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Multi Factorial Analysis of Facial Trauma

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ABSTRACT

Facial trauma represents a significant proportion of all trauma cases, influenced by various factors including urbanization, traffic conditions and lifestyle behaviors. This study aims to systematically review the patterns, causes and management of maxillofacial injuries in South Karnataka, India, highlighting the socio-demographic and etiological variables involved. This observational study analyzed facial fractures from March 2020 to March 2024 using a pre-structured proforma to collect data on socio-demographic variables, type of injuries and associated conditions. Statistical analysis was performed using SPSS 19, employing chi-square and t-tests to identify significant associations. Young adults, particularly males aged 21-30 years, were most frequently affected, with road traffic accidents being the leading cause of injuries. The maxilla was the most commonly involved facial bone. Overall facial fracture is associated with significant morbidity and prolonged absence from work. Urbanization and interpersonal conflicts were noted as primary contributors to the incidence of facial trauma. The study highlights the high prevalence of facial fractures among young adults and stresses the impact of socio-economic factors and urbanization on facial injury patterns. Effective prevention strategies focusing on traffic safety and public awareness are critical for reducing the burden of facial trauma.

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Key Words
Facial trauma, maxillofacial injuries, urbanization

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INTRODUCTION

Maxillofacial injuries reflect statistically increasing part of trauma in the present scenario with severe morbidity and mortality[1,2]. Numerous etiologies are associated with facial bone fractures, closely associated with the geography, urbanization, lack of strict traffic policies and high speed motor vehicles and poorly constructed roads[1]. Facial injuries are associated with social embarrassment, absence from work, other complications inherent to the facial fractures due to closeness of the vital structure like eye balls, nerves and oral cavity[3]. Trauma-major or minor has become an inevitability in daily life. Varied causes has been enlisted in literature, with facio-maxillary injury being frequent association. Men outnumber women and adults have higher ratio compared to children[4]. Facial fractures involve different parts of facial bones individually or in combination. Mandible has been said to be the commonest among them due to the mobility. Increasing rates of assault is one of the commonest causes of mandible fractures followed by fall of heavy objects and head on collision[5]. Age also plays a crucial role, where it is seen that young males in their twenties and thirties are commonly involved due to excess outdoor activities[5]. Facial fractures are frequently associated with other bodily injuries complicating the condition and management of the trauma. Head injury, abdomino-thoracic injury are all major trauma which require triaging and orderly sequencing of management. Other vital structures like airway and orbital injuries also pose greater threat and calls for timely intervention[6]. Management differs on the type of fracture and comminuting and the involvement of buttresses. Degree of displacement, vectors of forces acting on the fragments are to be taken into account to bring about proper reduction and stable fixation. When lower third of facial fracture is taken into account, occlusion is the utmost important aspect to be considered and when upper facial fractures are present vertical and horizontal dimensions are to be maintained to reduce the fractures into pre-traumatic height and width[7-9]. Complications are part of severe facial injuries, the facial projection may be lost when there is comminution. Moreover when nasal bone is involved mid face depression is seen. Hematoma, deformities, scar, loss of sensation and malocclusion are all seen after facial fractures which needs thorough evaluation with computed tomography with 3d reconstruction and proper attainment of reduction[10]. Maxillofacial trauma has experienced an increase in last few years, though a number of studies have been done in various local population in India, there is no systematic review of pattern and cause of maxillofacial trauma . Hence , the purpose of this study is to study systematically the changing trends in our local population of south Karnataka and study the present pattern, incidence, demographics and management of faciomaxillary trauma.

MATERIALS AND METHODS

An observational study including all types of facial fractures was done from March 2020 to March 2024. Informed written consent of the participating patients was taken. A pre-structured proforma was used to collect the baseline data regarding socio-demographic variables such as age, gender, marital status, occupation, duration of the disease, smoking, alcohol intake, tobacco consumption, concomitant illness, concomitant past history of facial trauma. Specific investigations included facial CT and orthopentogram. Data was entered in Microsoft excel spread sheet. Descriptive statistical tests (like percentage, proportion, central tendency, standard deviation) and inferential statistics like chi square test and one sample t-test a was used. SPSS 19 software was used for analysis.

