**RHINOPLASTY: A REVIEW**

1*Dr. Kunal Marwah, 2Dr. Vishal Bansal, 3Dr. Apoorva Mowar, 4Dr. Abhishek Sharma and 5Dr. Prajesh Dubey

1Post Graduate Student, Department of Oral & Maxillofacial Surgery, Subharti Dental College & Hospital, Meerut (U.P.), India.
2Professor & Head, Department of Oral & Maxillofacial Surgery, Subharti Dental College & Hospital, Meerut (U.P.), India.
3Professor, Department of Oral & Maxillofacial Surgery, Subharti Dental College & Hospital, Meerut (U.P.), India.
4Post Graduate Student, Department of Oral & Maxillofacial Surgery, Subharti Dental College & Hospital, Meerut (U.P.), India.
5Reader, Department of Oral & Maxillofacial Surgery, Subharti Dental College & Hospital, Meerut (U.P.), India.

*Corresponding Author: Dr. Kunal Marwah
Post Graduate Student, Department of Oral & Maxillofacial Surgery, Subharti Dental College & Hospital, Meerut (U.P.), India.

**ABSTRACT**

Rhinoplasty is generally considered to be one of the most challenging, complex, and exciting plastic surgery procedures. The procedure is done for correcting and reconstructing the nose. Rhinoplasty is one of the most challenging aspects of facial surgery as it requires a precise assessment of the deformity, a strong grasp on the underlying anatomic structures. The article discuss key concepts related to rhinoplasty types, its procedures and to evaluate and analyze the techniques and maneuvers that reliably lead to favorable long-term results.

**KEYWORDS:** Rhinoplasty, Primary Rhinoplasty, Secondary Rhinoplasty, Grafting.

**INTRODUCTION**

Face represents complete personality of a man or woman and nose is situated on the middle of face. The nose has a big impact on our perception of beauty. “The nose is the most prominent and protruding part of the human face, so it’s immediately noticed,” and cannot escape from the eyes of others. Nose gives beauty to face. Therefore cosmetically it is very important part of a person especially for woman as they are more aesthetically concerned.[1]

There are many situations when due to disease or trauma nasal defect arises, which requires nasal correction or reconstruction of nose. Treatments for the plastic repair of a broken nose are first mentioned in the Edwin Smith Papyrus, a transcription of an Ancient Egyptian medical text, the oldest known surgical treatise, dated to the Old Kingdom from 3000 to 2500 BC. Surgeons have tried to give their patients a more attractive face by altering the one physical anatomic structure that one usually notices first i.e. the nose by performing “Rhinoplasty”.[2]

Rhinoplasty can be classified as primary and secondary rhinoplasty. It can also be described as reduction, augmentative or corrective rhinoplasty.[3] Rhinoplasty in treatment of traumatic nasal deformity remains one of the most challenging problems with not only the skeletal structure deformed but also the disfigurement of soft tissue. When rhinoplasty is used to repair nasal fractures, the goal is to restore pre-injury appearance of nose.[4]

In rhinoplasty we can use different approaches closed and open approach. Closed approach rhinoplasty was traditionally developed as a cosmetic procedure to alter the shape of the nose via a closed (endonasal) surgical access. The transcolumnellar incision with bilateral marginal extensions, also described as the open rhinoplasty technique, has become progressively popular since the 1980s. In the past 3 decades many surgeons have embraced the open rhinoplasty approach via a transcolumnellar incision. Both techniques can provide excellent results. Some authors also used midcolumnellar excision in conjunction with cartilaginous implant for cases of bifid or bulbous nasal tip.[5]

Supratip deformity, an iatrogenic convexity located immediately cephalad to the nasal tip, still represents one of the most common postoperative deformities requiring secondary rhinoplasty. It can be avoided by proper resection of caudal dorsum, avoidance of dead space, restoration of adequate projection of nasal tip, and an approximation of the supratip subcutaneous tissue to underlying cartilage using supratip sutures, hence eliminating dead space. Supratip over projection is noted early after surgery (within 3 Months postoperatively) and supratip fullness is judged, for swelling and scar tissue in
early stage. If no favorable response is observed within 4 weeks, .1 -.2 c.c. Triamcinolone acetonide 40 mg / cc of .24 to .4 c.c. is injected as deep in supratip area, care should be taken not to inject in dermis.\[6\]

The present article reviews the approaches, procedures, and grafts of rhinoplasty, their advantage, disadvantage and associated complication.

