

# Why Primary Rhinoplasty Fails

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**Summary:** Rhinoplasty remains one of the most challenging operations performed by plastic surgeons. The complexity lies in the ability to have a consistent and predictable aesthetic result. The unpredictability is mainly attributable to the interplay of manipulated internal structures and wound healing dynamics. In addition, setting realistic expectations with the patient is essential for achieving high postoperative patient satisfaction. An open rhinoplasty approach enables an accurate and in-depth evaluation and intervention. The authors provide a detailed analysis and discussion on why primary rhinoplasty fails, along with the surgical approach for preventing these failures. (*Plast. Reconstr. Surg.* 148: 1021, 2021.)

**R**hinoplasty remains one of the most challenging operations performed by plastic surgeons. The complexity lies in the ability to have a consistent and predictable aesthetic result. The unpredictability is mainly attributable to the interplay of manipulated internal structures and wound healing dynamics. In addition, setting realistic expectations with the patient is essential for achieving high postoperative patient satisfaction. An open rhinoplasty approach enables an accurate and in-depth evaluation and intervention. The authors provide a detailed analysis and discussion on why primary rhinoplasty fails, along with the surgical approach for preventing these failures.

## POOR PATIENT SELECTION

Patient selection in cosmetic surgery is critical but even more so in rhinoplasty. The ideal patient should be rational, reasonable, ready, and reliable (4 Rs). Surgeons need to be aware of potential red flags. For example, a patient who has concerns that far exceed his or her deformity (i.e., body dysmorphic disorder) or a patient who is speaking poorly about another surgeon, particularly one who is an experienced surgeon, should sound an alarm (Fig. 1). Male patients are sometimes more challenging because they are more likely to be poor listeners or have difficulty communicating their goals.<sup>1</sup> The surgeon should never operate on an angry or unhappy patient. It is crucial to learn to say no!

## INCONGRUENT PATIENT EXPECTATIONS

Before examining the nose, the most important part of the initial consultation is getting to know the patient to clearly understand his or her goals and desires. Any patient that has unrealistic expectations should be noted and serve as a warning to the surgeon.<sup>2,3</sup> It is important to fully elucidate the patient's goals and motivations and to obtain a thorough psychological history. Any indication of psychological distress or unreasonable expectations should again caution the surgeon, as these signs may indicate poor patient satisfaction despite acceptable surgical results.

The patient and surgeon must have the same understanding of what can and what cannot be achieved. What cannot be achieved is often more important to emphasize than what can be achieved. The surgeon must be very honest and frank with the patient. Computer imaging is a helpful modality to give patients a visual understanding of potential results.<sup>4</sup> It is important to

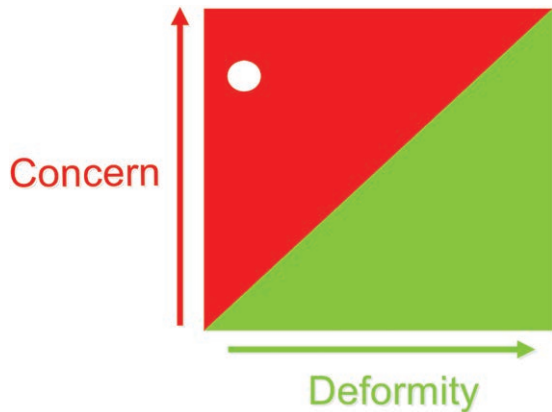
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**Fig. 1.** A patient who has concerns that far exceed his or her deformity is a red flag.

show average results, as the surgeon should aim to underpromise and overdeliver.

### INADEQUATE PREOPERATIVE NASOFACIAL ANALYSIS

The importance of a preoperative, comprehensive nasofacial analysis cannot be emphasized enough. Failure to execute adequate preoperative analysis results in a flawed operative plan and, ultimately, a less than ideal surgical result. The senior author’s (R.J.R.) practice is to ask the patient to specify his or her top three complaints. The

surgeon should note any prior nasal trauma and operations including rhinoplasty, septal reconstruction/septoplasty, and sinus surgery, and when possible, prior operative reports should be reviewed. An internal nasal examination should include assessment of the septum, turbinates, and internal and external valves. One should also palpate the nose to assess the length of the nasal bones and strength of the lower lateral cartilages. A comprehensive and systematic nasofacial analysis is the most critical initial step in establishing goals and formulating a precise surgical plan for aesthetic nasal surgery.<sup>5,6</sup> The senior author’s 10-7-5 method for nasal analysis is a useful instrument that provides the rhinoplasty surgeon with a deep comprehension of the nasal anatomy. This systematic analysis of patient’s frontal, lateral, and basal nasal views provides a background to identify changes to ideal aesthetic proportions and how to surgically restore them while maintaining sex and ethnic congruency (Table 1).<sup>7</sup>

