INTERNATIONAL JOURNAL OF CURRENT ADVANCED RESEARCH
ISSN: O: 2319-6475, ISSN: P: 2319-6505, Impact Factor: 6.614
Available Online at www.journalijcar.org
Volume 13; Issue 10; October 2024; Page No.3326-3330
DOI: http://dx.doi.org/10.24327/ijcar.2024.3330-1710

Research Article

ANALYSIS OF CONCOMITANT INJURY IN MAXILLOFACIAL TRAUMA PATIENTS

Sunil Vasudev., Asjadi Sheikh and Sahana MS

ARTICLE INFO

Article History:

Received 13th September, 2024
Received in revised form 24th September, 2024
Accepted 18th October, 2024
Published online 28th October, 2024

Key words:

Maxillofacial Trauma,Concomitant injuries, Challenges, Approach.

ABSTRACT

Aim: The purpose of this study was to obtain demographic data, determine the etiological risk factors,occurence of maxillofacial fractures, impact of concomitant injuries in treating maxillofacial trauma patients and challenges faced in the overall management of patients.
Material and methods: The study population consisted of the patients reporting to the emergency department of a tertiary care hospital in Bangalore.The study was conducted over a period of 1 year between May 2023 to August 2024.The data recorded included demographics, aetiology and trauma distribution, facial fracture site, concomitant injury,Glasgow coma scale(GCS) score,Injury Severity Score(ISS), hospital stay and course, interventions, and challenges encountered. **Results:**A study of 30 maxillofacial trauma patients found that most injuries were from road traffic accidents, with alcohol involvement in 36.7% of cases. Significant male predominance with a male to female ratio being 9:1,with 39.8 years being the mean age. Maximum trauma was encountered by the young 20-29 year population (30%).With an incidence rate of 83.3%, mandibular fractures were the most frequent fractures seen. Concurrent injuries were prevalent, with subarachnoid haemorrhage occurring in 26.6% of cases,these injuries lead to longer hospital stay. Significant interventions for patients who sustained Maxillofacial Trauma with Concomitant injuries were enlisted.The challenges encountered were documented.**Conclusion:**This study is an improved foundation for understanding and managing complex trauma which is provided by its treatment descriptions, overview of concurrent injuries, including their frequency, pattern, interventions, demographics and analysis of the challenges experienced.

INTRODUCTION

One of the most common injuries seen in the emergency department is maxillofacial trauma.Facial fractures may occur alone or in conjunction with other systems.Clinicians face a great deal of difficulty while treating maxillofacial fractures that involve many systems.Patients with craniomaxillofacial injuries with concurrent neurologic, cardiothoracic, visceral, or extremities trauma require specialised care and support. Clinical management of severely injured patients is challenging in all phases of treatment during the clinical course.

Road Traffic Accidents remain the primary cause for Maxillofacial Trauma[1,2].Influence of Alcohol during a traumatic event is still a significant contributing factor to injuries.The present study is aimed to obtain demographic data, determine the etiological risk factors,occurence of maxillofacial fractures, impact of concomitant injuries in treating maxillofacial trauma patients and Challenges faced in the overall management of patients.

*Corresponding author: **Sunil Vasudev**

DAPM RV Dental College,JP Nagar 1st phase, Bangalore
Postal Code 560078, India

MATERIAL AND METHODS

30 patients who were the victims of maxillofacial trauma were included in the study conducted over a period of 1 year and 3 months between May 2023 to August 2024 and were divided into two groups

- Group 1-Patients with maxillofacial trauma and concomitant injuries.
- Group 2-Patients with maxillofacial trauma alone

