

Epidemiology of Facial Bone Fractures – A Three Year Retrospective Study

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Abstract

Facial bone fractures are commonly seen in road traffic accident patients and the unique aspect of facial injury treatment is that the restoration of appearance alone may be the main indication for treatment. The current study aims to investigate the patterns in the etiology, demographic distribution, nature of injuries, management and outcome. This is a hospital based retrospective study conducted from medical records/case files of 256 patients who were admitted in the Department of Plastic Surgery with facial bone fractures for three years between January 2015 and December 2017 at NRI general hospital & medical college, Chinakakani, Andhra Pradesh, India. The patient's data were compared in terms of age, the month of injury, gender, mode of injury, fracture patterns, and type of treatment given. Majority of the cases of facial injury were in the age group of 15 to 45 years with males being the predominant gender affected. The most common mechanism of trauma in this study was road traffic accidents followed by Fall and Assault. June and July months had peak incidence of facial injuries. Majority of the patients had mid-face fractures followed by pan-facial and mandibular fractures. Majority of the cases needed closed and open reduction, only a few were managed conservatively. All cases were performed at one institute by a single plastic surgeon.

Keywords: Facial fractures, facial bone injury, maxilla, mandible, zygoma.

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Introduction

Facial bone fractures are seen in a large number of trauma patients and are of significant importance both in terms of aesthetics and functionality. The unique aspect of facial injury treatment is that the restoration of appearance alone may be the main indication for treatment.

There have been numerous studies on the epidemiology of facial fractures dealing with etiology and fracture patterns. Previous studies reported road traffic accidents and falls as the leading causes of facial injuries [1-2]. The fracture site is mostly dependent on the mechanism of injury with interpersonal violence commonly reported to be associated with mandible fractures while automobile accidents result in more complex fractures because of the high-speed impact [3-4].

With areas of thin bone and sinuses, the face is designed to act as a shock absorber to help prevent trauma to critical neurologic structures behind it. Many patients with facial fractures have a concomitant intracranial injury, and some may also have cervical spine injuries [5]. According to a study, facial trauma is one of the common reasons for consulting a plastic surgeon [6].

Providing immediate and quality support to victims is an essential component of any response to facial injuries caused by any reason to prevent functional disturbances, and to reduce the amount of short & long-term disability [7].

When dealing with trauma, without a high degree of clinical suspicion and proper diagnostic equipment (CT scans with multiplanar reconstruction, panorex films) the diagnosis of facial bone fractures may be significantly delayed and may only be apparent once the swelling has subsided [7-8].

There appears to be a significant difference in the fracture patterns when comparing different geographical regions, basing on the demographic variables such as age, gender, mode of injury, and the fracture patterns. This necessitates a region-based study to understand the fracture patterns and mode of injury in that particular population. Understanding case burden ensures that adequate measures are set in place to deal with these kinds of trauma. Also, continuous long-term collection of data regarding the epidemiology is necessary for developing preventive measures that might reduce the incidence [9]. Present study was designed to investigate patterns in the etiology and nature of injuries seen in 256 patients over three years, recorded in NRI general hospital, Chinakakani, Andhra Pradesh, India.

Materials and Methods

This is a retrospective study conducted from the Medical records/Case files of 256 patients who were admitted in the Department of Plastic Surgery under a single plastic surgeon, with facial bone fractures for three years between January 2015 and December 2017 at NRI general hospital & medical college, Chinakakani, Andhra Pradesh, India (a tertiary care centre). Patients requiring early interventions from Neurosurgery and Orthopaedics departments were admitted under the concerned branch directly and hence were not included in the present study. Patients who were not admitted and were discharged directly from the emergency and trauma department were also not included. The patient's data were compared in terms of age, the month of injury, gender, mode of injury, fracture patterns, and type of treatment given. Fractures were recorded with X-rays/3D CT films done at the time of admission to the hospital to diagnose. Fracture patterns were assessed

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based on the anatomical location of the injury. Mandibular fractures were grouped as fractures to the body, condyle, ramus, symphysis and angle. Midfacial fractures were classified as fractures to maxillary sinus wall, orbit, zygoma, nasal bone, le fort 1, le fort 2, le fort 3, palatine, dentoalveolar regions. Fractures involving the upper, middle and lower regions of face were studied as panfacial fractures. The isolated fractures were studied separately and these included fractures to the mandible, nasal bone, zygoma, maxilla, orbit and frontal bone. Also fractures. The data was entered into MS Excel and was analyzed using IBM Statistical Package for the Social Sciences (SPSS)

software trail student version 21, and Results were presented in numbers and frequencies.

