What We Have Lost by Forgetting Endonasal Rhinoplasty

Mark B. Constantian, MD, FACS[1,2,3]

[1] Department of Surgery, University of Wisconsin-Madison Center for Health Systems Research and Analysis, Madison, Wisconsin
[2] Department of Plastic Surgery, University of Virginia School of Medicine, Charlottesville, Virginia
[3] Private Practice, Nashua, New Hampshire

Address for correspondence Mark B. Constantian, MD, FACS, 19 Tyler Street, Nashua, NH 03060 (e-mail: mbconstantian@gmail.com).

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> "It's not what you don't know that gets you in trouble; it's what you do know that ain't right."
>
> — Will Rogers

Why Is There Open Rhinoplasty?

Surgeons who have recently trained, and even their faculty, may have forgotten that until the mid-1980s, there was, for all purposes, no such thing as open rhinoplasty. For a short period in the mid-1960s, surgeons tried Anderson's, Padovan's, and Goodman's innovations of better exposure through columellar incisions,[1–3] but sometime thereafter abandoned the technique because there seemed to be no point in extensive dissections for an operation in which the only goal was skeletal reduction.

Much of that changed with Sheen's description of tip grafts for projection,[4,5] dorsal and tip grafts for supratip deformity,[6] and then the first edition of his textbook, *Aesthetic Rhinoplasty*, published in 1979.[7] Over the next decade, Sheen described spreader and radix grafts, his own technical refinements, and summarized these innovations in a second edition of his text.[8] The quality of his results, not only in primary but in revision cases (which till then had been considered largely inoperable), was remarkable and excited surgeons to believe that their results could be better.

What most of us soon discovered was that duplicating the Sheen techniques was not as easy as he depicted them. Tip grafts shifted. Dorsal grafts slid. Spreader graft tunnels seemed impossible to create through short intercartilaginous incisions. And so surgeons followed the principle that they had learned in general surgery training: when in technical trouble, make the incision longer. By the mid-1980s, the rediscovery of open rhinoplasty had become a way of managing modern techniques. Now tip grafts could be sutured into position. Dorsal grafts could be fixed. Spreader grafts could be placed by approaching the septum through its dorsal surface.

Technical spinoffs quickly occurred as surgeons recognized the binocular access that open rhinoplasty afforded. Why not start the septoplasty dissection at the dorsal edge instead of using a Killian incision? Why place tip grafts if the alar cartilages could be sutured or advanced instead? If tip support decreases when the medial crura are separated from the columellar skin, use a columellar strut to stabilize them—and why not use an extended columellar strut for tip projection? Extend spreader grafts beyond the septal angle to lengthen a short nose. Use septal extension grafts for tip projection. And why use spreader grafts at all: following hump removal, it is possible to fold the excess upper lateral cartilages inward as "spreader flaps."[9] If the alar walls distort and retract, place alar or lateral crural strut grafts. If the soft triangles deform, place soft triangle grafts. Should these be "articulated" or "nonarticulated"? What happens if the columellar skin becomes ischemic? Place a composite graft.

What Open Rhinoplasty Became

With almost dizzying speed, the journals filled with new techniques and variations on new techniques. Open rhinoplasty was better for teaching because surgeons could see the anatomy, no longer "hidden" beneath short intranasal incisions. In revision cases, open rhinoplasty was especially superior because it allowed surgeons to explore and discover remnants of anatomy obscured by overlying soft tissues.[10]

Open rhinoplasty became not only another technique, its most ardent proponents asserted; it was the best technique, the modern technique. Why would anyone learn closed rhinoplasty if they no longer learned cross-leg flaps?

What Open Rhinoplasty Has Not Achieved

Open rhinoplasty, now essentially *au courant* for 35 years, should have established itself as a procedure that is faster to

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learn and that reliably produces better results by most surgeons for most patients most of the time.

But it has not. If open rhinoplasty were uniformly superior, secondary cases currently seen should have been predominantly produced by closed techniques, but they have not. In fact, in a series of 100 consecutive revision patients, the deformities in patients treated by open rhinoplasty were more complex and more numerous than those previously treated with closed operations.[11] In my practice, the overwhelming majority of revision cases seen today were first treated by open methods. Furthermore, some secondary deformities, like ablation of the nasal base, deep columellar scars with subcutaneous atrophy, loss of columellar skin, and cellulitis or draining sinuses from permanent sutures, are almost unique to open rhinoplasty. We have gained, and yet we have lost. What have we not gained?

- *Making rhinoplasty easier*: Rhinoplasty is widely acknowledged to be a difficult operation to learn and to perform, but closed rhinoplasty was abandoned for the wrong reasons and open rhinoplasty was adopted for the wrong reasons.

