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RHINOPLASTY SCOPING REVIEW

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ABSTRACT

Introduction: *in 2022, rhinoplasty was the third most common facial surgical procedure in the US, with 45,000 interventions. Since its inception in 1887, it has evolved to address aesthetic, respiratory and reconstructive needs, with pioneering keys to the development of current techniques. Nose surgery is complex, involving aesthetic, functional and psychological factors, as well as changes over time, making it difficult to predict outcomes.*
Objective: *to detail current information related to the anatomy and physiology of the nose, rhinoplasty, indications, contraindications, preoperative and surgical treatment.*
Methodology: *a total of 42 articles were analyzed in this review, including review and original articles, as well as clinical cases, of which 28 bibliographies were used because the other articles were not relevant for this study. The sources of information were PubMed, Google Scholar and Cochrane; the terms used to search for information in Spanish, Portuguese and English were: rhinoplasty, nose anatomy, rhinoseptoplasty, nose surgery, reconstructive surgery.*
Results: *include aesthetic and functional improvement of the nose, allowing patients to obtain a more balanced facial appearance and improved breathing. Correction of deformities such as dorsal hump, nasal tip modification and restoration of the internal nasal valve anatomy are key to obtaining a natural and harmonious nasal shape. In addition, the precise surgical approach at the alar base and nasal septum contributes significantly to the improvement of breathing, minimizing nasal obstructions.*
Conclusions: *Rhinoplasty is a complex surgical procedure that requires a meticulous and personalized approach for each patient, depending on their needs and anatomical characteristics. The combination of techniques, such as septoplasty, dorsal hump modification and nasal tip management, demonstrates the diversity of approaches that exist to address different aesthetic and functional problems of the nose. Incisions, both open and endonasal, must be made with precision to ensure proper exposure and adequate healing. In addition, proper management of the internal nasal valve and alar base is crucial to ensure both aesthetic and functional improvement in breathing.*

KEYWORDS: *Rhinoplasty, Nose, Surgery, Reconstructive.*

INTRODUCTION

In 2022, rhinoplasty was the third most common facial surgical procedure in the United States, with nearly 45,000 interventions. Since its first description by John Roe in 1887, rhinoplasty has evolved both technically and philosophically, with applications including aesthetic, respiratory, gender-affirming enhancements, and oncologic or traumatic reconstruction. Initially, rhinoplasty focused on cosmetic and reduction goals, but over time more proportional approaches were adopted that integrated cartilage grafting and suture refinements. Pioneers such as Jacques Joseph, Maurice Cottle, Samuel Fomon and Jack Sheen played key roles in the development of current techniques, many of which are still in use today. Cottle, in particular, emphasized the importance of the nasal septum in shaping the nose, while Sheen promoted the inclusion of rhinoplasty in non-Caucasian settings and the grafting technique(1-4).

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As rhinoplasty has evolved, so has the understanding of the interplay between aesthetics, breathing, smell and psychology, all connected in the nose. A negative result in these areas can affect the patient's perception, while a good result offers multiple benefits. The nose, being central to the face, directly influences the perception of facial beauty, which increases complexity by modifying it. Anatomical variations, trauma and personal preferences make obtaining consistent results a challenge, even for experienced surgeons. In addition, the nose changes over time, making predicting its long-term appearance an art. Evaluating the results of surgery is complex, involving both subjective and objective patient and surgeon criteria, including analysis of photographs(5,6).

METHODOLOGY

A total of 42 articles were analyzed in this review, including review and original articles, as well as cases and clinical trials, of which 28 bibliographies were used because the information collected was not important enough to be included in this study. The sources of information were Cochrane, PubMed and Google Scholar; the terms used to search for information in Spanish, Portuguese and English were: rhinoplasty, nose anatomy, rhinoseptoplasty, nose surgery, reconstructive surgery.

The choice of bibliography exposes elements related to anatomy and physiology of the nose, rhinoplasty, indications, contraindications, preoperative and surgical treatment.

DEVELOPMENT

ANATOMY AND PHYSIOLOGY

The external nose is formed by a bony and cartilaginous structure surrounded by muscles, soft tissue and skin. Its bony structure is composed of the nasal bones and the frontal processes of the maxillae, forming the “bony vault” in the upper third of the nose. The nasal bones meet the perpendicular plate of the ethmoid bone, forming the bony septum. The middle third, or “middle vault,” is composed of the upper lateral cartilages, which connect with the nasal bones.