Results

Demographic distribution

This retrospective study included 256 patients of all age groups, with age ranging from 7-75 years with the mean age of 30years. Majority of the cases of facial injury were in the age group of 15 to 45 years (87.5%), with young age predominance which is 15-25 years (n= 100, 39%), followed by 26 to 35 years (n=84, 32.8%) and 36 to 45 years. (n=40, 15.5%) [Table1]. Male gender predominated significantly (n=248, 96.9%) in this study (Figure-1).

Table 1: Age Distribution among Study Population

AGE CATEGORIES IN YEARS	FREQUENCY	PERCENTAGE
UPTO 14	4	1.6%
15 TO 25	100	39.1%
26 TO 35	84	32.8%
36 TO 45	40	15.6%
46 TO 55	18	7.0%
56 TO 65	8	3.1%
ABOVE 65	2	.8%
Total	256	100.0%

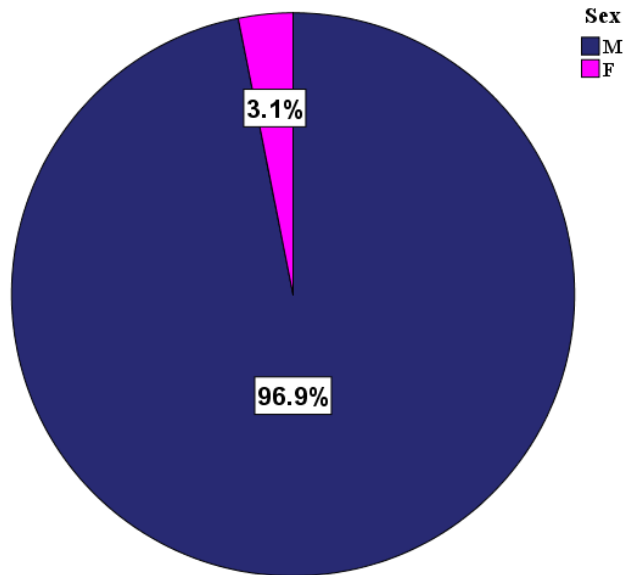


Figure 1: Gender Distribution among the Study Population

Distribution of injuries in a calendar year was assessed. Peak incidence was seen during June and July (11.7% and 10.9% respectively) followed by March (10.9%) and January (10.2%) months, and lowest frequency of injuries (4.7%) was seen in May and August [Table-2].

Table 2: Injuries in Relation with Months in a Year

MONTH OF INJURY	FREQUENCY	PERCENTAGE
JAN	26	10.2%
FEB	18	7.0%
MAR	28	10.9%
APR	20	7.8%
MAY	12	4.7%
JUN	30	11.7%
JUL	28	10.9%
AUG	12	4.7%
SEP	24	9.4%
OCT	14	5.5%
NOV	24	9.4%
DEC	20	7.8%

The most common mechanism of trauma in this study was road traffic accidents (n=236, 92%) followed by Fall (n=18, 7%) and Assault (n=2, 1%) [Figure2].

