

TITLE: Revision Rhinoplasty

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Introduction

Revision rhinoplasty is one of the most difficult and unpredictable plastic surgery procedures performed. It requires a precise assessment of the deformity, a strong grasp of nasal support mechanisms plus soft tissue skin envelope and a realistic appraisal of the outcome expected acutely and over a long period of time. This fine balance is often achieved by retrospective analysis of post-rhinoplasty results in order to highlight repeated problems and improve upon them. In the following discussion we will summarize the three main causes of dissatisfaction and how to handle each; then comment on several authors analysis of anatomic aesthetic deformities following rhinoplasty; and finally using one authors system, discuss the most common post-rhinoplasty deformities by nasal region and how to approach prevention and resolution.

Dissatisfaction

Parks states, "that a previous surgical result that is deemed unsatisfactory can be due to poor surgical technique or judgment, a patient's misconception of unreasonable expectations, or capricious results of healing."¹ Converse listed the following three causes, "poor esthetic judgment on the part of the surgeon, the surgeon's inexperience, and the inevitable need for a secondary operation in the difficult rhinoplasty. ...poor results often stemmed from the exacting surgeon attempting to accomplish too much in search of the perfect nose."² Or as Dr. Quinn says, "the enemy of good is better." (verbal communication many times) Mary Ruth Wright, PhD. states that the three major causes for dissatisfaction are: 1) a physical complication or disappointment in anatomical change, 2) an unrealistic psychological expectation, and 3) a lack of understanding or rapport between the surgeon and the patient.³ Not even dissatisfaction can be satisfactorily agreed upon.

Wright continues saying that first in dealing with a physical complication it is important for the surgeon to resolve his or her own feelings of disappointment and alleviate the patient's emotional reactions. It is important for the surgeon to bear in mind that he/she should not attempt to "explain away" or deny the existence of any possible complication, as these means

only tend to imply guilt on the part of the surgeon and project blame onto the patient. In this state of emotionality, the patient may question or even feel guilty about their decision for cosmetic surgery. Therefore, it is of the utmost importance that the patient's confidence in the value of aesthetic procedures and that it is their right to choose to have such procedures, be reestablished before a secondary procedure is discussed. Finally, it is wise for the surgeon to remember that a secondary procedure must be initiated and followed through in the same enthusiastic spirit as the initial procedure. Secondly, unrealistic expectations cannot be dealt with directly, it is of no value to tell the patient that they "should not have expected so much." This approach can only aggravate the situation. Now is the time for the surgeon to accept the patient's right to have had unrealistic expectations and to leave the responsibility of resolving these expectations to the patient. Most patients whose dissatisfactions result from unrealistic expectations do not continue to be unhappy, nor do they tend to decompensate emotionally. It is suggested that after letting the patient vent their dissatisfactions, the surgeon should simply state what they can and cannot do without making an issue of the patient's unreasonableness. Return visits are of paramount importance, as scheduled appointments and time usually suffice to settle dissatisfactions resulting from unrealistic expectations. Third, it is never too late to establish rapport. Lack of rapport has been documented to be a major cause for medical malpractice suits, and might be interpreted as a lack of sensitivity to emotional needs. It is recommended that the surgeon develop rapport by listening sensitively as well as intellectually, and by responding affirmatively rather than reacting defensively.³

Only two people of concern can be dissatisfied, the patient or the surgeon. Since the surgeon's goal should primarily be satisfaction of the patient, if the patient is dissatisfied so should be the surgeon. Regardless of actual physical outcome the surgeon must resolve to satisfy the patient. Not intending to imply reoperation necessarily, but by developing an understanding thoughtful relationship with the patient that results in the patient's understanding and acceptance of the attainable surgical outcome.

