Original Research Article

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Challenge and management outcome of panfacial fractures in Sohag University hospital, Egypt

Tarek Elsayed Ftohy Abdelrahman^{1*}, Ahmed Abdelmaboud², Ahmed Hamody²

¹Department of Surgery, ²Department of Anaesthesia, Sohag University, Egypt

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*Correspondence:

Dr. Tarek Elsayed Ftohy Abdelrahman, E-mail: tarekftohy2@gmail.com

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ABSTRACT

Background: panfacial fractures resembles a therapeutic challenge to maxillofacial surgeons This study was carried out to determine the etiology, injury characteristics and management outcome of pan facial fractures at Sohag university hospital.

Methods: A retrospective hospital based study of panfacial fractures patients was carried out at Sohag university hospital from January 2010 to December 2016. Data was collected and analyzed using SPPS.

Results: 200 Panfacial Trauma Patients were analysed. Males to females by a ratio of 24:1. Their ages ranged from 13 to 63 years with a mean of 30±12 years Most injuries were due to road traffic accidents (78%), and by falling from height in 12%. Mandibular fractures were the most common type of injuries. Open reduction and internal fixation by using plates and screws was the commonest surgical technique, used in 97.8% of cases. The most common complications were limited mouth opening, malocclusion. The mean duration of hospital stay was 11.13±2.23 days.

Conclusions: Road traffic accident (RTC) was the most common cause of panfacial injuries in our locality and the young adult males were the most commonly affected victims. The majority of maxillofacial fractures were treated by open reduction and internal fixation.

Keywords: Open reduction and fixation, Panfacial fracture, Submental intubation

INTRODUCTION

Panfacial fractures resemble major challenges to maxillofacial surgeon. These fractures, affecting the upper, middle and lower regions of the face .^{1,2} In most of cases panfacial fractures associated with soft tissue injuries and loss of bone anatomical relations. Severe panfacial fractures if not managed properly lead to complicated functional and aesthetic facial deformities, improper occlusion and panfacial injuries can impact the quality of life of the patient or limit social interaction. There is no consensus regarding the modality of treatment and principles of management.³⁻⁷

Panfacial fractures involve fractures of several bones of face, including mandible, maxilla, zygomatic complex, most often nasoorbitoethmoid (NOE) and frontal bone. They are commonly accompanied with malocclusion, facial deformity, diplopia, enopthalmos, and soft tissue injuries.¹

There is no clear classification of Panfacial fractures in the literature.² The most common cause is motor vehicle accident and direct assault.³ The incidence of maxillofacial trauma in general rapidly increasing specially in developing countries.⁴

Inspite of the decrease in the incidence of panfacial trauma from road traffic accidents due to the improvement in safety measures such as airbags and seat belts, injuries due to interpersonal violence continue to rise. ⁵ About 20% of maxillofacial injuries patients have an associated head injury. ⁶

Treatment of panfacial fractures can be challenging, because in most of cases no available points of fixation as a start point to re-establish bone continuity.⁷

Surgical approaches to the fracture changed in last decade wide exposure of fracture, immediate reconstruction of buttresses, three-dimensional computed tomography and rigid fixation systems made the changes for the better.^{1,8}

The surgeon's challenge is to restore complete aesthetic, anatomical and functional repair of the facial skeleton.⁸

Persistent facial deformity could happen due to failure of direct exposure of all fracture lines or due to unstable fixations in in some cases of residual post-traumatic facial deformity may persist which may need second corrective surgery. Treatment of panfacial fractures is so challenging. Often, such fractures commonly associated with neurological morbidity, and need intensive care unit for other co morbidities.

