

AESTHETIC RHINOPLASTY

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Abstract : Rhinoplasty is the most commonly performed aesthetic surgery procedure. It is universally acknowledged as the most difficult cosmetic surgery operation and requires a precise understanding of the anatomy and high surgical skill. A proper preoperative counseling is mandatory to define a clear set of aesthetic goals as some patients may want a change that cannot be achieved by surgery or that will not be harmonious with the face. It is essential to maintain a photographic record of the deformity and the result in standard views. The nasal deformity may be corrected by a 'closed' or an 'open' approach. Whereas simple operations like correction of nasal hump or dorsal nasal augmentation may be performed by the 'closed' approach, more complicated nasal deformities, including secondary rhinoplasties require an 'open' approach. The change in patient profile is immediately appreciable, however; it can take almost a year to notice the final change. Surgical complications are rarely noticed but aesthetic complications are feared and can only be eliminated by experience. A secondary rhinoplasty is only undertaken after a delay of at least one year to allow for scar remodeling and to obtain suppleness of tissues.

INTRODUCTION

Rhinoplasty, also known as 'the nose job', is the most commonly performed aesthetic procedure all over the world. Aesthetic rhinoplasty is universally acknowledged as the most elegant, but arguably, the most difficult cosmetic surgery operation. Past two decades have witnessed remarkable improvements in the precise understanding of anatomical and physiological aspects of various nasal elements, and their inter-relationship.

A detailed description of all rhinoplasty techniques is beyond the scope of this manuscript.

PERTINENT NASAL ANATOMY

The nose is a pyramidal structure occupying the central 1/3rd of the face. It is divided into two symmetrical chambers by a median septum, lined on the inside by the mucous membrane and covered externally by soft tissues including the skin, subcutaneous tissues and a fibromuscular layer. The nose has been traditionally divided into three compartments: the bony vault, the upper cartilaginous vault and the lower cartilaginous vault (fig.1).

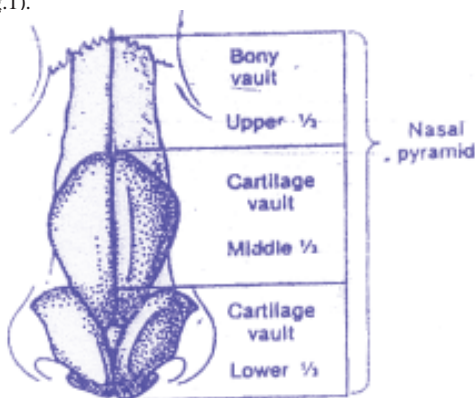


Fig.1 Showing three compartments of nasal pyramid: the bony vault (upper third), the upper cartilaginous vault (middle third) & the lower cartilaginous vault (lower third).

The bony vault is formed by the paired nasal bones supported laterally by the paired frontal processes of maxillae and posteriorly by the nasal spine of the frontal bone. Their articulations contribute the rigid structural

support to the cartilaginous portions of the nose.

The upper cartilaginous vault is formed by the paired upper lateral cartilages and the dorsal cartilaginous septum. Upper lateral cartilages are fused to the septal cartilage along much of the dorsum forming an angle of about 15 degrees in the area of internal nasal valve. The nasal septum has cartilaginous and bony components. The osseous septum is composed of the perpendicular plate of ethmoid, vomer, the nasal crest of maxilla and the nasal crest of palatine bone. The septal cartilage forms the major part of the caudal portion of the nasal septum and protrudes in front of the piriform aperture. Superiorly, it articulates with the perpendicular plate of ethmoid and posteriorly with the vomer and the premaxilla (fig. 2). The junction of the dorsal and the caudal border of the septal cartilage is called the septal angle.

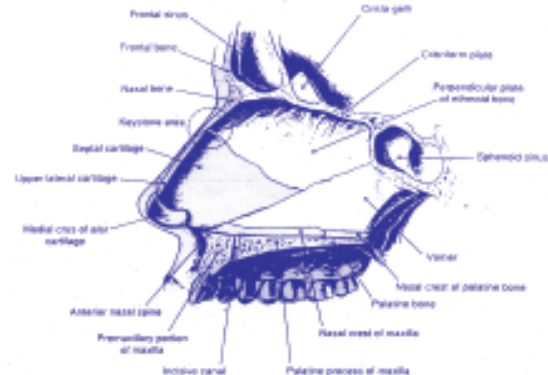


Fig.2 Sagittal view of the nasal septum showing the inter-relationship of its osseous & cartilaginous components. The confluent area of four solid structural elements viz. nasal bones, perpendicular plate of ethmoid, nasal septum & upper lateral cartilages is the 'keystone area' (depicted with a interrupted circle)