Revision Rhinoplasty Analyzed

Varying rates of revision have been documented in the literature from 7% to as high as 18%. A generally accepted ideal revision rate quoted in several articles is between 5-10%.¹ Many authors have analyzed deformities of post-rhinoplasty patients including Adamson, Kamer, Parkes, and Vuyk. Kamer classified deformity by major- saddling, midnasal asymmetry, pollybeak, retracted ala, retracted columella; and minor -bossa, hanging columella, wide base, irregular or high dorsum, implant adjustment, and acute nasolabial angle.² Others have classified the deformities in other manners. Two Parkes 1992, and Vuyk have classified the deformities anatomically by upper 1/3, middle 1/3 and lower 1/3. The most common deformity across studies was pollybeak, with other common deformities being saddling, midnasal asymmetry, bossa, and columellar retraction.^{1,4} According to Adamson, 50% of patients had one deformity, 30% had two, and 20% three.⁴ In order to identify deformity it is important to develop a systematic approach for evaluating the external and internal nasal abnormality. Gunter describes this well in the August 1987 issue of *Plastic and Reconstructive Surgery*, which is presented in the .ppt presentation. The deformities found will now be discussed in more detail by upper, middle and lower third including the possible etiology and surgical correction.

Upper Third Deformities

Abnormalities of the bony dorsum were the least common encountered.^{1,4} The most common deformity affecting the bony dorsum was excessive removal with a low broad bony pyramid. On A-P views this is portrayed as an indistinct separation of the eyes, pseudohypertelorism, with a washed out appearance due to less shadowing along the lateral nasal wall. This is a result of over-resection and inadequate lateral osteotomies leaving an open roof. This is more likely to occur when reduction is performed with an osteotome rather than a sharp rasp used in an incremental fashion. This deformity may be corrected with completion osteotomies and if necessary an onlay graft. Other deformities of the upper 1/3 included dorsal irregularity, high dorsum, and shifted graft. An error in evaluation that may lead to dorsal over-resection is the attempt to match the nasal dorsal profile to the radix that may in fact be deficient. The ideal starting point for the nasal dorsum is at the superior palpebral fold; this point is lower in the patient with a deficient radix. Byrd and Hobar recommend the plane of the cornea surface as a preferred reference point for radix projection; from this starting point the radix projects 0.28 times the ideal nasal length. It is also important to realize the affect of the nasion on overall nasal length and that a low radix decreases apparent nasal length while a high radix lengthens it. All of these effects must be considered when analyzing dorsal height and contemplating reduction or augmentation.⁵

Middle Nasal Vault Abnormalities

The middle nasal vault is commonly thought of as the cartilaginous dorsum. Though saddle nose deformities also may involve the bony dorsum and pollybeak deformities also involve interaction with the nasal tip, both will be discussed here. Other deformities of the middle third include pinched supratip, uneven/wide upper lateral cartilage and midnasal asymmetry.¹

Pollybeak deformity is the most frequent reported in many studies. It is a convexity of the nasal supratip relative to the rest of the nose. This deformity is colloquially known as pollybeak because the lower two thirds of the nose take on the convex profile of a parrot's beak. The most common causes of the deformity have been attributed to the following: 1) inadequate resection of the dorsal septum, 2) excessive dorsal septal removal 3) excessive alar cartilage removal resulting in decreased tip support, 4) excessive bony dorsal resection, 5) excessive supratip scar formation. Treatment depends on the cause. Inadequate resection of the dorsal septum may respond to re-resection, however, one must be cautious because over-resection relative to the available contracture of the overlying soft tissue envelope may lead to continued deformity. It may also be corrected with dorsal onlay grafts as well as tip grafts and other tip projecting maneuvers to be discussed later.¹ Probably the most difficult cause to correct is over-resection of the dorsal septal area which leads to supratip soft tissue scar formation from the inability of the overlying soft tissue envelope to contract to the new framework. A unique method to deal with this problem describes using triamcinolone injection into the subcutaneous space with 10 – 40 mg/mL solution at 4 week intervals to cause soft tissue atrophy and resolution of the deformity.⁶

Saddle nose deformity or concavity of the nasal dorsum may result from over resection of the cartilaginous and/or bony dorsum. This condition can also result from an over-projecting nasal tip, however. In the case of dorsal deficiency, especially in the case of revision rhinoplasty, septal cartilage is unfortunately often in short supply. Other autologous options for reconstruction include conchal cartilage, outer table cranial bone, iliac bone, and rib cartilage.⁷ Irradiated homologous costal cartilage has also been reported, however homologous and especially heterologous materials generally show significant resorption over time and are not recommended for this problem. Alloplastic materials such as Supramid, Gore-Tex, Mersilene, Medpor, and Proplast have been used with good success, however you must weigh the possibility of infection, inflammation, or rejection with the benefits. Special mention should be made of the use of Gore-Tex.

