The Role of Spreader Grafts in Management of Middle Third Crooked Nose

AHMED S.M. ABDEL RAHMAN, M.D.; MAHMOUD S. EL-FOULY, M.D. and NABIL G. ZIED, M.D.
The Department of Otorhinolaryngology, Faculty of Medicine, Cairo University.

Abstract

Objective: To compare between the use of spreader grafts and the other methods used to straighten the middle third crooked nose as regard function and aesthetic results as well as their hazards.

Material and Methods: Following Institutional Review Board approval, 30 patients who were referred to our institution complaining from middle third crooked nose and fitting certain pre-operative inclusion criteria were treated with use of spreader graft and non spreader techniques between September 2006 and August 2008, with minimum follow-up period of six months.

Results: 12 (80%) patients of spreader grafts group had been centralized middle third of their crooked nose while 3 (20%) patients suffered from minimal deviation and 15 (100%) had marked significant improvement in their nasal resistance by comparing the results of their rhino-metric results pre-operatively to post-operative state. 10 (66.7%) patients of non-spreader group had been centralized middle third of their crooked nose while 5 (33.3%) patients suffered from minimal deviation and 15 (100%) had only significant improvement in their nasal resistance by comparing the results of their rhino-metric results pre-operatively to post-operative state.

Conclusion: In cases with mild to moderate deviation of crooked nose, the non-spreader techniques, may be used with obtaining satisfactory results both function and aesthetic. On the other hand, in cases with moderate to severe deviation of crooked nose and associated anatomical deformities, the spreader grafts technique is the most ideal method for straightening of such crooked nose with also improving the function of the nose as well as Spreader grafts are accepted to be a standard for reconstructing the middle third of the nose.

Key Words: Crooked nose – Rhinoplasty – Spreader garfts.

Introduction

CROOKED or twisted nose results from a complex deformity of the bony pyramid, the upper and lower cartilaginous vaults, and the septum and causes functional and aesthetic problems [1].

Correcting the crooked nose remains one of the most challenging problems in rhinoplasty. When faced with a twisted nose, rhinoplasty surgeons tend to be divided into those who perform an anatomic reconstruction and those who prefer camouflage techniques regardless of the approach used [2].

Frequently, both a functional problem (airway obstruction) and an aesthetic problem must be addressed. An approach to the deviated nose is a situation that relies on accurate preoperative planning and precise intra-operative execution of corrective measures to return the nasal dorsum to midline, restore dorsal aesthetic lines, and maintain airway patency [3].

Nowadays autogenous cartilage grafts are being used for repositioning, reinforcement, recontouring and reconstruction of virtually every component of the nasal skeleton [4].

Although corrections using a wide range of surgical techniques to straighten the nose and maximize nasal function have been proposed, residual deformity and recurrence are very common because of cartilage memory and scar contracture. Therefore, to prevent recurrence, residual deformity and to maintain the correction of the septum, a permanent support that is stable and strong, with the ability to maintain its given shape after placement on one or both sides of the septum, is needed [5].

The internal nasal valve (INV) refers to the slit-like region between the caudal end of the upper lateral cartilage (ULC) and the nasal septum. It is the narrowest portion and primary regulator of the nasal airway. Reduction rhinoplasty decreases the nasal airway cross-sectional area and may cause symptoms, unless additional surgical measures are taken [6].

Submucosal placement of strips of cartilage along the anterior border of the septum-the spreader graft-has proved to be an effective method for reconstructing
the roof of the middle vault. It is recommended in all primary rhinoplasty patients in whom resection of the roof of the upper cartilaginous vault is a necessary part of the surgical plan [7].

Aim of work:

The aim of this study is to compare between the use of spreader grafts and the other methods used to straighten the middle third crooked nose as regard the function and aesthetic results as well as their hazards.

Also, the aim of this study is to address the multiplicity of surgical techniques and pitfalls in the treatment of twisted noses.

Material and Methods

Following the rules of Institutional Review Board approval and the Ethical Committee of Otorhinolaryngology department, Faculty of Medicine, Cairo University, this study was conducted on thirty patients complaining of twisted nose presenting at the Otorhinolaryngology department out-patient clinic in Kasr al-Aini hospital from the period of September 2006 to August 2008.

Patients are subjected to the following:

- A detailed history which is very important step in the evaluation of every patient presenting with twisted nose. A past history of nasal trauma, previous rhinoplasty and or septal surgery was taken.
- Physical examination is done for every patient concerning:
  - Type of deformity C-shaped or I-shaped?
  - Associated mal growth of lower alar cartilage and/or another deformity?
  - Associated nasal obstruction is it nasal valve problem or Turbinate hypertrophy?