Fig. 1: Open approach: incisions.

Fig. 2: Endonasal Incision.
Fig. 3: Caudal septal extension graft. This graft extends directly from the caudal septum to control the projection, rotation, and strength of the nasal tip. (A) Lateral view, showing columellar strut (green) secured to nasal septum (red). (B) Placement of graft. (C) Graft in anatomic position.

Fig. 4: Caudal septal replacement graft. This graft is useful when the caudal septum is weak, deformed, or absent. (A) Lateral view. (B) Frontal view. (C) Graft in anatomic position.
Fig. 5: Autogenous grafting materials- Conchal cartilage.

Fig. 6: Autogenous grafting materials- Costochondral graft.

FIG. 7: (A) AlloDerm placed over the methylene blue markings. (B) Preoperative markings transposed onto an AlloDerm sheet. (C) The graft is folded on itself to create double layer. (D) Intraoperative view of double-layered dorsal graft with single layer left mid-vault component.
FIG. 8: (A) In the closed approach, the graft is cut to size. (B) A Keith needle is inserted through the skin into the hollow cylinder of a metal suction tip. (C) The edge of the proximal portion of the AlloDerm graft is pierced with the Keith needle.

DISCUSSION
Rhinoplasty can be classified as
1) Primary rhinoplasty.
2) Secondary rhinoplasty.

It can also be described as reduction, augmentative or corrective rhinoplasty. The initial approach to rhinoplasty begins with complete nasal and facial analysis to fully characterize aesthetic and structural problems. Only then can a surgical plan be created. The face can be divided into equal vertical fifths. There is a single region between the medial canthi and paired regions between lateral aspect of the pinna and lateral canthus as well as paired regions between the lateral and medial canthi. The width of the nasal base should approximate the intercanthal distance and is approximately one fifth of the facial width.\(^3\)

The vertical height of the face can be divided into horizontal thirds spanning the trichion to glabella, glabella to subnasale, and subnasale to menton. Thus, nasal length is ideally one third of facial height. Although these proportions are equal in the aesthetic ideal, the upper third of the face tends to elongate with age because of elevation of the hairline while the lower third contracts.\(^7\)

There are studies that have divided the nose into different aesthetic subunits. These are the tip, dorsum, sidewalls, alar nasae, and soft triangles. The three variables looked at were epidermal thickness, dermal thickness, and density of pilosebaceous subunits. The best-matched skin for reconstructing a given nasal defect is likely to come from an adjacent nasal subunit. In case of distant donor site, helical root, helical rim and preauricular area are closest to nasal skin in terms of dermal thickness. The lateral forehead, preauricular area and the helical roots are best matched to nasal skin in terms of density of pilosebaceous units. The skin of a nasal subunit is more histologically similar to the skin of adjacent nasal subunit than any non-nasal skin.\(^8\)

Multiple composite free grafts from helix and earlobe in columella and nasal tip reconstruction were used. Composite free graft, which contain tissue of more than one germ layer, offers infinite variety of application for reconstruction of congenital and acquired deformity of nasal tip. These are easily obtainable, also matches appropriately with respect to color and texture. However, use of these grafts is limited by size and may require two stages for repair of donor site. These can take up darker pigmentation and also require careful handling.\(^9\)

Autogenous septal or auricular cartilage grafts can also be used to spread collapsed lateral crura and, buttress them from beneath in order to correct the pinched nasal tip in cases where nasal tip deformity was secondary to collapsed alar rim subsequent to loss of lateral crural support. These grafts offer versatility and durability of results in correcting the pinched nasal tip and aesthetically, they improve the contour of the alar rim. The problem encountered was maintaining this technique and to able to predict the width of the graft needed for correction of both functional and aesthetic deformity.\(^10\)
The nasal asymmetry can be managed either by direct surgical intervention of asymmetrical parts of nose or by camouflage.\textsuperscript{[11]} Dorsum defects of the nose not only creates an undesirable aesthetic appearance but, may lead to functional problems that seek surgical care. Augmentation rhinoplasty techniques are used to repair dorsum defects.\textsuperscript{[12]}

