Modified Vertical Dome Division Versus Standard Tip Refinement Technique, a Comparative Retrospective Study

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ABSTRACT

Tip modification is a major goal in most rhinoplasty operations. Many techniques have been developed and modified for improvement of tip projection, definition, and support. Through the endonasal approach, a technique of new dome creation, scoring, suture fixation, columellar strut, and if needed tip graft, was previously used by the second author as a standard technique for tip modification. This helped to achieve a well-defined, supported, and projecting tip. The author has also developed a new technique, dependent on vertical dome division and I-beam of medial crura, and columellar strut, but without delivery of lateral crura. Thus, any problem along the alar rim (e.g. notching, or retraction) is avoided by keeping an intact rim. It has been noticed that the rate of secondary tip procedures after this technique, was markedly reduced. A retrospective study was conducted aiming to evaluate this modification as compared with the standard technique. A total of 600 cases were included, and divided into 2 groups. Each group included 300 randomly selected cases. The first group underwent primary aesthetic rhinoplasty, with the standard technique. The second group was operated upon, with the new technique. The incidence of the post operative problems related to the tip and alar side walls for each group were compared. The results showed that these problems were much lowered with the use of the new technique. Finally, the authors concluded that this technique is safe and useful for tip refinement.

INTRODUCTION

Tip modification is a major goal in most rhinoplasty operations. It could be considered the key for a successful rhinoplasty. The classic endonasal Joseph rhinoplasty [1] has ended with many unpleasant results, such as dropped tip, Polly beak, and hanging columella. This is because the anatomical factors maintaining the tip support were not considered. These were interfered with during incisions and excisions [2]. The first attempts to improve tip projection were made by Irving Goldman [3,4]. The Goldman’s tip was based on cutting the angle between medial and lateral crura, and suturing the medial crura together. Although Goldman’s technique was creative, in time, surgeons realized its problems e.g. pinching, notching, retraction, and asymmetry. The concept of Goldman’s tip has been modified over years by master rhinoplasty surgeons of the past 25 years, who developed the techniques of new dome creation, scoring, suture fixation, columellar strut, and tip grafts [5-14]. This approach preserved the lateral crus and established a strong tripod structure of conjoined lateral to medial crura supported by cartilage grafts. This helped to achieve the objectives of obtaining a clearly defined, well projecting tip that appears triangular and symmetrical in basal view. In a series of over 3000 cases, the second author used these techniques for tip modification, with delivery of alar cartilages through the endonasal approach, as a standard technique [2]. Using this technique, the author had achieved the objectives with minimal postoperative problems. The author has also developed a new technique, which is largely dependant on Goldman’s tip and I-beam of medial crura, but without delivery of the lateral crura. This is in order to keep an intact rim and avoid any problems (even minor problems) along the alar rim such as notching, retraction, collapse, asymmetry, and dimpling of the alar side wall. The author has been using this technique for the last 6 years, in more than 2500 cases. It is supposed to be safe and useful in achieving projection, definition, and rotation. In his experience with this large number of case, it has been noticed that the rate of tip secondary procedures following this technique was markedly reduced. However, these were just observations of the authors that were not subjected to any organized study. So, the aim of this study is evaluation of this modification, and its role in tip refinement in comparison with the standard tip refinement technique which was previously used by the same author.

PATIENTS AND METHODS

This retrospective study was conducted in a private rhinoplasty center in Jeddah, Saudi Arabia,
during the period from June to September, 2006. Most of the cases included in this study were operated upon by the second author. Random samples of data of the patients operated upon before 1999, using the standard tip refinement technique (new dome creation, scoring, suture fixation, columellar strut, and optional tip graft), were compared to similar samples of patients operated upon later using the vertical dome division technique without delivery of lateral crus (as modified by the second author) [2].

The study was done in 2 parts:

Part I: This included a total of 200 cases that underwent a revision or secondary procedures. The primary surgery in all cases was aesthetic rhinoplasty, including dorsal modification or osteotomy, lateral osteotomies, tip refinement, and may be alar reduction. Cases of dorsal augmentation, severe asymmetry or crooked noses, tip deformities, and cases of isolated tip surgery were excluded. No other criteria of patient selection were put. According to the technique of tip surgery in the primary operation, the cases were divided into 2 subgroups:

1- Subgroup A: The primary technique was the standard tip refinement (no.=100 cases).