Rhinoplasty is not difficult because the incisions are internal, because dissection is blind, because the structural anatomy is hidden from the surgeon, because the techniques are extremely challenging, or because the anatomy is especially complex and the margin of error is small. Technical access in rhinoplasty is not as restricted as in endoscopic procedures; the anatomy is simpler than that of the hand or head and neck; the margin of error is broader than in microvascular surgery; and surgeons who perform lipoplasty already have the skills for modifying structures that they cannot see by feeling the overlying surface.

Instead, rhinoplasty is primarily difficult because the nasal soft tissues have limited contractility, because nasal regions are interrelated and layered, because the operation itself is dynamic and interactive, and because rhinoplasty is a right brain operation.[12] Rhinoplasty is not hard because the surgeon cannot see well enough.

- *Maintenance of nasal layers and their phenomenology*: It is insufficiently complex to describe the layers of the nose as skeleton covered by the skin.

The nose does have two layers, a deeper layer composed of the nasal septum, nasal bones, and upper lateral cartilages, and a more superficial layer of nasal skin containing the alar cartilages, invested on both surfaces by the external and vestibular soft tissues.[13] This anatomical arrangement explains why the nose shortens when the bony vault is reduced (less tension on the dorsal nasal skin, which falls posteriorly, pulling the alar cartilages with it) and lengthens when the dorsum is reduced. Submucosal reduction of the upper lateral cartilages and cephalic reduction of the lower lateral cartilages also produce a "dead space" that also allows the nose to shorten.[14]

These normal anatomical and physiologic relationships are instantly disrupted when the surgeon opens the nose, so phenomenology that used to be common knowledge when everyone did closed rhinoplasty has been forgotten. As a result, surgeons may unwittingly take the long way around, and add nonanatomical septal extension or composite grafts, concluding that is those techniques that created length, when in fact most of the gained length came from their dorsal grafts.

Technical Aspects of Closed Rhinoplasty That Have Been Lost

- *The advantages of limited dissection*: As surgery has advanced, dissection in most operations has become narrower and anatomical solutions have been sought that replicate what nature ideally does. Think of endoscopic appendectomy, cholecystectomy, carpal tunnel release, or brow lifts; transconjunctival blepharoplasty; and the short scar facelift.

Contrary to this direction is current rhinoplasty teaching, where dissection has gotten wider, the tip cartilages are routinely disarticulated from each other and from the septum, the upper lateral cartilages are separated from the anterior septal edge, and the soft tissues skeletonized onto the cheeks. None of these routine maneuvers addresses the patient's aesthetic or functional complaints. While it is not clear what, or how much, of the surgical results are affected by such deconstructions, the very fact that columellar, alar rim, soft triangle, lateral crural, and other grafts are needed to overcome the corresponding soft tissue response suggests that something must be happening. Dowlatshahi, Deng, Fudem, and I demonstrated a musculofascial endoskeleton that is disrupted when the alar walls are skeletonized, probably a significant factor in postoperative rim retractions unless supporting grafts are placed.[15] By contrast, endonasal rhinoplasty only uncovers areas that are directly related to the patient's cosmetic or functional goals, so that alar wall grafts, for example, are never required unless there are preoperative deficiencies, and columellar struts are never needed; so compensatory techniques are necessary only to overcome the trauma of surgical access.

Imagine what would happen if we treated the lower eyelids by the same deconstruct/reconstruct method that we so routinely use in many rhinoplasties—separating skin and muscle layers, splitting the lid retractors, opening the septa, removing and reconstructing the tarsal plates—the lower lids would never work again.

- *Circulatory preservation*: Accompanying every surgical dissection is damage to the nasal circulation, already precarious in revision noses, and complicating closure of the columellar incision.

When tip grafts are placed endonasally, tissues are expanded from the side, and if the wound can be closed, it is impossible to over-augment the tip. By contrast, in flat, contracted tips or underdeveloped cleft noses, when the surgeon has achieved adequate projection, it may now be impossible to close the columellar incision without prohibitive tension or ischemia. The possibility of soft tissue loss, rarely encountered in endonasal rhinoplasty, has become so

unfortunately commonplace that young surgeons are taught to use nitroglycerin paste, await delayed healing, or place composite grafts for segmental losses. These salvage procedures are difficult to justify under the usual criteria for cosmetic operations.

- *Soft tissue feedback*: The unimpeachable advantage of closed rhinoplasty is the ability to see how the skin surface reacts, moves, and reshapes with each change in skeletal support.

Traditional teaching assumes that if the surgeon creates an excellent skeletal shape, the surface result will follow. Every surgeon's experience belies this false assumption. The skin is not a passive tablecloth, but instead has its own vectors of contraction: medially and posteriorly over the bony vault, medially over the upper cartilaginous vault, and concentrically and posteriorly around the nasal tip. The end result is what we all observe as supratip deformity, whether caused by surgery, septal collapse, trauma, or Wegener's granulomatosis.[13] Whenever a surgeon has lost tip shape or created a supratip convexity, he or she has exceeded that patient's soft tissue limits. The prime advantage of the endonasal approach is hence the ability to see the skin surface react, and therefore judge more precisely how much reduction or augmentation can be accomplished. In addition, with the skin sleeve intact, the ability to see tip contour, nasal symmetry, and nasal proportion is more accurate, right brain concepts that are critical to achieving satisfactory outcome.[16]

- *No gain in diagnostic capability*: Commonly accepted is the assumption that one key to rhinoplasty is the need to see the "hidden anatomy"—asymmetries or irregularities not visible from the surface, or remnants of cartilage left by previous surgeons that can neither be palpated nor seen—an apparent advantage of open rhinoplasty.