Rhinoplasty aims to achieve nasal balance and establish harmony with the face while preserving a functional nasal airway.\textsuperscript{[13]} The septum is the most important anatomical structure in nasal tip support. The septum supports the nasal tip and maintains nasal tip projection in response and smiling\textsuperscript{[14]}, also septal extension graft may serve as a valuable option in septal cartilage-depleted patients. It gives a strong construct for tip surgery with patient satisfaction.\textsuperscript{[15]}

In external rhinoplasty technique transcolumnellar incision provided unparallel anatomical exposure. The advantages outweigh the potential disadvantage, which include transcolumnellar scar, wound separation, and delayed healing and nasal tip edema along with increased operative time.\textsuperscript{[16]} Also midcolumnella excision are used for a better nasal contour. Middolumnellar excision in conjunction with cartilaginous implant for cases of bifid or bulbous nasal tip shows excellent results.\textsuperscript{[17]}

There are 4 stages that describe nasal tip shaping and positioning.
Stage 1 detailed soft tissue elevation and cephalic trim.
Stage 2 was medial crura unification and dome projection.
Stage 3 described lateral crura and dome shaping with suture techniques.
Stage 4 was tip positioning for symmetric projection and rotation.

The key techniques, including tip control and projection, were achieved through the use of reversible suture methods. All 4 stages culminated in the achievement of the ultimate goal, the “unified, systemic tip complex.” External shaving in treatment of thick sebaceous nasal tip refractory to standard reduction technique, have revealed a very high success rate, with one significant complication, a hypertrophic scar, and two minor complications – hypopigmentation.\textsuperscript{[18]}

Anatomic reconstruction should be a preferred approach while camouflage should be reserved for small defects as described in few studies.\textsuperscript{[19]}

Cleft lip patient is associated with facial skeletal deformities, nasal surgery is the end result of an overall treatment programme for cleft lip. One of the most important aspects of the cleft lip rhinoplasty is the creation of a symmetric and ideally positioned maxilla, without which the outcome of rhinoplasty will not be optimal. Residual deformities exist in sagittal, horizontal and vertical planes that require correction. Endonasal or an open technique is most desirable approach. Majority of the nasal deformities are corrected by an open technique. For correction of dorsal asymmetry lateral osteotomies should be done. Columella strut for the tip projection, shield graft/tip graft for tip definition and dorsal graft for dorsal height are used to correct the asymmetries. Nasal obstruction is one of the most common complaints in the patient with cleft nasal deformity, and has been attributed to the altered nasal anatomy as well as physiology and to the reduced size of the nasal airway caused by the significant external nasal deformity, septal deviation, and deficit in maxillary growth.\textsuperscript{[20]}

Different flaps are used in reconstruction of nose. Free radial forearm flap\textsuperscript{[21]} and rib cartilage graft for reconstruction of inner nasal lining and nasal pyramid respectively. The disadvantages of the radial forearm flap are limited to the use of skin graft to cover the donor site, and the long scar running up the forearm. Radial forearm flap can be of great value in total nasal reconstruction where local tissue is not available or applicable.\textsuperscript{[22]}

Primary Rhinoplasty: Primary rhinoplasty is an exciting and challenging surgical procedure. To obtain excellent outcomes in rhinoplasty, a detailed knowledge of nasal anatomy, analyzing facial and nasal region, and broad understanding of the long-term effects of surgical maneuvers on the ultimate nasal aesthetics and function is necessary.\textsuperscript{[23]} Primary cosmetic rhinoplasty refers to the surgical manipulation of the previously unoperated nose for esthetic enhancement. Reconstructive rhinoplasty is the esthetic and/or functional enhancement of nose that is altered by trauma, pathology, or tumor surgery. In the last 40 years many of the fundamental principles of cosmetic rhinoplasty have evolved. Initially rhinoplasty was primarily performed as a reductive procedure, focused on removal of the dorsum and cartilage excision. More recently, cartilage grafting and advanced suturing techniques have caused a paradigm shift toward tissue preservation and anatomic form. The concept of rhinoplasty refers to alterations of nasal anatomy by reduction, augmentation, or alteration to achieve the anatomic harmony between the radix, dorsum, tip, and alar base.\textsuperscript{[2]}

