

A retrospective clinical trial on nasal bone fractures admitted to a level three emergency room

 Serkan Cayir¹,  Huseyin Mutlu²,  Ekrem Taha Sert²

¹Department of Otolaryngology, Head and Neck Surgery, Aksaray Training and Research Hospital, Aksaray, Turkey

²Department of Emergency, Faculty of Medicine, Aksaray University, Aksaray, Turkey

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Abstract

Aim: The anatomical location and protruding structure of the nasal bone can easily lead to fracture as a result of trauma. The high incidence rates have emphasized that the causes, treatments, and complications of these fractures should be investigated. The purpose of this study is to investigate our treatment modalities and complications by reviewing the current information about such fractures.

Material and Methods: A total of 582 patients presented with nasal bone fractures between January 2014 and December 2019 were retrospectively analyzed. Examination findings, patient records, and radiological examinations of fractures were analyzed in detail.

Results: The age of the patients was between 2 and 83 years (mean age: 33.9 ± 6.11 years). The study included 451 (77.5%) males and 131 (22.5%) females. The most common etiologic factor was assault (35.7%). The most common postoperative complications included deformity (53 patients; 9.1%), nasal congestion (41 patients; 7.1%), and smell disorders (5 patients; 0.9%), with the complications increased with the severity of fracture.

Conclusion: Reduction procedures are successfully performed within the first 2 weeks following nasal fractures, and if there is a suspicion of causing deformity in patients under observation, necessary surgical interventions should be performed.

Keywords: Complication; Nasal fracture; reduction; trauma

INTRODUCTION

Deaths due to trauma in healthy individuals under 40 years of age represent an important public health problem since they are preventable (1). Maxillofacial traumas are observed quite frequently in emergency departments and most of them are nasal bone fractures. In addition to the protruding structure of the nasal bone, increasing sports activities and social life complexity in recent years have led to an increased incidence of nasal bone fractures. Nasal bone fractures are the third most common fractures among all body bones and are the most common one among facial bone fractures, with a rate of approximately 40%. The reasons why they are frequently observed include anatomical location as well as thin membranous bone structure and thus a low fracture resistance against traumas (2).

The most common factors causing nasal trauma in developed countries are motor vehicle accidents and sports-related injuries, whereas the assault has become prominent in other countries. It has been reported that the

nasal bone fractures are frequently accompanied by other facial bone fractures in motor vehicle accidents (3).

In addition to aesthetic concerns, functional problems including smell disorders and difficulty in breathing through nose may develop in patients following nasal bone fractures (4). Therefore, in addition to aesthetic correction procedures for nasal bone, the treatment of the septum and other affected nasal structures that may cause functional problems should be planned in combination in these patients. The present study aimed to investigate the demographic characteristics of the patients with nasal fractures and their etiological causes and to present the characteristics of bone fractures, the treatment modalities, and additional pathologies in patients.

MATERIAL and METHODS

The study included 582 patients who were diagnosed with nasal fracture at the emergency room and treated and followed-up at the otorhinolaryngology clinic of the Aksaray University Training and Research Hospital, Turkey, between January 2014 and December 2019. The data were

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Corresponding Author: Serkan Cayir, Department of Otolaryngology, Head and Neck Surgery, Aksaray Training and Research Hospital, Aksaray, Turkey **E-mail:** drserkancayir@hotmail.com

obtained by screening the patient files retrospectively. The demographic characteristics, causes of trauma, time of admission to the hospital, type of fracture, other concomitant injuries, and treatments applied were analyzed. Patients with fractures in other facial bones and those who were not followed up regularly were excluded from the study. Based on appropriate indications, the patients were given standard treatments such as fluid intake, tetanus prophylaxis, antibiotics, analgesic therapy, cold/ice application, wound care, appropriate surgical procedures, and general trauma support. The first diagnoses of all patients were made by the emergency medicine specialist or otorhinolaryngologist. The closed reduction procedure was performed under sedoanalgesia and the open reduction procedure was performed under general anesthesia. Closed reductions were performed with the help of Asch septum straightening forceps, and open reductions were performed using rhinoplasty sets. Internal nasal silicone splints were taken after 3 days and external nasal splints were taken after 1 Week. The study commenced following approval from the Aksaray University Local Ethical Committee. The fractures were classified into five separate categories according to the description by Higuera et al (5). (Table 1).

