



Facial Bone Fracture Patients Visiting Pusan National University Hospital in Busan and Yangsan: Trends and Risks

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Abstract

Purpose: This study examined patients with facial bone fracture visiting Pusan National University Dental Hospital to understand the trends, and to enhance appropriate care and treatment for patients with facial bone fracture.

Methods: We investigated 531 patients presenting with facial bone fracture in Yangsan and 802 patients in Busan from January 2010 to December 2013. We divided the patients by year, month, gender, age, site, and cause to compare with historic data and other studies.

Results: The gender ratio was 3.58:1 in Yangsan and 4.31:1 in Busan. Patients aged in their 20s had the highest number of facial bone fractures in both Yangsan and Busan. The most frequent fracture site was the mandible, and the most frequent cause was slip down in both Yangsan and Busan.

Conclusion: The investigation and comparison of patients with facial bone fracture who visited Pusan National University Hospital located at Yangsan and Busan from 2010 to 2013 found a difference in the total number of patients at each hospital, but the trends were not significantly different.

Key words: Bone fractures, Facial bones, Maxilla, Mandible, Zygoma

Introduction

In oral and maxillofacial surgery, facial bone fracture is a common trauma, resulting from traffic accident (TA), assault, slip down, or industrial accident. If the facial bone fracture is not appropriately treated, the result may be functional disability and an aesthetic problem. In some cases, a fatal emergency may develop. Bell[1] reported that mortality rate due to head and neck injuries is the highest cause of death under 34 years old. Since there are many emergency circumstances requiring appropriate and immediate

treatment, many clinical studies have investigated the trends and characteristics.

Generally, the risk of facial bone fracture is increased by population, traffic, exercise, and leisure activity with differences by age, gender, cause, and site. The research literature is rich on this topic, and results vary by social, regional, and cultural conditions of study populations.

This study examined patients with facial bone fracture visiting a Dental Hospital of Pusan National University Hospital after January 2010—divided into the Dental Clinic Center of Pusan National University Hospital at Ami-dong,

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Busan and Pusan National University Dental Hospital at Yangsan—and investigated the distribution by period, age, gender, site, and cause. We compared these data with previous data to understand the trends, and performed an observational study to enhance appropriate care and treatment for patients with facial bone fracture.

Materials and Methods

The targets of this study were the patients with facial bone fracture who visited the Department of Oral and Maxillofacial Surgery of Pusan National University Dental Hospital located in Yangsan and the Dental Clinic Center in Pusan National University Hospital located in Busan from January 2010 to December 2013. Based on their charts, the patients were classified by year, month, gender, age, site, and cause. The sites were categorized by maxilla, mandible, zygoma, nasal bone, and orbital cavity following Schultz[2]. Exclusion criteria included fracture with limitation of alveolar bone, fracture of teeth, trauma with limitation of soft tissue, and death of patient without any treatment for the injuries of facial bone before the death. And, this study protocol was reviewed and approved by Pusan National University Dental Hospital Institutional Review Board.

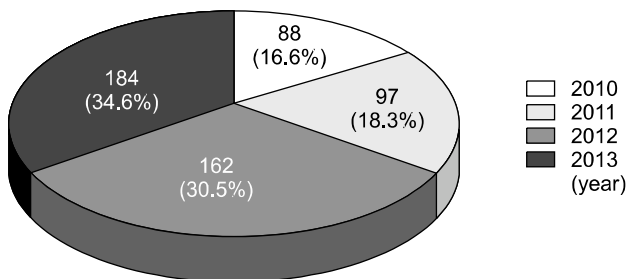


Fig. 1. Year distribution of number of patients in Yangsan.

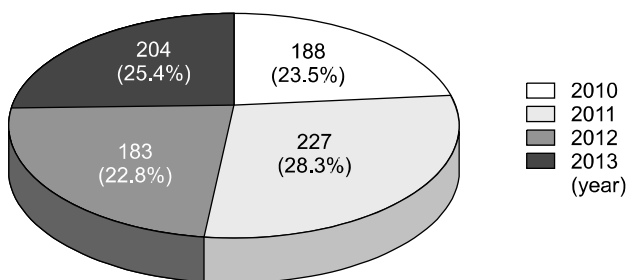


Fig. 2. Year distribution of number of patients in Busan.