There is no consensus about the best approach for management of panfacial trauma there is many different techniques for treatment of panfacial fractures top down and outside in. Or bottom up and inside out has been used to describe the standard approaches for panfacial fracture management. For cases where the maxilla and mandible have fractures that interrupt the geometry of dental arches Kelly et al suggested reducing and stabilizing hard palate as guide for mandibular reconstruction.²

Gruss et al recommended zygomatic arch reduction and malar projection firstly aiming to re-establish the outer facial frame before NOE or inner facial frame is reduced while Melville preferred Top to Bottom sequence if NOE was involved in the panfacial trauma.^{1,9}

Rarely panfacial trauma resembling life threatening condition; however, it is almost associated with dangerous sequala, such as airway obstruction. [10,11]

Many complications could associate the reconstruction of panfacial fractures Malocclusion can be managed with, orthodontic treatment or orthognathic surgery. Anesthesia of the face could happen due to nerve damage and mostly improve conservatively. More difficult complications such as include malar asymmetries, diplopia enophthalmos, and telecanthus. 12,13

The aim of this study was to describe our own experiences in the management of panfacial trauma including etiological pattern, and management outcome of these fractures in our institution. The study provides

basis for establishment of treatment guideline and planning for preventive strategies.

METHODS

Study design

Postoperative study including all patients presented with panfacial trauma in the period from January 2010 to December 2016 in the emergency department of Maxillofacial Surgery Unit at Sohag University Hospital and met the inclusion criteria. All cases with panfacial trauma either pure facial trauma or polytraumatized patients, all age groups

Exclusion criteria

- Patients with single facial trauma, e.g. fracture mandible.
- Patients with pure soft tissue injury.
- Demographic data includes: Age, sex, occupation, social level, residence, were registered and reported.

Mechanism of injury

Road traffic accident, accidental injuries, fall from height, injuries at work, assault, sport injuries.

Type of maxillofacial injury

Soft tissue injuries, facial bones fractures: mandible, maxilla, zygoma, nose, periorbital, forehead, registered.

Associated injuries: central nervous system, cardiothoracic, orthopedic, ocular, abdominal organs injury was reported. All cases diagnosed with clinical evaluation and by radiological investigation X-Ray Skull, Panorama, Three-dimensional CT face. Data of surgical treatment of injuries included, date of admission, date of surgical treatment in relation to date of trauma, date of discharge.

Modality of surgery i.e. Plates and screws, Arch bar and wire, Interdental wire, mixed. Overall mortality (within the first 30 days post-traumatic).

Over all morbidity

Malunion malocclusion, nonunion, ankylosis, infection, tempromandibular joint (TMJ) dysfunction, facial pain, sensory affection (hypothesia, hyperthesia).

Follow up

Clinical, Radiological (if indicated). Up to 6 months postoperative as following, once weekly first month. Every two weeks second month, every month, the last four months.

In this retrospective study, all panfacial trauma patients

admitted to the Emergency department of Sohag university hospital over period from January 2010 to December 2016 were included.

Trauma patients are first seen at the A and E department where resuscitation is carried out according to Advanced Trauma Life Support (ATLS) principles. From the A and E department these patients are admitted in their respective surgical wards or ICU after definitive treatment.

During this study, all panfacial injury patients seen at the A and E department were, after informed written consent, consecutively recruited into the study. Patients who died before initial assessment were excluded from the study.

Data related to the study was obtained from the patient; when this impossible, history was obtained from either the relative or police attending with the patients.

The causes of injury were classified as road traffic accidents (RTAs), assault from others, and falling from height. The mandibular fractures classified according to Ivy and Curtis classification, the fracture maxilla classified as Lefort I, II, and III. 14,15

Data analysed using the (SPSS) for. A p-value of less than 0.05 considered significant.

RESULTS

During the period under present study, 200 patients were included. 192 (96%) patients were males and females were 8 (4%) with a male to female ratio of 24:1. Their ages ranged from 13 to 63 years with a mean of 30 ± 12 years.

Road traffic accident resembling for 156 (78%) of all cases. Of these, 116 (58%) injuries were related to motorcycle accidents affecting passenger's motorcyclists, and pedestrian.

Table 1: Distribution of patients according to cause of injury.

Variables	No. of patient	Percentage
RTA	156	78
Motor car accident	40	20
Motor cycle accident	116	58
Firearm injury	12	6
Falling from height	24	12
Machine injury	4	2
Falling of hard object	4	2

Of the 200 panfacial injuries, 116 (58%) with soft tissue injuries which included contusion, lacerations and abrasions. The mandible was commonly involved in 176(88%) of patients (Table 2).

