Aesthetic rhinoplasty: Avoiding unfavourable results

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ABSTRACT

Rhinoplasty is one of the most challenging surgical procedures in plastic surgery. It is not surprising that a significant number of patients end up with unfavourable outcomes. Many of these unfavourable outcomes could be the result of poor judgment and wrong decision making. Most frequently, the unfavourable outcome is the result of errors in surgical technique. In this paper, unfavourable outcomes resulting from errors in surgical technique are discussed under the heading of each operative step. Poor placement of intra-nasal incision can result in internal valve obstruction. Bad columnar scars can result from errors during open rhinoplasty. Unfavourable results associated with skeletonisation are mentioned. Tip plasty, being the most difficult part of rhinoplasty, can result in lack of tip projection, asymmetry and deformities associated with placement of tip grafts. Over-resection of the lower lateral cartilages during tip plasty can also result in pinched nose, alar collapse causing external valve obstruction and other alar rim deformities. Humpectomy can result in open roof deformity, inverted V deformity and over-resection resulting in saddle nose. The so-called poly beak deformity is also a preventable unfavourable outcome when dealing with a large dorsal hump. Complications resulting from osteotomies include narrowing of nasal airway, open roof deformity, inverted V deformity and asymmetry of the bony wall resulting from incomplete or green stick fractures. Judicious use of grafts can be very rewarding. By the same token, grafts also carry with them the risk of complications. Allografts can result in recurrent infection, atrophy of the overlying skin and extrusion resulting in crippling deformities. Autografts are recommended by the author. Unfavourable results from autografts include displacement of graft, visibility of the graft edges, asymmetry, warping, and resorption.

KEY WORDS

Aesthetic rhinoplasty; hump resection; osteotomy; radix; unfavourable results

INTRODUCTION

Rhinoplasty, in spite of being one of the most difficult and challenging surgical procedures in plastic surgery, does have a high level of satisfaction among most patients undergoing this procedure. Likewise, because of the complexity of this operation, there are a significant number of patients who end up with unfavourable outcomes.

Unfavourable outcomes resulting from each of the operative steps in aesthetic rhinoplasty are discussed with emphasis on prevention.

OPERATIVE SEQUENCE

The author uses the following sequence during rhinoplasty:

• Incision
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- Skeletonisation
- Tip plasty
- Dorsal humppectomy
- Septoplasty. Graft harvest from the septum, if indicated
- Osteotomy
- Grafts, if indicated.

The author performs the tip plasty before doing the dorsal hump resection because the tip is the more difficult aspect and it is easy to balance the dorsum to the tip rather than the other way around. Unfavourable results associated with each one of these operative steps are discussed in detail with emphasis on avoidance.

INCISION

The following types of incisions are used in rhinoplasty:
- Endo‑nasal rhinoplasty
  - Inter‑cartilaginous incision
  - Intra‑cartilaginous incision
  - Marginal incision.
- Open rhinoplasty
  - Marginal incision and
  - Trans‑columellar incision.

In endo‑nasal rhinoplasty, violation of the internal valve, using particularly the inter‑cartilaginous incision, can result in nasal airway obstruction. This is due to cicatrization of the internal valve. Therefore, it is extremely important to protect the integrity of the internal valve.

While most scars resulting from open rhinoplasty are favourable, sometimes these scars can be conspicuous and disfiguring [Figure 1]. It is important to make the incision with a very sharp blade to avoid trauma to the wound edges and more importantly, it is essential to use magnification during the approximation of the trans‑columellar incision. Injury to the medial crura during elevation of the skin flap can result in notching of the columella.

SKELETONISATION

Undermining of the soft tissues over the bony and cartilaginous vault, or skeletonisation, is done in order to allow the soft tissues to adjust to the altered underlying nasal framework. Skeletonisation should be minimal and only to the extent that is required to do the necessary manipulations, such as hump removal or graft placement. Excessive undermining can have unfavourable outcomes, such as displacement of the graft [Figure 2] or displacement of the nasal bones into the pyriform aperture following osteotomy, which can have disastrous consequences.

Also, during skeletonisation, it is important to hug the periosteum so that if a graft is indicated it will be placed in opposition to the osteocartilaginous framework. Placement of grafts in a more superficial plane will result in lack of integration, abnormal and mobility and/or visibility of the graft edges [Figure 3].

Excessive and unnecessary undermining will also result in prolonged swelling, oedema and scarring.

TIP PLASTY

Tip plasty is perhaps the most difficult aspect of rhinoplasty. Several methods are used to correct the tip.
• Endo-nasal tip plasty
• Delivery
• Non-delivery
• Eversion.
• Open rhinoplasty

In the endo-nasal approach, the tip can be manipulated using the delivery method, the non-delivery method and the eversion technique.

