

A COMPARATIVE STUDY ON NASAL BONE FRACTURE ASSOCIATED WITH SEPTAL DEVIATION CORRECTED WITH SEPTOPLASTY VERSUS CLOSED REDUCTION

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ABSTRACT

Objective: The dorsum of the nose formed by nasal bones helps to maintain the airway and esthetic appearance of the nose. Faciomaxillary trauma is associated with a nasal bone fracture with or without nasal septal fractures. Nasal bone fractures can lead to deviation of the external nose and nasal obstruction. The management includes correction of nasal bone deformity with either septoplasty or reduction of nasal septal deviation by the non-surgical method. A study was conducted to compare the results of septal deviation corrected by septoplasty and non-surgical reduction of septal deviation combined with nasal bone fracture reduction.

The aim of this study was to compare the results of septal deviation corrected by septoplasty and non-surgical reduction of septal deviation combined with nasal bone fracture reduction.

Materials: Sixty-two patients with nasal bone fractures with varying degrees of external nose deformity and nasal septal deviation were divided into two groups. Group A consisted of patients treated with septoplasty and nasal bone fracture correction and Group B consisted of patients treated with non-surgical reduction of septal deviation and nasal bone fracture correction. Type I, II, and III nasal bone fractures were included with all types of septal deviations. The subjective improvement in nasal obstruction was assessed using the visual analog scale in both groups.

Results: There were 26 males (81.25%) and 06 (18.75%) females in Group A and 25 (83.33%) males and 05 (16.67%) females in Group B. In Group A, 12 (37.5%) patients were aged between 18 and 27 years, 10 (31.25%) patients were aged between 28 and 27 years, 07 (21.87%) patients were aged between 38 and 47 years, and 03 (09.37%) patients were aged between 48 and 57 years. The mean age was 23.54±2.30 years.

Conclusion: Nasal bone fractures cause not only esthetic facial deformity but also functional airway obstruction. A thorough clinical examination, computed tomography scan, and patient counseling are necessary. There is no statistically significant difference in the final outcome between the septoplasty and closed reduction of the septal deviation undertaken to relieve nasal obstruction in patients with associated nasal bone fractures.

Keywords: Nose, Nasal bones, Nasal septum, Reduction and fracture.

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INTRODUCTION

The nose is the most prominent part of the face serving the purpose of the airway and giving an esthetic appearance to the entire face. However, the nose is liable to be involved in trauma due to its prominent disposition [1]. Nasal bone fractures are the third most common fractures in the body as the nose is likely to be affected in all types of faciomaxillary injuries [2]. The prevalence of nasal bone fractures is around 39–50% all over the world [3]. They are reported more commonly among men than in women with a male-to-female ratio of 2.10:1 [4]. They are also reported in the age group of 20–30 years commonly [5]. The patients report pain in the nose, bleeding from the nose, deformity and swelling, and black eyes after the trauma [6]. Diagnosis is made usually clinically by checking for the presence of crepitus. In doubtful cases, X-ray of nasal bones would help in diagnosis as well as in the management [7]. Computed tomography (CT) scans of the skull are especially useful in faciomaxillary injuries to rule out involvement of anterior cranial fossa [8]. In some patients, nasal bone fractures cause not only deformity but also emotional distress and financial burden [9]. Early evaluation and diagnosis within 2–3 h or delayed reporting by the patient and decision to undergo treatment after 4–5 days defines the planning for the surgical treatment [10]. If the delay is beyond 4 weeks, patients may require osteotomies to achieve nasal deformity correction because the callus formation following nasal bone fractures is common and quick [11]. There are two methods used for treating nasal bone fractures; closed reduction or open reduction; the former is undertaken within 3 weeks

and the later after 3 weeks [12,13]. The closed type of reduction is usually undertaken as a daycare procedure and it is simple and economical [12]. The final results of closed reduction are unpredictable and difficult to correct the deformity with a success rate of 09–50% [13-15]. Even a simple fracture can lead to a nasal deformity, and inappropriate treatment can cause esthetic and functional issues. External nasal deformity before nasal trauma may lead to unexpected outcomes. Hence, initial treatment needs to be planned carefully. In the present study, we aimed to analyze the clinical features in cases where concomitant rhinoplasty and open reduction were performed as the primary treatment, after nasal bone fracture. Furthermore, we concentrated on patients who had external nasal deformity before nasal bone fracture.