The lower cartilaginous vault comprises of the paired lower lateral (alar) cartilages, the accessory cartilages and the fibro-fatty connective tissue. The alar cartilages provide support and configuration to the tip of the nose and the columella. Each alar cartilage is subdivided into three crura (medial, middle and lateral) with two important junctions (columella breakpoint and dome defining point) (fig. 3). The domal segment of the middle crus forms the dome, which is the most projecting part of the alar cartilage. The lobule is the entire mobile area overlying the alar cartilages, whereas the true intrinsic tip incorporates just the area between the tip-defining points transversely, and between the columella breakpoint and supra-tip point vertically. The columella separates the nostrils and joins the tip of the nose to the upper lip.

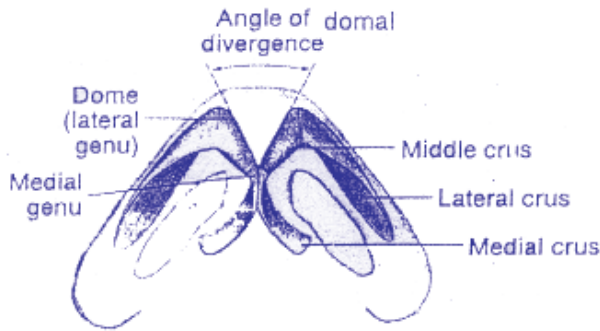


Fig.3 Basal view of the paired alar cartilages showing their subdivisions into medial, middle & lateral crura. The middle crus forms the 'lateral genu' at its junction with the lateral crus, and the 'medial genu' at its connection with the medial crus.

NASAL PROPORTIONS AND AESTHETICS

The distance along the dorsum of the nose from the nasion to the tip defining point is *nasal length*. The horizontal distance from right alar groove to the left alar groove is *nasal width*. The angle between glabella and the root of the nose is *nasofrontal angle* (range: 125-135 degrees) (fig. 4). The angle between the columella and the upper lip is called *nasolabial angle* (range: 90-105 degrees) (fig. 4).

In *frontal view*, the nasal width should be equal to the intercanthal



Fig.4 Showing the nasofrontal and the nasolabial angles.

distance. In *profile view*, the radix of the nose should be located at the deepest point of the nasofrontal angle. There should be 2-4 mm of columellar show. In the *basal view*, the nose should have the appearance of an equilateral triangle.

INITIAL CONSULTATION

It is mandatory to define a clear set of aesthetic goals with every patient. Some patients may want a change that cannot be achieved by surgery or that will not be harmonious with the face. With anxious / depressed / over demanding / unrealistic patients, the best course is to explain that the surgery is not likely to fulfill their desires and refuse to operate.

Preoperative Examination

The whole face should be examined in frontal, profile and basal views for aesthetic proportions.

An assessment is made of skin thickness, relative length and width of the nasal bones, presence of deviations of the dorsum and / or tip, osseo-cartilaginous hump, tip projection, position of the domes, shape and size of alae, nostrils and columella, deviation of the caudal border of the septal cartilage, extent of the columellar show, and also the inclination of nasofrontal and nasolabial angles. The relationship of the chin projection to the nose should also be documented.

The internal nose (vestibules) should also be carefully examined with a fiberoptic rhinoscope or by a nasal speculum. The condition of mucosal lining, inferior and middle turbinates, internal nasal valve area, presence of septal deviation or perforation should be carefully

noted.

The patient is made aware of any limitations the examination findings may impose on the desired surgical outcome, possible complications and the expected post operative course. He/ she should be explained that the surgically altered nose continues to be modified by the healing process and it is seldom possible to designate a final result immediately following rhinoplasty.

Documentation

Besides carefully recording patient complaints and examination findings, color photographs of each patient are taken before, and serially after the operation, in standard views (front, right and left lateral, right and left oblique, and basal). Operative details with diagrams should always be entered into the data sheet, at the end of the operation, by the surgeon himself.

LAB INVESTIGATIONS

Routine blood and urine analysis along with other preoperative investigations depending upon the patient's age and medical history are carried out.

ANAESTHESIA

Most of the patients request for general anaesthesia. However, a combination of monitored intravenous analgesia with local topical and infiltration anaesthesia is preferred by some surgeons. Infiltration with a vasoconstrictive agent (1 % xylocaine with 1: 100,000 dilution of adrenaline) is always used to minimize blood loss. Infiltration must avoid tissue distortion.

