

Original Research Article

Management of Panfacial Fractures- A Clinical Study at Tertiary Care Centre- Osmania General HospitalSwathi Gagannatham^{1*}, N Nagaprasad², M Madhusudana Naik³, G Praveen Harish⁴¹Post Graduate, Department of Plastic and reconstructive surgery, Osmania Medical College/ Osmania general Hospital, Afzalgunj, Hyderabad, Telangana, India²Professor, Department of Plastic and reconstructive surgery, Osmania Medical College/ Osmania general Hospital, Afzalgunj, Hyderabad, Telangana, India³Assistant Professor, Department of Plastic and reconstructive surgery, Osmania Medical College/ Osmania general Hospital, Afzalgunj, Hyderabad, Telangana, India⁴Associate Professor, Department of Plastic and reconstructive surgery, Osmania Medical College/ Osmania general Hospital, Afzalgunj, Hyderabad, Telangana, India

Received: 03-06-2021 / Revised: 02-07-2021 / Accepted: 31-07-2021

Abstract

Introduction: Panfacial fractures commonly occur due to road traffic accidents in developing countries like India. Submental intubation can be an effective technique for upper airway management in few panfacial trauma patients associated with fracture of skull base or displaced nasal fracture and it offers an effective alternative to short term tracheostomy. **Aims:** To study different patterns of Panfacial fractures, their management and complications **and** to study the pattern and distribution of fractures at different sites of the maxillofacial skeleton. **Materials and methods:** This study is a prospective clinical study conducted in department of plastic surgery for a period of 2 years. Panfacial fractures divided as fracture involving the upper, middle, and lower face. The patients were followed at 2 weekly interval for the first 3 visits, followed by monthly interval up to a maximum of 6 months. **Results:** Mandible is the most common in the mid face fractures in facial fractures. In the mandible, parasymphysis was the most common fractured site constituting 43.33% of patient population. 27 patients (90%) were treated by open reduction and internal fixation and 3 patients (10%) were treated by closed reduction arch bar/eyelets and inter maxillary fixation. Out of 30 patients studied, 1 patient had zygomatic arch prominence, 1 patient had wound infection, In two patients, malocclusion was identified in the in post operative period, and was managed by reapplication of IMF in the operation theatre. **Conclusion:** Treatment to be focused on re-establishing proper occlusal, vertical and horizontal dimensions in the facial frame, as well as restoration of orbital, oral volumes. The high frequency of panfacial fractures due to RTA in our country.

Keywords: Mandible, Parasymphysis, Panfacial fractures.

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Introduction

The maxillofacial region is the most vulnerable part of the body as far as trauma is concerned. Injuries to the maxillofacial region are increasing in frequency and severity [1] every year. With the technological advancements in the developing countries like India, the occurrence of road traffic accidents have been increasing drastically over the period of last 10 years. Panfacial fractures constitute 3.7%-9% of facial bone fractures. Panfacial fractures are defined as fractures involving the lower, middle, and upper face. The components of the true panfacial fracture include the lower third, the middle third, and upper third of the face. Treatment can be challenging and requires an individualized treatment plan. A firm understanding of the treatment principles of each individual fracture is necessary before attempting to tackle the patient with panfacial

fractures. Historically, the panfacial fractures were treated conservatively, which led to significant postoperative problems, including crippling malocclusion, significant increase in facial width, and decreased facial projection. Secondary deformities that were surgically addressed still remain extremely difficult to correct. Advances in rigid fixation, wide exposure, primary bone grafting, and attention to soft tissue reattachment and radiological advances like 3D CT have significantly improved the treatment of the patient with panfacial fractures. Traumatic panfacial fracture repair is one of the most complex and challenging reconstructive procedures to perform. Several principles in literature postulated regarding the repair of panfacial injuries were always in a stepwise fashion. The primary goal of management in most of these approaches is to restore the occlusal relationship at the beginning of sequential repair so that other structures can fall into alignment. Panfacial fractures are caused by impact from high-energy mechanisms and have characteristics beyond that seen in more common isolated facial fracture [2,3]. Such high-energy forces directed at the craniofacial region result in secondary vectors of injury or contre-coup forces, which necessitate a high degree of suspicion for other significant injuries. Approximately 4% to 10% of all facial fractures. Mostly have condylar neck or intracapsular fractures o 20% chance of cervical

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spine injuries. Lower Glasgow Coma Scale score (average GCS 10) or higher hospital complication rate (18%).