RESULTS AND DISCUSSIONS

The most common age group was 21-30yrs as shown in (Fig 1). Overall, younger age groups were more involved compared to elderly group. Urban areas showed increasing number of injuries depicting urbanization as one of the causative factor for the increasing trauma which is seen in (Fig 2). Road traffic accident has stood the top most association with facial fracture which is followed by assault , fall and fall of an object as other minor causes as seen in (Fig 3).

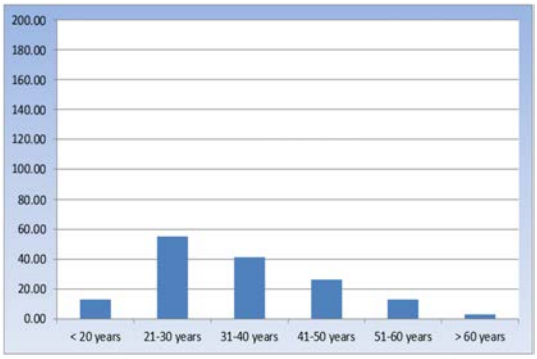

Fig. 1: Age Distribution

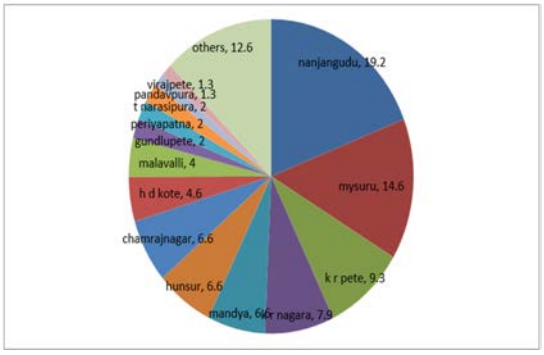

Fig. 2: Geographical Distribution

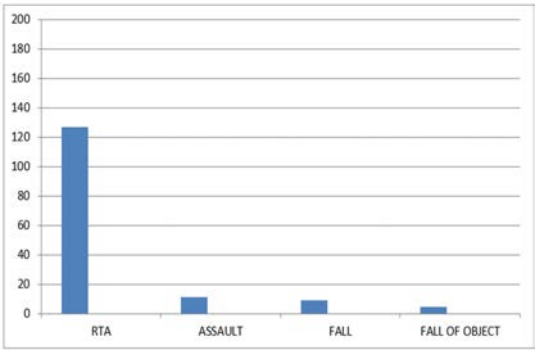

Fig. 3: Mode of Injury

In our study, maxilla was the most commonly involved structure of facial bones with varied involvement of its structures in isolation and combination, followed closely by orbit. Mandible involvement was seen in <fifty percent of patients, with the least involvement being the frontal bone as shown in (table 1). The mandible involvement was as follows: most common involvement was seen in parasymphysis with 15.9 % followed closely by condyle in 13.9 %. whereas, least involvement was seen in ramus with 2.6% as depicted in (Table 2).

Table 1. Prevalence of Individual Bones

Bones	Percentage
Frontal bone (total)	12.6
Orbit(total)	48.3
Nasal bone and septum(total)	20.5
Maxilla(total)	57.6
Zygoma(total)	38.4
Mandible(total)	38.4

Table 2: Mandible Patterns

Parts		Percentage
Symphysis	Isolated	5(3.3%)
	Total	10(6.6%)
Parasymphysis	Isolated	16 (10.6%)
	Total	24(15.9%)
	Bilateral	5(3.3%)
Body	Isolated	5(3.3%)
	Total	8(5.3%)
	Bilateral	4(2.6%)
Ramus	Isolated	2(1.3%)
	Total	4(2.6%)
	Bilateral	0
Condyle	Isolated	10(6.6%)
	Total	21(13.9%)
	Bilateral	1(0.7%)
angle	isolated	4(2.6%)
	total	7(4.6%)

Head injury association was seen in only 16.6 percent of cases with contusion and pneumocephalus being more common. Time required for radiological healing was lesser in nasal bone, while that of frontal maxilla an zygoma being nearly same of about 5-5.4 weeks and the longest being the mandible of about 9.3 weeks on average as shown in (Table 3).