OPEN VS. CLOSED APPROACH

A rhinoplasty can be performed by an open or a closed approach. The *closed approach* is performed by making intranasal incisions and is more complex to teach and learn. It has the inherent disadvantage of limited exposure, visibility and flexibility. But, it leads to minimal scarring and oedema. The common indications for an endonasal approach are a dorsal hump reduction, dorsal augmentation, minor tip problems and minor deviation of the nasal septum. Most of these corrections can be done under local anaesthesia supplemented with intravenous sedation.

In the *open approach* the entire nasal skin is stripped off the dorsum. It provides an excellent exposure and is better suited for 'problem noses' (revision rhinoplasty / cleft lip rhinoplasty / complex nasal deviations / severe tip distortion or gross asymmetry / large septal perforations etc).

GENERAL SEQUENCE OF OPEN RHINOPLASTY

The basic steps of rhinoplasty described below are applicable to correction of most of the nasal deformities but they are not necessary in every case.

Incisions : For an *open approach*, *infracartilaginous* / *marginal incisions* (fig. 5a) are made at the caudal margin of each alar cartilage and they are joined by a *transcolumellar incision* (fig. 5b). This allows

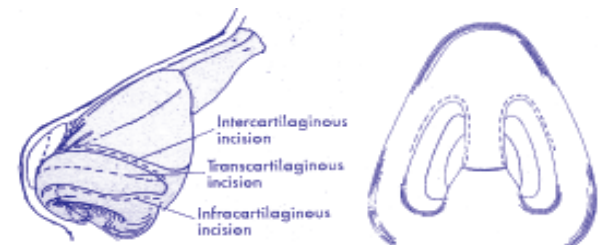


Fig.5a & 5b Diagrammatic representation of the location of the intercartilaginous, transcartilaginous and infracartilaginous incisions (see text for details). Showing the transcolumellar incision, which joins the infracartilaginous incisions on either side to, for open rhinoplasty.

the soft tissues of the nose to be elevated off the underlying osseocartilaginous skeleton. The transcolumellar incision may be curvilinear, chevron, inverted chevron or a stair-step incision. It is generally located in the middle or lower third of the columella.

After incisions, a sharp, curved scissors is used to dissect the skin and the soft tissue off the lateral crus on either side. Likewise, the columellar skin is carefully dissected off the caudal margin of the middle crus, to completely expose the lower third of the nose.

Dorsal Reduction : Dorsal reduction is done conservatively to preserve the structural support of the nose. Overzealous resection is the commonest cause of secondary deformities, as open roof, concave dorsum and collapsed internal valve.

Subperichondrial tunnels are created by reflecting the mucosa, on both sides, under the dorsum of the nose. This allows dorsal reduction without transecting the functional mucosal lining.

Bony dorsum is reduced first. Rasps are preferred over chisels as they allow more gradual reduction of the bony hump. The exact amount of cartilaginous hump (septal cartilage and the upper lateral cartilages) to be removed becomes apparent now. Controlled reduction of the cartilaginous hump is performed under direct vision with a serrated scissor or blade. The nose is inspected and palpated after each incremental reduction to ensure a straight and smooth profile.

Nasal Shortening: A conservative excision of the caudal septum and partial excision of the anterior nasal spine can be performed to achieve shortening of nasal length.

Inferior Turbinates: Turbinates are almost always hypertrophic on the concave side of a deviated septum. There is seldom an indication for turbinectomy because a total resection leads to impairment of function and partial resections are frequently followed by relapse. However, a partial turbinectomy may be performed in a very narrow nose.

Septal Surgery: Correction of any septal deviations or harvesting of the septal cartilage grafts is done at this stage. Septum can be approached either by 'tip split technique' separating the medial crura from each other or by a 'dorsal split incision' which detaches the upper lateral cartilage from the dorsal septal border. Mucoperichondrial flaps are elevated from either side of the septum. The flap elevation is carried well past the osteochondral junction of the nasal septum. Minor septal deviations can be corrected by transecting the septal cartilage along its inferior border in the vomerine groove and also vertically at its junction with the perpendicular plate of ethmoid bone. Partial thickness incisions on the septal cartilage on one surface allow it to warp on the opposite side, and can help in correcting deviation.

For major deviations a septal resection is necessary. This is achieved by the Ballengers' swivel knife and the harvested cartilage piece can be used as a graft, if necessary. The deviated part of the vomer should also be resected otherwise the nasal septum will not come to the midline. To maintain the dorsal and columellar support of the nose, and to prevent a septal collapse, an L-shaped strut of septal cartilage measuring at least 1 cm dorsally and 1 cm caudally must be left intact. If this caudal strut is also deviated it must be relocated to the midline and fixed.