### CREATING A FUNCTIONAL PROBLEM

Deformities of the nasal dorsum are commonly found in revision rhinoplasty and can lead not only to irregularities and disruption of the dorsal aesthetic lines but also compromise of the internal nasal valve. Inadequate support can lead to midvault collapse, resulting in an aesthetically

**Table 1. Evidence-Based Nasal Analysis: The 10-7-5 Method**

Nasal View	Analysis
Frontal	
1. Facial proportions	Height (thirds), width (fifths), symmetry
2. Skin type/quality	Fitzpatrick type, thin or thick, sebaceous
3. Symmetry/nasal deviation	Midline, dorsal deviation, C-, reverse C-, or S-shaped deviation
4. Dorsal aesthetic lines	Straight, symmetric or asymmetric, well- or ill-defined, narrow or wide
5. Bony vault	Narrow or wide, asymmetric, short or long nasal bones
6. Midvault	Narrow or wide, collapse, inverted-V, saddle deformity
7. Nasal tip	Ideal/bulbous/boxy/pinched, supratip, tip-defining points, infratip lobule
8. Alar rims	Gull-shaped, facets, notching, retraction
9. Alar base	Width
10. Upper lip	Long or short, dynamic depressor septi, upper lip crease
Lateral	
1. Nasofrontal angle and radix	Acute or obtuse, high or low radix, prominent or low nasion
2. Nasal length, dorsum and supratip	Length: long or short Dorsum: smooth, hump, scooped out Supratip: break, fullness, pollybeak
3. Tip projection	Overprojected or underprojected
4. Tip rotation	Overrotated or underrotated
5. Alar-columellar relationship	Hanging or retracted ala, hanging or retracted columella
6. Periapical hypoplasia	Maxillary or soft-tissue deficiency
7. Lip-chin relationship	Normal, overprojected or underprojected chin
Basal	
1. Nasal projection	Overprojected or underprojected, well- or ill-defined tip-defining points, columellar-to-lobule ratio
2. Nostril	Symmetry, long/ narrow or short/wide nostril, nostril-to-tip ratio, concave or convex ala
3. Columella	Caudal septal deviation, flaring of medial crura
4. Alar base	Width
5. Alar flaring	Type 1, 2, 3, or 4

displeasing inverted-V deformity. Maximal control with a graduated approach of the dorsum is critical. Use of the senior author’s 4 Rs component dorsal hump reduction is recommended when addressing this area: (1) release the upper lateral cartilages from the septum, (2) incrementally resect the septum proper, (3) rasp the bony dorsum, and (4) restore the dorsal aesthetic lines.<sup>8</sup>

When sufficient upper lateral cartilage volume is present, restoration of the dorsal aesthetic lines is predictably achieved by using the senior author’s four-step approach for autospreader grafts: (1) pull-twist-turn, (2) horizontal mattress sutures, (3) percutaneous osteotomies, and (4) simple interrupted sutures. [See **Video 1 (online)**, which shows dorsal aesthetic line reconstruction.] Spreader grafts should be used selectively when additional midvault infrastructure is needed (**Table 2**).

External nasal valve compromise is also commonly encountered in revision rhinoplasty. This area is particularly prone to late changes because of wound contraction and scarring of the soft triangles and the lack of structural support in this region. Alar collapse caused by misplaced alar grafts causing obstruction is commonly encountered. Preoperative nasal analysis and examination will determine the cause. Removal of obstructing alar grafts and replacement with appropriate structural support will open the external nasal valve and restore air flow. Proper and routine placement of extended alar contour grafts in primary rhinoplasty is advocated, as it helps prevent external nasal valve collapse secondarily.

### WOUND HEALING

The unpredictability of wound healing in rhinoplasty is often the key determinant of a good versus a bad result. The creation of dead space in rhinoplasty creates a welcoming environment for erratic soft-tissue contraction. In addition, although the amount of scar tissue formation is often genetically predetermined, surgical technique and postoperative management play an important role. If rhinoplasty surgeons can control and reliably predict

skin contraction and wound healing, rhinoplasty results will undoubtedly improve.

