surgeon. Different psychological circumstances and particular anatomic characteristics mandate careful attention to this particular subset of patients. Specifically, the nasal tip complex appears to droop secondary to loss of underlying support. This may, in turn, give the appearance of a relatively prominent dorsal hump, which may be overresected if not addressed properly. The use of osteotomies is minimized secondary to the underlying fragility of the nasal pyramid.



FIG. 10. Views (27 months postoperatively) of the aging nose demonstrating drooping tip, lengthening of nose, and relative dorsal hump (*left*, preoperative; *right*, postoperative).

The nasal airway flow dynamics are altered; this may present as nasal airway obstruction. The tip complex and internal nasal valves must be addressed, in addition to septal deviation and inferior turbinate hypertrophy, to correct this

problem. In all, rhinoplasty in the aging patient can be rewarding to both the surgeon and the patient with an excellent aesthetic and functional outcome if surgeons adhere to the preceding principles.

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