Nasal Osteotomies : A major hump resection inevitably results in a flat plateau along the nasal dorsum. Obliteration of this open roof is accomplished by medial mobilization of the lateral bony walls which simultaneously narrows the nasal pyramid.

A lateral osteotomy can be performed by either an intranasal or a percutaneous approach. In intranasal approach, an incision is given in the nasal vestibule at the pyriform aperture area and subperiosteal tunnels are created along the proposed lines of osteotomies on either side. An osteotome is gently advanced by careful manipulation.

In percutaneous lateral osteotomy, a 2 mm wide osteotome is introduced percutaneously about 3 mm medial and caudal to the medial canthus of the eye. Several small perforations in the bone, along the line of the osteotomy, are made through the same incision by altering the position of the osteotome. No subperiosteal undermining is done. When a minimal to moderate amount of medial mobilization is required the osteotomy line extends from the pyriform aperture inferiorly to end at the frontonasal suture superiorly (*low to high*). For greater mobilization a 'low to low' osteotomy is made where it extends straight up to the level of the inner canthus superiorly. This is always combined with the transverse percutaneous osteotomy.

Now a hinged greenstick fracture is created (infracture) by manually displacing the osteotomised bones medially. The stability of the mobilized segments is contributed by the intact mucosal lining, the periosteum and the soft tissues attachments externally. A sustained and uniform pressure is now applied by compressing the nose to reduce the bleeding. The nasal dorsum is checked for irregularities.

A medial osteotomy is not necessary in all cases. Only when the bone resection of the dorsum was minimal and the bony base width still needs to be reduced, it is necessary to perform the medial osteotomies before infracturing the nasal bones.

Dorsal Augmentation : Requisite grafts for the dorsum, tip and the columella can be carved from resected nasal septum. If necessary, cartilage can be harvested from concha or costal cartilage. A 'boat shaped' piece of cartilage is placed over the nasal dorsum to correct a saddle deformity of the nose.

Correction of Nasal Tip : In external rhinoplasty, tip sculpturing is usually executed after dorsal profile alignment. It should be assessed whether the tip requires a reduction in the volume, a change in the orientation of the alar cartilages or tip projection, a cephalic rotation to increase the naso-labial angle, a narrowing of the interdomal distance or a combination of the above.

Tip-sculpturing procedures include tip-grafts, suture techniques, alar cartilage excision and columellar grafts etc. In most cases, only a conservative reduction in the volume of the cephalic border of the lateral crus is needed to refine the tip. It is necessary to preserve a continuous, 6-8 mm wide strip of lateral crus to ensure long term support and natural contouring. Inherent dangers of scarring and asymmetric healing exist whenever the complete alar cartilage strip is interrupted. Resection of the fatty tissue located between the alar domes further improves tip definition.

Domal, transdomal and interdomal sutures (*suture techniques*) also provide predictable long term narrowing and refinement of the tip.

Height and contour can also be added to the tip with autogenous cartilage grafts from the nasal septum or auricular cartilage. Placement of a shield shaped infratip lobular graft / onlay tip cartilage graft in the domal area increases tip projection. Columella strut grafts placed in between the two medial crura can be used to provide structural support to the tip. They also enhance tip projection. These grafts can be sutured in place for better and long-term stability.

Closure : After tip remodeling is complete the skin is redraped for final evaluation before closure. All intranasal incisions are closed with 5-0 vicryl. A 6-0 nylon suture is used for closure of the transcolumellar incision.

Nasal Base Sculpting: Aesthetically, the width of the nasal base should be equal to the intercanthal distance. After the incisions for rhinoplasty have been closed, nasal base modifications are carried out by excision of a wedge or crescent from the alar base on either side. They should always be done conservatively. This is necessary when the alar base is excessively wide and thick or there has been an excessive diminution



Fig.6 a,b Pre & Post operative view of young girl after hump removal by rasping using an endonasal approach.



Fig.7 a & b Front and profile views of a 24 year old boy with saddle deformity of the nose following trauma.



Fig.7 c & d Postoperative front and profile views of the same patient following dorsal nasal augmentation with a polyethylene (Porex) implant, using an endonasal approach.

in the projection of the nasal tip leading to flared alae.

Dressing and Splintage : Intranasal packing is done with paraffin gauze. An external dressing is done with steristrips to redrape the skin and position the nasal tip. It is also necessary to apply a conforming nasal splint (POP / acrylic / orthoplast) to maintain the position of the osteotomised nasal bones and to restrict oedema formation.