Inclusion criteria:

Were patients complaining from twisted nose whether it was C-type or I-type deviation with or without tip and/or lower alar cartilage deformity.

Exclusion criteria:

Any patient who had isolated dorsal bony deformity was excluded. Any patient who had previous rhinoplasty or septal surgery was excluded.

A randomized prospective controlled study was designed for the patients dividing them into two groups.

Group A included patients who had the use of spreader grafts for re-enforcement of the septum and Upper Lateral Cartilage (ULC) after correction in their rhinoplasty surgery.

While, Group B included patients who had the use of other methods of rhinoplasty such as camouflage, septal correction with ordinary rhinoplasty.

Both open and closed techniques will be used in surgery and they will be performed by one surgeon.

All patients were subjected, pre-operatively as well as six months post-operatively, to:

- Aesthetic photographic evaluation of the dorsum of the middle third of nose.
- Subjective analysis for functional score using Visual Analogue Scale (VAS) using Lund Mackay score ranging from 0 to 5 for their symptoms.
- Aesthetic score plotted from 0 to 4 for subjective improvement; where:
  0 = No improvement.
  1 = Mild improvement.
  2 = Moderate improvement.
  3 = Good improvement.
  4 = Excellent improvement.
- Objective analysis for nasal obstruction using Acoustic Rhinometery.

All the results were tabulated and statistically analyzed.
Results

This study included 30 patients with crooked nose. There were 9 females (33.3%), and 21 males (66.7%). Patients ranged in age between 18 to 31 years.

Group A:

This group included 15 patients treated with the use of spreader graft. This group included [10 males and 5 females] with age ranges from 18 to 29 years [Mean age = 23.47 with standard deviation = 4.17].

Effect on symptoms:

1- Pre treatment:
According to the Lund-Mackay scoring system of symptoms using the VAS, nasal obstruction VAS of the 15 patients ranged from 0-5 with a mean of 3.87±0.35; cosmetic VAS ranged from 0-5 with a mean of 3.20±0.56, and Rhinometry Rt. was mean of 0.67±0.27 and Lt. was mean of 0.84±0.28.

2- Post treatment:
The post-operative VAS-Nasal Obstruction results in the spreader group showed that 2 patients (13.3%) were satisfied while 13 patients (86.7%) were markedly satisfied. The post-operative VAS-Cosmetic results showed that one patient (6.7%) was not satisfied, 10 patients (66.7%) were satisfied and 4 patients (26.7%) were highly satisfied. The post-operative Rhinometric results which were in the spreader group mean Rt. 0.33 with standard deviation 0.12 and calculated p-value, in comparison with the pre-operative state, was highly significant [0.000]. Also, in the same group mean Lt. was 0.33 with standard deviation 0.06 and the p-value was high significant [0.000].

Photographic assessment:
All the 15 patients had crooked nose before surgery. The post-operative photography of non-spreader group showed that 10 patients (66.7%) were central while 5 patients (33.3%) were mildly deviated.

Group B:

This group included 15 patients treated with the use of non-spreader graft techniques. This group included [11 males and 4 females] with age ranges from 18 to 31 years [Mean age =24.2 with standard deviation = 4.229].

Effect on symptoms:

1- Pre operative:
According to the Lund-Mackay scoring system of symptoms using the VAS, nasal obstruction VAS of the 15 patients ranged from 0-5 with a mean of 3.65±0.51; cosmetic VAS ranged from 0-5 with a mean of 3.0±0.56, and Rhinometry Rt. was mean of 0.82±0.59 and Lt. was mean of 0.80±0.40.

2- Post operative:
The post-operative VAS-Nasal Obstruction results in the non-spreader group showed that 6 (40%) patients were satisfied while 9 patients (60%) were markedly satisfied. The post-operative VAS-Cosmetic showed 3 patients (20%) were unsatisfied, 9 patients (60%) were satisfied and 3 patients (20%) were highly satisfied. The post-operative Rhinometric results of non spreader group were mean Rt. 0.32 with standard deviation 0.59 and the p-value, in comparison with the pre-operative state, was significant [0.004] while mean Lt. was 0.33 with standard deviation 0.07 and p-value was highly significant [0.000].

Photographic assessment:
All the 15 patients had crooked nose. The post-operative photography of non-spreader group showed that 10 patients (66.7%) were central while 5 patients (33.3%) were mildly deviated.

Table (1): Photographic assessment of both groups post-operatively.

