Grafting Versus Suture Techniques in Tip Rhinoplasty

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ABSTRACT

Nasal tip surgery is regarded as the most challenging aspect of plastic surgery. Nasal tip harmony improves its visual appeal. A graduated approach to tip projection is predicted on precise, incremental, non-destructive changes made to the tip complex, beginning with conservative cartilage excision proceeding to suture modification, and finishing with the use of tip grafts. No routine tip procedure is ever used. The aim of the work is to study and implement the different surgical treatment options for the management of the various nasal tip deformities. Twenty patients with various tip deformities were operated upon through an open approach accompanied by either sutures or various grafts or both. It has been a conclusion that management of nasal tip deformities with combined suture techniques and grafting provides the optimum cosmetic result.

Key Words: Rhinoplasty, nose, tip, suture, grafts, combined, open approach

INTRODUCTION

There is no greater challenge in rhinoplasty than the predictable construction of a nasal tip that is elegant and distinct and there is no other problem in rhinoplasty that involves so many variables.\(^1\)

The dorsal edge of the septum, the caudal septum, the nasal spine, the size, position and substance of the lower lateral cartilages, the position of the domes of the lower lateral cartilages, the character of the skin and the relationships and size of the nostrils all play a role in determining tip configuration. A thorough understanding of the influence of these various factors on the tip and a well-defined conception of the surface anatomy serve to guide the surgeon in the assessment and management of the nasal tip.\(^2\)

The increased use of cartilage excision techniques in aesthetic rhinoplasty often resulted in disruption of the nasal tip components, with inconsistent outcomes. Thus, sutures served to hold the disrupted tip components and then reposition them in place. In the 21st century, there was a rapid transition from disruptive cartilage altering techniques to procedures that made use of precision suture placement for reshaping of the nasal tip cartilages without serious disruption of the components. Surgical results are more predictable with increased reliance on sutures placed with precision and with an understanding of the dynamic that they induce when used singly or in combination. Currently, instead of excising and repositioning of the tip cartilages, the focus is on lateral crus preservation and tip cartilage modification through precise suture placement and tension control.\(^3\)

There are five basic suture techniques used in tip plasty that include: transdomal suture, interdomal suture, the lateral crus mattress suture, columella-septal suture, and intercrural sutures.\(^4\)

In the last few decades, numerous grafting techniques have been developed to sculpt the nasal framework in primary and secondary rhinoplasty. These techniques have originated from the basic principle that maintenance of the major supporting structures of the nose is fundamental for aesthetic and functional purposes. Failure to maintain or furnish needed support results in suboptimal results with deformities that are challenging to correct.\(^5\)

There are three general types of tip grafts: onlay tip grafts, infratip lobular graft, and columellar tip graft.\(^6\)

In this study, a trial was done to compare between results achieved through nasal tip suturing, grafting, or combined techniques.

PATIENTS & METHODS

Surgery was performed on 20 patients between 2007 and 2009. This included 18 females and 2 males.
The mean age of the female patients was 31 ±10 years. One male patient was 30 yrs old and the second was 42 years old.

Patients were grouped according to indication into 3 groups:

• Group I: Primary Rhinoplasty (15 Patients)
• Group II: Traumatic Deformity (3 Patients)
• Group III: Secondary Rhinoplasty (2 Patients)

All patients underwent extensive preoperative evaluation in the form of history taking, thorough physical examination, complete laboratory investigations, psychiatric evaluation, and photographic evaluation and documentation.

Patients were classified according to tip deformity and hence the planned tip work into 3 groups:

**Group 1: Tip sutures**

In this group we included 7 patients who mainly were proposed to do various types of Tip sutures. Tip sutures are indicated as part of the non destructive techniques for modification of the nasal tip projection. Sutures were mainly for cases clinically showed wide nasal tip, bifid nose, or asymmetrical tip.

**Group 2: Tip grafts**

In this group we included 7 patients who mainly were proposed to do various types of tip grafts. Tip grafts are indicated in:

1. A short infratip lobule segment that can not be corrected by borrowing from the medial crus
2. To increase and maintain tip projection
3. To shape the nasal domes and the columella
4. To add support to the dorsum
5. To add support to the lateral crura
6. Inability to achieve the desired look in the tip using non destructive techniques and the normal anatomy
7. To create visible angularity beneath extremely thick tip skin.