Table 1. Classification of nasal bone fracture

Types	
Ia	Simple unilateral, non-displaced
Ib	Simple bilateral, non-displaced
II	Simple displaced
III	Closed comminuted
IV	Open comminuted
	In addition to the types
	Airway obstruction
	Septal hematoma
	Crush injury
	Severe displacement

Table 2. Characteristics of patients

Age (mean, years)	33.9 ± 6.11
Gender (female: male)	131:451
Fracture type (% , n)	
Ia	102 (17.6%)
Ib	63 (10.8%)
II	256 (43.9%)
III	91 (15.6%)
IV	70 (12.1%)
Treatment Modality (% , n)	
Observation	106 (18.2%)
Open Reduction	27 (4.6%)
Closed Reduction	449 (77.2%)

Statistical analysis

Descriptive statistics for continuous variables were expressed as mean and standard deviation and minimum and maximum values, whereas categorical variables were expressed as numbers and percentages. Chi-square test was used to determine the relationship between groups and categorical variables, and Student's t-test was used to compare group means of continuous variables. Data were analyzed using SPSS 21 (SPSS Inc., IBM company, Chicago). $P < 0.05$ was considered statistically significant. The patient characteristics are shown in Table 2.

RESULTS

Data of 582 patients who were treated due to nasal fracture were analyzed; 451 (77.5%) of patients were male and 131 (22.5%) were female. The age of patients was between 2 and 83 years (mean age: 33.9 ± 6.11 years). When the incidence of nasal fracture was examined by age groups, the highest incidence rate was seen in patients aged 16-40 years (328 patients), followed by those aged 0-15 years (122 patients), those aged 40-65 years (86 patients), and those aged >65 years (46 patients). The distribution of patients by seasons has revealed that the condition was most common in summer (283 cases, 48.6%), followed by spring (157 cases, 27%), autumn (83 cases, 14.2%), and winter (59 cases, 10.2%).

The most common etiologic factor in the development of nasal fracture by sex was assault (82% in males, 18% females), followed by traffic accident (58% in males, 42% in females), falling down from height (55% in males, 45% in females), firearm injuries (72% in males, 38% in females), and trauma from animals (55% in males, 45% in females). The most common etiologic factor in both sexes was assault in adults and sports injuries in children. There was no significant difference between the two sexes in terms of the causes of fracture ($p > 0.05$). The distribution of cases based on etiological factors is shown in Table 3.

Table 3. Etiological factors of nasal bone fracture

Etiology	%	N
Assault	35.7	208
Traffic accident	22.2	129
Falling - Crashing	13.1	76
Firearm injuries	10.5	61
Traumas from animals	10	58
Other	8.5	50
Total	100	582

The patients were admitted to the otorhinolaryngology outpatient clinic on an average of 2.9 days after the first diagnosis from the emergency department. The examination of treatment modalities has shown that the observation and closed reduction procedure were applied in 59.8% (61) and 40.2% (41) of patients with type Ia fracture, respectively, and in 50.7% (32) and 49.3%

(31) of patients with type Ib fractures, respectively. The observation was performed in only 3.2% (8) of patients with type II fracture, and the closed and open reduction procedures were performed in 94.5% (242) and 2.3% (6) of such patients, respectively. The observation, closed reduction, and open reduction procedures were performed in 3.3% (3), 86.8% (79), and 9.9% (9) of patients with type III fracture, respectively, and in 2.8% (2), 80% (56), and 17.2% (12) of patients with type IV fracture, respectively. The examination of posttreatment complications has revealed that 41 patients (7.1%) developed nasal congestion, 53 patients (9.1%) developed deformity, and five patients (0.9%) developed smell disorders, and these complications were increased in proportion to the severity of fracture. It was observed that the complication rate was low in Type I (1.2%) and Type II (1.8%) fractures, while this rate was 5.1% in Type III fractures and 8.9% in Type IV fractures.