To minimize the effect of scar tissue formation, surgical technique with precise and minimal dissection while maintaining the correct plane of dissection is critical. The minimal amount of internal structure resection should be performed to obtain the desired result. Meticulous hemostasis and the use of tranexamic acid has been transformational in the senior author’s practice.<sup>9</sup> Tranexamic acid is commonly used in other surgical specialties such as cardiac, orthopedic, and trauma surgery. It is a synthetic lysine analogue that competitively inhibits the activation of plasminogen to plasmin, avoiding the breakdown of fibrin clots by plasmin.<sup>10</sup> The senior author administers 1 g intravenously and applies it topically to the dorsum and tip with a neuropledget soaked with a 3% concentration. In our experience, tranexamic acid allows for dramatically improved dryness, meticulous hemostasis, and decreased bruising and swelling postoperatively.

### LACK OF STRUCTURAL SUPPORT

Soft-tissue contraction is exacerbated by the lack of structural support that is often seen in revision rhinoplasty. The loss of tip projection after a primary rhinoplasty is not uncommon and is only worsened with zero to minimal structural support. It is the senior author’s preference to use a septal extension graft to control both tip rotation and projection, as previous experience demonstrated that columellar strut grafts were unable to reliably achieve this and should instead be seen as an effective tool for unifying the nasal tip and maintaining its position (**Table 3**).<sup>11</sup> It is also the senior author’s preference to use septal cartilage for structural support followed by fresh frozen, nonirradiated, cadaveric cartilage if needed.<sup>12</sup> The septal extension grafts have been shown to effectively control tip projection, rotation, and shape by securing the nasal tip to the septum.<sup>13,14</sup> The septal extension graft is keel-shaped to mimic the inferior margin of the middle crura. It is placed onto the anterior septal angle as a “fixed-floating” graft

**Table 2. Nasal Dorsum Treatment in Rhinoplasty**

	Existing Deficiency	Residual Hump	Midvault Collapse/ Inverted-V Deformity	Distorted DAL
Mild	Cartilage graft (septum, rib)	CDHR	Autospreader flaps	Osteotomies with autospreader flaps
Moderate	Cartilage graft (septum, rib)	CDHR	Autospreader flaps, spreader grafts	Osteotomies with autospreader flaps or spreader grafts
Severe	Cartilage graft (rib)	CDHR	Spreader grafts	Osteotomies with spreader grafts

DAL, dorsal aesthetic lines; CDHR, component dorsal hump reduction.

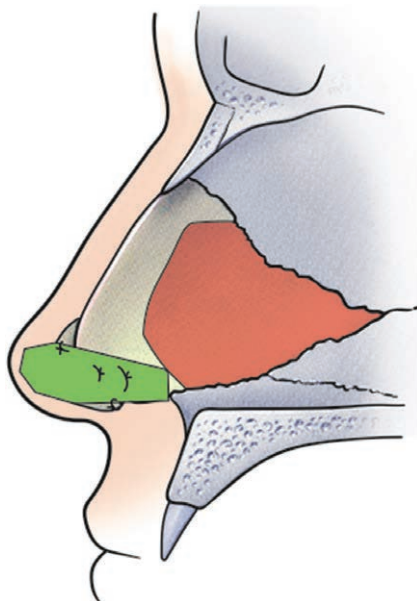
**Table 3. Nasal Tip Treatment in Rhinoplasty**

	Lateral Crural Deformity	Middle Crural Deformity	Medial Crural Deformity
Mild	EACG with or without CSG/SEG	Medial crural suture with or without resection crura/septum	CSG/SEG
Moderate	EACG with or without CSG/SEG	Medial crural suture with or without resection crura/septum	SEG with or without tip graft
Severe	Cartilage graft (rib) to reconstruct lateral arm	Medial crural suture with or without resection crura/septum	SEG with or without tip graft

EACG, extended alar contour graft; SEG, septal extension graft; CSG, columellar strut graft.

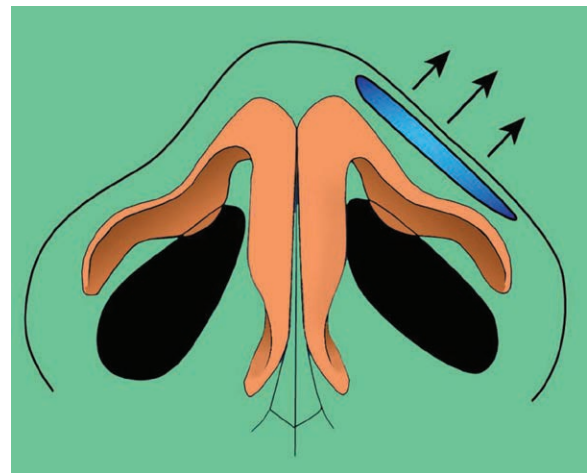
with extension beyond the anterior septal angle into the interdomal space with the most caudal and inferior portion of the graft placed on the cephalic border of the medial crus at the columellar-lobular angle. A four-step suture technique is performed (Fig. 2): (1) body fixation horizontal mattress suture, (2) superior stabilization suture, (3) inferior stabilization suture, and (4) body stabilization horizontal mattress suture. [See Video 2 (online), which shows a septal extension graft.]