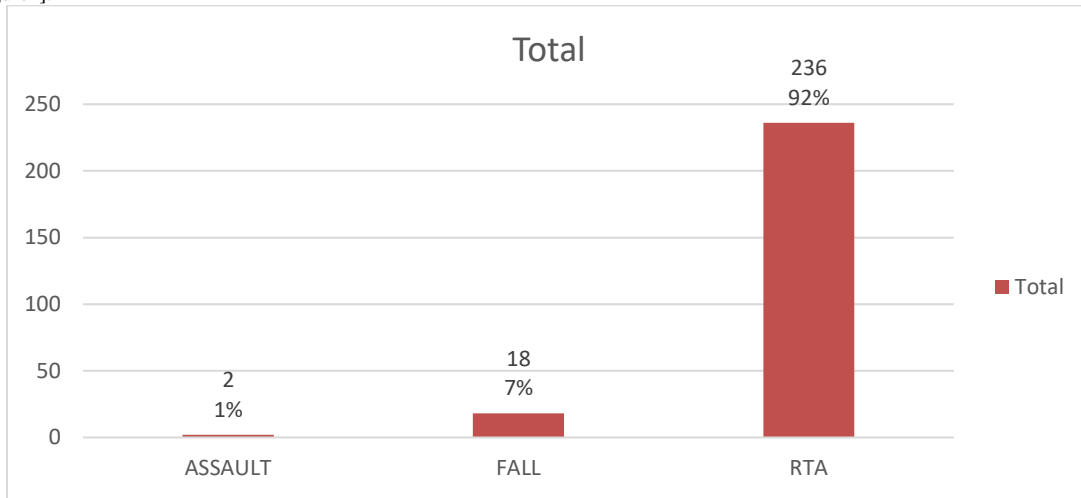


Figure 2: Mode of Injury among the Study Population

Facial fractures patterns

Out of the 256 patients analyzed majority (90.6%) had Midface fractures, and Pan-facial were seen with 60.9% of cases. [Figure3].

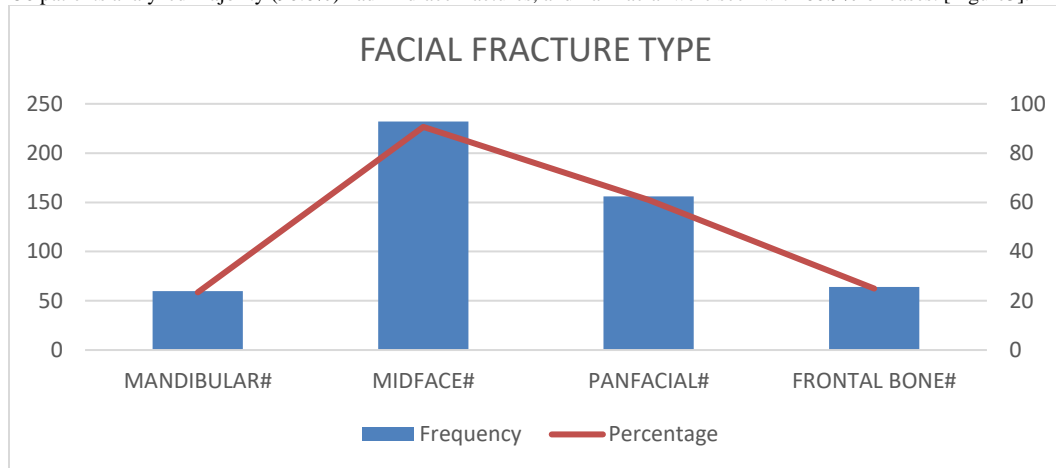


Figure 3: Site Of Facial Fracture among the Study Population

In mandible fractures (n=60), majority had fracture of Body (n=44, 17.2%) followed by Condyle fracture (n=24, 9.4%) followed by Ramus (n=18, 7%) along with other fractures [Table-3]. In Mid face fractures (n=232, 90.6%) majority had Maxillary sinuses (n=152, 59.4%) followed by Orbital (n=144, 56.3%) & Zygoma (n=142, 55.5%) involvement. Nasal bone was involved in nearly half of cases (n=114, 44.5%) and Le Fort type-3 fracture (12.5%) was slightly predominant over Le Fort -1(9.4%) and le Fort-2(9.4%) [Table3].

Table 3: Site of Fracture in Mandible & Mid Face Injuries among the Study Population

	Fracture Site	Frequency	Percentage
MANDIBLE	BODY	44	17.2%
	CONDYLE	24	9.4%
	RAMUS	18	7.0%
	SYMPHYSIS	8	3.1%
	ANGLE	2	.8%
MID FACE	MAXILLARY SINUS	152	59.4%
	ORBITAL	144	56.3%
	ZYGOMA	142	55.5%
	NASALBONE	114	44.5%
	LEFORT 1	24	9.4%
	LEFORT 2	24	9.4%
	LEFORT 3	32	12.5%
	PALATINE	22	8.6%
	DENTOALVEOLAR	18	7.0%

Facial Fractures (Isolated)

There were only 64 isolated bone fractures. Isolated Mandibular and Nasal bone fractures were more (n=16, 6.3% for each) followed by isolated zygoma fractures (n=14, 5.5%) followed by isolated frontal bone fracture (n=8, 3.1%), followed by isolated orbital bone fracture (n=6, 2.3%) followed by isolated Maxillary bone fracture (n=4, 1.6%). There were no isolated fractures seen in palatine and Dento-Alveolar Le Fort fracture planes [Figure-4].