This study center has all surgical specialties involved in the management of facial trauma. There are all disciplines coverage at the hospital for trauma surgery and are available all through the 24 hours including emergency departments, general surgery, orthopaedic surgery, plastic surgery, neurosurgery and intensive care facilities. The study hospital is the tertiary referral centre for maxillofacial surgery for people of many states.

Materials and Methods

This study is a prospective clinical study conducted at Osmania General Hospital, Hyderabad from 2019 to 2021. Patients 15 years and old are included for the study. All the patients when initially seen in the casualty, assessed for airway, breathing, circulation and the level of consciousness, cases sorted out and attended by the concerned surgeon. When the involvement of other systems is managed and stabilised then patient is transferred to plastic surgery department for the management of facial bone fractures. Patient's details (age, sex, address), history, examination findings, concomitant

injuries are noted in a predefined printed proforma. Soft tissue lacerations are not recorded as associated injuries.

For this study the fractures of the mandible were divided into symphysis, parasymphysis, body, angle, ramus, condyle, coronoid and dentoalveolar. The mid face fractures are divided into Lefort I, II, III, zygomatic complex, zygomatic arch, nasal, infra orbital rim and dentoalveolar. All the patients are subjected to computerised tomographic scan of the head and neck with 3 dimensional reconstruction of the facial bones. The patients were taken up for open reduction and internal fixation/closed reduction depending on the general condition of the patient, fracture displacement and fracture comminution. The patients are put in inter maxillary fixation one day after the definitive surgery, and kept in place for a variable period of 4-6 week. The patients were followed at 2 weekly interval for the first 3 visits, followed by monthly interval up to a maximum of 6 months.

Results

Age distribution of 30 patients who met the inclusion criteria during the study period.

Table 1: Demographic distribution in study

Age	No of patients with fracture (%)
10-19	2(6.67)
20-29	12 (40.00)
30-39	10(33.33)
40-49	4 (13.33)
50-59	1 (3.33)
60-69	1 (3.34)
Grand Total	30
Etiology	
Assault	1 (3.33)
Fall From Height	3 (10.00)
Fall From Train	1 (3.33)
RTA	25 (83.34)
Areas fractured	
Upper + middle + lower areas	1 (3)
Middle + lower areas	25 (83)
Upper + middle areas	4 (14)
Grand total	30 (100)

The major aetiology of panfacial fractures in this study was road traffic accidents, constituting 83.34% of the total. The second leading cause was fall from height (3 patients 10%). The mid face was involved in panfacial fractures in all the patients(100%) in this study. The mandible was fractured in 29 patients(96.66%), the commonly fractured individual bone. The frontal bone was fractured in 5 patients(16.66%).

In 4 patients (14%), all the three areas of the facial skeleton were fractured in this study. In one patient (3%), the frontal bone and mid face bones were fractured. In the remaining 25 patients(83%), the mid face bones and the mandible were fractured, accounting for the majority of cases in this study. Zygomatic complex injuries were most common in the mid face fractures, followed by lefort II fractures in this study.

Table 2: Mandible- fracture distribution

Site(Mandible- fracture site distribution)	Number
Parasymphysis	12
Symphysis	10
Body	8
Angle	4
Ramus	4
Condyle	4
Coronoid	1
Site (Mid face fracture distribution)	
Lefort I	8
Lefort II	13
Lefort III	2
Dento alveolar	4
Zygomatic complex	17
Zygomatic arch	9
Infraorbital rim	4
Nasal	9