<table>
<thead>
<tr>
<th>Photographic Assessment</th>
<th>Operation</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Spreader</td>
<td>Others</td>
</tr>
<tr>
<td>Central</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Mild Deviation</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

Table (2): Post-operative patients' satisfaction according to cosmetic results as well as nasal obstruction.

<table>
<thead>
<tr>
<th>Satisfaction</th>
<th>Operation</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Spreader</td>
<td>Others</td>
</tr>
<tr>
<td>VAS Cosmetic:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.00</td>
<td>1</td>
<td>6.7%</td>
</tr>
<tr>
<td>3.00</td>
<td>10</td>
<td>66.7%</td>
</tr>
<tr>
<td>4.00</td>
<td>4</td>
<td>26.7%</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>100.0%</td>
</tr>
<tr>
<td>VAS Obstruction:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.00</td>
<td>2</td>
<td>13.3%</td>
</tr>
<tr>
<td>4.00</td>
<td>13</td>
<td>86.7%</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
Some cases of Non-Spreader group Pre- and post-operative
Some cases of Spreader grafts Pre- and Post-operative
The Role of Spreader Grafts in Management of Middle Third Crooked Nose

Graph (1): Number of male and female patients in each group.

Graph (2): Mean VAS Cosmetic of both groups in the pre-operative state.

Graph (3): Mean VAS Nasal Obstruction of both groups in the pre-operative state.

Graph (4): Mean rhinometry in both groups Before & After surgery.
Markedly satisfied

![Graph (5): Post-operative Nasal Obstruction patients' satisfaction of both groups](image)

**Graph (5):** Post-operative Nasal Obstruction patients' satisfaction of both groups

- Spread, 86.70%
- Other, 60.00%

Markedly satisfied

![Graph (6): Post-operative Cosmetic patients' satisfaction of both groups](image)

**Graph (6):** Post-operative Cosmetic patients' satisfaction of both groups

- Spread, 93.30%
- Other, 80.00%

**Discussion**

To date, the most ideal surgical technique for correction of the stubborn crooked nose has not been found. Correction of septal deviation and its maintenance are the key elements in the surgical management of the crooked nose [8].

According to Pontius and Leach [9], main schools of thought regarding management of crooked nose are:

- Camouflage techniques.
- Complete deconstruction and anatomic reconstruction of the nose.
- Combination of techniques. The approach of the patient with crooked nose should follow a methodical analysis and complete treatment of each deforming factor while support of the nasal skeleton is maintained.

Accomplished surgeons tend to be divided on the best surgical approach. An anatomic reconstruction provides optimal contour and nasal dimensions at the risk of weakening the supporting bony and cartilaginous skeleton with potential collapse [10]. Alternatively, "camouflage" techniques preserve maximum structural support but may require aesthetic compromise with a dorsum that is overlay prominent and dorsal aesthetic lines that are wide, divergent, or asymmetric [11-13].

On the basis of these previous data, in our study we thought that the use of spreader grafts with resection of upper lateral cartilages ULCs from the septum with adjusting the twisted mid central portion and re-enforcement by spreader grafts would allow good centralization of the crooked nose with straightening and avoiding the inverted V problem which results from marked narrowing of mid central portion of the nose after re-suturing the ULCs in the septum directly. Also, it wide the internal nasal valve angle so it decreased the nasal resistance so the use of spreader grafts would improve both cosmetic and functional problems.

This study was designed including two groups of patients of crooked nose. Group one (spreader grafts) 15 patients [10 males and 5 females] with age ranges from 18 to 29 years [Mean age = 23.47 with standard deviation = 4.17] while the Group two (non-spreader) 15 patients [11 males and 4 females] with age ranges from 18 to 31 years [Mean age = 24.2 with standard deviation = 4.229].

In pre-operative assessment of both groups, it was noticed that mean (Visual Analogue Scale) VAS-Cosmetic of the spreader group was 3.2 with standard deviation 0.56 and the mean VAS-Cosmetic of non spreader was 3.0 with standard deviation 0.65 and there is no significant difference between the two groups as regard the cosmetic before the operation as the $p$-value between the two groups was 0.37. This means the selection criteria between both groups according to their cosmetic problem, are nearly equal.

In pre-operative assessment of both groups, it was also noticed that mean VAS-Nasal Obstruction of the spreader group was 3.87 with standard deviation 0.35 and the mean VAS-Nasal Obstruction of non spreader was 3.65 with standard deviation 0.51 and there is no significant difference between the two groups as regard the nasal obstruction problem before the operation as the $p$-value between the two groups was 0.105. This means the selection criteria between both groups according to their Nasal Obstruction problem, are nearly same.