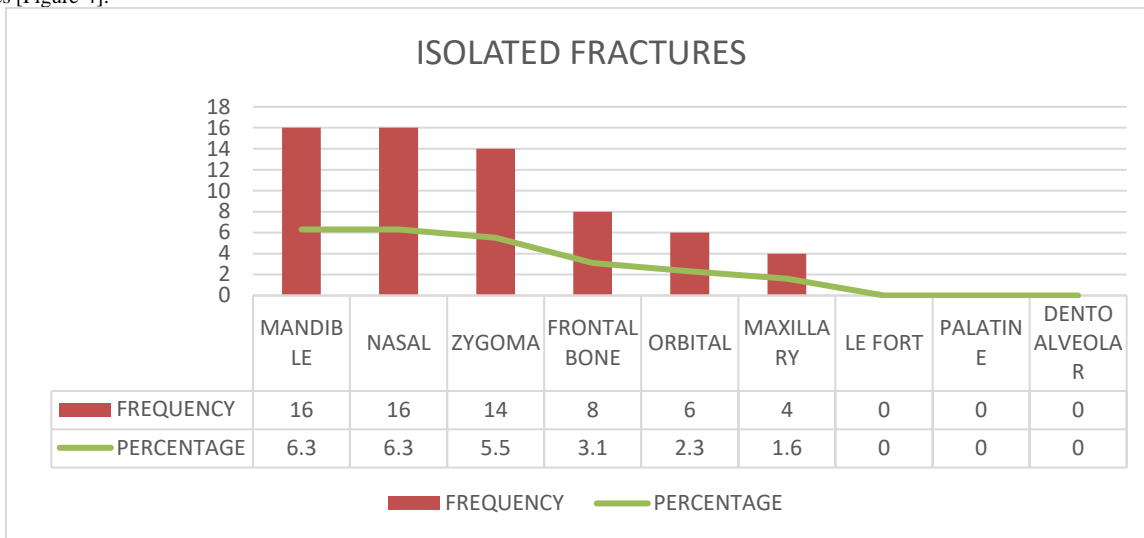


Figure 4: Isolated Facial Fracture among the Study Population

Management

Majority of the cases were treated by open reduction and internal fixation with plating and screw fixation as necessary and with postoperative soft, non-chew diet. Closed reduction only was performed in 5 cases. 10.5% of the cases were conservatively managed.

Table 4: Management of Injuries with Face Fractures among the Study Population

MANAGEMENT	FREQUENCY	PERCENTAGE
CONSERVATIVE	27	10.5%
LAMA#	11	4.2%
CLOSED REDUCTION	5	1.9%
OPEN REDUCTION	104	40.6%
CLOSED AND OPEN REDUCTION	109	42.5%
TOTAL	256	100%

, #LAMA –left against medical advise

Discussion

The present study was conducted to evaluate etiological factors, nature and pattern of facial fractures in cases admitted under plastic surgery department, NRI general hospital, a tertiary care center in Chinakakani, Andhra Pradesh, India. Many previous studies have reported different types of associations in their epidemiological investigations, which were, in turn, dependent on various factors such as geographic region, month, and time of the study, which influenced both the type and the frequency of injuries making comparisons difficult.

A 10 year review [7] on injuries showed facial injury is a commonly involved component in trauma patients. The present study had 256 patients of facial injury. 87.5% of total cases were in the 15 to 45 years of age group with 30 years as mean age. Around 40% of the cases belonged to 15 to 25 years, followed by 26 to 35 years age group. Hwang K et al., a Korean study [8], showed 30.6 years as mean age and highest frequency of facial bone fractures were in 21–30 years in their 11 years retrospective analysis on facial fractures, which has similar findings with the present study. A similar Indian study [9] done in Haryana showed 29 years as mean age in facial fractures.

Second and third decade is an economically productive age group. In this age group, people are more social, energetic (sports activities, violence), and working (frequent travelers). These reasons might be making them more susceptible to RTA and facial fractures [10]. The present study, as shown below 14 years & above 65 years (the

dependent extreme) age groups, were less frequently injured. The low incidence in children can be explained by the high elasticity of children's bones, the smaller face relative to head size making them to a decreased exposure to major trauma [11]. On the other hand, less frequency in the geriatric age group can be explained by being less active when compared to other ages and less involvement in outdoor activities, which is supported by many similar studies [12-13].

The majority of the drivers and the working population around this region are male, explaining the predominance of male cases (97%). This male predominance in all age groups is supported by many studies [8,14-17].