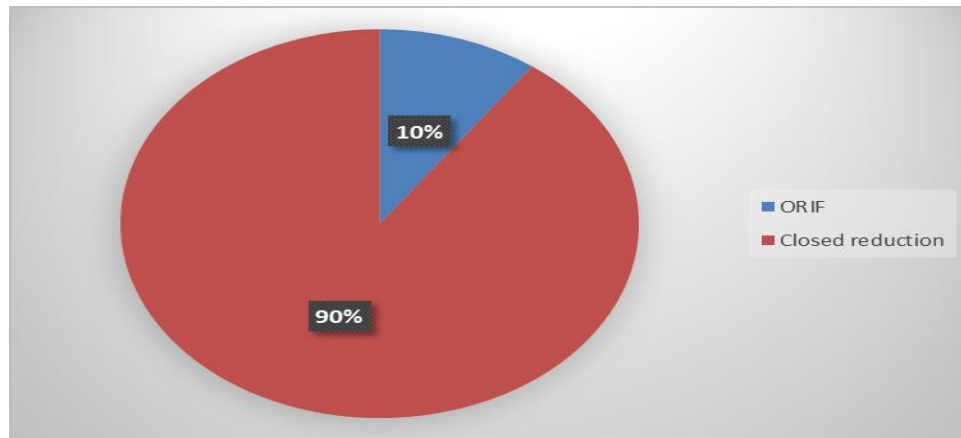


Fig 1: Treatment in present study

27 patients(90%) were treated by open reduction and internal fixation and 3 patients (10%) were treated by closed reduction arch bar/eyelets and inter maxillary fixation.

Table 3: Complications in present study

Complications	No of patients (%)
Wound Infection	1(3)
Implant Exposure	1 (3)
Facial Assymetry	1(3)
Transient Malocclusion	2 (7)
Nil	25 (84)

Out of 30 patients studied, 1 patient had zygomatic arch prominence, 1 patient had wound infection, In two patients, malocclusion was identified in the in post operative period, and was managed by reapplication of IMF in the operation theatre

Discussion

The epidemiology of maxillofacial fractures is absolutely inconsistent.

The factors like incidence, aetiology, clinical presentation, and treatment patterns of maxillofacial fractures can be influenced by socio demographic factors of the population studied. Frequencies differ both within and between countries depending on contributing entities such as environmental, cultural, and socioeconomic factors. Studies done by Olasoji et al[3], Kieser et al,[4] have shown that the epidemiological features of maxillofacial fractures vary from one country to another and even within the same country depending on the prevailing socioeconomic, educational, cultural, and environmental factors.

The aetiology of maxillofacial trauma is another important epidemiological factor that directly affects the incidence, clinical presentation, and treatment modalities of the facial fractures. This study results found that road traffic accidents remain the leading cause of injury. Numerous articles by Subhashraj et al[5], Sakr et al[6], motamedi et al[7], fasola et al[8], Al-Khateeb and Abdullah[9] have reported RTAs as the main aetiological factor in developing countries such as India, Egypt, Nigeria, and United Arab Emirates respectively, whereas interpersonal violence were common causes of maxillofacial fractures in many developed nations as reported by Walker et al,[10]. These aetiological factors reflect differences in socio economic factors, national infrastructure development (particularly road ways, traffic regulations and legislation) and other behavioural practices. Inadequate road safety awareness, unsuitable road conditions, violation of speed limits, ill-maintained vehicles without safety features, failure to wear seat belts or helmets, entry into opposite traffic lanes, violation of the highway code, use of

alcohol or other intoxicating agents, behavioral disorders, and socioeconomic insufficiencies of some drivers are the cardinal reasons for the large numbers of RTA in India.

Two wheeler accidents predominate as a result of inattention and poor road conditions. Fall-related facial injuries were the second most common cause of facial bone fractures, seen especially affecting the mandible, was similar to previous studies by Boffano et al and Down KE et al.[11,12] Assault was the third most common cause of facial injury, the magnitude of which is lesser (10.5%) compared with that reported (13–90%) by Schon R et al and Ozkaya et al in other countries[13,14] and reported as the leading cause by a few countries. The high number of panfacial fractures due to RTA in this study is attributed to inadequate road safety awareness, unsuitable road conditions, violation of speed limits, old vehicles without proper safety measures, failure to wear seat belts or helmets, use of alcohol and young drivers. In the present study, road traffic accidents constituted the most common cause of injury. The incidence of maxillofacial injuries due to road traffic accidents in this study is 76%, where as the incidences in studies done in other parts of India were 62% in Chennai, 68.3% in Mysore, 87% in Pune and 80.31% in Odhisa[15-17]. Other aetiological factor was falls which included falls on the ground and falls from height and fall from train (4 patients, 13.33%). There are several reasons for the relatively higher incidence of facial trauma resulting from falls. In general, falls in elderly are also very common due to reduced flexibility, loss of balance, poor lighting, and other health conditions. In addition, in the urban area, falls from height were responsible for significant number of facial fractures in working sites.