Grafts were mainly for cases with bulbous nasal tip, under-projection of the tip, or plunging tip.

**Group 3: Combined Sutures and Grafts**

In this group we included 6 patients who were planned to do both sutures and grafts to control tip dynamics. The combined technique was done for the previous indications in addition to a thick nasal tip skin.

**Surgical Approaches to the Patients**

All patients were operated upon under general anaesthesia with an inflated cuff endotracheal tube. Antibiotic prophylaxis was given. A throat pack was carefully placed in the posterior oropharynx to prevent inadvertent digestion of blood during surgery. A low mean arterial pressure was maintained during surgery to maintain a dry surgical field.

Approximately 10 mL of 1% lidocaine with 1:100,000 epinephrine is injected into the intranasal mucosa, along the septum, and into the soft-tissue envelope. After injection, a local vasoconstrictor solution is placed to shrink the nasal mucosa, facilitate exposure, and minimize blood loss.

All patients underwent various forms of open rhinoplasty

The classic steps in open rhinoplasty were done including the V incision, skeletonization, septoplasty, cephalic trimming, nasal tip work, and bony rhinoplasty

**Nasal tip**

Each of the elements responsible for tip support is analyzed individually after adequate exposure. The lateral crura are assessed for their degree of convexity/concavity, length/width dimensions, position, and symmetry. Analysis of the length and strength of the medial crura is critical for tip projection and definition. Medial crura that are long and stable are less likely to contribute to loss of tip projection postoperatively. Short and/or weak medial crura can lead to a loss of supratip definition as the differential between dorsal height and domal peak lessens.

Graft harvesting in 17 patients was needed intraoperative. It was done in 15 patients from the nasal septum while in 2 cases, the need for more graft material was obtained from the ear cartilage.

After meticulous hemostasis had been obtained, the skin envelope was redraped and closed. The transcolumnellar incision was closed in simple interrupted sutures.

The nasal dorsum was covered with quarter-inch paper tape carefully layered into position ensuring that the skin is not wrinkled and that the tip is completely covered. A plastic splint is applied to the dressing and a small gauze pad is
taped beneath the nostrils to collect mucus and blood.

**Post-operative follow up**

After the first postoperative visit, the patient was instructed to return to the clinic at 3rd and 8th weeks after the operation. Follow up is continued at 3, 6, 12 months and then annually.

**RESULTS**

This study included 20 patients coming for Rhinoplasty. They were 18 females and 2 males. Figure (1)

![Sex distribution of patients included in the study](image1)

**Figure (1): Sex distribution of patients included in the study**

The mean age of the female patients was 31 ±10 years. One male patient was 30 years old and the second was 42 years old.

Patients were grouped according to indication into 3 groups

- Group I: Primary Rhinoplasty (15 Patients)
- Group II: Traumatic Deformity (3 Patients)
- Group III: Secondary Rhinoplasty (2 Patients)

This is illustrated in Fig (2)

![Percentage of groups included in this study](image2)

**Fig (2): Percentage of groups included in this study**
Initial surgical management involved an open rhinoplasty for all patients included in the study. However, the plan proposed before surgery regarding nasal tip work was changed intraoperative according to surgeon judgment and satisfaction. Four of the twenty patients underwent various tip grafting techniques. Three others had various tip suturing. The remaining 13 combined both techniques suturing and grafting.

**Fig(3): Outline of the surgical management of the patients included in the study according to the tip work**

During the course of the study, we were confronted with a number of complications, both aesthetic and non-aesthetic. 

**Non-aesthetic complications** (fig. 4) included:

1. **Epistaxis**
   
   Mild postoperative bleeding occurred in 1 case and was controlled with 60 degree head elevation, gentle nostril pressure for 15 minutes, and application of topical decongestant nasal sprays such as phenylephrine.

2. **Rhinitis**
   
   Two patients presented with symptoms of dryness, crusting, and nasal obstruction. This was treated by nasal saline. It provided symptomatic relief.