Results

1. Distribution by year

This study investigated 531 patients with facial bone fracture in Yangsan and 802 patients in Busan. The number of patients continuously increased after 2010 in Yangsan, while a similar number of patients was counted in each year in Busan (Fig. 1, 2).

2. Distribution by month

The number of patients by month in Yangsan was the highest in March at 11.5%, followed by June and September (Fig. 3). In Busan, the highest number was in April at 10.5%, followed by June and October (Fig. 4). However, special trends were not observed at either hospital.

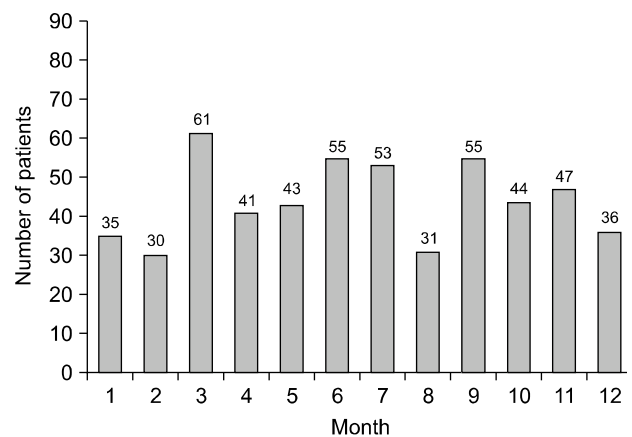


Fig. 3. Month distribution of number of patients in Yangsan.

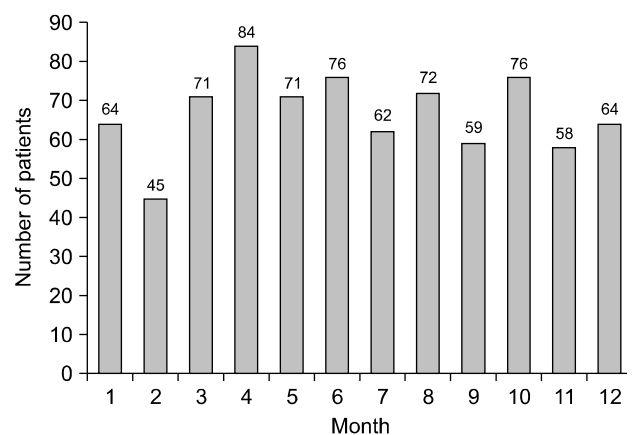


Fig. 4. Month distribution of number of patients in Busan.

3. Distribution by gender and the ratio

The number of males was the highest at both Yangsan and Busan, and the gender ratio of male and female was 3.58:1 in Yangsan and 4.31:1 in Busan (Fig. 5, 6).

4. Distribution by age

Regarding the distribution by age, the number in their 20s was the highest at 21.8%, followed by those in their 30s at 17.3% and in their 10s at 16.2% in Yangsan (Fig. 7). In Busan, the number in their 20s was the highest at 22.2%, followed by those in their 30s at 16.3% and in their 50s at 15.5% (Fig. 8).

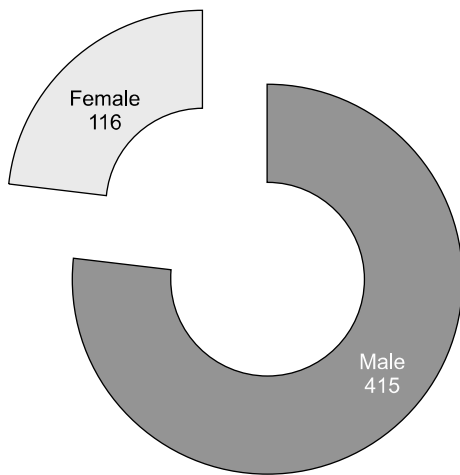


Fig. 5. Gender distribution in Yangsan.

