



# Analysis of patients with isolated nasal fracture applied to emergency service

## Acil servise başvurmuş izole nazal fraktürlü hastaların analizi

Ceyhun Aksakal,<sup>1</sup> İzzettin Ertaş,<sup>2</sup>

<sup>1</sup>Department of Otolaryngology, Tokat State Hospital, Tokat, Turkey

<sup>2</sup>Department of Emergency Medicine, Tokat State Hospital, Tokat, Turkey

### Abstract

**Introduction:** The aim of this study is to investigate the relationship between etiologic factors and fracture types of patients underwent nasal fracture reduction due to nasal fracture and applied to emergency service.

**Methods:** In this study, we evaluated 74 patients who underwent nasal fracture reduction due to isolated nasal fracture. Patients were classified as two groups according to Stranc and Robertson classification: Frontal impact group type 1 (FI), Frontal impact group type 2 (FII), Lateral impact group type 1 (LI), Lateral impact group type 2 (LII), Communitated fracture group (C).

**Results:** The mean age of the patients was 25.17. The most common types of fractures were FI (n=20), LI (n=20), LII (n=17), C (n=12) and FII (n=5). The most common cause of injury was fights (n=30), falls (n=27), traffic accidents (n=8), sports events (n=6), and occupational accidents (n=3). The two most common symptom findings were swelling (70.2%) and epistaxis (16.2%). Septal fractures were seen in 24.3% of patients and septal hematomas in 35.13%.

**Discussion and Conclusion:** LII type fractures are the most commonly seen in fighting events, LI type is the most common type of fall events, and C type fractures are the most common in traffic accidents and occupational accidents. The fight is also the most common cause of nasal fractures in young patients.

**Keywords:** Emergency; nasal fracture; tomografi.

Since the nose is an organ in the middle of the face, it is one of the most exposed structures to trauma. Nasal fractures (NF) may be isolated or seen with other fractures such as zygoma, mandible and orbita fracture. NF is present in 40% of maxillofacial fractures.<sup>[1]</sup> The most common causes of NF are falling, fighting, traffic accidents and sporting events.<sup>[2]</sup>

### Özet

**Amaç:** Bu çalışmanın amacı acil servise başvurmuş ve nazal fraktür nedeniyle nazal fraktür redüksiyon yapılmış hastaların etyolojik faktörlerinin kırık tipleriyle ilişkisini araştırmaktır.

**Gereç ve Yöntem:** Biz bu çalışmada izole nazal fraktür nedeniyle nazal fraktür redüksiyonu uygulanmış 74 hasta değerlendirdik. Hastalar Stranc ve Robertson sınıflaması kullanılarak Frontal etki grubu tip 1 (FI), Frontal etki grubu tip 2 (FII), Lateral etki grubu tip 1 (LI), Lateral etki grubu tip 2 (LII), Parçalı kırık grubu (C) olmak üzere sınıflandırıldı.

**Bulgular:** Hastaların yaş ortalaması 25,17 idi. En sık görülen kırık tipleri sırasıyla FI (n=20), LI (n=20), LII (n=17), C (n=12), FII (n=5) idi. En sık başvuru nedeni sırasıyla kavga (n=30), düşme (n=27), trafik kazası (n=8), spor olayları (n=6), iş kazası (n=3) idi. En sık iki ana semptom bulguları şişme (%70,2) ve epistaksis (%16,2) idi. Septal fraktür hastaların %24,3 ünde, septal hematoma ise %35,13 ünde görüldü.

**Sonuç:** Kavga olaylarında en sık LII tip kırık, düşme olaylarında en sık LI tip, trafik kazası ve iş kazalarında en sık C tip kırık görülmektedir. Genç hastalarda nazal fraktürün en sık nedeni kavgadır.

**Anahtar Sözcükler:** Emergency; nasal fracture; tomography

Nasal trauma can cause cosmetic and functional disorders. Depending on the nasal fracture type, the type of attempt to be made may vary. While closed reduction may be sufficient for fractures affecting unilateral, bilateral or nasal septum in small quantities, operations involving rhinoplasty may be necessary for advanced deformities.<sup>[3]</sup>



The aim of this study is to investigate the relationship between etiologic factors and fracture types of patients underwent nasal fracture reduction due to nasal fracture and applied to emergency service.