2- Subgroup B: The primary technique was the new modification (no.=100 cases).

Surgical techniques:

The procedures were done in all cases under local anesthesia with sedation. The exposure was via the closed approach. Through an inter-cartilaginous incision, dorsal undermining and hump removal or dorsal osteotomy was traditionally done. Hemi-transfixion incision was also done for exposure of the septum and harvesting a cartilage graft. Lateral external osteotomies were done after tip surgery.

In subgroup (A): The standard tip refinement technique [2] with delivery of alar cartilage was done as follow:

- Marginal incision is done with delivery of the two alar cartilages as bipedicle chondro-cutaneous flaps.
- Cephalic trimming of the lower lateral cartilages, leaving at least 8mm width.
- New double dome creation: Tissue forceps is pushed under the bilateral flaps, elevating them to achieve symmetry and create a new more acute domal angle. This maneuver helps to achieve more tip projection, elevation, definition, and symmetry.
- The newly created dome is scored vertically with preservation of vestibular skin.
- Suture fixation is done. The sutures are passed through the intermediate and lateral crus 1mm below the scored area. This creates a new more acute domal angle, and establishes the new dome.
- A precise pocket is dissected between the two medial crura for inserting a columellar strut which is then sutured to both by mattress sutures.
- If needed, a tip graft is applied and sutured in place to the caudal margin of medial crus.
- The marginal and inter-cartilagenous incisions are closed. Septocolumellar sutures are used for fixation of columella to caudal septum, preserving the already achieved tip projection.

In subgroup (B): The new modification of vertical dome division without delivery of lateral crus [2] was used as follows:

- The marginal incision is done from mid-columella up to the level just lateral to the external soft triangle. The incision is not extended along the caudal margin of the lateral crus.
- Vertical dome division is done by extending the marginal incision from the external soft triangle backwards to meet the inter cartilaginous incision, dividing the vestibular skin and cartilage.
- The bilateral intermediate and medial crus are delivered to one side.
- Columellar strut is positioned, and sutured the same way as mentioned above in the standard technique, as well as a tip graft if needed.
- The complex structure of medial, intermediate crus with the strut and tip graft is pushed back into their normal position, and the incisions are similarly closed.

Both subgroups are compared as regards to the indications of secondary surgery. Pre and post-operative photographs of the primary surgery were observed. Assessment of the outcome of the primary tip procedure was done by the first author and an assistant doctor, and any tip-related problems such as pinching, notching, retraction, or asymmetry were recorded.

Part II: This includes a total of 400 cases, that were divided into 2 subgroups:

Subgroup (A): 200 cases that underwent primary aesthetic rhinoplasty before 1999 were randomly selected with the same criteria of part I. Their operation was done using the standard tip refinement technique.
Subgroup (B): Includes 200 cases that were done after 1999. Cases were randomly selected with the same criteria. The technique of tip refinement was the new modification described above. The mean operative time, the mean period of hospital stay, were calculated. The follow-up notes were reviewed, as well as the preoperative and postoperative photographs. The incidence the postoperative problems related to the tip was recorded, as a parameter of the outcome of each technique. The incidence of each problem, as notching, pinching, or retraction was also recorded and compared between the two subgroups.

RESULTS

Part I: 1- Subgroup (A):

100 cases of secondary rhinoplasty were included. The primary procedures were done by the same author, using the standard double dome delivery technique. The primary procedures were done in the period from June 1997 to January 1999. The cases were 64 females and 36 males. Their age ranged from 18 to 39 years. 68 were Arabian and 32 were non Arabian of many races. Indications of the secondary procedures in this subgroup of patients were as follow:

- 24 cases were presented mainly with the tip still a little pit broad (lack of proper tip definition). 10 cases showed tip asymmetry, as the main presenting problem.
- 17 cases came for secondary dorsal modification: 8 cases showed mild saddling and came for dorsal grafting, 2 cases had deviated long axis of the dorsum, and 7 cases had residual little hump and needed humpectomy and re-osteotomy.
- 49 cases were presented with alar side wall problems such as notching of the alar rim (26 cases), pinching (2 cases), asymmetry of the nostrils and ala (10 cases), alar retraction (6 cases), and alar collapse (5 cases).