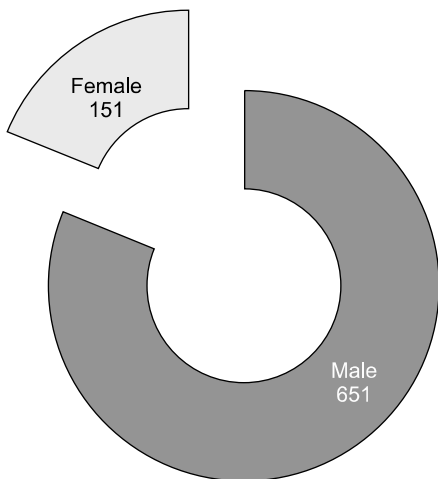


Fig. 6. Gender distribution in Busan.

5. Distribution by site of facial bone fracture

Regarding the distribution by site, mandible fracture was most common in Yangsan (46.7%), and in Busan (41.8%) (Fig. 9, 10). In Yangsan, the order occurrence was mandible, nasal bone, maxilla, zygoma, and orbital cavity; in Busan, the order was mandible, nasal bone, zygoma, orbital cavity, and maxilla.

6. Distribution by cause of fracture

Regarding the causes of fractures, slip down was most common (36.5%), followed by collision, TA, assaults, and fall down in Yangsan, and no patient had pathologic fracture (Fig. 11). In Busan, slip down was most common (33.7%), followed by collision, TA, assault, and fall down,

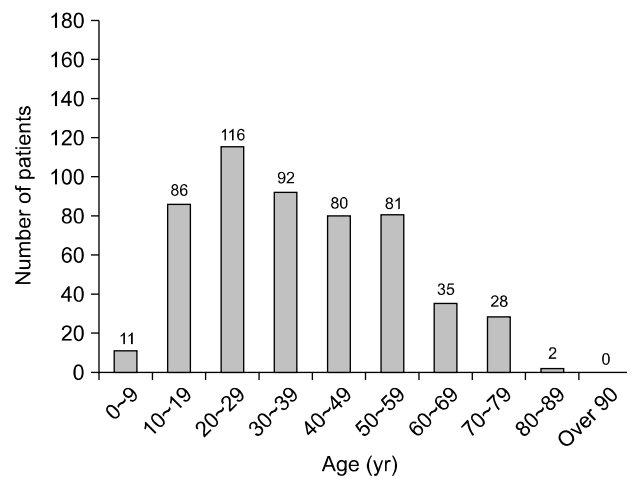


Fig. 7. Age distribution in Yangsan.

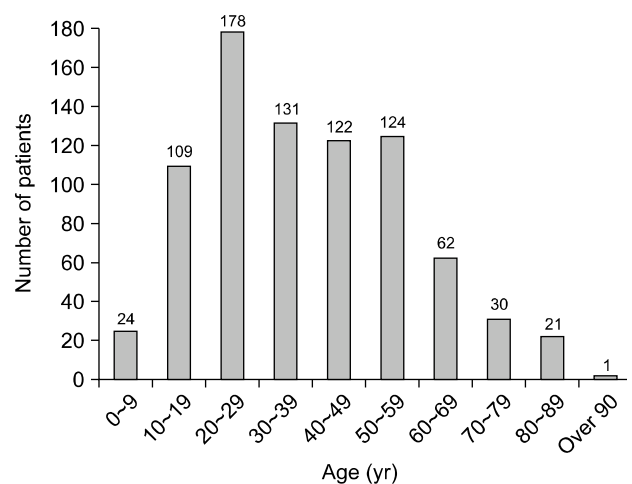


Fig. 8. Age distribution in Busan.

the same as in Yangsan, and there was one patient with pathologic fracture (Fig. 12).