Alar rim deformities are one of the more common problems encountered in revision rhinoplasty. They include alar notching, retraction, collapse, and asymmetry. These deformities have been well characterized by the alar-columellar relationship.<sup>15-17</sup> This area is particularly prone to late changes caused by wound contraction and scarring of the soft triangles and the lack of structural support in this region. It is the senior author's preference to use an extended alar contour graft routinely in primary rhinoplasty given its clear improvement on alar aesthetics (Fig. 3).<sup>18</sup>

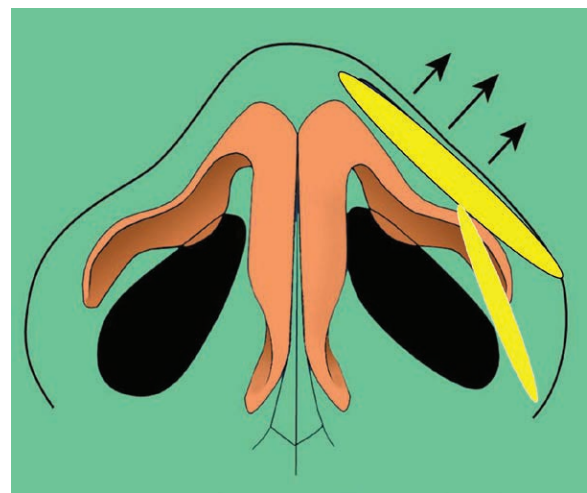


**Fig. 2.** Septal extension graft four-step suture technique.

[See Video 3 (online), which shows extended alar contour grafts.] In addition, if there is any residual notching or asymmetry after placement of the extended alar contour graft, a retrograde or dual alar contour graft is placed through a separate stab incision below the extended alar contour graft (Fig. 4 and Table 4) [See Video 4 (online), which shows retrograde alar contour grafts.]



**Fig. 3.** Extended alar contour graft.



**Fig. 4.** Retrograde or dual alar contour graft.

**Table 4. Nasal Ala Treatment in Rhinoplasty**

	Alar Retraction	Alar Notching	Alar Malposition	External Valve Collapse
Mild	EACG	EACG	EACG	EACG
Moderate	EACG plus RACG	EACG plus RACG	EACG plus RACG	EACG plus RACG
Severe	EACG plus RACG	EACG plus RACG	EACG plus RACG	EACG plus RACG

EACG, extended alar contour graft; RACG, retrograde alar contour graft.

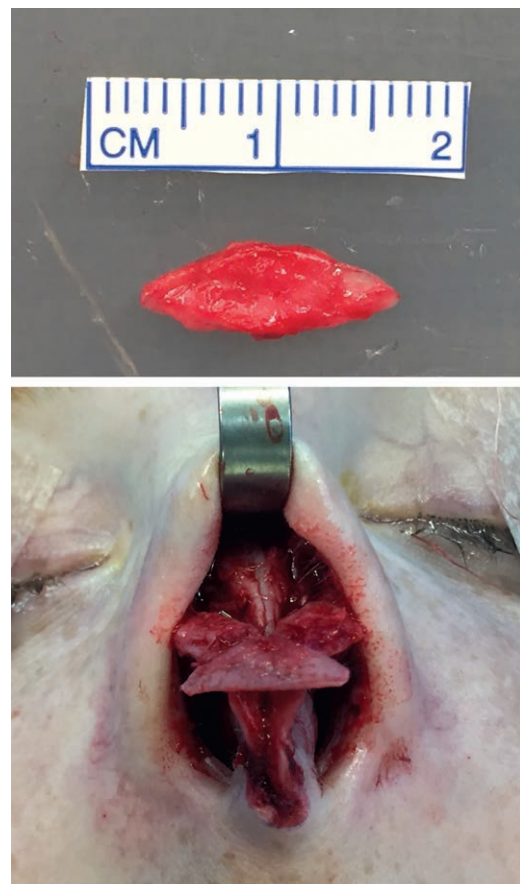
**DEAD SPACE CLOSURE**

Obliteration of dead space is a key component in rhinoplasty, as it minimizes soft-tissue contraction, resulting in a more predictable outcome. Dead space closure is performed in a systematic five-step manner: (1) infratip lobule butterfly graft, (2) supratip spanning suture, (3) membranous septum closure, (4) splints (septal, external), and (5) soft-tissue triangle Surgicel (Ethicon, Inc., Somerville, N.J.) impregnated with mupirocin (Table 5).