## Material and Method

### Study design and setting

Local ethic committee approval was obtained for this cross sectional retrospective study. Medical records of patients who had isolated nasal fracture and closed reduction and applied to Tokat State Hospital Emergency Department between 3 November 2016 and 6 November 2017 were examined. Approximately 200000 applications are made to our hospital's emergency service per year.

### Participants, examination and surgical technique

The data of patients were collected based on case history, clinical and radiographic findings. Cases with inadequate information, patients with facial fracture with nasal fracture excluded from study. A total of 249 patients with maxillofacial fracture applied to our emergency clinic between 3 November 2015 and 6 November 2017 according to medical records. From these patients 112 isolated nasal fractures was identified. After applying exclusion criteria 74 patients included this study. Nasal cavities findings with anterior rhinoscopy and nasal endoscopy and cases with edema outer side of the nose, edema and hyperemia in the nasal mucosa, bleeding foci, septal fracture, septal hematomas were reviewed. Computerized tomography in preoperative period was used to classify fracture types of patients (Fig. 1). All patients underwent nasal fracture reduction under sedation or general anesthesia by an otolaryngologist in the operating room. Prior to reduction, cotton containing 1% lidocaine and 0.01% adrenaline was applied to both nasal cavities. Boies elevator were used for closed reduction. In order to fix the fractured bones after the reduction, merocel buffer was applied to the nasal cavities of all patients and thermal splint was applied to the outer part. Internal buffer was removed 2–3 days after operation and outer buffer was removed 5–7 days after operation. These surgical practices are the routine practice in our clinic for nasal fracture reduction.

The type of trauma were categorized to five class: Fall, Fight, Sport-related accident, Traffic Accident, Work Related Accident.

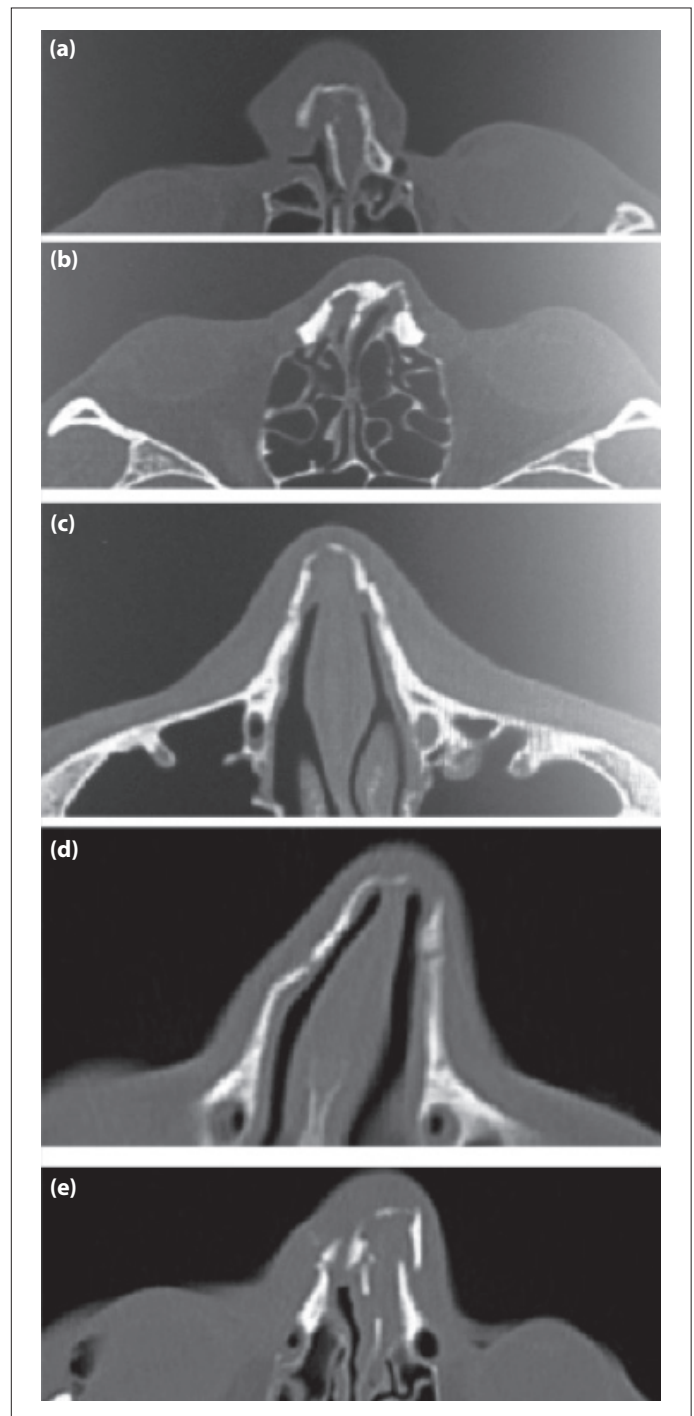
Patients were classified according to Stranc and Robertson's nasal fracture types,<sup>[4]</sup> (Fig. 2):