There is a stark difference between the incidence and etiology of trauma in developed and developing countries. In African and Asian countries, road traffic crashes have been shown to be the predominant cause. In this study RTA is the major cause of injury followed by falls from height and assaults, this is in agreement with studies carried out by Subhashraj et al[18], and motamedi et al.[7]

In our study alcohol consumption prior to injury was recorded in 15 patients (50%) comparable to the study conducted by Malik Sunita et al [19] and by Indubhusan et al in Odisha reported 31.21% of the patients had at least one social risk factor, including alcohol abuse, smoking, and non-intravenous drug abuse. A relationship between substance abuse and post operative complications has been reported by some authors. Passeriet al [20] observed a positive association between complications and chronic abuse of alcohol and drugs. Alcohol impairs judgement, brings out aggression, often leads to inter personal violence, and is also a major factor in motor vehicle accidents. Age and aetiology distribution of maxillofacial fractures revealed the most vulnerable victims of maxillofacial injuries and their relationship with aetiological factors. Age distribution is similar to this study conducted by other studies in India like Subhashraj [18] et al in Chennai. According to K Subhashraj et al., Amiya Agarwal et al [22], the majority of fractures (more than 75%) were found in males. Similarly, in this study, 29 patients with panfacial trauma were males, most likely due to a high physical activity by men, more involvement in traffic accidents, altercations and work related accidents. It was striking that male vehicle drivers sustaining facial fractures far outnumbered female drivers, confirming the risk-taking behavior of young men. Panfacial fracture was seen in only one female in this study, this may be due to the fact that the majority of females most often are confined to household works and they drive vehicle less frequently and more carefully than men. Fractures that occur most frequently following the assault include the nasal bones, mandible, zygoma, and midface in descending order. Nasal bone fractures have been reported as the most frequent midfacial fractures because of facial prominence, lack of soft tissue, and being an easy target in violence attacks, making them the most fragile facial bones. Relatively, fewer nasal bone fractures were noted in this study. The majority of fractures were of the midface in few studies, the larger proportion of which were bilateral, more commonly being caused by high velocity trauma of RTAs. When analyzing fractures individually, the most common site was the mandible, consistent with studies, probably as it occupies a larger vulnerable area in the facial skeleton. In this study, the most commonly fractured individual bones were the mandible followed by the zygoma (includes zygomatic complex and zygomatic arch) and maxilla (includes left fractures and dento alveolar maxilla). This is comparable to the study conducted by A. Mitiji et al [23] and Padmanidhi et al [24]. In the study conducted by A. Mitiji et al the most common fracture region in the mandible was the body (36.0%) and also in Padmanidhi et al [24] study in UP reporting mandible 44% and body was most common 34.4%. In comparison, Subhashraj et al [18] reported parasymphysis as the most commonly fractured regions of the mandible 40% which is consistent with this study.

Conclusions

Panfacial fractures commonly occur due to road traffic accidents in developing countries like India. The other common cause was fall from height and assault. Males between 20 -40 years of age the commonly injured in panfacial trauma. Mandible is the most commonly fractured individual bone followed by the zygoma in patients with panfacial fractures. Most of the fractures in panfacial trauma involve the combination of lower and mid face bones. Parasymphysis was the commonly fractured site in high velocity injuries in panfacial trauma, along with the zygomatic complex. Panfacial fractures management is challenging because of the association of concomitant injuries, increased patient morbidity, and functional impairment often accompanying these injuries securing airway in patients with panfacial injuries is a challenge to the anaesthesiologist. Submental intubation can be an effective technique for upper airway management in few panfacial trauma patients associated with fracture of skull base or displaced nasal fracture and it offers an effective alternative to short term tracheostomy. Treatment approach must focus on prompt and thorough evaluation, prioritizing treatment (often staged) to preserve function, and

providing for support to fractures if reduction and fixation cannot be achieved quickly. An individual and appropriate approach to plan and execution for facial fracture reconstruction for re-establishing proper occlusal, vertical and horizontal dimensions in the facial frame, as well as restoration of orbital, oral, and nasal cavities/ volume. Most commonly managed with open reduction and internal fixation which were associated with relatively lesser proportion of complications. The significance of early soft tissue redraping and augmentation will help to achieve a better result after a disastrous facial injury with relatively decent aesthetic outcome. The high frequency of panfacial fractures due to RTA in our population highlights the need for strict enforcement of traffic rules, road safety measures, measures to prevent drunk & drive and awareness of morbidity due to accidents.

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Conflict of Interest: Nil

Source of support: Nil