Study design

This was cross-sectional investigative study.

Institute of study

This was PVS Hospital, Kozhikode, Kerala.

Period of study

The study period was October 2021–October 2022.

METHODS

Sixty-two patients attending the ENT department with nasal bone fractures, aged between 18 and 57 years were divided into two groups.

The Institute Ethics Committee approval was obtained for the study. An Ethics Committee-approved consent form and pro forma were used for the study.

Inclusion criteria

Patients aged between 18 and 57 years were included in the study. Patients reporting for treatment after the nasal bone fracture from 01 h to 505 days were included in the study; Patients of both genders were included in the study. Patients with other faciomaxillary injuries were included in the study. Patients willing to participate in the study were included in the study. Patients with complaints of nasal obstruction following the trauma, bleeding from the nose, pain, and swelling of the nose were included in the study. Patients with external nose deformities were included in the study.

Exclusion criteria

Patients aged below 18 and above 57 were excluded from the study. Patients not willing to participate in the study were excluded from the study. Patients with previous histories of septal surgeries were excluded from the study. Patients with diseases of the nose causing nasal obstruction were excluded from the study. All the patients were elicited about the clinical history and mechanism of injury. All the patients were examined clinically to know the site of the fracture, deviation of the bridge of the nose, and other facio-maxillary injuries. X-ray of the nasal bones and CT scan of the skull including the face were undertaken. Surgical profile investigations were undertaken before deciding on reduction or surgery. Patients were divided into two groups and allotted to each group through randomization numbers obtained from randomnumber.com. Group A patients (32) were subjected to septoplasty and Group B patients (30) were subjected to closed reduction of the nasal septum. All the patients were subjected to surgery under general anesthesia. Classical septoplasty surgery was used to correct the septal deviation in Group A patients. In Group B patients, Ash's forceps were used to refracture the nasal septum and medialize it. In both groups, correction of the nasal bone fracture was undertaken using Walsham's forceps to out-fracture and realign the deviated segments of the nasal bones. All the patients were packed with glove finger stalks in both the nasal cavities to maintain the alignment (internal fixation) which was removed after 48 h. A POP bandage was applied on the external surface of the nose to prevent the recurrence of the deviation and kept for 3 weeks. The variables noted were age, sex, mean time between trauma and surgery, type of surgery, type of nasal bone fracture, degree of deviation, type of septal deviation, and degree of deviation. The final outcome was assessed by an independent ENT surgeon who had not participated in the study but was given the pre-operative and post-operative pictures of the patients. CT images of the patients and grading of nasal obstruction before and after the reduction or septoplasty with visual analog scale (VAS) scoring was used to assess the results; where a score of 0 indicated "not satisfied at all" and 10 indicated "very satisfied." The following classification of nasal bone fracture was used in this study:

Classification	Description
I	Simple fracture with minimal displacement
II	Fracture with a favorable fracture line that mimics nasal osteotomy, which is performed for improving the shape of the nose
IIb	A broad nasal dorsum on the unaffected side
IIh	A hump nose on the unaffected side
III	Comminuted fracture with saddle nose deformity that requires reconstruction of the nasal dorsum

All the data were analyzed using standard statistical methods. The mean follow-up period was 09.25±0.2 months.

Statistical analysis

All the data were entered in the Excel sheet and continuous variables were analyzed using mean and standard deviation. Categorical variables were analyzed using frequency and percentages. The Chi-square test was applied to analyze the relationship between categorical variables.