Discussion

Our investigation and comparison of patients with facial bone fracture who visited Pusan National University Hospital at Yangsan and Busan from 2010 to 2013 found differences in the total number of patients at each hospital

but the trends were not significantly different. The number of patients who visited the hospitals investigated in this study was 531 in Yangsan and 802 in Busan. Generally, patients visited the hospital in Busan more than the hospital in Yangsan, presumably caused by difference of standard population in 2013 (3.56 million in Busan and 0.27 million in Yangsan). However, other explanations could be the difference in the number of hospitals, or accessibility to Yangsan from other areas of Gyeongsangnam-do province.

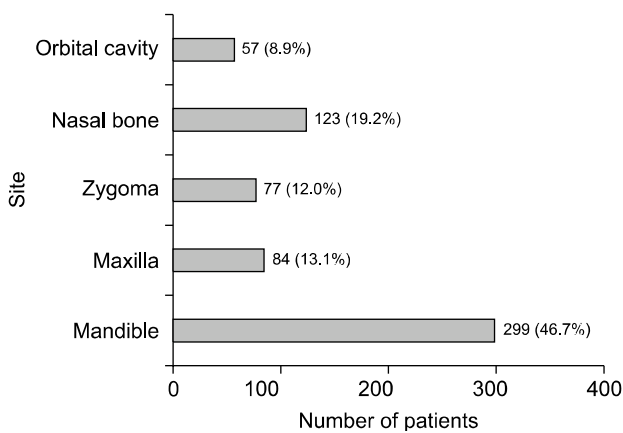


Fig. 9. Site distribution in Yangsan.

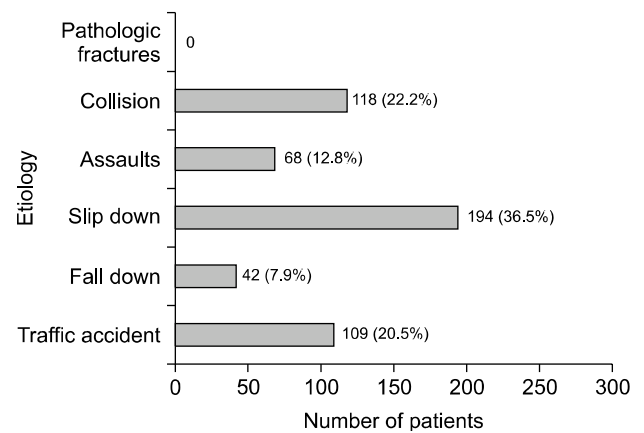


Fig. 11. Etiology distribution in Yangsan.

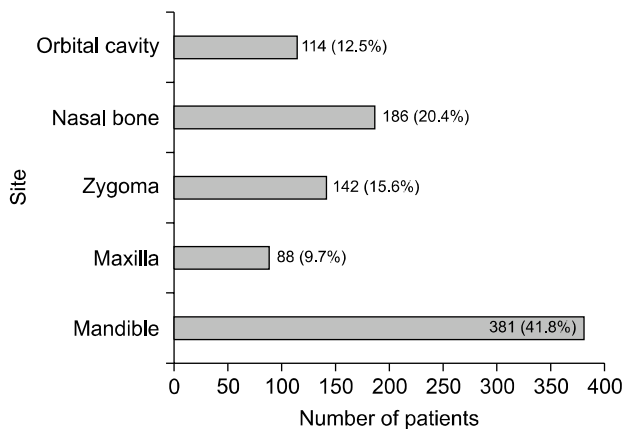


Fig. 10. Site distribution in Busan.

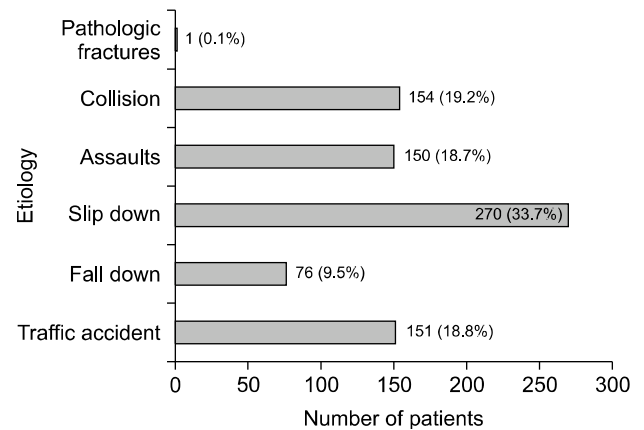


Fig. 12. Etiology distribution in Busan.