CLOSED / ENDONASAL APPROACH

Incisions (fig. 5a): An *infracartilaginous / marginal* incision made at the caudal margin of the alar cartilage can be extended to join the 'transfixion' incision (incision along the caudal edge of the septum behind the columella) to provide access.

However, most often a *transcartilaginous / infracartilaginous / cartilage splitting* incision is used for the closed approach. It transects the alar cartilage at roughly the same distance from cephalic and caudal edges and extends from the lateral end of the lateral crus to the dome. It can also be extended to join a transfixion incision.

The *intercartilaginous* incision made between the lower margin of upper lateral cartilage and the upper border of the lateral crus of the alar cartilage is less employed these days because it may result in scarring in the region of the internal valve causing interference with nasal breathing. Often, it has to be combined with an infracartilaginous incision for better visualization (*delivery approach*). This approach is employed for a more difficult tip plasty. The



Fig.8 a & b Basal and profile views of an 18 year old girl who was operated in infancy for cleft lip defect. The secondary deformity of the lip and the nasal deformity are clearly visible.



Fig.8 c & d Showing postoperative views (basal and profile) of the same patient. She underwent a single stage correction of her lip and nasal deformity by an open approach. She required alar modification, submucous septal resection, dorsal nasal augmentation with iliac bone graft and relocation of the caudal septal strut. She also required maxillary augmentation with cancellous bone chips from the iliac crest. Note the improvement in the shape of nasal tip and nostril symmetry in basal view and the improvement in nasolabial angle, columellar show and the maxillary prominence on the profile view.

lateral crura can be dissected free from the overlying skin and 'delivered' as individual bipedicle chondro-cutaneous flaps for sculpting. Many rhinoplasty surgeons have abandoned the 'delivery method' in favour of the external approach.

POST OPERATIVE MANAGEMENT

The head is kept elevated to decrease oedema and oozing. The patient is prescribed antibiotics and anti-inflammatory drugs for 5 days and is kept on a liquid diet for 24 hours. Intranasal packs are removed after 48 hours. They may be left for 3-4 days if a septoplasty has been performed. The nasal splint and sutures are removed on 5th / 6th postoperative day. Strenuous exercises are avoided for three weeks.

Postoperative oedema is maximum at 48 hours and it gradually subsides over 3-4 weeks. The surgically altered nose continues to be modified by the healing process for up to 18 months after surgery.

RESULTS

Aesthetic rhinoplasty is a very exacting procedure but extremely rewarding. The change in patient profile is immediately appreciable (fig 6-8), however, it can take almost a year to notice the final change.

COMPLICATIONS

Despite the complexity of rhinoplasty, complications during the post operative period are relatively uncommon. *Infection* is rare after rhinoplasty. Use of prophylactic antibiotic is always necessary. *Nasal bleeding* may occasionally occur after pack removal. It can usually be controlled by elevation of the head, compression at the base of the nose and by repacking. *Haematoma* formation is rare as the nasal incisions are not closed tightly. Moreover, intranasal packing, application of steri-strips and external splintage obviates any dead space. An undetected intra-septal haematoma may lead to septal cartilage necrosis and loss of nasal support. *Necrosis of the external nasal*

skin may result from an incorrect plane of dissection or from attempts to radically thin the overlying soft tissue. *Vestibular atresia*: Improperly placed intranasal incisions and resection of nasal lining can result in scarring. This can lead to stenosis and airway obstruction. 'Spreader grafts' are small, longitudinally oriented cartilage grafts which are placed parallel to and on either side of the dorsal septum to restore natural nasal width in a case of vestibular stenosis. They may be used after excision of a large cartilaginous hump to minimize upper lateral cartilage collapse. A *septal perforation* can result if the septal mucoperichondrial flaps have been left lacerated on both sides after septal cartilage resection. Septal perforations can lead to crusting, nasal bleed and a whistling sound on inspiration. Every aesthetic procedure can leave an *unsatisfied patient* if a proper pre-operative counseling has not been carried out or there has been under / over correction.

SECONDARY RHINOPLASTY

The challenges in secondary rhinoplasty may involve a wide and complex span of problems ranging from difficult to virtually impossible. Like all other secondary surgeries, secondary rhinoplasty is more difficult because of altered anatomy, presence of scar tissue and damaged blood supply. Moreover, the patient is unhappy and upset. Secondary procedures require exceptional diagnostic and technical skills.

The guiding principles for secondary rhinoplasty are to delay surgery for at least a year to complete scar remodeling, multiple consultation and counseling sessions, an appropriate surgical plan following an accurate diagnosis and the use of only autogenous material as grafts.

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