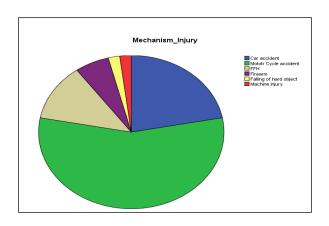


Figure 1: Incidence of pattern of injury.

Table 2: Maxillofacial fractures (n=50).

Injury site	No. of patients	Percentage
Mandible	176	88
Parasymphyseal	96	54.5
Condyle	44	25
Symphyseal	4	2.3
Coronoid	20	11.4
Comminuted	4	2.3
Body	20	11.4
Dentoalveolar	8	4.5
Ramus	4	2.3
Angle	8	4.5
Maxilla	164	79.5
Lefort 1	128	78
Lefort 2	28	17.1
Dentoalveolar	8	4.9
Palatal splitting	24	14.6
Zygoma	180	90
Nasal bone	76	38
Frontal bone	64	32
Orbit	64	32
Soft tissue	116	58
Associated injuries	132	66

Table 3: Associated injuries (n=33).

Associated injuries	Frequency	Percentage
Neurosurgery	52	39.4
Orthopedic	44	33.4
Abdominal injuries	16	12
Thoracic injuries	12	9
Ocular	8	6

132 patients (66%) had associated injuries. Of these, head (39.4%) and musculoskeletal (33.4%) regions c were in patients who had associated head injuries, 28 patients (53.8%) mild injuries (Glasgow Coma Scale [GCS]: 13-15), 12 (23.1%) with moderate injuries (GCS: 9-12), and 12 (23.1%) with severe injuries (GCS: 3-8).

Surgical treatment was required in 180 (90%) of patients under general anesthesia with nasal endotracheal tube in 132(73.3%) of patients, submental endotracheal intubation in 44 (24.4%) of patients and oral endotracheal tube in 4 patients (2.2%) only.

Tracheostomy was done in four cases (2.2%) only open reduction and internal fixation by plates and screws was done in 176 (97.8%) being the most common surgical procedures performed. Intermaxillary fixation (IMF) was done in 140 (77.8%) of patients either with arch bars or eyelet wiring methods.

Titanium mesh was used in 24 (13.3%) patients for orbital blow out fractures commonly affected (Table 3).

Table 4: Operative parameters.

Variables	No. of patient	Percentage
Intubation method		
Nasal	132	73.3
Submental	44	24.4
Oral	4	2.2
Tracheostomy	4	2.2
Titanium mesh	24	13.3
Plates and screws	176	97.8
Arch bar	140	77.8

A total of 38 complications were recorded limited mouth opening and malocclusion were the most prevalent complications (Table 5).

Table 5: Complications of maxillofacial injuries.

Complications	No. of patients	Percentage
Malocclusion	6	0.03
Limited mouth opening	7	0.04
Numbness	6	0.03
Chronic facial pain	6	0.03
Infection	3	0.015
Plate exposure	7	0.04
Facial nerve injury	2	0.02
Disability	1	0.006

6 patients needed redo surgery to correct malocclusion and to control infection. The overall length of hospital stay ranged from 3 day to 30 days (11.12±12.24 days). Patients with head trauma and with orthopedic injuries had statistically significant longer hospital stay (P <0.001). In present study, unfortunately 8 patients died giving a mortality rate of 4%.

DISCUSSION

Panfacial fracture is a term to define those fractures involving the upper, middle and lower face. The aim of treatment panfacial fracture is prevention of facial

deformities, malocclusion.² Most of panfacial trauma has other systems injuries like orthopedic or neurosurgery so multidisplinary approach with other specialties is very important to achieve ideal management of those polytraumatized patients.³

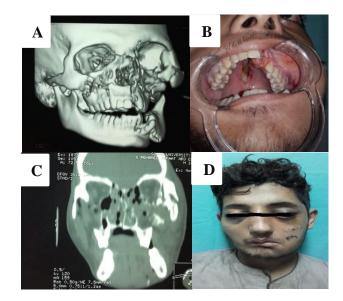


Figure 1: Preoperative View; (A) preoperative 3D CT; (B) Preoperative occlusion; (C) coronal view; (D) preoperative anterior view.