Frontal Impact Group Type 1 (FI): Only on the lower part of the nasal bone

Frontal Impact Group Type 2 (FII): Proximal part of nasal bone and frontal process of maxillary

Lateral Impact Group Type 1 (LI): Movement of the nasal bone to the unilateral nasal cavity

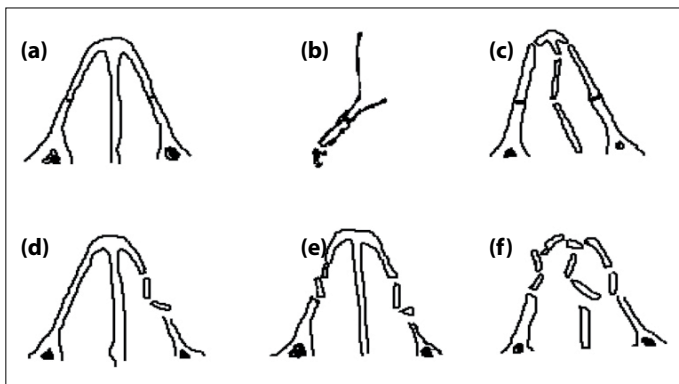
Lateral Impact Group Type 2 (LII): Outward displacement of



**Figure 1.** Preoperative computed tomographic (CT) images of nasal bone fractures according to five types. **(a)** Preoperative CT image of frontal impact group type 1. **(b)** Preoperative CT image of frontal impact group type 2. **(c)** Preoperative CT image of lateral impact group type 1. **(d)** Preoperative CT image of lateral impact group type 1. **(e)** Preoperative CT image of comminuted fracture group.

a part of the ipsilateral nasal bone, displacement of the contralateral nasal bone

Comminuted Fracture Group (C): Multiple fractures with nasal bone collapse



**Figure 2.** Graphical representation of nasal bone fracture pursuant to the Stranc-Robertson classification. (a) Normal nasal bone. (b) FI type. (c) FII type. (d) LI type. (e) LII type. (f) C type.

Patients age, gender, time to application to emergency service, days of reduction and days of fracture, distribution by month and complications after NF were also reviewed.

## Results

### Demographics and clinical findings

A total of 74 patients were evaluated in the study. 57 of the patients were male and 17 were female. Age of the patients ranged from 5 to 70 years and the mean age of all patients was  $25.17 \pm 15.14$  (Table 1).

A total of 52 (70.2%) swelling cases around the nose was seen in the patient while 12 (16.2%) patients had epistaxis. Septal fractures were seen in 18 patients (24.3%) while septal hematomas were present in 26 patients (35.13%). Septal fractures were seen in FII group in 5 (100%) patients and C in 7 (58.3%) patients. The rates of septal fractures in groups FII and C were higher than in groups FI, LII and LLI. Septal hematoma was higher in group C and FI group than the other groups. ( $n=9$ ; 75%,  $n=3$ ; 60%, respectively), (Table 2).

The cause of nasal fracture was 30 fights, 27 falls, 8 traffic accidents, 6 sport activities and 3 work accidents (Table 1).

**Table 1. Patients demographics, type of nasal fracture and causes of nasal fracture**

| Type of nasal fracture | FI    | FII | LI   | LII   | C     | Total |
|------------------------|-------|-----|------|-------|-------|-------|
| Sex                    |       |     |      |       |       |       |
| Male                   | 14    | 2   | 14   | 16    | 11    | 57    |
| Female                 | 6     | 3   | 6    | 1     | 1     | 17    |
| Mean age               | 21,35 | 51  | 24,4 | 22,17 | 26,33 | 25,17 |
| Cause                  |       |     |      |       |       |       |
| Fall                   | 8     | 3   | 10   | 3     | 3     | 27    |
| Fight                  | 7     | 1   | 8    | 11    | 3     | 30    |
| Sports                 | 3     | 0   | 1    | 2     | 0     | 6     |
| Traffic accident       | 2     | 0   | 1    | 1     | 4     | 8     |
| Work-related           | 0     | 1   | 0    | 0     | 2     | 3     |
| Total                  | 20    | 5   | 20   | 17    | 12    | 74    |

FI: Frontal impact group type I; FII: Frontal impact group type II; LI: Lateral impact group type I; LII: Lateral impact group type II; C: Comminuted fracture group.