The upper lateral cartilages overlap the nasal bones at the corner, a crucial point for nasal aesthetics. This area, where the upper lateral cartilages meet the cartilaginous septum, forms an angle of 10 to 15 degrees, called the internal nasal valve, which influences airflow. The shape of the nasal tip depends on the lower lateral (alar) cartilages, which consist of a lateral and a medial pillar supporting the columella and the lateral part of the tip, respectively. The nasal wings do not contain cartilage, but fibroadipose tissue, as the lower lateral cartilages pass over the alar sulci(7,8).

The musculature of the nose includes several key mimic muscles, such as the nasalis, the nasal dilator, the levator labii and ala of the nose, and the nasal septal depressor. These muscles are surrounded and interconnected by a fibrous fascia that is part of the superficial musculoaponeurotic system of the face. Although their clinical importance is often underestimated, these muscles are critical in maintaining patency of the external nasal valve. This is demonstrated in cases such as Bell's palsy, where patients may experience unilateral nasal airway obstruction. Because of this, some surgeons prefer to perform nasal reconstruction in a subdermal plane rather than a deeper submuscular plane to avoid dysfunction.

As for the septum and the skin and soft tissue envelope, the thickness and texture of the SSTE of the nose vary according to gender, age, ethnicity, and history of surgery or trauma. The tissue over the rhinion is the thinnest, followed by the upper third and the lower third, which is the thickest and most sebaceous. The texture of the latter is similar to that of the forehead and glabella, which is important when considering nasal reconstruction.

The internal nose is composed of the nasal septum, nasal turbinates, olfactory cleft, lateral nasal wall and nasal floor, all covered by mucosa. Among these, the nasal septum and inferior nasal turbinates are the most important structures from an aesthetic and functional perspective(4,9).

The nasal septum is a central structure in the nasal cavity, formed by cartilage in its anterior part and bone in the posterior part, which separates the left and right nasal passages. It is crucial for the support of the external nose, the projection of the columella and the shape of the nasal tip. Its preservation during surgeries, such as septoplasty, is essential to avoid deformities, especially in the “keystone” area, which connects the cartilage and bones. In addition, the septum is part of the internal nasal valve, the proper functioning of which is key to breathing(10).

The nasal turbinates are mucosa-covered bony structures that play a vital role in airflow, helping to warm, humidify and filter inspired air. They are formed by three turbinates in each nasal passage: upper, middle and lower, and their inflammation, due to conditions such as rhinitis or septal separation, can obstruct airflow. The blood supply to the nose is abundant, with arteries joining at Kiesselbach's plexus, a common area of nosebleeds. The innervation of the nose is complex, with nerves controlling both motor and sensory function, including olfactory perception through the filaments(11).

INDICATIONS

Rhinoplasty is performed for functional or aesthetic reasons or a combination of both, and it is essential to achieve a balance between the two to ensure patient satisfaction. Without proper counseling and a well-balanced surgical plan, patients may not be happy with the results. It is important for the surgeon to assess both the physical and psychological aspects of the patients, establishing clear communication about expectations and ensuring that they are realistic.

Computer simulation is used to illustrate the possible outcomes of surgery, but it may generate unrealistic expectations in some patients. In addition, candidate selection for primary and revision rhinoplasty can be complicated. In the case of revision rhinoplasty, patients often have higher expectations due to previous experience.

The open approach reveals the entire nasal cartilaginous skeleton and also provides excellent access to the bony cavity.

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This procedure can be used for both primary and revision rhinoplasties. However, opening the nose a second or third time is much more complicated due to scar tissue formation and anterior cartilage manipulation. Tip modification surgery is more easily performed using the open approach because of the better exposure, making it the preferred technique in many academic institutions. The tip is also shown when opting for a delivery approach, although it requires separating the tip at the left and right domes, which causes distortion as they move into their respective nostrils. Many experienced surgeons employ the tip delivery approach, but it requires considerable skill and is difficult to perfect.

The endonasal approach allows modification of the upper third of the nose, especially for osteotomies and dorsal hump reduction. Spacer injectors can also be placed endonasally, although many surgeons prefer the open approach to ensure accurate placement. Some maneuvers within the lower third are possible through the endonasal, such as placement of alar ribbon grafts, rim grafts and cephalic trimming. However, finer interdomal and transdomal sutures, or nuanced grafts, are usually performed with the open approach. For some patients, the primary reason for choosing a surgical approach is faster recovery. The endonasal and tip-placement approaches generate less intensity and duration of postoperative edema compared to the open approach, in addition to avoiding the creation of a columellar scar(12-14).

CONTRAINDICATIONS

Some contraindications that can be seen are the following: psychiatric disorders, obstructive sleep apnea, cocaine use, smoking, bleeding disorders, recent previous rhinoplasty, age 15 years for women and 17 years for men(4).