Table 1. Compared with previous years

| | Period | | | |
|----------------------|---------------------|---------------------|------------------|-------|
| | 1992~1996 (5 yr) | 1999~2003 (5 yr) | 2010~2013 (4 yr) | |
| | | | Yangsan | Busan |
| No. of Patients | 429 | 466 | 531 | 802 |
| Average no. per year | 86 | 93 | 133 | 201 |

Table 2. Compared with previous gender distribution and ratio

| Gender | Period | | | |
|----------------------|---------------------|---------------------|------------------|--------|
| | 1992~1996 (5 yr) | 1999~2003 (5 yr) | 2010~2013 (4 yr) | |
| | | | Yangsan | Busan |
| No. of male | 429 | 466 | 415 | 651 |
| No. of female | 86 | 93 | 116 | 151 |
| Male to female ratio | 4.6:1 | 3.9:1 | 3.58:1 | 4.31:1 |

Comparing the patients with facial bone fracture visiting the hospitals from 1992 to 1996 and from 1999 to 2003, the yearly average number of patients increased over two times (Table 1). Presumably this increase stemmed from the development of a regional emergency clinic center, a 1,339 emergency medical information center, and increased awareness of the citizens. Since the population of Busan was 3.81 million in 2000 and the total population decreased, we surmise that the number of patients was not proportional to the population. Comparing the monthly distribution to other publications from different regions, it was highest in July at 13.4% in Chuncheon according to Kim *et al.*[3], in September at 12.7% in Seongnam according to Oh *et al.*[4], in March at 10.7% in Masan according to Lee and Ro[5], and in July at 10.8%, and in Daegu according to Lee and Moon[6]. In this study, it was the highest in March at 11.5% in Yangsan and in April at 10.5% in Busan. According to Breytenbach[7], fractures occur in warm seasons, seen in several studies that found highest numbers in spring (when temperatures are rising) or summer (the hottest season).

The male:female ratio was 3.58:1 in Yangsan and 4.31:1 in Busan. The gender ratio in the standard population of 2013 was 1.01:1 in Yangsan and 0.98:1 in Busan, indicating that the rate of male in Busan was dominant over female although more females inhabit Busan, but the rate of female patients were higher than the male in Yangsan. Compared to previous data, facial bone fractures occur more often in males (Table 2). The gender ratio was similar to other studies indicating the ratio of facial bone fracture between male and female as 4:1 according to Kim *et al.*[3], 4.7:1 according to Oh *et al.*[8], 3.19:1 according to Oh *et al.*[4], 4.2:1 according to Jang and Jang[9]. Presumably there are more male drivers and males are more prone to violence, resulting in fractures, social activity, and drinking. As females take jobs with high risk and their social activity in-

creases, they are exposed to more risks of facial fracture, increasing the female ratio of fracture.

We noted that of the age groups, the highest numbers were patients in their 20s, followed by those in their 30s at both Yangsan and Busan, then those in their 10s in Yangsan and 50s in Busan. Age was normally distributed. Comparing with other studies, the highest rate in 20s is seen in many clinic studies such as domestic studies of Kim *et al.*[3] and Oh *et al.*[8], and overseas studies of Olson *et al.*[10] and Nakamura and Gross[11]. Presumably social activities increased in the 20s, with more exposure to beating, violence, drinking, driving that might cause fracture. Our old data also shows patients in their 20s with the highest number of fractures (Table 3). Following the high risk in the 20s, the rate decreased significantly. The number of patients with fracture in 10s, 30s, 40s, and 50s was similar at both Yangsan and Busan.