Table 3. Healing Time of Various Fractures

Frontal bone(total)	5.2 weeks
Orbit(total)	5.2 weeks
Nasal bone and septum(total)	4.8 weeks
Maxilla(total)	5.4 weeks
Zygoma(total)	5 weeks
Mandible(total)	9.3 weeks

Facial fracture has remained as an unfamiliar entity though it is commonly associated in all traumatic incidents. whereas, with increasing awareness about it, the recognition and management has become well-known to the few population. As already known, facial fracture can range from un displaced fracture to comminuted complex fractures. Timely approach to these fracture can rejuvenate the face to its pre-traumatic appearance[11]. Previous studies have shown younger age group in their 20s and 30s to be more involved which is similar to our study. This may be because of increased outdoor work by the younger age people and engagement in travelling within or across the cities. In addition to this younger ones are also more into sports activities, which predispose them to injuries[12,13]. Male to female ratio is higher due to the outdoor activities in males and physical recreational activities with injury susceptibilities. Whereas in older patients female to male ratio is higher due to weakening of bones due to postmenopausal state[14]. Urbanization is a boon to the mankind, on the other hand, it has turned out to be a cause of major traumas. Due to the progress in travelling speed and growth and civilization, the impact from the accidents, sports and conflicts result in high energy injuries, where facial fractures have become common association[15]. The etiological factors causing facial fracture is topped by road traffic accidents, involving mostly two wheelers. The rider is always severely injured, whereas the pillion rider may sustain or may not have trauma[4]. In most of the case series it is seen that assault follows road traffic accident[4,16] and later is the fall or other object injuries which is also seen in our studies. Manual labour persists in India, where heavy object transfer and assembly are major cause of object injuries. Adding to it, freely wandering animals on the highway streets have contributed to the accidents. Developing countries are facing increasing number of facial fractures due to poor awareness of road safety, poor road infrastructures, and violation of traffic rules[17]. The prevalence of fracture of various regions of the face has always varied from one region to another and from time to time, there are wide variation in geographical location, etiology and time. On one hand, road traffic accidents have higher trend in a region whereas assault or sport injury contribute to the majority in another. These even change with time and locations, this has been possible because of ever changing and developmental modifications[18]. When the patterns of facial fractures are studied, it is seen that most of the series have mandible as the major pattern involved followed by orbit. Though nasal bone is projected area, its involvement is seen lesser than the mandible and maxilla[19,20]. Our study found maxilla as the most commonly involved bone followed by the orbit. Mandible and zygoma are involved in 38.4% of patients, followed by nasal bone fractures in 20.5% and least with the frontal bone fracture (12.6%). When mandible fracture alone is seen, it is seen that

condyle is most common fracture[21], but in our study it is parasymphyseal fracture closely followed by condyle fracture. Panfacial fracture is seen in 7.2% cases. We also studied the involvement of head injury with facial fractures. As mentioned in the literature , head injury can range from 2-80% given the difference in the topography and etiology of injuries. In our study we found 16.6% of the patients with facial fracture had associated head injury in which 10% had contusion and pneumocephalus while 6.6% had subarachanoid haemorhage[22]. There is lack of studies on the time required for healing of different fracture sites which we have studied. It is important in the post operative period to allow patients to completely return to their functional normal without any fear of refracture or displacement. In our study we found that nasal bone had early healing with mean healing time of 4.8 weeks whereas maxilla, zygoma and frontal bone healed between 5 weeks-5.4 weeks. Mandible being the mostly functional and rigid bone took a mean time of 9.3 weeks to heal.

CONCLUSION

Overall prevalence of facial fractures is high with varied etiology causing significant morbidity and absence from work and high cost. Younger patients are commonly involved with alcohol influence contributing significantly to the injury. Urbanization and interpersonal conflict are major contributors to the cause of facial fracture. It is seen that Maxilla is the most commonly involved bone with early healing and panfacial fracture is seen less compared to single fractures. As wi th complication, loss of occlusion is the major functional problem where, timely intervention is required for optimal outcome.

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