PREPARATION

Preoperative preparation for rhinoplasty includes a detailed evaluation of the patient, considering history of previous nasal surgery and any relevant experience with previous surgeons. It is important to identify psychiatric comorbidities, such as depression or body dysmorphic disorder, to establish appropriate planning. Other medical problems, such as sleep apnea, chronic sinusitis, hypertension, and bleeding problems, which may require additional treatment, should also be evaluated. Drug use, especially cocaine, may affect the choice of anesthetic agents. High-quality preoperative photographs should be taken in various views (frontal, lateral, three-quarter, basal and dorsal) to guide surgery and for medicolegal purposes. Counseling focuses on balancing aesthetic and functional expectations, especially in reduction rhinoplasty in women. Risks of surgery include aesthetic dissatisfaction, pain, bleeding, infection, scarring, nasal obstruction, loss of smell, septal perforation, among others(15).

Nasal analysis and examination.

The external nose is divided into several aesthetic subunits relevant to reconstruction and rhinoplasty. In terms of rhinoplasty, it is divided into three thirds: upper, middle, and lower. The upper third runs from the nasofrontal suture to the middle third; the middle third widens inferiorly, while the lower third is the widest. The root of the nose, or nasion, influences the perception of dorsal projection, and ethnic variations affect the shape of the nose (leptorrhine, platyrhine, mesorrhine). Nose symmetry, deviations, curvatures and sequelae of previous surgeries should be evaluated.

In the middle third, the symmetry of the internal and external nasal valves is evaluated, using maneuvers such as Cottle's, to improve airflow if necessary. The lower third is the most complex because of its relationship to aesthetics, respiratory function and ethnic variations. Nasal tip projection should be evaluated according to specific standards, but is also influenced by chin projection.

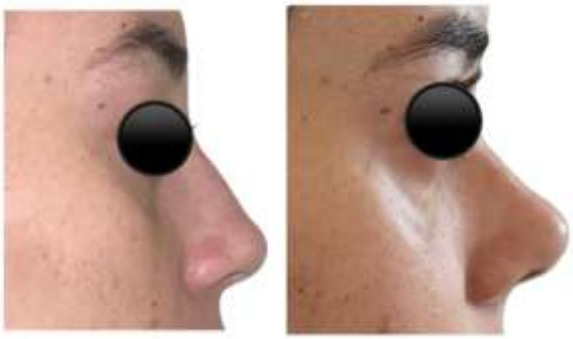
In addition, the base of the nose, columella, symmetry and shape of the lower lateral cartilages should be inspected. Anterior rhinoscopy and nasal endoscopy complement the physical evaluation, detecting septal deviations or perforations, and allowing the harvesting of cartilage for grafting if necessary. Finally, turbinates and swollen bodies are also examined. This comprehensive approach allows for accurate surgical planning, considering both aesthetic and functional aspects(16-18).

On the day of the surgical procedure.

In the operating room, general anesthesia is induced and orotracheal intubation is performed, with the tube clamped to avoid distorting the nose. Many surgeons prefer intravenous anesthesia with propofol and remifentanil, which reduces bleeding and improves postoperative recovery. Tranexamic acid and corticosteroids are administered to reduce bleeding and edema. The use of prophylactic antibiotics is under debate, but postoperative antibiotics are not necessary.

The patient is placed in the supine position, with the arms close to the body and the head slightly elevated to improve access and reduce bleeding. An orogastric tube is used to evacuate the stomach contents at the end of the surgery. Before the injection of local anesthesia, the patient's eyes are protected. Anesthesia is then injected into various areas of the nose, and decongestant swabs are placed in the nasal cavities, and the skin is prepared with solutions such as povidone iodine or isopropyl alcohol. The entire midface is exposed and, if necessary, the thorax or scalp is accessed to obtain grafts. Finally, preoperative photographs are posted in the operating room for reference(19-21).

Figure 1. Patient seen from lateral view before and after rhinoplasty.



Source: The Authors.

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TREATMENT

The rhinoplasty process can vary depending on the surgeon's approach. This workflow follows an "inside-out, top-down" approach. First, if necessary, turbinoplasty and reduction of the swollen body of the nasal septum is performed, as this helps control bleeding and avoids complications during surgery. If the septum is very deviated, turbinoplasty may be postponed until after septoplasty, although ideally not delayed. Some surgeons prefer to perform septoplasty before rhinoplasty to improve septal exposure. Modification of the septum and dorsal hump are performed simultaneously. Resection or shaving of the hump is done prior to septoplasty to ensure sufficient dorsal septal height remains. In dorsal sparing techniques, septoplasty is performed first, and then a dorsal lowering thrust is performed. In revision surgery, the order may change due to scar tissue.

