

## AUGMENTATION RHINOPLASTY: 9TH COSTAL CARTILAGE GRAFT FOR STAGE III SADDLE NOSE DEFORMITY

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### ABSTRACT

**Objective:** To evaluate the results of 9th rib costal cartilage in the reconstruction of stage III saddle nose deformity.

**Study Design:** Case series.

**Place and Duration of Study:** Combined Military Hospital Rawalpindi, from Dec 2014 to Jun 2017.

**Material and Methods:** Individuals with stage III saddle nose deformity for at least two years due to trauma or as a sequel of septal surgery, with no history of anxiolytic and antidepressant intake were included in the study.

Patient satisfaction level before and after surgery in terms of aesthetics and functionality were measured through Visual Analogue Scale (VAS) scoring system. The VAS system consisted of six different questions put to the patient in the form of a questionnaire regarding the shape of the nose and the impact that it had on his physical, emotional and social life. The score was calculated preoperatively and six months postoperatively in all patients. The minimum follow-up for each patient was six months. Data was analyzed using SPSS.

**Results:** Ten male patients between 14-33 years (25.5 mean SD  $\pm$  6) fulfilled the inclusion criteria. The pre op VAS score ranged between 33.3 and 50 (mean 41.2 SD  $\pm$  5). The post op VAS score ranged between 70.8 and 87.5 (mean 78.3 SD  $\pm$  6.2). There was a statistically significant improvement in the VAS score. Post op recovery was uneventful in all patients. One patient had post op recipient site infection which settled with IV antibiotics. One patient had severe post op donor site pain which was relieved by IV analgesics.

**Conclusion:** Saddle nose is a difficult problem in nasal reconstruction, causing significant psychological and functional problems for the patient. Reconstruction with 9th costal cartilage graft provides functional and psychological relief.

**Keywords:** Costal cartilage, Rhinoplasty, Saddle nose.

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### INTRODUCTION

The nose plays a significant role in facial beauty and self esteem<sup>1</sup>. It is also a prominent structure of the face with projection making it unusually vulnerable to trauma and deformity in road traffic accidents and modern sports like boxing and karate. Aggressive nasal surgeries like submucosal resection (SMR) for nasal obstruction, untreated septal pathologies like septal hematoma, abscess and chronic granulomatous diseases are further sources of insult to nose. Tzadik and colleagues noted that, depending on the surgeon's skill, saddling rates varied from 0% to 2.6% (average, 0.4%) in patients who had undergone sub mucous

resection of the nasal septum<sup>2</sup>. In all these cases, ignoring the problem from the onset or delayed consultation may lead to structural deformities of the nose, one of the commonest being saddle nose deformity<sup>3</sup>.

The descriptive definition of the saddle-nose deformity represents a wide range of severity. Other features commonly observed in patients with significant saddle-nose deformities include the following:

- Depression of the middle vault and dorsum
- Loss of nasal tip support and definition
- Shortened (vertical) nasal length
- Over rotation of the nasal tip
- Retrusion of the nasal spine and caudal septum

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This deformity in its severe form disfigures the facial appearance of the individual leading to in many cases, low self esteem and in rare cases withdrawal from social interaction. Empirical studies support the notion that aesthetic rhinoplasty patients show low levels of self-esteem<sup>4,5</sup>.

For the rhinoplasty surgeon it is one of the

op mean visual analogue score (VAS) which also included self-esteem as one of the parameters.

### PATIENTS AND METHODS

The case series comprised of patients admitted to the Plastic Surgery Department Combined Military Hospital Panu Aqil, for the treatment of stage III saddle nose deformity between December 2014 and June 2017.