3. **Contact Dermatitis**
   
   Mild contact dermatitis resulted from irritation of the skin by the topical adhesives tape occurred in 1 case. This was treated by removal of the offending agent and application of topical steroids. Fortunately, contact dermatitis resolved without any permanent sequelae.
Figure (4): Non-aesthetic complications following rhinoplasty in this study

Aesthetic complications included (fig.5)

- **Scarring:** Wide transcolumnellar scars were faced in 2 cases. Patients were instructed to wait for 6 months and avoid exposure to the sun and the use of certain creams and lotions.

- **Further surgeries:** The need for touch-ups (re-touches) arose in 2 cases. One case was due to slightly wide nostrils remaining which necessitated alar resection. The other case was due to migration of grafts due to insufficient or inaccurate fixation.

- **Unsatisfactory outcomes:** To determine the degree of satisfaction of the outcome of tip rhinoplasty surgeries performed in this study, we had to obtain opinions from both the patients and the plastic surgeons. Patient satisfaction was obtained by direct questionnaire to be either satisfied, fairly satisfied, and unsatisfied. Doctors’ satisfaction, on the other hand, was assessed by a panel formed of three plastic surgeons who were not included in this study. (fig.6), (table 1).

  - **Patients who underwent Tip Rhinoplasty with tip grafts:** 3 patients were satisfied, while 1 patient was fairly satisfied by the outcome of the procedures. Plastic surgeons were generally satisfied by all cases apart from their comment on the broad tips.
  - **Patients who underwent Tip Rhinoplasty with only tip sutures:** 2 patients were satisfied, whereas 1 patient was fairly satisfied. Concerning the doctors’ opinions, they were satisfied by 2 cases, fairly satisfied by 1 case due to the need of more tip definition
  - **Patients who underwent Tip Rhinoplasty with combined suture techniques and tip grafts:** 11 patients, as well as doctors, were satisfied with the outcome of the procedure. 1 patient were fairly satisfied, while 1 patient was unsatisfied.

Thus, out of 20 patients who underwent initial surgeries to address various tip deformities, a total of 16 patients were satisfied and 3 patients were fairly satisfied, and 1 patient was unsatisfied by the aesthetic outcomes of the procedures.
Fig (5): Aesthetic complications following Tip Rhinoplasty in 20 patients

Fig (6): Percentage of patient satisfaction in various tip techniques in this study

Table (1): Patient’s levels of satisfaction by various tip Rhinoplasty procedures

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Total no of patients</th>
<th>Satisfied patients</th>
<th>Fairly satisfied patients</th>
<th>Unsatisfied patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tip Grafts</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Tip Sutures</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Combined Grafts and sutures</td>
<td>13</td>
<td>11</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
Case (1): [a] preoperative view. Findings on nasal analysis included significant osseocartilaginous dorsal hump; wide bony nasal pyramid, midvault, and midface; poorly defined nasal tip with wide angle of divergence and domal arch; vertically oriented and wide lower lateral crura; and dependent tip with insufficient infralobular breakpoints and excess infratip lobule, giving the appearance of poor tip projection and hanging columella.

[b]: The postoperative view after 12 months
Case (2): [a] A 21-year-old girl presented with complaints of a dorsal hump and a wide, poorly defined nasal tip that was “too low”, hypoplastic receding chin. Findings on nasal analysis included a wide midvault and slight dorsal hump; a slightly dependent, moderately bulbous nasal tip; large nostrillo-small tip/lobule imbalance.

[b] Postoperative view after 6 months (note the chin improvement after lipofilling)

**DISCUSSION**

Fomon’s statement in the early part of the 20th century, *“He who masters the tip, masters rhinoplasty,”* remains valid today.\(^1\)

Attaining a well-defined and properly projecting nasal tip is a vital component for success in tip shaping and is based on a fundamental understanding of the anatomical components that provide nasal tip support and their influences on tip projection and shape. The length, width, strength, shape, and position of the lower lateral cartilages and the ligamentous attachments between these paired structures are critical in supporting the nasal tip. The upper lateral cartilages, nasal septum, nasal base, and pyriform aperture provide additional stability and
support to the nasal tip through their soft tissue attachments.\(^7\)