Incisions and exposure

In the open rhinoplasty approach, a transcolumellar incision is made in the form of a staircase or "chevron" (inverted V) to hide the scar and direct the contraction forces. The base of the chevron should be at least 3 mm wide and at the level of the narrowest part of the columella, where the skin is thinner and will heal better. The incision is made with a thin blade, taking care not to damage the medial crura of the lower lateral cartilages. A columellar flap is then elevated to the domes of the lower lateral cartilages, and the soft tissues are isolated.

A marginal incision is made, extending laterally from the transcolumellar incision, using skin hooks and ensuring that the dome of the lower lateral cartilage is under tension. The process is then repeated on the opposite side in a symmetrical fashion. With the lower two-thirds of the nasal skeleton exposed, an elevator is used to dissect the periosteum of the nasal bones and the frontal processes of the jaws, completing the open approach.

In the endonasal approach to rhinoplasty, an intercartilaginous incision is made in the region of the volute, between the lower lateral cartilage and the upper lateral cartilage. A wide, double-ended skin hook is used to evert the nasal ala and facilitate the incision with a #15 blade. It is then blindly designed with scissors (such as Joseph or Giunta) along the surface of the upper lateral cartilages and nasal bones, keeping the perichondrium intact. An elevator is used to design the periosteum of the nasal bones and the frontal processes of the maxillae, completing the endonasal approach.

If a septoplasty is necessary, a hemitransfixion incision can be added, which can be attached to the intercartilaginous incision to improve exposure. For a cephalic trimming, intracartilaginous incisions are added to excise the cephalic margins from the inferior lateral cartilages and underlying vestibular skin. Because the incisions are located behind the tip of the nose, access to the domes and medial crura of the lower lateral cartilages is complicated. In these cases, if the open approach is not adequate, the tip is best accessed by a delivery approach, a modification.

The approach for tip insertion involves, after performing an endonasal procedure, visualizing the lower lateral cartilages through additional incisions in the nasal vestibules. A bilateral transfixion or hemitransfixion incision is made at the medial ends of the intercartilaginous incisions, followed by marginal incisions without transcolumellar incision, creating bipedicled chondrocutaneous flaps. After cutting the interdomal ligaments, the domes are retracted.

Septoplasty

This procedure seeks to relieve nasal obstruction, remove cartilage for grafting or correct nasal deviations. Septoplasty is usually performed at the beginning of rhinoplasty. To access the quadrangular cartilage, a hemitransphyseal incision may be made or the nose may be opened, which facilitates identification of the cartilage. Once exposed, a scalpel and fine scissors are used to cut down to the perichondrium, and then an elevator is used to separate the cartilage from the bony structures. Keeping the dissection in the proper plane reduces bleeding and improves the strength of the septal flap. If an open rhinoplasty is performed, disarticulation of the lateral cartilages improves visualization. After lifting the flaps, the deviated cartilage and bone are resected. It is crucial to leave 10 to 15 mm of cartilage intact to avoid postoperative deformity. If the cartilage is deviated, grafts can be used to correct it.

Dorsal Hump Reduction

Resection of a dorsal protrusion is performed with various instruments (rasp, osteotome, piezotome, scalpel, dorsal scissors), depending on the size and location of the protrusion. As protrusions usually have both cartilage and bone components, a combination of cartilage excision and bone scraping or osteotomy is required. The cartilage is cut with a scalpel, removing a wedge that reduces the dorsal protrusion. It is important not to resect too much cartilage at first, to avoid deformity, and to use the remaining cartilage as a graft. Resection may precede or follow disarticulation of the lateral cartilages. Small bony humps are scraped or cut with an osteotome, while larger ones require bony resection. Lateral osteotomies should be performed to avoid deformities such as open roof. Although a flat dorsum is the goal, a slight curvature should be preserved to avoid later deformities.

Dorsal preservation, popularized by Cottle, is a technique that allows reduction of the nasal hump without disarticulating the lateral cartilages of the quadrangular cartilage or causing an open roof deformity, keeping the upper and middle nasal vaults intact. There are two main approaches: push-down and let-down. Both involve removal of a strip of septal cartilage and bone under the dorsum to reduce its projection. This can be done through a hemitransfixion incision or open rhinoplasty, making sure not to disarticulate the upper lateral cartilage. Lateral and transverse osteotomies are then performed to mobilize the bony vault and allow the dorsum to move downward. In case of large humps, bilateral intermediate osteotomies are performed to allow further descent. These osteotomies must be done with precision, and many surgeons prefer the use of piezotomes, although their size may increase postoperative edema due to the increased elevation of the maxillary periosteum.