Secondary Rhinoplasty
Secondary rhinoplasty surgery is safe and effective in both open and close approaches and can be performed with little risk of skin necrosis, scar formation, infection, hematoma formation or septal perforation. Factors in consideration involves location of transcollumellar incision, plane of dissection, manipulation of the supratip, ineffective use of exposure and use of tip grafts. Problems associated with primary open rhinoplasty that can cause problem in secondary procedure are depressed visible scar, destruction of soft tissue, columnellar deformities, scar formation, infection, hematoma formation or septal perforation.\textsuperscript{[24]}
Open Rhinoplasty
This approach provides excellent exposure of the lobule and demonstrates the anatomy in the clearest fashion. The transcolumellar incision with bilateral marginal extensions, also described as the open rhinoplasty technique, has become progressively popular since the 1980.\(^5\) (Fig. 1) The realization of the flap viability and ability to modify and graft cartilage that has been stripped from its supporting perichondrium has contributed to the success of this approach. This flap allows the placement of complex grafts (shield, columella, tip, supra tip, ala, spreader, and so forth) under direct vision. This incision is useful in patients who have small nostrils, need extensive reconstruction, or have difficult septums.\(^5\) Burm and Oh\(^5\) introduced a more direct technique for nasal bone reduction using an endonasal incisional approach, known as indirect open reduction for proper reduction of nasal bone.

Advantage
The greater visibility of the open rhinoplasty also facilitates soft-tissue modification of the nasal tip. In patients with a bulbous nasal tip secondary to an excessively fibro fatty subcutaneous plane, the flap allows direct access to the underlying tissue for careful removal. The open access also allows direct visualization of the nasal bones. While most reductive nasal modifications can be done via endonasal access, reconstruction and augmentation of the bony and cartilaginous dorsum using autologous (rib, iliac crest) or alloplastic material is greatly facilitated.\(^5\)

Disadvantages: Disadvantages of the open rhinoplasty technique include the slight increased operative time for flap elevation, the presence of the transcolumellar scar, and paresthesia of the nasal tip. The scar is usually well concealed under the nasal tip and is not visible on frontal view. The inverted-V transcolumellar incision allows proper alignment of the flap at closure, and also helps camouflage the scar. Surgeons should consider the possibility of keloid formation, especially in African American patients with a prior history.\(^1\)

Closed Rhinoplasty: Rhinoplasty was traditionally developed as a cosmetic procedure to alter the shape of the nose via a closed (endonasal) surgical access. (Fig. 2) In the past 3 decades many surgeons have embraced the open rhinoplasty approach via a transcolumellar incision. Both techniques can provide excellent results. However, major differences in surgical technique, training, and visibility are observed between the two approaches. In closed rhinoplasty, the access to the nasal structures is usually via a combination of partial or complete transfixion incisions along with an intercartilagenous (between the lower and upper lateral cartilages) or intracartilagenous (cartilage splitting) incisions.\(^2\) Simultaneous septoplasty or turbinate reduction can be done via separate incisions. The most difficult challenge of the closed rhinoplasty approach is to achieve a predictable and desired alteration of both bony and cartilage structures via minimal direct visualization of altered structures in their anatomic passive relationships. Unlike bony alterations, cartilage has memory, and maintaining the cartilage in the desired position is difficult, but can be achieved using a variety of cartilage modifications (scoring, transection, repositioning, trimming, sutures, and grafting). Grafting of the nasal tip structures can be challenging via the closed approach and requires complex understanding of the tip. Graft movement and stability are among the few problems that the surgeon may encounter.\(^5\)

Advantage
An advantage of the closed rhinoplasty technique is the speed, lesser dissection, and absence of skin incision. It has been suggested that when compared with closed approach, the open technique will result in some degree of long-term nasal tip collapse, due to the soft-tissue retraction, scarring, and weakening of the footplates of the lower lateral cartilages. However, as in many areas of cosmetic surgery, this concept has not been validated by long-term prospective cohort or randomized studies. The endonasal or closed rhinoplasty technique is an effective but highly specialized method, especially with respect to complex nasal tip plasty and augmentation.\(^5\)

Grafting in Cosmetic Rhinoplasty: In primary rhinoplasty, there is weakening of the underlying framework, especially with reductive techniques. This has resulted in more structural grafting during primary and revision procedures and an increasing popularity of the open technique, which offers the advantage of easier visualization and placement of grafts. An absolute understanding of graft types and techniques is required to tailor the surgical technique to the unique needs of the patient.\(^2\)

Graft Materials: Various grafts and implants are available for use in primary and revision rhinoplasty. Although no ideal grafting material exists, with appropriate graft selection and sound surgical technique, dependable outcomes can be achieved. Grafts can be broadly categorized into autogenous, homologous, and alloplastic types. Injectable agents such as hyaluronic acid fillers are occasionally used for refinements.\(^2\)