Preoperatively, an underprojecting nasal tip may be diagnosed as the primary nasal deformity or may accompany other nasofacial imbalances. Iatrogenic loss of tip support may result from purposeful or unintended violation of critical tip-supporting structures. Maneuvers such as cephalic trimming of lower lateral cartilages, caudal septal resection, dorsal reduction, transfixion incisions, and alar base resections impact tip support and can cause a substantial reduction in tip projection.\(^8\)

The universal goal of nasal tip surgery is to create a stable, symmetric, and aesthetically projected and rotated nasal tip that is triangular at base view and harmonious with the rest of the nose, improving its overall visual appeal.\(^9\)

Before the advent of suture techniques, the cartilages of the nose were largely controlled by excision, crushing, and scoring procedures. At the time these were the easiest methods for creating a new nasal shape. Unfortunately, they also had the potential to damage the cartilage, thereby frequently causing instability, collapse, and a host of secondary problems such as alar retraction, pinched tips, retracted alae, and external valve collapse. With the advent of cartilage grafts and conservative cartilage excision, the complications seen with the more traumatic methods were reduced. When suture techniques gained popularity, they increased the surgeon's ability to control the shape of the nasal architectural framework by a quantum leap.

Suture techniques, however, are not a substitute for cartilage grafts when there are major changes to be made in the nose.\(^5,10\)

A thorough preoperative evaluation for the nasal tip deformity was paramount in this study, where patients were grouped according to nasal tip deformity to three groups; the plan for the first group was just suturing, the plan for the second was grafting, while the proposed plan for the third was combining both suturing and grafting. These plans were changed a lot according to intra-operative findings and surgeon judgment for tip improvement.

In the last few decades, numerous grafting techniques have been developed to sculpt the nasal framework in primary and secondary rhinoplasty. These techniques have originated from the basic principle that maintenance of the major supporting structures of the nose is fundamental for aesthetic and functional purposes. Failure to maintain or furnish needed support results in suboptimal results with deformities that are challenging to correct.\(^5\)

Goldman (1961) advocated the use of cartilage button placed interdomially, but this method lost popularity because of the circumferential scarring and single point light reflex that is created. Autologous overlay tip graft was advocated by Von Mangoldt (1970) to increase tip projection.\(^11\)

Anderson (1971) popularized the use of cartilaginous columellar strut as a routine part of his open rhinoplasty technique. This basic maneuver is the most significant advance in rhinoplasty during the last 25 years and has formed the basis of open structure rhinoplasty technique\(^12\).

In the beginning, a vast variety of grafts were used for augmentation rhinoplasties and autologous cartilage (septum, pinna, and rib) seemed to be the preferred choice because of its low resorption and complication rates.\(^13\)

Some authors have preferred synthetic materials over autologous grafts because of their immediate availability, lack of donor-site morbidity, better adaptability, good immediate results, and low costs.\(^14\)

In our study, the use of cartilage tip grafts in different positions helped a lot for tip definition. However the tip remains a little bit boxy and wide which fairly satisfied the patient and was criticized by the panel of plastic surgeons.

For many years it was believed that permanent sutures would be necessary to achieve a permanent effect on cartilage contour. That has simply not been proven true. Polydioxanone (PDS) sutures work just as well as permanent sutures and have the benefit of not causing stitch reactions (by protruding through the skin) or microabsceses.\(^4\)
In our study the cases that underwent sutures only showed a very good tip definition, however the points of transmission were not smooth enough.

A method of combined suture techniques and tip grafts was proposed to make a good tip definition and smooth outline of the tip. The use of minced cartilage for smoothening of the nasal dorsum was also suggested. The patients who underwent this combined technique were all satisfied (83% satisfied and 17% fairly satisfied) and the results were not criticized by our plastic surgeons panel.

Conclusion
Patients’ level of satisfaction can be achieved by harmonizing the nasal columella with providing an appropriate nasal tip projection through various techniques depending on each patient’s own characteristics. Our success stemmed from our ability to understand the properties of fibroareolar tissues of the nasal tip, anatomic transformation of the shape of cartilage anatomic elements supporting the nasal tip, and changes in these during surgery.

Both the use of grafts and various tip sutures helped in the control of the tip dynamics. However, the aesthetic outcome following a combination of both techniques was more satisfactory than the outcome that can be achieved following one of them.

REFERENCES