DISCUSSION

The most complex and distinctive part of the characteristic of individuals' physical appearance is facial shape, and the nose is the most important part of this appearance. Due to its protruding structure, the nose is susceptible to injuries, making the nasal bone fracture the most common type of fracture among facial fractures (6). In addition, since bone or cartilage traumas that cause deformity in nose have a significant impact on facial aesthetics and nasal functionality, the diagnosis and treatment of these traumas play an important role. The incidence rates vary by social lifestyles, habits, level of development, and educational level of societies (7).

Some previous studies have shown that nasal fractures are more common in males than females (8,9). In our study, the incidence rate of nasal fracture was significantly higher in males than females ($p < 0.05$). In another study examining nasal fractures by age, the highest incidence rate was in patients aged 20–30 years (31.8%), followed by those aged <20 years (22.3%), those aged 30–40 years (19.7%), and those aged 40–50 years (16.1%) (6). The study by Oh et al. has reported that the highest incidence rate was in patients aged 20–30 years (31.7%), followed by 22.6% in those aged <20 years, 20% in those aged 30–40 years, and 16.1% in those aged 40–50 years (10). Many studies in the literature have reported that males and patients aged 15–40 years have a high incidence rate of nasal fracture. In our study, we found that nasal fractures are more common in patients aged 16–40 years (56.4%) and male sex (77.5%), which is consistent with the literature. The labor force participation and greater participation in violence and physical activities of the male population at this age is considered as the reason for this increased incidence (2).

Etiologic factors in nasal fractures vary by sex, age, and regional factors. A study has reported that the most common etiologic factors in the development of nasal fracture were fighting (36.3%) and traffic accident (20.8%) in adults and sports injuries (59.3%) in children(11). In our

study, the most common factor was assault (34.8%) in adults and sports injuries (43.9%) in children.

Although closed reduction procedure is generally sufficient in the treatment of nasal fracture, there is no consensus on the timing of treatment (12). A study by Harrison et al. (13) has reported that the appropriate time for the reduction procedure was 5–10 days for adults and 3–7 days for children. Another study by Rohrich et al.(12). has suggested that it is appropriate to perform the treatment within 7 days. In another study, it has been stated that reduction of nasal fractures with multiple fracture lines would be more appropriate 2 weeks after trauma (14). In our study, we found that the reduction procedure was performed within an average of 5.9 days. For minor fractures that have no effect on the aesthetic face shape, surgery was not performed and patients were followed up for complications. We believe that it is important to make a comprehensive evaluation after the reduction of edema and to evaluate the effect of fracture on the face shape in detail. We recommend planning surgical intervention when it is considered that the condition may cause deformity.

The study by Hwang et al. examining the complications following nasal bone fractures has reported that nasal deformity (10.4%), nasal congestion (10.5%), septum deviation (10%), diplopia (3.1%), epiphora (3.1%), and smell disorders (37.7%) developed in the patients (15). In addition, since the olfactory cells are located in the medial part of upper concha and the superior part of nasal cavity, which are mostly damaged sections during a closed reduction procedure, a loss of sense of smell may be observed after the surgical procedure (16). In our study, we detected nasal congestion in 41 patients (7.1%), deformity in 53 patients (9.1%), and smell disorders in five patients (0.9%).

The main limitation of our study was the limited number of data obtained from the medical records of the patients due to the retrospective nature of the study. However, this study may provide an inspiration for clinicians in the management of patients with nasal fractures

CONCLUSION

In conclusion, nasal fractures are a common fracture type in all age groups and in both sexes, particularly in males and those aged 20–30 years. Reduction procedures performed within the first 2-week post trauma lead to very successful results.

Competing interests: The authors declare that they have no competing interest.

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