Table 1: The demographic data and clinical parameters in the subjects (n- Group A-32, Group B-30)

Observation	Group A - 32	Group B - 30	p-value
Age			
18-27	12	11	0.122
28-37	10	09	
38-47	07	07	
48-57	03	03	
Gender			
Male	26	25	0.241
Female	06	05	
Type of nasal bone fracture			
I	13	12	0.011
II	06	08	
IIb	06	05	
IIh	05	03	
III	02	02	
Type of nasal septal deviation			
Mild	03	04	0.027
Moderate	16	14	
Gross	13	12	
Nasal obstruction - VAS score			
0-3	03	02	0.031
04-06	16	15	
07-10	13	13	
External nose deformity - VAS score			
0-3	04	02	0.042
04-06	17	18	
07-10	11	10	

VAS: Visual analog scale

Fisher's exact test was used wherever the Chi-square test did not meet the cochrane criteria.

RESULTS AND DISCUSSION

Out of 62 patients, 32 were grouped as Group A, and 30 were grouped as Group B. There were 26 males (81.25%) and 06 (18.75%) females in Group A and 25 (83.33%) males and 05 (16.67%) females in Group B. In Group A, 12 (37.5%) patients were aged between 18 and 27 years, 10 (31.25%) patients were aged between 28 and 27 years, 07 (21.87%) patients were aged between 38 and 47 years, and 03 (09.37%) patients were aged between 48 and 57 years. The mean age was 23.54±2.30 years. In Group B, 11 (36.66%) patients were aged between 18 and 27 years, 09 (30%) patients were aged between 28 and 27 years, 07 (23.33%) patients were aged between 38 and 47 years, and 03 (10%) patients were aged between 48 and 57 years. The mean age was 24.05±1.36 years. Type I nasal bone fracture was the most common one in both groups accounting for 40.62% of patients in Group A and 40.0% of Group B. Type II nasal bone fracture was observed in 18.75% of patients in Group A and 26.66% in Group B. Type IIb nasal bone fracture was observed in 18.75% of patients in Group A and 16.66% in Group B. Type IIh nasal bone fracture was observed in 15.62% of patients in the Group A and 10.0% in Group B. Type III nasal bone fracture was observed in 06.25% of patients in Group A and 03.33% in Group B (Table 2). The mild septal deviation was noted in 09.37% of patients in Group A and 13.33% of patients of Group B, moderate septal deviation was noted in 50% of patients, and gross septal deviation was noted in 40.62% of patients and 40% of the Group B patients (Table 2). Pre-operative VAS score of nasal obstruction was 0-3 in 09.37% of patients, 04-06 score in 50%, and 07-10 score was noted in 40.62% of patients. External nose deformity VAS score of 0-03 was noted in 12.05% of patients, 04-06 score was noted in 53.12% of patients, and 07-10 score was noted in 34.37% of patients. Similarly, in Group B, the scores were 06.66%, 60%, and 33.33% in Group B patients (Table 2).

The post-operative subjective improvement in the nasal obstruction and personal satisfaction about the esthetic appearance of the external

Table 2: The post-operative VAS scores and their significance using Chi-square test in the study (n – Group A – 32, Group B – 30)

Observation	Group A – 32	Group B – 30	p-value
Nasal obstruction-VAS score			
0–3	02	01	0.001
04–06	03	04	
07–10	27 (84.37%)	25 (83.33%)	
External nose deformity – VAS score			
0–3	02	22	0.001
04–06	06	06	
07–10	24 (75%)	22 (73.33%)	

VAS: Visual analog scale

nose were measured with VAS in the study of the two groups which showed that there was no difference in the results. The number of patients satisfied was similar in both groups. Statistical significance was calculated using the Chi-square test and found to be significant with $p < 0.05$ (Table 2). The VAS scores of more than 7 were found in 75% of the patients of Group A and 73.33% of the Group B patients (Table 2). Similarly, the nasal obstruction relieved in the post-operative period was relieved with a VAS score of more than 7 in 84.34% of Group A patients and 83.33% of Group B patients (Table 2). It was observed that there was not much difference in the final outcomes of relief in nasal obstruction and correction of nasal deformity in both group patients.