In each one of these, the cephalic portion of the low lateral cartilage is resected. Unfavourable results can occur due to excessive resection. If the mucosa is also resected along with the cartilage then retraction of the ala will result [Figure 4]. It is also important to maintain the integrity of the ala rim. If the ala rim integrity has to be disrupted; for instance, as in correction of the ultra-projecting tip or the boxy tip, then it should be reconstituted. Failure to do so will result in a pinched nose [Figure 5]. Asymmetric dissection of tissue from each side will result in tip asymmetry. Extreme resection of lower lateral cartilage will result in alar collapse [Figure 6]. In more complicated tip plasty, an open approach is used. In the open approach, direct manipulation of the cartilage can be performed. Many times sutures are used. Some surgeons prefer to use non-absorbable sutures. These can result in palpable nodules, suture granulomas [Figure 7], extrusion and sometimes, persistent pain. It is, therefore, advisable to use non-absorbable sutures, and polydioxanone sutures (PDS) is an ideal suture. The amount of time that it will take for the PDS suture to resorb will have resulted in healing of the manipulated tissues.

Open rhinoplasty facilitates placement of tip grafts and strut grafts in addition to placement of different types of sutures which may be required in difficult tips, especially in secondary cases.

One of the common faults in rhinoplasty is lack of tip projection [Figure 8]. In the profile of the nasal dorsum, the tip...
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should be the highest point. Tip grafts should be used when indicated. However, they should be placed meticulously, or they will end up with visible edges or asymmetry.

**HUMP RESECTION**

**Over resection (saddle nose)**

Resection of the prominent hump is a common component of many rhinoplasty procedures. This seemingly simple manoeuvre can result in unfavourable results.

There are several ways of excising the dorsal hump. It is important to understand that the dorsal hump has a bony and a cartilaginous component. Whereas the cartilage can be resected with a knife or scissors, resection of the bone requires an osteotome, a saw, or a rasp.

One of the most common mistakes by the beginner in resecting the hump is over-resection. Even an apparently large hump requires a small amount of resection. Over-resection can easily occur when resecting the hump with a saw. When using the saw, one need at least 2 mm of purchase and 1 mm is lost during the sawing procedure as bone dust. 1 mm is further lost during rasping the irregularities. Therefore, the minimum amount of tissue loss with the saw technique is at least 4 mm which, in many cases, is too much, resulting in saddle nose [Figure 9].

For moderate to small humps, the nasal rasp is perhaps the best method.

Use of the nasal rasp allows for a graduated approach to hump reduction. Use of the rasp will, therefore, rarely result in over-resection. It is very important for the rasp to be sharp. Both push and pull rasps should be used to smoothen the dorsum. Using a rasp after osteotomy can result in avulsion of a comminuted bone fragment, particularly with a pull rasp.

**Low radix-pseudohump**

When the radix is low, the dorsal fullness may be a pseudohump rather than a true dorsal hump. Resection of this apparent dorsal hump with reference to the low radix will result in over resection and saddle nose deformity. It is important to recognize this and elevate the radix with a graft and then lower the dorsum if necessary [Figure 10].

**Camel back hump**

When there is a depression above and below a mid-dorsal hump (camel back deformity) then rasping the hump can result in saddle nose deformity. In these cases, a graft should be placed above and below the mid-dorsal hump [Figure 11].

**Under resection**

One of the common complications while resecting the hump with the rasp is under-resection and a residual hump. This can occur with dull rasps. Careful attention should, therefore, be paid to ensure that adequate hump resection has been achieved when using the rasp.

**Open roof deformity**

One of the dreaded results following excision of a large hump is the so-called “open roof” deformity [Figure 12]. When a very large hump is resected, the dorsum should be carefully appraised after performing the osteotomies. Frequently a spreader graft or a dorsal only graft is required in order to prevent the open roof deformity.

**Inverted V deformity**

Inverted V deformity is another complication that can occur while doing a hump resection and osteotomy.
This is the result of disassociation between the upper lateral cartilages and the inferior border of the nasal bones. This can result after a large hump resection and vigorous use of a pull rasp. This deformity may not be apparent during surgery unless carefully sought for. This is particularly true in thick-skinned individuals when the deformity becomes apparent after several months. This deformity results from medial displacement of the upper lateral cartilages [Figure 13]. It is best avoided as it is very difficult to correct secondarily [Figure 14].

Poly beak deformity
Poly beak deformity, evident as supra-tip fullness, results from inadequate resection of the dorsal borders of the upper lateral cartilages during hump resection.

In many cases, there is a concomitant over-resection of the bony dorsum giving rise to the poly beak deformity [Figure 15]. This type of deformity can also result from excessive scarring in the supra-tip region. It can result from the accumulation of blood and/or oedema in the supra-tip region post-operatively. In my experience, it is very important to use steri-strips and tape the supra-tip area prior to applying the nasal splint. This tape is usually left on for 6-7 days.

DORSAL IRREGULARITIES

Dorsal irregularities can be another unfavourable result if the nasal dorsum is not rasped after hump excision by either an osteotome or a saw. It is very important to palpate the nasal dorsum following the osteotomy as sometimes a spicule of bone may be present after the osteotomy giving rise to either visible or palpable irregularities on the dorsum and lateral wall at the site of the transverse osteotomy [Figure 16]. These should be addressed by using a pull rasp.