Autograft: Autogenous grafts are harvested from the patient and include cartilage, bone, and various soft tissues, such as perichondrium and temporalis fascia. Autogenous cartilage is the structural grafting material of choice because of its ease of carving and reliable long-term outcome, with low rates of infection, resorption, and extrusion.\(^29,30\) Autogenous grafts also avoid the potential risk for an immune response or viral contamination. Cartilage grafts are useful for providing structural scaffolding and creating contour. When crushed, cartilage remains viable and supports the growth of surrounding cartilage.\(^31\) The most commonly used autograft in rhinoplasty is septal cartilage. It is versatile, convenient, and requires little extra effort to
obtain grafts with sufficient quantity and quality to suffice in most primary rhinoplasty cases. It can be used for spreader grafts, tip grafts, alar grafting, rim grafts, columellar struts, and small-volume dorsal onlay grafts. (Fig. 3,4) Crushed septal cartilage is commonly used to provide volume and soften transition zones, usually at the tip or rhinion. Septal cartilage can be harvested from an endonasal approach or an open approach via either an anterior-superior, dome division technique or from an anterior-inferior approach posterior to the columella as a hemi-transfixion incision or Killian incision.\[28\]

In revision cases, it is common to find inadequate septal cartilage for any necessary grafting. Auricular or conchal bowl cartilage is usually the next most convenient donor site. The primary disadvantage of this donor site is the addition of a second surgical site and potential for complications. Also, conchal bowl cartilage is curved and has elastic memory that makes it less desirable than septal cartilage. This memory usually requires sutured stacking of the graft to counter the contour problems associated with its inherent architecture. Stacking also adds strength and volume to the graft. Most commonly, the conchal bowl is approached from a posterior approach after the ear has been prepped and draped into the surgical field. It can be wise to use the ear opposite of the patient’s preferred sleep side, as some postsurgical discomfort is expected. The entirety of the conchal bowl can be harvested, preserving the antihelical fold and the cartilaginous strut from the helical crus. This will preserve auricular architecture postoperatively.\[5\] (Fig. 5).

Costochondral grafts are an excellent source of abundant structural graft for large and severe deficits. They have long been used for reconstruction in various parts of the body, including the ear, temporomandibular joint, and the nose. They are especially useful in patients requiring revision rhinoplasty or patients who have had septrhynoplasty. This allows the surgeon to harvest usually more than enough cartilage for even the most deficient and difficult nose. Commonly the fifth or sixth rib is chosen as harvest site, as it allows the incision to be hidden in the inframammary crease.\[3\] (Fig. 6).

**Allograft:** Allografts are grafts derived from human cadavers. Bone allografts are common to orthopedics, spinal surgery, and oral surgery. In cosmetic rhinoplasty, the most common allograftic graft is acellular dermal matrix. This is sterilized dermis taken from prescreened cadaveric donors that comes in a variety of thicknesses and sizes. Given the significant early resorption, these materials are best used for graft camouflage under a thin soft tissue envelope, particularly in the rhinion area.\[32,33,34,35\] (Fig. 7,8)

**CONCLUSION**

The nose is the most prominent and protruding part of the human face, so it’s immediately noticed. Therefore cosmetically it is very important part of a person especially for woman as they are more aesthetically concerned. The results in rhinoplasty can depend on the doctor’s surgical skill and variations in the patient’s skin thickness. No standard rhinoplasty operation exists, because the underlying anatomy of each patient is unique. Therefore, surgeons must develop not only the ability to analyze the anatomic relationships of the nasal structures but also techniques to adequately alter these structures for each patient’s anatomy. The final result of surgery is a combination of the surgical manipulation of the tissues and the healing responses of multiple different tissue types. Complications in rhinoplasty can be divided into those that occur early and those that tend to occur or become apparent late in the postoperative period. Many factors may influence the final outcome rhinoplasty. Generally Many of these complications in rhinoplasty can be avoided through meticulous attention to detail during the operative procedure, and is perhaps most important at the end of the operative procedure. Reoperation should be performed to correct deformities that were not diagnosed or addressed in previous surgeries. The most common reason for reoperation of the nose is simply a failure to plan. No one plans to fail, they just fail to plan.

**REFERENCES**