In fact, that assumption is not true. Finding alar cartilages that are too small to provide projection or external valvular support, or asymmetries that are not visible from the surface may be an anatomical victory, but does nothing to help the patient. If anatomical imperfections are not visible, palpable, or obstructing, it does not matter to the success of the operation if they are there. The critical anatomical points that determine the surgical plan are tip projection and the balance between dorsal height and nasal length (which impact the profile) and the competence of the internal and external nasal valves, in particular narrow middle vault or cephalic rotation of the lateral crura or "malposition," (which determine the frontal view and the airway). These four points can all be diagnosed from the surface so that the entire surgery can be planned preoperatively.[17]

What We Have Lost in Teaching Rhinoplasty

Why do so many competent surgeons abandon rhinoplasty, believing they are not smart enough or technically proficient? There are several answers.

- *No faculty agreement on fundamental concepts*: Why do not all surgeons know the basics—those principles upon which all rhinoplasty rests?

One reason is that the faculty—as relatively small as it is—cannot agree on the basics. There is no uniform consensus about structural support; ideal surface aesthetics; the relative contributions of skin and skeleton to nasal shape; how much (or even if) the skin sleeve will shrink; how best to stabilize the internal or external valves (or even how many valves there are); if there is value to radix grafts; whether augmentation can help patients who want smaller noses; whether spreader grafts, flaps, or tension sutures are best; how supratip breaks occur; or even what naturally creates tip projection. No wonder young surgeons are confused. These are not abstruse details.

- *Insufficient reporting of complications*: A 2014 Boolean search for rhinoplasty complication publications in the entire rhinoplasty literature since 1975 identified only 37.[18]

If the papers on extruding alloplastics were eliminated, only 29 remained. One striking finding to us was that 15 of the 31 terms searched (airway complications, postoperative airway complications, spreader graft, spreader flap, nasal cartilage graft, among others) yielded no papers at all.

Where, then, can surgeons read about rhinoplasty complications? On the Internet? As of March 27, 2021, Google yielded 905,000 such complications: 564,000 searching "open rhinoplasty complications," "closed rhinoplasty complications" (961,000), "tip suture complications" (2,690,000), "graft complications" (333,000), "tip graft complications" (579,000), "rib graft complications" (624,000), "spreader graft complications" (68,000), "postoperative airway obstruction" (916,000), and "radix graft complications" (32,200). These are orders of magnitude larger than we found in 2014, though only a handful of new complication papers have been published.[17] One reason that surgeons cannot learn rhinoplasty is that there is too little reporting of complications.

It is painful to experience complications and even more painful to report them. We are not alone in these foibles. In a review of 3,756 outcome studies, Chan et al[19] documented that 65% of harmful outcomes were incompletely reported, and that 86% of studies omitted results that compromised the authors' conclusions. We can do better.

- *Too few outcome studies*: Finally, we still do not really know what works. In this era of outcome studies, in 2015 only five papers identified themselves as such.[16] Fortunately, additional studies have appeared, of which we have only cited a few.[20–28] This is a significant recent improvement.

Outcome studies uncover both the best and the underbelly. The literature needs many more Level 2 and Level 3 studies; currently there are less than 10. Practice patterns must build on the results of the good ones. Papers that describe techniques impacting middle vault or alar rim contour also impact the airway and must be accompanied by functional measurements. Technical papers must include the experience, outcomes, contraindications, and complications of these innovations in the hands of their originators, with modifications and updates published as they occur. All techniques have consequences. Complicated techniques have more consequences. We faculty

cannot lose readers in our descriptions or pay too little attention to the nuances of our techniques. The difference between marketing and teaching lies in how much we reveal our limitations. The failure to link technique to outcome handicaps surgeons and exposes patients to unforeseen consequences.

Progress brings the good and the bad. Sheen's writings were a paradigm shift, and according to Thomas Kuhn's classical work on scientific progress,[29] large changes are followed by small modifications that nibble around the edges of the field being advanced. Still, today's surgical results operated by open or endonasal routes are superior to what they were in the 1970s.

The explosion of new interest in endonasal surgery may or may not reflect another paradigm shift. But that is the way science advances. Lewis Thomas wrote: "You either have science, or you don't; and if you have it, you are obliged to accept the surprising and disturbing pieces of information, even the overwhelming and upsetting ones, along with the neat and useful bits. It is just like that."[30]

Conflict of Interest
None declared.

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