The infratip lobule butterfly graft is used to obliterate the dead space above the lower lateral cartilage after the cephalic margin of the lower lateral cartilage is removed. This minimizes scarring and retraction of the alar rim. It is a soft graft, typically obtained from the cephalic trim cartilage. This graft also provides support and continuity between the tip and alar lobule, which is otherwise prone to collapse and contour irregularities (Fig. 5).<sup>19</sup> [See Video 5 (online), which shows a butterfly graft.] Closure of the supratip dead space with a spanning suture eliminates the soft-tissue memory and further refines the supratip. [See Video 6 (online), which shows a supratip spanning suture.]

Closure of the membranous septum after septal reconstruction and closure around the septal extension graft are important in minimizing fluid around the septum and septal extension graft. [See Video 7 (online), which shows septal sutures. See Video 8 (online), which shows septal extension graft dead space closure.] Closure also eliminates the soft-tissue memory caused by the deviated septum and further stabilizes the septal extension graft. This is performed using horizontal absorbable mattress sutures. It is also the senior author’s preference to leave a posterior unilateral drainage port to allow any fluid to egress easily. To further close the membranous septum dead space, mupirocin-coated intranasal Doyle open lumen splints are then placed and

sutured in place. [See Video 9 (online), which shows Doyle splints.] When needed, external splints (which are used as a soft silicone bolster) provide external soft-tissue support and control soft-tissue memory of the ala and nasal sidewalls. [See Video 10 (online), which shows lateral splints.] The soft-tissue triangle is never sutured closed given the high risk of poor wound healing and subsequent alar notching and retraction. Therefore, Surgicel impregnated with mupirocin is placed inside the soft-tissue triangle to eliminate dead space and support this region. [See Video 11 (online), which shows Surgicel application.] This will autocoagulate in 3 to 5 days.



**Fig. 5.** Infratip lobule butterfly graft. (Adapted from Rohrich RJ, Afrooz PN. The infratip lobule butterfly graft: Balancing the transition from the tip lobule to the alar lobule. *Plast Reconstr Surg.* 2018;141:651–654.)

**Table 5. Five-Step Dead Space Closure Technique**

Infratip lobule butterfly graft
Supratip spanning suture
Membranous septum closure
Splints (septal, external)
Soft-tissue triangle Surgicel



**Fig. 6. (Continued).**

**Fig. 6. (Continued).** A 31-year-old woman presented to the senior author (R.J.R.) for tertiary rhinoplasty. (Left) Preoperatively, the patient had persistent nasal deviation, asymmetric wide midvault, and distorted dorsal aesthetic lines. In addition, she suffered from a residual dorsal hump, pollybeak deformity with a bulbous nasal tip, and excessive infratip lobule. (Right) The patient is shown at her 12-month follow-up after undergoing an open rhinoplasty with extended spreader grafts, septal extension graft, columellar strut graft, extended alar contour grafts, and butterfly infratip graft. Note correction of the bony deviation, hump removal, reestablishment of the dorsal aesthetic lines, and correction of the pollybeak deformity. Lateral and basal views of the patient are also shown.

### CONCLUSIONS

The complex interplay among dead space, lack of structural support, soft-tissue memory, and wound healing can make rhinoplasty outcomes unpredictable. However, our understanding of these processes has dramatically improved. By carefully selecting our patients, performing precise preoperative nasofacial analysis, using structural support, and closing dead space, the results will be more consistent, predictable, functional, and aesthetic, while minimizing primary rhinoplasty failures (Fig. 6). [See Video 12 (online), which shows revision rhinoplasty surgical technique (part 1) using spreader grafts, septal extension graft, cephalic trim, tip suturing, extended alar contour grafts, and retrograde alar contour grafts. See Video 13 (online), which shows revision rhinoplasty surgical technique (part 2) using spreader grafts, septal extension graft, cephalic trim, tip suturing, extended alar contour grafts, and retrograde alar contour grafts.]

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### PATIENT CONSENT

*Patients provided written consent for the use of their images.*

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