In this study, 62 subjects were included randomly and allotted to two groups based on the method of intervention used to correct the nasal septal deviation associated with the nasal bone fractures. The nasal bone fractures were divided into three types as described in the previous paragraphs. There were 26 males (81.25%) and 06 (18.75%) females in Group A and 25 (83.33%) males and 05 (16.67%) females in Group B. In Group A, 12 (37.5%) patients were aged between 18 and 27 years, 10 (31.25%) patients were aged between 28 and 27 years, 07 (21.87%) patients were aged between 38 and 47 years, and 03 (09.37%) patients were aged between 48 and 57 years. The mean age was 23.54 ± 2.30 years. In Group B, 11 (36.66%) patients were aged between 18 and 27 years, 09 (30%) patients were aged between 28 and 27 years, 07 (23.33%) patients were aged between 38 and 47 years, and 03 (10%) patients were aged between 48 and 57 years. The mean age was 24.05 ± 1.36 years. Among the nasal bone fractures, Type I is the simplest one and simultaneous closed reduction and septal correction and rhinoplasty could be attempted if the patient desires esthetic surgery [16]. If the treatment does not satisfy the patient, then open reduction rhinoplasty could be considered even after reevaluation at 6 months [13,17]. In a recent study by Chen *et al.* [6,14], immediate reduction and rhinoplasty were done following nasal bone fracture and their mean VAS score was 7.14, which was similar to the present study results [13]. The open rhinoplasty gives a chance to the surgeon to accurately assess the cause for deviation and meticulous planning could be done to give the best results; hence, closed reduction in the initial stages is preferable which leaves an opportunity to make corrections when the patients' VAS scores are poor [18]. In addition, such an approach also minimizes the time and cost associated with secondary surgery [19]. In the present study, VAS scores of more than 7 were found in 75% of the patients of Group A and 73.33% of the Group B patients (Table 2). Similarly, the nasal obstruction relieved in the post-operative period was relieved with a VAS score of more than 7 in 84.34% of Group A patients and 83.33% of Group B patients. In Type II nasal bone fractures, the fracture line is similar to the osteotomies done in rhinoplasty, hence if it is found on only one side a similar osteotomy has to be done on the opposite side to correct the nasal deformity [20], whereas in Type III nasal bone fractures which are comminuted in nature, often seem to need an open reduction and internal fixation. Moreover, the final outcome may not be pleasing (due to external scar)

to the patient, and hence, closed reduction is preferable [21,22]. Hence, it is always better to plan for closed reduction rather than open fixation as the former leaves a chance to come back for open reduction. It was observed that there was not much difference in the final outcomes of relief in nasal obstruction and correction of nasal deformity in both group patients (Table 2). The same principle holds good for correction of nasal septal deviations also as it was found in the present study. The challenges that should be stressed in the present study are that facial edema and associated facial injuries make it unclear about nasal bone fractures. Therefore, it is required of the surgeon to do a thorough pre-operative consultation, along with analysis of CT images and facial photographs of the patient before the trauma are essential.

Limitations

The small sample size is in limitation followed hence, additional studies with larger sample size and various treatment methods are necessary for the future.

CONCLUSION

Nasal bone fractures cause not only esthetic facial deformity but also functional airway obstruction. A thorough clinical examination, CT scan, and patient counseling are necessary. There is no statistically significant difference in the final outcome between the septoplasty and closed reduction of the septal deviation undertaken to relieve nasal obstruction in patients with associated nasal bone fractures. When a patient is not satisfied with either relief of nasal obstruction or esthetic appearance of the nose, there is always a chance to operate in open method.

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