In the view of our study, it was noticed that the means of objective rhinometry results before operation for the spreader and non-spreader groups were nearly equal; the $p$-value between both sides was insignificant. This means in conclusion that both groups were randomly arranged, and the pre-operative parameters were more or less the same.
In the spectrum of post-operative Rhinometric results in the spreader group in comparison with the pre-operative state, was highly significant [0.000]. These results were identical with the results of Boccieri et al. [14] who studied 26 patients with crooked nose and used spreader grafts in their primary rhinoplasty and noticed that the comparison of pre-operative and post-operative rhinometric measurements showed substantial and objective improvement in nasal airflow for patients with pre-operative airway obstruction.

Post-operative Rhinometric results of non spreader group in comparison with the pre-operative state, was significant. These results were matching the results of Fischer and Gubisch [15] who used a lot of non spreader techniques such as lateral batten grafts, splay grafts, lateral crural extension grafts, camouflage grafts and lateral alar suspension. They noticed that the post-operative rhinometric results showed highly significant improvement from the pre-operative state.

Post-operative VAS-Nasal Obstruction results in the spreader group showed that 2 patients (13.3%) were satisfied while 13 patients (86.7%) were markedly satisfied. On the other hand, the non spreader group showed 6 (40%) patients were satisfied while 9 patients (60%) were markedly satisfied.

According to photographic assessment post-operatively, the spreader group showed that 12 patients (80%) had central nose and 3 patients (20%) had mild deviation. While the post-operative VAC-Cosmetic results showed that one patient (6.7%) was not satisfied, 10 patients (66.7%) were satisfied and 4 patients (26.7%) were highly satisfied. These results mimic the results of many authors Esman [8], Gruber et al. [16] and Pontius and Leach [9] who studied 12 patients, 21 patients and 79 patients respectively using cartilages as spreader grafts and reached cosmetic results from 77% to 82%. They explained the results were attributed to cartilage memory and post operative fibrosis.

While the results of other authors like Gurlek et al. [8] and Mendelsohn [17] who studied 20 patients and 41 patients respectively, showed better results in straightening different types of crooked nose [C-type, I-type and S-type] reached from 89% to 92% as they use high-density porous polyethylene spreader grafts (HDPP) with a thin plain sheet (0.85 x 38 x 50mm) that can cut to appropriate size for spreader grafts which have the ability to prevent recurrence attributable to cartilage memory.

The review of post-operative photography of non-spreader group showed that 10 patients (66.7%) were central while 5 patients (33.3%) were mildly deviated. The post-operative VAS-Cosmetic showed 3 patients (20%) were unsatisfied, 9 patients (60%) were satisfied and 3 patients (20%) were highly satisfied. These results barely reach the results of many authors Byrd et al. [2], Fischer and Gubisch [15] and Gassner et al. [18] who studied 4 cases [spreader], 33 patients [spreader and non spreader] and 6 patients [spreader] and they noticed overall post-operative photographic assessment showed centralization in non spreader patients were 72% while in spreader grafts patients ranged from 78% to 82%.

The comparative study of photographic assessment of both groups showed no significant difference between two groups as the p-Value was 0.409.

The statistical analysis of both groups together; on comparing the postoperative cosmetic and as well as the functional improvement of nasal obstruction in crooked nose, showed that although the results gave upper hand to the spreader versus non-spreader techniques in somehow but there is still no significant difference in between, this attributed to in both groups the surgeon paid attention to the functional problem of the patients by correcting it through septal and/or turbinate surgery.

During the conduction of this study it was noticed that, regarding the redo, one patient of spreader group needed revision rhinoplasty while 2 patients of non-spreader needed to do the same.

It’s to be noticed that the follow up period for the cases in our study was 6 months. Longer periods of follow up may show different results, as the main drawback for the use of spreader grafts, is that it widens the nasal dorsum. This problem improves gradually as the width of the nasal dorsum decreases by time. Furthermore, problems as inverted V deformity and dorsum irregularities start to appear in the non-spreader group as time goes by. So, this is the reason that it’s recommended to have longer follow-up period to precisely compare between the two groups.

Conclusion: In cases with mild to moderate deviation of crooked nose, the non-spreader techniques, may be used with obtaining satisfactory results both function and aesthetic.

On the other hand, in cases with moderate to severe deviation of crooked nose and associated anatomical deformities, the spreader grafts technique is the most ideal method for straightening
of such crooked nose with also improving the function of the nose as well as. Spreader grafts are accepted to be a standard for reconstructing the middle third of the nose.

References