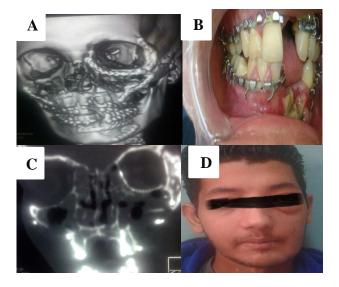


Figure 2: Postoperative view; (A) postoperative 3D CT; (B) postoperative occlusion; (C) coronal View; (D) postoperative anterior view.

It is observed that most of bilateral panfacial fractures were due to road traffic accidents which agree with other studies.⁵ submental intubation is safe and simple to execute without the need of any specialized instrument.

We used submental intubation in 44 patients about 24.4% of cases which was very helpful as it is easy and not interfering with occlusion or fixing the nasal complex fracture. Early intervention prevents postoperative facial

deformity or unacceptable results. In present study the timing of surgery is crucial as our protocol of management is to operate the patient as soon as the facial the edema subsided (from 7 to 10 days).

The panfacial trauma commonly affect males, the male predominance in present study agrees with other literatures. ¹⁶⁻²⁰ Males are commonly affected due to their more exposure to trauma risk factors like driving vehicles, sports injuries.

Present study agree with many literatures as the majorities of patients in the present study were young adult in their third decade. 16,18-23 However, this observation in not agree with some studies, the most common age groups affected by panfacial fractures is the 3rd decade. The etiology of the increased incidence of panfacial fractures in young adults in present study may be due to that people in this period of life are more active regarding sports, hard activities, industry, and high-speed vehicle. The low incidence in the very young and old age groups is due to the low activities of these age groups.

In present study we found that the commonest cause of panfacial injuries was road traffic accidents, which agree with other studies in but in contrast to other studies done in developed countries which reported assaults from others as the commonest cause of panfacial fractures. 12,20,23,25-29

Soft tissue injuries were the most commonly occurring type of injury and mandibular fracture was the most frequent type of bony injury. That agree with other studies. 18,26,30 This dominance may be due to that the mandible is the most prominent and only mobile facial bone. While some articles reported maxillary fractures as the commonest site of injury. 19,31,32 This difference in pattern of injury may be due to variations in the mechanism of injury and anatomical site of the fractured bone.

Head trauma resembling the majority of co-injuries similar to findings from other studies.³³⁻³⁵ The incidence of missed injuries has been reported to be higher in patients with associated severe head injuries.³³⁻³⁵ This is explaining the high rate of undiagnosed maxillofacial injuries in our patients, most of them had associated severe head injuries.

There are many modalities of treatment of panfacial fractures, but the treatment of choice differs according to on many factors like treatment cost, feasibility in the hospital, medical team decision and skills, all of which may vary from one center to another. most of the patients treated in present study with open reduction and internal fixation, which is consistent with the studies conducted by Kamulegeya et al, Chandra Shekar, Erol et al and Kilasara et al. 18,23,25,36 Open reduction and internal fixation has been reported to be the 1st choice of treatment of panfacial fractures.

The average length of hospital stays (LOS) in present study (18.12 days) was found to be longer than that of 2.5 days reported by Martins Junior et al. ^{37,38} The reason for this difference is that in the present study patients with multiple maxillofacial fractures, associated injuries, and those with associated lower limb fractures had significantly longer hospital stay contributing significantly to the overall mean LOS.

CONCLUSION

Road traffic accident (RTC) was the most common cause of panfacial injuries in our locality and the young adult males were the most commonly affected victims. The majority of maxillofacial fractures were treated by open reduction and internal fixation.

Panfacial fractures should be managed by open reduction and internal fixation as soon as possible to reduce the morbidity resulting from these injuries.

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Institutional Ethics Committee

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