2- Subgroup (B):

Tis included 100 cases of secondary rhinoplasty in which the primary procedure was the modified vertical dome division. The primary procedures of these patients were performed in the period from August 1999 till December 2004. The cases were 69 females and 31 males, within the same range of age as subgroup A. 72 were Arabian and 28 were non-Arabian races. Indications of the secondary procedure were:

- 55 cases were seeking for dorsal re-adjustment: 28 cases needed dorsal grafting, 4 cases had re-osteotomy for deviation, 23 had re-osteotomy and humpectomy for a residual mild hump.
- 5 cases had tip asymmetry.
- 11 cases needed alar wedge excision either primarily or secondarily.
- 29 cases showed alar side wall problems such as: Pinching (6 cases), Asymmetry (19 cases), notching (2 cases) and retraction (2 cases). No cases were found presented with collapse. Table (1) shows a comparison between subgroup (A) and subgroup (B).

Part II: 1- Subgroup (A):

200 cases that underwent primary aesthetic rhinoplasty before 1999 were reviewed. All were done using the standard tip refinement technique (double dome delivery with closed approach). 65% of cases were females and 35% were males. Their age ranged from 18 to 42 years. 70% were Arabian and 30% non Arabian of many races. The mean operative time was 45 minutes. The mean hospital stay was 22 hours. No major complications were recorded. There are minor problems that were found post-operatively, related to the tip and alar side wall. These problems were: Mild notching in 80 cases (40%), pinching in 5 cases (2.5%), retraction in 40 cases (20%), alar collapse in 13 cases (6.5%), and asymmetry in 60 cases (30%). There was an overlap in occurrence of these problems. The over all incidence of these problems is 47%. The incidence of cases who sought for correction of these problems is 18% and the other 29% were satisfied with their result.

2- Subgroup (B):

200 cases that underwent primary aesthetic rhinoplasty with the modified vertical dome division technique (after 1999) were reviewed. 68% were females and 32% were males. Their age group was the same as subgroup A. 71% were Arabian and 29% were non Arabian of many races. The mean operative time was 28 minutes. The mean hospital stay was 14 hours. Fig. (1) shows a case done with this technique by the first author, as an example. No major complications were recorded. Minor problems encountered were; mild notching in 5 cases (2.5%), pinching in 5 cases (2.5%), retraction in 6 cases (3%), and asymmetry in 20 cases (10%). Alar collapse did not happen. There was an overlap between these problems. The over all incidence of these problems is 12%. Cases that seek correction of these problems were 5%. A comparison between the incidences of these problems in the two subgroups is shown in Table (2).
Fig. (1): A 38 year old case with broad ill defined asymmetric tip, and hanging columella, 1ry aesthetic rhinoplasty was done to her by the first author using the modified vertical dome division technique [2].

Fig. (1-A): Preoperative front view.  
Fig. (1-B): Preoperative lateral view.  
Fig. (1-C): Preoperative 45 degrees.  
Fig. (1-D): Preoperative basal view.

Fig. (1-E,F,G,H):  
Same views for the same case 6 weeks postoperatively.
DISCUSSION

The current study compared two of the techniques used for tip refinement during rhinoplasty. The first is the standard technique used by the second author before 1999. The second is the new modification of vertical dome division. The standard technique was depending on delivery of alar cartilage (via closed approach), then new double dome creation through scoring, suture fixation, columellar strut, and if needed tip graft. Although this technique was highly recommended by the author in that time, and although it had relatively predictable results, there were unavoidable healing

Table (1): Comparison between the 2 subgroups of part I.

<table>
<thead>
<tr>
<th></th>
<th>Subgroup A</th>
<th>Subgroup B</th>
</tr>
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<tbody>
<tr>
<td>Primary procedure</td>
<td>Closed approach</td>
<td>Closed approach</td>
</tr>
<tr>
<td></td>
<td>Standard double dome</td>
<td>Modified vertical Dome division</td>
</tr>
<tr>
<td></td>
<td>Delivery technique</td>
<td>(non delivery)</td>
</tr>
<tr>
<td>No. of 2ry cases</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Period of time</td>
<td>19 months</td>
<td>65 months</td>
</tr>
<tr>
<td>Presenting problem:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tip:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of definition</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>Tip asymmetry</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Dorsum:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residual hump</td>
<td>7</td>
<td>23</td>
</tr>
<tr>
<td>Saddling</td>
<td>8</td>
<td>28</td>
</tr>
<tr>
<td>Deviation</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Alar side-wall problem:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notching</td>
<td>26</td>
<td>2</td>
</tr>
<tr>
<td>Pinching</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Retraction</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Asymmetry</td>
<td>10</td>
<td>19</td>
</tr>
<tr>
<td>Collapse</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Alar wedge excision</td>
<td>0</td>
<td>11</td>
</tr>
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</table>

Table (2): Comparison between the two subgroups of part II.