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Bone Vault Modification

Narrowing of the bony vault is performed to adjust the width of the upper third of the nose, using medial and lateral osteotomies. The lateral osteotomies adopt a high-low-high configuration to avoid a visible step and ensure stability of the external nasal valve. The superior extension of the lateral osteotomy reaches the nasofrontal suture, and the inferior extension forms a "Webster's triangle" that preserves the insertions of the alar ligaments.

A piezotome can be used instead of osteotomes to perform these osteotomies, and medial osteotomies are done through intercartilaginous or open rhinoplasty incisions. For medial osteotomies, Anderson-Neivert curved osteotomes are used, which allow for a continuous osteotomy between the lateral cartilage and the dorsal septum. The separation between the medial and lateral osteotomies allows a green stem fracture, which gives stability to the segment.

Lateral osteotomies can be performed percutaneously or through small incisions in the mucosa. The use of percutaneous osteotomes better stabilizes the bony segments, but they can be more difficult to move. In addition, percutaneous osteotomies may leave visible scars in some patients, especially those with darker skin. If rough contours occur, curettage can be performed, although it is more difficult to do so on mobile bony segments. If the bone is too mobile after osteotomies, iodine-impregnated gauze or K-wires can be used to hold the bone in place.

Bone vault straightening is used to correct deviations in the upper third of the nose. Bilateral lateral osteotomies and a transverse osteotomy are performed at the nasal root to mobilize the bony vault as a unit and allow for reorientation. The lateral osteotomies adopt a high-low configuration and connect with the root osteotomy at the nasofrontal suture to facilitate movement, without causing fracture of the green stem. The root osteotomy is performed percutaneously with a 2- to 3-mm straight osteotome through an incision in the nasion.

If the deviation is severe (more than 3 mm from the lateral corner to the midline), an intermediate osteotomy is performed on the side opposite the deviation. This osteotomy creates a thin wedge of bone that allows displacement of the vault toward the midline, similar to the dorsal descent preservation technique. To avoid unwanted fractures, Sayre or Boies elevators are used to gently move the vault. In cases where the vault still does not move after adjustments, a dorsal septotomy may be necessary to complete the mobilization, using scissors.

When the osseous vault is deviated and excessively wide, there are two

- Add medial osteotomies to lateral, radicular and intermediate osteotomies to narrow the vault.
- Perform unilateral medial and lateral osteotomies on the deviated side, moving the vault toward the midline. The first option is more complex and increases the risk of instability, while the second option can only be done if the nasal bones do not have a posterior hump.

If there is a dorsal hump and vault deviation, a dorsal preservation technique can be performed with unilateral osteotomies on the side opposite the deviation, which requires precision. Alternatively, the hump can be resected and the roof closed asymmetrically to correct the deviation. In cases of complexly contoured noses, osteotomies across previous fractures can restore shape(4,22).

Intermediate Vault Management

Patients with narrow internal nasal valves, whether due to congenital causes, trauma or previous rhinoplasty, may benefit from spacer grafts to open the internal valvular angle and correct deformities such as inverted V. These grafts are usually bilateral, although in unilateral cases only one is needed. These grafts are usually bilateral, although in unilateral cases only one is needed. It is important to note that spacer grafts can widen the medial vault, which should be considered if the patient wishes to maintain a narrow dorsum.

The vertical spacer injector, described by Sheen in 1984, is placed between the perichondrium and quadrangular cartilage, just below the junction of the upper lateral cartilages and the dorsal septum, eliminating the inverted V and improving airflow. The grafts are precisely placed, often with mattress sutures to maintain their position. In open rhinoplasty, grafts are placed with better visibility and may be made of septal cartilage. Placement can be in two ways: directly between the upper lateral cartilage and the septum, or below the junction to avoid widening. If there is not enough septal cartilage, auricular or costal cartilage can be used, although auricular cartilage is more fragile and costal cartilage can be deformed if not cut correctly. It is recommended to carve the costal cartilage and leave it in saline solution to verify its shape before using it. It is also possible to use cadaveric costal cartilage grafts, although there are debates about their resorption(23,24).

In cases where there is excess width of the upper lateral cartilage relative to the height of the septum, such as after dorsal resection, auto-spreader flaps can be used instead of vertical spacer grafts. For this, the mucoperichondrium is elevated laterally away from the upper lateral cartilage and gently scored to fold the medial margin of the cartilage inward.