By sites, the mandible was the most frequent, followed by nasal bone at both Yangsan and Busan. In the older data, the mandible was the highest but the patients with nasal bone fracture were few (Table 4). Jang and Jang[9] reported that the cases of mandible were 59.3% but there were no isolated nasal bone fractures. Their explanation was that patients with isolated nasal bone fracture went to plastic surgery or otorhinolaryngology. The rate of patients with the isolated nasal bone fracture visiting this hospital was high since many came to this maxillofacial surgery. Comparative frequency of mandibular and maxillary fracture was variously reported as 9:1 according to Lee and Ro[5], 6.1:1 according to Rim *et al.*[12], and 3.3:1 according to Oh *et al.*[4] in domestic studies; and it was 3.56:1 in Yangsan and 4.33:1 in Busan according to this study.

In the distribution by causes, slip down was the highest at both Yangsan (36.5%) and Busan (33.7%), and collisions

Table 3. Compared with previous age distribution (%)

| Age of range (yr) | Period | | | |
|-------------------|------------------|------------------|------------------|-------|
| | 1992~1996 (5 yr) | 1999~2003 (5 yr) | 2010~2013 (4 yr) | |
| | | | Yangsan | Busan |
| 10~19 | 15.9 | 20.1 | 16.2 | 13.6 |
| 20~29 | 30.5 | 32.4 | 21.8 | 22.2 |
| 30~39 | 20.8 | 15.7 | 17.3 | 16.3 |

Table 4. Compared with previous site distribution (%)

| Fracture site | Period | | | |
|---------------|------------------|------------------|------------------|-------|
| | 1992~1996 (5 yr) | 1999~2003 (5 yr) | 2010~2013 (4 yr) | |
| | | | Yangsan | Busan |
| Mandible | 70.6 | 69.0 | 46.7 | 41.8 |
| Maxilla | 4.0 | 12.9 | 13.1 | 9.7 |
| Zygoma | 7.5 | 8.0 | 12.0 | 15.6 |
| Nasal bone | 4.0 | 7.0 | 19.2 | 20.4 |

Table 5. Compared with previous etiology distribution (%)

| Etiology | Period | | | |
|------------------|---------------------|---------------------|------------------|-------|
| | 1992~1996 (5 yr) | 1999~2003 (5 yr) | 2010~2013 (4 yr) | |
| | | | Yangsan | Busan |
| Traffic accident | 27.5 | 33.5 | 20.5 | 18.8 |
| Fall | 28.3 | 12.9 | 7.9 | 9.5 |
| Assault | 30.2 | 22.3 | 12.8 | 18.7 |
| Slip down | 11.4 | 18.0 | 36.5 | 33.7 |

and TA showed similar rate. Compared to our older data, assault was significantly less and slip down increased noticeably (Table 5). Our explanation is that the general psychological atmosphere of this society became more non-violent, but there may be many cases providing inaccurate medical history to hide the cause related to violence due to the medical insurance system. Also, TA was reported as the highest cause in many domestic and overseas studies but Park *et al.*[13], reported the highest causes in order of slip down, fall down, assault, and TA; Oh *et al.*[4] summarized the causes in order of slip down, fall down, TA, and assaults. In concentrated residential areas or with patients aged 10s to 20s, slip down and assault were more frequent causes than TA.

Conclusion

This study investigated and targeted patients with facial bone fracture visiting the Department of Oral and Maxillofacial Surgery of the Dental Clinic Center in Pusan National University Hospital located at Busan and of Pusan National University Dental Hospital located at Yangsan for outpatient department and emergency room from January 2010 to December 2013. Five-hundred and thirty-one patients with facial bone fracture visited Yangsan and 802 patients visited Busan. The gender ratio was 3.58:1 in Yangsan and 4.31:1 in Busan, showing that the male was dominant. The number of patients with fractures was the highest in 20s at both Yangsan and Busan and the next

was 30s. The site of fracture was highest in order of mandible, nasal bone, maxilla, zygoma, and orbital cavity in Yangsan and mandible, nasal bone, zygoma, orbital cavity, and maxilla in Busan. The commonest cause of fracture was slip down at both Yangsan and Busan and the next was in order of collision, TA, assaults, and fall down.

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