<table>
<thead>
<tr>
<th>Alar side-wall problem</th>
<th>Subgroup A</th>
<th>Subgroup B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notching</td>
<td>40%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Pinching</td>
<td>2.5%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Retraction</td>
<td>20%</td>
<td>3%</td>
</tr>
<tr>
<td>Asymmetry</td>
<td>30%</td>
<td>10%</td>
</tr>
<tr>
<td>Collapse</td>
<td>6.5%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Fig. (2): Another case, 21 year old, with ill defined tip. By the same author, using the same technique. Notice that edema and echymosis are minimal in the postop. views. Only 12 days after.

Fig. (2-A): Pre op. front view.  
Fig. (2-B): Pre op. 45 degrees view.  
Fig. (2- C & D): Post op. same views.
problems due to scarring, fibrosis and contracture along the alar side wall such as notching, retraction, pinching, collapse and even deviation and asymmetry. This is because of the exposure of the lateral crura whether using delivery as done in the author’s series or even if the external approach was used. These undesirable problems are worse in Mediterranean and Middle Eastern patients, since their skin is relatively thicker, with a well developed subcutaneous fibro-fatty layer, with more fibroblasts and more production of fibrin, and later on more fibrosis and scarring. In order to reduce these healing problems, the author thought in minimizing the exposure surface area. His modified technique (without lateral crus marginal incision and delivery), keeps an intact alar rim and reduces the healing process along alar side wall, rim, and supralar region. Thus, reducing the previously mentioned healing problems.

The study was conducted in 2 parts. Part I was a preliminary survey, by comparing the cases coming for revision surgery in the era of the standard technique and in the recent years after the new modification. It was clear from the results that the over all incidence of revision surgery became less in recent years. The period of time during which the 100 cases of subgroup A were done was 19 months, and that of subgroup B was 65 months. This means that the incidence of secondary rhinoplasty became markedly reduced. When the presenting problems were analyzed, tip related problems in subgroup B were only 6 cases (6%), in contrast to 34 cases in the first subgroup (34%). Alar side wall problems constituted 49% in subgroup A in contrast to 29% in subgroup B. When each problem was reviewed separately, notching decreased from 26% to 2% of the problems, retraction decreased from 6% to 2%, collapse dropped from 5% to 0%. Pinching increased slightly as an absolute figure (from 2% to 6%), but when correlated to the time interval almost it is not changed. The percentage of asymmetry was changed from 10% to 19%, but also if the time interval is considered the incidence is even decreased.

Part II of the study compared the outcome of surgery of 200 cases in each subgroup. With the new modification the mean operative time was diminished from 45 minutes to 28 minutes. The overall incidence of the fore-mentioned minor problems was diminished from 45 minutes to 28 minutes. The overall incidence of revision surgery in the era of the standard technique and in the recent years after the new modification. It was clear from the results that the overall incidence of revision surgery became less in recent years. The period of time during which the 100 cases of subgroup A were done was 19 months, and that of subgroup B was 65 months. This means that the incidence of secondary rhinoplasty became markedly reduced. When the presenting problems were analyzed, tip related problems in subgroup B were only 6 cases (6%), in contrast to 34 cases in the first subgroup (34%). Alar side wall problems constituted 49% in subgroup A in contrast to 29% in subgroup B. When each problem was reviewed separately, notching decreased from 26% to 2% of the problems, retraction decreased from 6% to 2%, collapse dropped from 5% to 0%. Pinching increased slightly as an absolute figure (from 2% to 6%), but when correlated to the time interval almost it is not changed. The percentage of asymmetry was changed from 10% to 19%, but also if the time interval is considered the incidence is even decreased.

The authors finally recommended its use for tip refinement during aesthetic rhinoplasty especially for Arabian noses.

REFERENCES