### Types of fractures

FI type fractures were seen in 20 patients out of 74, FII type fractures in 5 patients, LI type fracture in 20 patients, LII type fractures in 17 patients and C type fractures in 12 patients (Table 1). When considering proportionally, FII type fractures were more frequent in females whereas FI, LI, LII and C fractures were more common in males (Table 1). When the relationship between the fracture types due to fracture was examined, the most frequent fracture was LI type fracture in falls, LII fracture in fights, FI in sport events, C in traffic accidents, C type fractures in occupational accidents ( $n=10$ ,  $n=2$ , respectively), (Table 1).

### Other findings

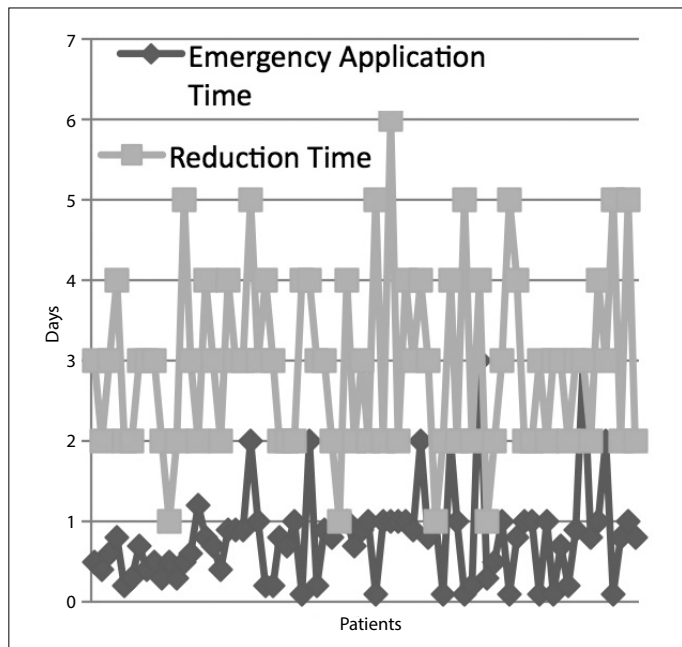
Average application time for the emergency department was found to be 0.8 days and the reduction time was 2.9 days (Fig. 3).

According to the months, the rate of fractures was seen most frequently in May and June because of nasal fracture, and the application was the least in April (Fig. 4).

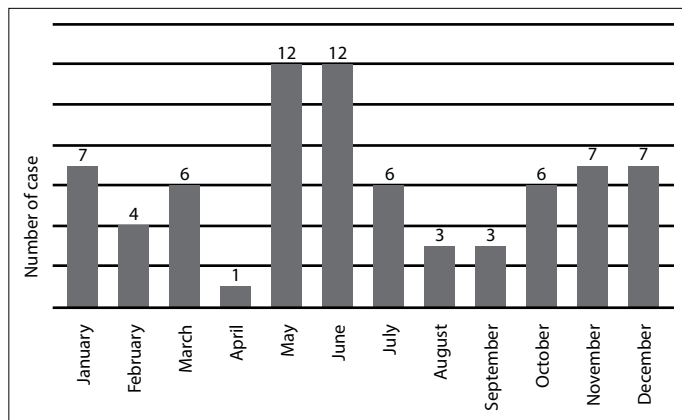
**Table 2. Relation of nasal fracture types with symptoms and septal fracture, physical examination findings**

| Type of fracture | Symptoms |      |           |      | Physical examination findings |      |                 |       | Total |
|------------------|----------|------|-----------|------|-------------------------------|------|-----------------|-------|-------|
|                  | Swelling |      | Epistaxis |      | Septal fracture               |      | Septal hematoma |       |       |
|                  | n        | %    | n         | %    | n                             | %    | n               | %     |       |
| FI               | 13       | 65   | 2         | 10   | 1                             | 5    | 4               | 20    | 20    |
| FII              | 3        | 60   | 3         | 60   | 5                             | 100  | 3               | 60    | 5     |
| LI               | 12       | 60   | 1         | 5    | 3                             | 15   | 4               | 20    | 20    |
| LII              | 12       | 70,5 | 2         | 11,7 | 4                             | 23,5 | 6               | 35    | 17    |
| C                | 12       | 100  | 4         | 33,3 | 7                             | 58,3 | 9               | 75    | 12    |
| Total            | 52       | 70,2 | 12        | 16,2 | 18                            | 24,3 | 26              | 35,13 | 74    |

FI: Frontal impact group type I; FII: Frontal impact group type II; LI: Lateral impact group type I; LII: Lateral impact group type II; C: Comminuted fracture group.