**Table-I: Saddle nose deformity staging.**

| Stage | Severity | Details  |
|-------|----------|--|
| 1     | Minimal  | Minimal saddle nose corresponds to a depression above the supratip of the nose due to loss of septal support associated with slight retraction of the base of the columella, while tip projection and rotation are not affected  |
| 2     | Moderate | Moderate saddle nose corresponds to more marked recession of the dorsum, but not exceeding 5 mm. It induces loss of septal support that can affect its anatomical relations with the triangular cartilages, the tip or even the columella. The nose has a flattened appearance on all views. Decreased projection and/or cephalic rotation of the tip may be observed at this stage and will need to be taken into account   |
| 3     | Major    | Major saddle nose corresponds to a marked lack of bony and cartilaginous support. The bony arch of the middle third of the nose is amputated inducing major retraction of the nasal mucosa, while loss of the height of the cartilaginous septum is responsible for columellar retrusion. Tip projection is decreased and the nostrils are broader, giving a short nose appearance. Functionally, this deformity alters the internal (due to collapse of septal support) and external nasal valves (due to lack of central support, the nostrils become flatter and wider) |

**Table-II: VAS questionnaire.**

| S No. | Questions  | Score |   |   |   |
|-------|--|-------|---|---|---|
|       |  | 1     | 2 | 3 | 4 |
| 1     | Overall satisfaction with the shape of the nose                              |       |   |   |   |
| 2     | Self esteem while attending social gatherings                                |       |   |   |   |
| 3     | Confidence while being photographed  |       |   |   |   |
| 4     | Confidence while interacting with opposite gender                            |       |   |   |   |
| 5     | Confident to face comments on facial/nose appearance by colleagues/strangers |       |   |   |   |
| 6     | Satisfaction over seeing oneself in the mirror on day to day base            |       |   |   |   |

most demanding and technically challenging deformity to manage. The main feature of saddle nose deformity is loss of septal support, leading to functional and aesthetic sequel which needs to be addressed in the form of septal reconstruction as the integral part of the management<sup>6</sup>.

We corrected saddle nose deformity with costal cartilage. This study aimed to assess the results of ninth costal cartilage for stage III saddle nose deformity, by comparing the pre and post

Individuals with stage III saddle nose deformity due to trauma or as a sequel of septal surgery were included in the study. The classification system of Durbec *et al* was used<sup>7</sup> (table-I). Patients with saddle nose deformity for at least two years with no history of anxiolytic and antidepressant intake were included. Patients suffering from chronic granulomatous diseases of the nose were excluded from the study. Patients suffering from vasculopathies, coagulation disorders and skin conditions like chronic

eczema and scleroderma were also excluded from the study.

Pre operative counseling of all patients was done, and documented. Pre and post operative photographs were taken. Patient satisfaction level before and after surgery in terms of aesthetics and functionality were measured through VAS scoring system. The VAS system consisted of six different (table-II) questions put to the patient in the form of a questionnaire regarding the shape of the nose and the impact that it had on his physical, emotional and social life. Each question was scored on a scale from 0-4, divided by 24 and multiplied by 100. The score of each question was added and a score out of maximum 100 was reached. The score was calculated preoperatively and six months postoperatively in all patients. The minimum follow-up for each patient was six months.

### Operative Procedure

Each operation was performed under general anesthesia. Ninth rib cartilage graft (taken from the right side) was used in all patients and placed as an L strut graft through an open rhinoplasty approach. An inverted V seagull columellar incision was used as it helped in columellar lengthening required due to placement of the L portion of the cartilaginous strut. The cartilage graft was harvested first as this allowed some time for immediate early wrapping.

Remnants of the nasal septum and the anterior nasal spine were exposed between the medial crura. The upper lateral cartilages were dissected from the nasal septum.

In the second step, the nasal dorsum was reconstructed. To prevent warping of costal cartilages, we used the 9th costal cartilage as a whole only shortening it to match the length of the individual now. The inferior border of the cartilage was rotated 90 degrees to become the convex dorsum. No cartilage was trimmed or carved, and hence the intrinsic stress forces within the graft were not disturbed. The dorsal transplant, - covering the entire length of the

nasal dorsum - reached from the nasal root till the cartilage used as a columellar strut. A thin columellar strut was placed between the medial crura and fixed to the nasal spine and dorsal graft. Ethibond (polyester) was used to suture the cartilage grafts together and to the nasal spine.