Peak incidence was seen during June (11.7%), followed by July and March (10.9%) and September & November (9.4%). A similar study done in central Karnataka [18] shows peak incidence in March is supporting our study. Another study done at Chennai [19] showed a high prevalence in September, which also supports our study. The lowest frequency of injuries (4.7%) was seen in both May and August.

RTAs were found to be the most common cause of trauma in the present study, as mentioned. This may be because the hospital is situated beside a national highway making the majority of the patients brought here, victims of road traffic accidents. Not abiding by the driving vehicle safety norms like not using seat belts, vehicles without airbags, overspeeding, non-usage of safety devices like helmets by the

young population is an equally important reason in developing countries. This is supported by many similar studies [20-22].

In the present study majority (90.6%) had Midface fractures. Singaram D et al [23] Subhasrajat al [16]. and Septa D et al [24] had a similarly high prevalence of Midface fractures. Zygomatic bone and arches were more involved in their studies, whereas arches were least involved in our study. Chandra L et al [14] had more number of isolated mandibular fractures followed by Midface fracture, which were coinciding with the present study. The reason behind this variation needs to be further evaluated in terms of mode and type of injury, the vehicle used, etc. In the present study, type III Le Fort

fractures were slightly more prevalent than other Le Fort types, which is supported by Gupta et al [9].

Other associated injuries with Facial fractures were very less (15.6%) in the present study, but in many studies (Rishi Bali et al [25], Ramdas S et al [26]) it was more prevalent than our study, however among associated injuries, head injury was prevalent in these two studies which is similar to present study. But this may be due to the fact that cases needing immediate intervention for associated head injury or systemic injuries were not included in the present study.

Table 5: Associated Injuries with Face Fractures among the Study Population

ASSOCIATED INJURIES	FREQUENCY	PERCENTAGE
NO	108	84.4%
TEMPORAL FRACTURE	6	4.7%
EXTRA DURAL HEMORRHAGE	3	2.3%
SUBDURAL HEMORRHAGE	2	1.6%
SUBARACHNOID HEMORRHAGE	1	.8%
TEMPOROMANDIBULAR JOINTDISLOCATION	1	.8%
RIGHT TEMPORAL	1	.8%
RIGHT SCAPULA FRACTURE	1	.8%
PARIETAL FRACTURE	1	.8%
HYOID FRACTURE	1	.8%
HUMERUS FRACTURE	1	.8%
EAR LACERATION	1	.8%
C3 C4 SUBLUXATION	1	.8%
TOTAL	128	100.0%

85% of the patients were managed by surgical intervention, majority being Open Reduction with Plating in the present study, as is the normal standard of care. Furthermore, there are many advantages like immediate recovery of function, cutting down the period of bone remodeling and consolidation of the fracture site, and a faster healing period, which makes it suitable surgery for patients [27]. This finding is supported by Kaura S et al [28], Rishi Bali et al [2], Gali R et al [21] where 73%, 62.6%, 58.6% of their study population respectively were treated successfully by open reduction and internal fixation (ORIF). Only conservative treatment was required in (26%) of the patients. Ram das s et al [26] had almost similar findings, where 33.8% were conservatively managed. Those who are conservatively managed under regular observation were given proper medication (antibiotics and analgesics) and were advised soft/liquid diet, limiting jaw movement, rest, and oral hygiene instructions.

Conclusion

This retrospective study included 256 patients of all age groups which were admitted with facial injuries during a period of 3 years from 2015 -2017 to our tertiary hospital. Early Adulthood age population (15 to 45 years) and Male gender were more vulnerable to facial injuries in the present study. June and July months had Peak incidence of injuries followed by month March with Road traffic accident being the most common etiology.

Of the 256 patients examined majority had Midface fractures followed by Pan facial and Mandibular fractures along with other fractures. Among non-isolated fractures, Midface and among isolated fractures mandible and nasal bones were more involved. Among non-isolated fractures, Nasal bone was involved in nearly half of the patients. In mandible fractures (non-isolated) majority had a fracture of Body followed by Condyle fracture. In Midface fractures (non-isolated) majority had Maxillary sinuses involvement followed by Orbital. Le Fort type-III fracture was more common than Le Fort -I and II. The majority of facial fractures were primarily & successfully managed by surgical intervention. In the present study, it is seen that facial fractures occur in significant number of road traffic accidents in this day and age too, owing it to the lack of road safety guidelines and their implementation. The authors would like to emphasise on the need for expert assessment of injury and need for specialist care, for

facial bone fractures to avoid complications due to neglect and the need for adequate measures for the care of this population.

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