RADIX

Deformities of the radix can result if inadequate attention is paid to this part of the nasal dorsum. Many times, the radix is too low, and this will require a radix graft. In some ethnic groups, the radix is high, and this will require lowering. In dealing with the radix, it is very important to ensure that
the patient’s ethnicity is not altered as the radix constitutes an important ethnic hallmark, such as low radix in Indian noses [Figure 17] and high radix in the Greeks.

This should be carefully discussed with the patient pre-operatively.

A common unfavourable result when using dorsal onlay grafts is excessively high radix [Figure 18].

UNMASKING HIGH SEPTAL DEVIATION

In a patient who has a high septal deviation, a hump resection can unmask this deformity and result in a crooked nose. In such cases, a camouflage graft may be required in order to cover the curved upper border of the septum. It is, therefore, very important to recognize this during the pre-operative evaluation. Otherwise, a rhinoplasty following hump resection can convert a straight nose into a crooked nose.

OSTEOTOMY

Four types of osteotomies are used:
- Lateral
- Medial
- Transverse
- Double.
Osteotomy can be performed either endo-nasally or percutaneously.\[^4\] The author prefers percutaneous approach. This gives better control and also less chance of comminution of the nasal bones. The level of the osteotomy will depend on the nature of the problem. When dealing with a convex nasal bone, usually in post-traumatic cases, a double level lateral osteotomy may be required. Also, in post-traumatic cases, a transverse osteotomy may be required.

In post-traumatic cases and in broad noses [Figure 19], there may be a web between the nasal bone and the septum [Figure 20]. This may need to be resected with a medial osteotomy to mobilize the nasal bones inwards. Failure to do this will result in persistence of a broad, bony vault or open roof deformity.

Transverse osteotomies may be required to correct broad, post-traumatic noses and frequently in correcting the crooked or twisted nose.

**Nasal airway compromise**

Another unfavourable result following osteotomy is narrowing of the nasal airways by medial displacement of the nasal bones. This can occur in a patient who has a moderate degree of nasal deviation pre-operatively which may be asymptomatic. Narrowing of the nasal airway by doing a lateral osteotomy and displacement of the nasal bones medially can thus precipitate symptoms of nasal airway obstruction in a pre-operatively asymptomatic case.

**Greenstick fracture**

Another unfavourable outcome related to osteotomy can result from incomplete fracture or the so-called “greenstick fracture”. In such cases, the nasal bones will revert to their original pre-osteotomy location causing post-operative asymmetry. It is, therefore, very important to ensure that the osteotomy is complete and the nasal bones are freely mobile.

**Step deformity at the osteotomy site**

In performing lateral osteotomy, it is important to make the cut in the bone low along the naso-frontal process of the maxilla; otherwise, there will be a residual stump which might be visible or palpable.

**GRAFTS**

The use of grafts in rhinoplasty can be very rewarding. However, grafts are also fraught with possible complications leading to unfavourable results. There are three categories of grafts. These include:

- **Alloplasts**
• Homografts
• Autografts.

**Alloplasts**
Over the years, many types of alloplasts have been used. Jacques Joseph, who is considered the father of rhinoplasty, used ivory. Currently, the most commonly used alloplasts include silicone and porex. Although these grafts can work well in patients who have a thick nasal soft tissue envelope, they are fraught with complications when used in patients with fair and thin tissue canopy and in secondary rhinoplasties.[7]

Alloplasts are tempting to use because of their easy availability off the shelf, unlimited bulk and lack of donor site deformity. However, alloplasts have many disadvantages.[8] These include: Non-integration resulting in abnormal mobility, the edges can be visible and palpable, and over a period of time, there is atrophy of the skin and the subcutaneous tissues overlying the implants, resulting in erythema. Many times, these grafts can get infected [Figure 21] and extrude [Figure 22]. When this happens, the resultant deformity compounds the original problem for which the grafts were used in the first instance [Figure 23].

Alloplasts should not be used in secondary rhinoplasties due to the presence of scars and decreased vascularity.

**Homografts**
Preserved bone and cartilage have been used, but these carry with them a high incidence of resorption. Acellular tissue matrix, such as allograft and allomax, can be used when soft tissue padding is required to cover grafts, particularly in patients with very thin and attenuated tissues. They can also be used as filler to correct soft tissue irregularities.

**Autografts**
Autografts are the preferred grafts in rhinoplasty and have the least amount of complications for the most part.[9] The following types of autografts are used:
• Cartilage
  • Nasal septum
  • Ear
  • Rib
• Bone
  • Perpendicular plate of ethmoid from the nasal septum
  • Iliac crest
• Rib
• Cranial bones
• Fascia
• Dermis.
such cases, diced cartilage wrapped in fascia as advocated by Daniel[5] should be used. These complications are usually the result of technical errors and are not inherent to the graft material and should be avoidable.

In summary, most unfavourable outcomes in aesthetic rhinoplasty are the result of over-resection of tissues, either bone [Figure 27], cartilage [Figure 28], or both, and are avoidable.

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Indian Journal of Plastic Surgery May-August 2013 Vol 46 Issue 2
How to cite this article: Bhangoo KS. Aesthetic rhinoplasty: Avoiding unfavourable results. Indian J Plast Surg 2013;46:349-58.

Source of Support: Nil, Conflict of Interest: None declared.

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