The dorsal sparing technique also has a similar effect, as by reducing the hump, the upper lateral cartilages are displaced outward. For very narrow medial vaults, the "butterfly" injector, a curved or flat oval-shaped cartilage injector, is placed across the inferior medial vault, aggressively opening the internal valve by pulling the lateral cartilages outward. This injector is visible under the skin and should only be used when nasal breathing is the patient's main priority.

In cases of mild internal nasal valve collapse, "flaring" sutures may be an option. These horizontal sutures are placed across the upper lateral cartilages, from one side to the other, parallel to the nasal septum, opening the internal valves without overly widening the dorsum.

In cases of lateral deviation or contour asymmetry, such as C-shaped noses or unilateral medial vault narrowing, unilateral spacer injectors can be used on the concave side. If there is bilateral obstruction of the internal nasal valve, bilateral

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injectors are used, with the injector on the concave side being thicker. Spacer injectors can also correct dorsal septal deviation. For single-sided deviated noses, "clockwork" sutures are effective in straightening the medial vault, resuspending the lateral cartilages superior to the dorsal septum. It is best to use several looser sutures to avoid palpable indentations, and horizontal mattress sutures are placed across the septum.

To correct a mild saddle deformity, which has mainly cosmetic effects and minimal nasal obstruction, an overlying injector, such as crushed septal cartilage, can be used. This graft is placed under the SSTE in endonasal rhinoplasty or secured with sutures or fibrin glue in open rhinoplasty. If septal cartilage is not available, auricular or costal cartilage can be used, although these do not flatten as well, so they need to be chopped up. To avoid palpable or visible contours of the chopped cartilage, an injector may be placed.

In more severe deformities that affect the airway and cause collapse of the internal nasal valves, a more aggressive approach is required. One option is to perform extracorporeal septal reconstruction, using septal or costal cartilage to create an L-strut with one or two extended spacer injectors and a caudal strut injector. The upper lateral cartilages can be joined to reopen the internal valves. Alternatively, some surgeons prefer to reconstruct the dorsum with a rigid injector and suspend the medial vault from it, as in the case of the calvarial bone injector placed in a narrow pocket through an intercartilaginous incision. If the nasal bones are shaved to create a rough surface, the injector is fixed without hardware, although plate and screw fixation is also possible. Rib is another popular material because of its combination of bony and cartilaginous components, making it more similar to the natural nasal structure than a pure calvarial bone graft(4,25).

Lower Third Management

Surgical techniques to correct a "bulbous" nasal tip caused by excess curvature or width in the lower lateral cartilages. Cephalic trimming is a common maneuver, which involves removing strips of cartilage from the lateral crurae to reduce the prominence of the supraspinatus. A "cephalic inward turn" can also be performed, which folds the cartilages medially without removing tissue, helping to reduce the curvature and improve stability. In cases of narrow supraspinatus noses, trapezoidal grafts are used to lateralize the crura. In addition, excessive projection of the supraspinatus, caused by a high anterior septal angle, is addressed with quadrangular cartilage removal or scar treatment. It is essential to maintain adequate support after cartilage removal.

External nasal valve support focuses on dynamic collapse of the alar wings during inspiration, which indicates external valve insufficiency. This collapse is more evident when bilateral. In cases of unilateral collapse, the probable cause is a deviation of the nasal septum, which generates an asymmetric airflow and causes one-sided collapse, following Bernoulli's principle. In these cases, correcting the deviation usually solves the problem. However, when the collapse is bilateral, it is necessary to use alar ribbon grafts. These grafts, placed superficial to the inferior lateral cartilages, can be inserted through open approaches or marginal incisions. The key to their effectiveness is to identify the exact area of collapse and to place the injectors in a manner that provides adequate support.

Modification of the contour of the nasal wings offers several options depending on the desired correction. Inward cephalic twist flaps are effective in reducing asymmetry and irregularity in the lateral crura of the lower lateral cartilages, and also decrease suprasternal fullness. For patients without excessive supraspinatus fullness or who have already undergone cephalic trimming, lateral crura strut grafts represent an alternative. These grafts are placed on the deep surface of the lateral crura to straighten, reinforce or reposition the crura.

Relocation of the lateral crura can be accomplished by dissecting them and shifting them downward to correct deformities, such as excessive cephalic rotation, and then suturing them without grafts, although grafts provide greater stability. Reinforcement of the alar margin, to prevent retraction or reduce dynamic collapse, is accomplished with thin alar margin grafts or articulated margin grafts, which are larger and placed along the alar margins. Hinged edge grafts are especially useful for correcting cloverleaf deformities, which are characterized by prominent vertical folds.