In the next step the nasal tip was reconstructed. The medial crura were fixed to the columellar strut and the tip reconstructed by suturing the domes together above the columellar and dorsal transplant.



**Figure-1(a):** The typical abnormalities of severe saddle nose deformities, including broad nasal radix, dorsum, and tip; low tip projection; retracted and short columella; rounded nostrils; and large nasal valve angle.



**Figure-1(b):** Post op result with dorsal reconstruction.

A redivac drain was placed in all patients at the donor site and removed after 24 hrs. Ten ml of 2% lignocaine with adrenaline and 10 ml 0.5% bupivacaine was injected locally at the donor site to prevent post operative pain.

Data was analyzed using SPSS. Mean and standard deviation (SD) was calculated for numeric variables. Percentages were calculated for categorical variables. Independent t-test was used to compare numeric values. A *p*-value <0.5 was considered as significant.

## RESULTS

Ten patients fulfilled the inclusion criteria. All patients were males between 14-33 years (25.5 mean DS  $\pm$  6). The shortest follow-up was 6 months and longest 13 months (mean 8.5 SD  $\pm$  2.4). The preop VAS score ranged between 33.3 and 50 (mean 41.2 SD  $\pm$  5). The post op VAS score ranged between 70.8 and 87.5 (mean 78.3 SD  $\pm$  6.2). The mean difference between the preop and post op VAS score was 37.2. There was a statistically significant improvement in the VAS score as the *p*-value was 0.0001 as calculated by independent t test.

No intraoperative complications were encountered; particularly, no vessel, nerve, or pleural injury occurred during rib harvest.

Post op recovery was uneventful in all patients. One pt had post op recipient site infection which settled with IV antibiotics. One pt had severe post op donor site pain which was relieved by IV analgesics.

## DISCUSSION

Correction of severe saddle nose deformity is technically difficult. Reaching an aesthetically satisfactory result on top of functional correction can be a challenge. As all our patients were males, these patients are harder to satisfy.

There is no consensus regarding the most suitable surgical method for saddle nose correction. Autologous bone/cartilage remains the preferred method of correction. Different donor sites have been described with each having its own pros and cons. But wherever a large volume of cartilage has been required rib cartilage graft has been chosen<sup>8-11</sup>.

Traditionally chondrosynchism of 5-7th rib cartilage is harvested as graft but we have used the 9th costal cartilage which Sheen has called the nose rib<sup>12</sup>. Ninth rib cartilage graft has been used successfully by others to correct saddle nose deformity<sup>13,14</sup>.

The 9th rib is the first "floating rib" and thus a simple retrograde supraperichondrial dissection is possible. It provides a straight segments

of rib cartilage which can be used to reconstruct the dorsum. It also provides enough cartilage to reconstruct the septum and if required the tip and alar rim.

Few studies have reported surgical outcomes after correction of saddle nose deformity. The ones which have measured surgical outcomes have shown good results. One study found that 78% of patients showed aesthetic improvement after the operation (i.e., excellent or good outcomes)<sup>15</sup>. In a review of 20 saddle nose cases, Mao *et al* reported that only 5% had unsuccessful surgical results<sup>16</sup>.

In the present study we found that all of the patients showed a good aesthetic improvement after the operation. None of the patients in this study needed a revision surgery for additional augmentation. The patients were happy with the results and there was a significant increase in self esteem of the patient.

Surgical correction in nasal deformity has shown to have positive effect on the self esteem and psychological well being of patients<sup>17-19</sup>. It was reflected in our study by a statistically significant improvement in VAS score.

## CONCLUSION

Saddle nose is a difficult problem in nasal reconstruction, causing significant psychological and functional problems for the patient. Reconstruction with 9th costal cartilage graft provides functional and psychological relief.

## CONFLICT OF INTEREST

There is no conflict of interest and no financial assistance has been provided by anyone. This article has not been presented in any conference or submitted to any other journal.

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