Gore-Tex, expanded polytetrafluoroethylene, is gaining wide acceptance in the field of facial plastic and reconstructive surgery. Excellent results have been reported with its use in regards to tissue ingrowth, contour, and stability. In a recent long-term follow-up (10 year) of its use for primarily dorsal augmentation, the overall complication rate (infection of the graft requiring its removal) was 3.2%. However the rate was 1.2% for primary rhinoplasty and 5.4% for revisions. This is thought to be due to the greater likelihood of placing the graft in contact with the dermis, a known cause of increased risk of graft rejection. Additionally 30% of patients with graft infection had coexisting septal perforations. Septal perforation is probably a contraindication to Gore-Tex implantation.⁸

Another complication of rhinoplasty is either over resection of the upper lateral cartilages or failure to secure the upper lateral cartilages to the septum following cartilaginous hump removal or twisted nose repair with subsequent displacement of the cartilages medially and inferiorly. This will lead to an overly narrow middle nasal vault and the inverted “V” deformity of the caudal edge of the nasal bones. Additionally, this may lead to internal nasal valve collapse and nasal obstruction. This problem is corrected with the placement of a spreader graft. The graft may be placed via a closed or open approach, however the open approach is much easier for the novice and allows suture fixation of the graft. The grafts are placed high along the septum from the underside of the nasal bones to the caudal aspect of the upper lateral cartilage. Care must be taken to make the grafts the same width in order to not create mid-nasal asymmetry. If asymmetry is created it may be repaired with a small unilateral onlay graft.⁹

The middle vault may also be troublesome in the correction of the twisted nose. If deviation of the attachment of the nasal septum and upper lateral cartilage is not recognized as contributing to the twisted nose and not addressed the surgical result will be less than satisfying. In order to correct this deformity during the primary operation the dorsal septum must be straightened and the upper lateral cartilage detached from the nasal septum and re-sutured. If persistent deviation occurs following these maneuvers the remaining asymmetry may be camouflaged with cartilage on-lay grafting or the placement of spreader grafts depending on nasal valve function.

Lower Third Abnormalities

Taken as a group nasal tip problems are often the most commonly sited area of

dissatisfaction and revision. Parkes further divided the lower third problems into tip/alar problems and columellar problems. The columellar deformities consisted of hanging columella, retracted columella and acute nasolabial angle. The tip/ala problems were categorized into retracted ala, pinched tip, dependent tip, bossa, under projected tip and amorphous tip. Hanging columella was the most common columellar deformity and nasal bossa was the most common tip deformity.¹

A hanging columella exists when the amount of columellar show exists more than the aesthetically acceptable 2-4 mm, and the ala is not notched or high. The hanging columella may be corrected by judicious resection of excess skin and or cartilage. A retracted columella appears when less than 2 mm of columellar show is present. This abnormality may be corrected by grafting the columella. First a determination must be made whether only the cartilaginous support is deficient or whether skin needs to be grafted as well. Grasping the columella and gently pulling inferiorly can determine this. If the skin appears sufficient a cartilage graft can be placed via a hemi-transfixion incision and retrograde columellar dissection. If skin and cartilage are necessary a composite graft of auricular cartilage and skin may be placed. An acute nasolabial angle is usually manifested in conjunction with an under-rotated nasal tip and can be corrected with maneuvers to rotate the tip to be discussed later. However deficiency of the premaxilla may also contribute to this abnormality and premaxillary plumping grafts may aide in camouflaging this problem.

Tip abnormalities were classified into retracted ala, pinched tip, dependent tip, bossa, under-projected tip and amorphous tip. A retracted ala results from excessive lower lateral cartilage and skin removal. It may be corrected by composite grafting from the ear.² Likewise the pinched nasal tip usually results from over resection of the lower lateral cartilages and may be corrected by interdomal cartilage grafting and tip grafting as necessary. Nasal bossae are either scar tissue over the lower lateral cartilages or knuckles of cartilage themselves that are especially evident in thin-skinned patients. These may be dealt with through conservative delivery techniques and shave excision. They may be further camouflaged by temporalis fascia or similar material as an onlay.^{2,10}