In cases of severe alar retraction, especially after aggressive cephalic trimming, cartilage injectors may not be sufficient, so free chondrocutaneous injectors can be used. To adjust the alar base, techniques such as Weir and Sill excisions, which involve removing skin to correct the width of the nasal wings, are used. Sill excisions are used to reduce wide wing bases, while Weir excisions are applied to lateral wing flaring. In both cases, symmetry and careful closure of the incisions are sought. When the nostrils are very narrow, a less invasive procedure is sometimes sufficient.

Nasal tip modification is one of the most challenging aspects of rhinoplasty, especially in previously operated noses. There are various techniques ranging from destructive procedures to reversible methods using grafts and sutures. These techniques have multiple effects, such as increasing projection, tip refinement, or rotation and projection, depending on the patient's needs. Some of the most common methods of modifying projection are described below.

Rotation of the nasal tip is a fundamental aspect of cosmetic rhinoplasty, especially when seeking to modify the shape of the nose to achieve more desirable or feminine features. This rotation refers to the angle at which the nasal tip is positioned in relation to the upper lip, which has a major impact on the appearance of the nose. More rotation is associated with a more youthful and feminine appearance, and is considered attractive in most cases.

Nasal tip refinement is one of the most delicate stages of rhinoplasty, where small modifications in the anatomy can have a major impact on the final aesthetics of the nose(4,6,26).

Additional grafting is a key step in rhinoplasty when seeking to make finer aesthetic adjustments after the main structural phase

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of surgery. These grafts are intended to smooth visible contours, correct irregularities or improve the projection of certain areas of the nose to achieve a more harmonious and natural result.

After rhinoplasty, the incisions are closed with absorbable (endonasal) and non-absorbable (transcolumellar) sutures. If necessary, place a columellar narrowing suture to adjust the base of the nose. Silastic splints are used to support the septum and promote healing, and paper tape and plaster is applied to maintain the shape of the nose, which are removed in 7-14 days, depending on the stability of the nose. In addition, liposomal bupivacaine can be administered to block pain and reduce opioid use(27,28).

CONCLUSIONS

Rhinoplasty is a complex surgical procedure that requires a meticulous and personalized approach for each patient, depending on their needs and anatomical characteristics. The combination of techniques, such as septoplasty, dorsal hump modification and nasal tip management, demonstrates the diversity of approaches that exist to address different aesthetic and functional problems of the nose. Incisions, both open and endonasal, must be made with precision to ensure proper exposure and adequate healing. In addition, proper management of the internal nasal valve and alar base is crucial to ensure both aesthetic and functional improvement in breathing. The surgeon's skill and experience are essential to obtain satisfactory results, minimizing complications and improving quality of life.