**Figure 3.** The time of application to emergency and the time of closed reduction of patients.



**Figure 4.** Distribution of nasal fractures according to the month.

## Discussion

Nose is the most affected organ in traumas. Often, studies have less coverage of isolated nasal fractures within other facial fractures. This study focuses on nasal fractures that constitute the majority of maxillofacial trauma cases.

In our study, the most common cause of nasal fractures were falling and pounding. Traffic accidents and sports injuries are less common cause of nasal fractures. When the characteristics of the fractures are examined, falls are the most common cause in women, while fights are the most common cause in men. In addition, another interesting characteristic of our study is that more fractures of type FI and FII were seen in women and fractures of type C, LI and LII were seen more frequently in males. FI and FII type fractures are a condition where the upper nasal bone is affected, LI and LII are the cases mostly affected by lateral nasal bones. In the event of a fall,

the most frequently affected part of the nose is the upper side. However, the lateral sides of the nasal bone are more affected by pounding. This can be explained by the fact that men are found more in the outdoors and more in the environment of violence. In a study by Kang et al. on 313 patients with isolated nasal fractures, trauma and fall were found as the most common cause of fracture. However, traffic accidents were higher in this study than in our study.<sup>[1]</sup> In the study of Çil et al., fights and falls were again found as the most frequent causes.<sup>[5]</sup> In studies conducted on maxillofacial traumas have usually found traffic accidents and falls as the cause of multiple facial fractures.<sup>[6,7]</sup> This difference can be explained by the severity of the traffic accident. Also in our study, C type nasal fractures were most commonly seen in traffic accidents. This shows that the most traumatic etiology on the nose is traffic accidents.

There is no generally accepted classification in the literature regarding the classification of nasal fractures. In this study, classification proposed by Stranc and Robertson was used in the classification of nasal fractures. FI and LI type nasal fractures were found most frequently in this study. FI type fracture was found to be more frequent in fall events and LI type fracture was found more frequent in fight events. LII type fracture was again more frequent than in other types in fighting cases. Nishioka et al. classified nasal fractures as bilateral, unilateral, frontal, and frontal/lateral mixed in their studies. Bilateral type nasal fractures were most frequently seen in their study.<sup>[8]</sup> In fact, when two classifications are compared, it is seen that the LII type fracture corresponds to the bilateral type fracture and the unilateral type fracture corresponds to the LI type fracture. However, it is seen that the frontal and frontal/lateral mixed type fracture does not exactly correspond to the classification used by Stranc Robertson.<sup>[4]</sup> In the classification used by Stranc and Robertson, it was seen that the evaluation of the frontal part fractures is more detailed and useful.

Although there is no consensus about the timing of nasal fracture repair, repair is usually recommended within 2 weeks.<sup>[9,10]</sup> Although some studies have suggested that the earlier the reduction after trauma, the better functional and anatomic results will be obtained, Perkins et al.'s study of the timing of nasal fracture repair did not find any difference in the reduction success at any time within 2 weeks.<sup>[11]</sup> However, the same study did not mention situations such as septal hematoma and septal fracture accompanying nasal fracture. In our study, the reduction was performed on the sixth day after the fracture. However, generally reduction was applied within 3 days. However, from our standpoint, early reduction is more important in terms of patient comfort in nasal fractures, especially with septal hematoma.

It is a known fact that traumatic events are known to increase in the summer. Increase in the frequency of presence in the social environment and the increase in the time spent in the external environment affect this situation. In our study, nasal fractures were seen mostly in May and June, as a confirmation. Similarly, other studies in the literature have found that nasal trauma is most common during the summer months.<sup>[5,12]</sup>

## Conclusion

Nasal fractures with an urgency affect etiologic cause of nasal fracture. Septal fractures and septal hematomas are commonly seen, especially in traffic accidents and occupational accidents.

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**Conflict of Interest:** There are no relevant conflicts of interest to disclose.

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