The remainder of the abnormalities- dependent tip, under-projected tip, and amorphous tip are interrelated and will be discussed together with a broader discussion of nasal tip support mechanisms and reaction of the nasal tip to certain surgical maneuvers as well as tip grafting. Tip projection is defined as that distance that the tip defining point projects anterior to the facial plane. While many definitions of ideal tip projection exist, the most common perhaps being 0.55-0.60 of the nasal length, additionally the tip should project anteriorly to the dorsum with a defined supratip break. Many interrelated features create an aesthetically pleasing projection and perhaps a subjective assessment from physical exam and preoperative photos is the best measure. However, most surgeons have a clear pre-operative objective to maintain, increase, or decrease nasal tip projection. Our perception of nasal tip projection is influenced by chin projection, upper lip height, nasolabial angle, dorsal height, nasofrontal angle, and other physical characteristics. Three to five mechanisms are commonly quoted as being major contributors to nasal tip projection, one author details 1) telescoping attachment of upper and lower lateral cartilages (scroll area), 2) length and direction of lateral crura, 3) medial crural attachment to caudal nasal septum, and 4) ligamentous attachment of superior septal angle to domes of lower

lateral cartilages¹¹. Many rhinoplasty maneuvers disrupt these support mechanisms, and long-term healing may interfere with projection over time. A study by McCollough and Anderson objectively and prospectively looked at operative effects on nasal tip projection. They found that nasal tip projection increased an average of 1.5 mm following injection of local anesthetic solution, emphasizing judicious use of anesthetic and the importance of preoperative photos. Additionally, they concluded that the most important mechanism in tip projection was the attachment of the medial crural footplates to the caudal septum, and that detachment of this feature especially through the use of full transfixion incisions was detrimental to tip projection. Complete strip procedures without the use of sutured-in columellar struts to lengthen the footplate-columellar junction actually decreased tip projection. In general, rhinoplasty approaches tend to disrupt normal tip support mechanisms and these must be reconstructed and augmented in order to attain the desired surgical goal.¹¹ What maneuvers can be undertaken to control tip projection?

Byrd and colleagues retrospectively reviewed cases and found that in 20 patients with floating columellar struts 19 had loss of tip projection. This led them to devise a new method for controlling tip projection. They designed three varieties of septal extension grafts, a direct extension type, a batten type, and a spreader type for use in different situations. These grafts are sutured to the septum and project in-between the domes to allow 6 mm of projection over the dorsum in thin-skinned patients and 10 mm in thick-skinned patients. Through use of this technique, desired maintenance or increase in tip projection was achieved in 19 of 20 patients.¹² Therefore, at least a sutured-in-place columellar strut should be used to maintain tip projection. Septal extension grafting should also be considered in at-risk patients in whom increased tip projection is desired. Another method to increase tip projection is the cartilage tip graft.

The cartilage tip graft may be used to contour an amorphous tip, increase projection, or camouflage tip irregularities. In the early days of rhinoplasty the tip was projected as much as could be achieved using suture techniques, cephalic trim, and even columellar grafts placed on the maxillary spine like tent poles. The nasal dorsum was then reduced to the achievable height of the tip. This often led to unrefined operated tips and over-resected weak dorsum. Jack Sheen and others began using tip grafting to project the nasal tip in the early 70's. First single grafts were used and then later multiple layered grafts of solid, scored, or morselized cartilage were used. Over the years tip grafting has proven to be a reliable, stable method to improve tip projection and definition, and to camouflage irregularities. In addition to septal cartilage, auricular cartilage is routinely used for tip grafting and is ideal because of its gentle curvature which shaped well to the nasal tip. One word of caution, however, is that the use of multiple layered grafts may round off the natural double break point of the transition between lateral, intermediate and medial crura, and this is a trade off to increased projection.^{13,14}

Conclusion

Revision rhinoplasty may be one of the most challenging operations a surgeon may embark on. Developing an honest rapport with the patient, listening to their concerns and frequent discussions as to their expectations is equally as important as identifying correctable anatomical defects and having the surgical skill to correct them. Even the best surgical result may be unsatisfactory to the unrealistic patient and complicated by the surgeon who is unwilling

to listen. Once rapport is established and realistic expectations are discussed, a systematic analysis of the nasal cosmetic and functional problems must be undertaken. Knowledge of the most common complications of primary rhinoplasty will not only help to avoid them, but also lead to understanding of what is necessary to correct them.

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