BIBLIOGRAPHY

1. *Rogers BO. John Orlando Roe--not Jacques Joseph--the father of aesthetic rhinoplasty. Aesthetic Plast Surg. 1986;10(2):63–88.*
2. *Sheen JH. Spreader graft: a method of reconstructing the roof of the middle nasal vault following rhinoplasty. Plast Reconstr Surg. 1984 Feb;73(2):230–9.*
3. *Constantian MB. Jack H. Sheen, M.D., 1925 to 2021. Plast Reconstr Surg. 2022 Sep;150(3):721–3.*
4. *Fichman M, Piedra Buena IT. Rhinoplasty. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 [cited 2025 Feb 15]. Available from: http://www.ncbi.nlm.nih.gov/books/NBK558970/*
5. *Crosara PFTB, Nunes FB, Rodrigues DS, Figueiredo ARP, Becker HMG, Becker CG, et al. Rhinoplasty Complications and Reoperations: Systematic Review. Int Arch Otorhinolaryngol. 2017 Jan;21(1):97–101.*
6. *Carvalho B, Ballin AC, Becker RV, Berger CAS, Hurtado JGGM, Mocellin M. Rhinoplasty and facial asymmetry: Analysis of subjective and anthropometric factors in the Caucasian nose. Int Arch Otorhinolaryngol. 2012 Oct;16(04):445–51.*
7. *Cem Miman M, Deliktaş H, Özturan O, Toplu Y, Akarçay M. Internal Nasal Valve: Revisited with Objective Facts. Otolaryngol Neck Surg. 2006 Jan;134(1):41–7.*
8. *Janeke JB, Wright WK. Studies on the Support of the Nasal Tip. Arch Otolaryngol - Head Neck Surg. 1971 May 1;93(5):458–64.*
9. *Zito PM, Hohman MH, Mazzoni T. Paramedian Forehead Flaps. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 [cited 2025 Feb 15]. Available from: http://www.ncbi.nlm.nih.gov/books/NBK499932/*
10. *Miman MC, Deliktaş H, Ozturan O, Toplu Y, Akarçay M. Internal nasal valve: revisited with objective facts. Otolaryngol--Head Neck Surg Off J Am Acad Otolaryngol-Head Neck Surg. 2006 Jan;134(1):41–7.*
11. *Galarza-Paez L, Marston G, Downs BW. Anatomy, Head and Neck, Nose. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 [cited 2025 Feb 15]. Available from: http://www.ncbi.nlm.nih.gov/books/NBK532870/*
12. *Momeni A, Gruber RP. Primary Open Rhinoplasty. Aesthet Surg J. 2016 Oct;36(9):983–92.*
13. *Singh P, Pearlman S. Use of Computer Imaging in Rhinoplasty: A Survey of the Practices of Facial Plastic Surgeons. Aesthetic Plast Surg. 2017 Aug;41(4):898–904.*
14. *Dinis PB, Dinis M, Gomes A. Psychosocial consequences of nasal aesthetic and functional surgery: a controlled prospective study in an ENT setting. Rhinology. 1998 Mar;36(1):32–6.*
15. *Rettinger G. Risks and complications in rhinoplasty. GMS Curr Top Otorhinolaryngol Head Neck Surg. 2007;6:Doc08.*
16. *Cobo R. Non-Caucasian Rhinoplasty. Clin Plast Surg. 2022 Jan;49(1):149–60.*
17. *Hosokawa Y, Miyawaki T, Omura K, Akutsu T, Kimura R, Ikezono T, et al. Surgical Treatment for Empty Nose Syndrome Using Autologous Dermal Fat: Evaluation of Symptomatic Improvement. Ear Nose Throat J. 2022 Sep 29;014556132211308.*
18. *Boahene KDO. The African Rhinoplasty. Facial Plast Surg. 2020 Feb;36(01):046–52.*
19. *Ottoline ACX, Tomita S, Marques M da PC, Felix F, Ferraiolo PN, Laurindo RSS. Antibiotic prophylaxis in otolaryngologic surgery. Int Arch Otorhinolaryngol. 2013 Jan;17(1):85–91.*
20. *Jo JY, Jung KW, Kim HJ, Park SU, Park H, Ku S, et al. Effect of Total Intravenous Anesthesia vs Volatile Induction With Maintenance Anesthesia on Emergence Agitation After Nasal Surgery: A Randomized Clinical Trial. JAMA Otolaryngol-- Head Neck Surg. 2019 Feb 1;145(2):117–23.*
21. *Gutierrez RWH, Gobbo HR, Heringer LDFL. Tranexamic Acid in Patients Undergoing Rhinoplasty: An Updated Systematic Review and Meta-Analysis of Randomized Controlled Trials. Aesthetic Plast Surg. 2024 Jun;48(11):2076–85.*
22. *Wick EH, Whipple ME, Hohman MH, Moe KS. Computer-Aided Rhinoplasty Using a Novel "navigated" Nasal Osteotomy Technique: A Pilot Study. Ann Otol Rhinol Laryngol. 2021 Oct;130(10):1148–55.*
23. *Wee JH, Mun SJ, Na WS, Kim H, Park JH, Kim DK, et al. Autologous vs Irradiated Homologous Costal Cartilage as Graft Material in Rhinoplasty. JAMA Facial Plast Surg. 2017 May 1;19(3):183–8.*
24. *Kridel RWH, Ashoori F, Liu ES, Hart CG. Long-term use and follow-up of irradiated homologous costal cartilage grafts in the nose. Arch Facial Plast Surg. 2009;11(6):378–94.*
25. *Christophel JJ, Hilger PA. Osseocartilaginous Rib Graft Rhinoplasty: A Stable, Predictable Technique for Major Dorsal Reconstruction. Arch Facial Plast Surg [Internet]. 2011 Mar 1 [cited 2025 Feb 16];13(2). Available from: http://archfaci.jamanetwork.com/article.aspx?doi=10.1001/archfacial.2010.95*

26. *Goldman IB. The importance of the mesial crura in nasal-tip reconstruction. AMA Arch Otolaryngol. 1957 Feb;65(2):143–7.*
27. *Alameddine KO, Richards BA, Vyas K, Chaudhry A, Millesi E, Hamilton GS, et al. Evaluating the Efficacy of Liposomal Bupivacaine in Postoperative Pain Management for Rhinoplasty: A Retrospective Study. Aesthetic Plast Surg. 2024 May;48(9):1722–7.*
28. *Lee MR, Unger JG, Rohrich RJ. Management of the nasal dorsum in rhinoplasty: a systematic review of the literature regarding technique, outcomes, and complications. Plast Reconstr Surg. 2011 Nov;128(5):538e–50e.*

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