The study population consisted of the patients reporting to the emergency department of a tertiary care hospital in Bangalore. Patients of all age groups and gender, with facial soft tissue injuries diagnosed as maxillofacial fractures either clinically or radiographically were included in this study.The patients who refused to have maxillofacial surgery to fix their facial fractures or who left against medical advice (LAMA) were excluded from the study.The data recorded included demographics, aetiology and trauma distribution, facial fracture

site, concomitant injury,Glasgow coma scale(GCS) score,Injury Severity Score(ISS), hospital stay and course, interventions, and challenges encountered.The concomitant injuries enlisted are fractures of cervical, lumbar,rib femur bone, radius , tibia and fibula, cerebral injuries such as subdural haematoma(SDH),Subarachnoid haemorrhage(SAH),Extradural Haematoma(EDH) and Pneumocephalus,Chest injuries included Pneumothorax,Haemothorax.Other injuries included are Pubic Diastasis,Liver Laceration and Ruptured Internal Carotid Artery(ICA)aneurysm.

Maxillofacial fractures,cervical,lumbar,rib fractures and cerebral injuries were confirmed with Computed Tomography(CT) findings.Femur Bone fracture,radius fracture,Tibia and fibula fracture,pubic diastasis were identified using X-Ray.Pneumothorax,haemothorax were established using Chest X-ray and CT Scan.Peritoneal bleed was initially assessed by Focused Assessment With Sonography in Trauma(FAST) scan and the extent of laceration/injury confirmed using exploratory laparotomy.

Following a brain injury, a patient's degree of consciousness is gauged by their Glasgow Coma Scale (GCS) score.GCS score below 8 was considered the indicative factor for intubation. Mean GCS scores were calculated between the two groups.

The Injury Severity Score (ISS) is a calculation that suggests the severity of injuries in trauma patients.The ISS is based on the Abbreviated Injury Scale (AIS), which scores each of the six body systems for injury severity. A higher ISS score correlates with higher mortality, morbidity, and hospital stay. The average ISS was calculated among the group 1 and group 2 patients.

Throughout the hospital stay, the medical interventions and management were recorded.

The Challenges that maxillofacial surgeons encounter when serving as the primary team for trauma patients were identified and documented from the time of admission to the day of surgery, the ward shift, and the day of discharge.

RESULTS

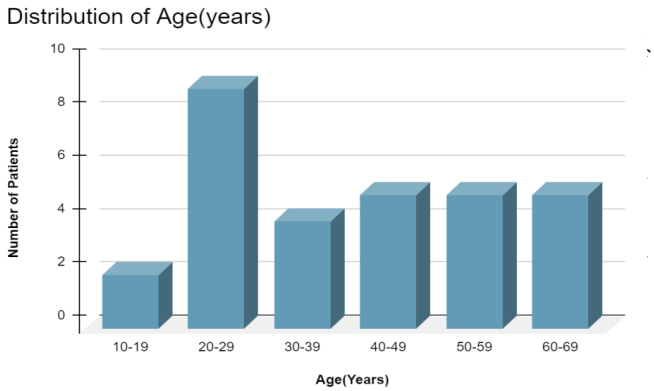

Table.1, Distribution of Age (in years)

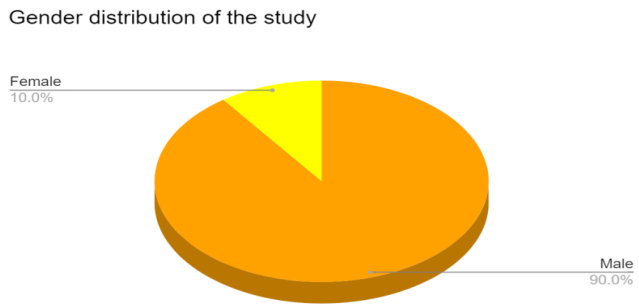

Fig.1 Gender Distribution of the study

Trauma was primarily caused by road traffic accidents (RTAs), accounting for 83.4% of cases, and followed by self-falls (6.7%). For the remaining study participants,the cause of trauma was assault, pedestrian injury, or sports injury (accounting to 3.3% each).

36.7% of the study group had RTAs due to alcohol intoxication, indicating that alcohol use was a major contributing factor to injuries.(Fig 2).The Injury Severity Score(ISS) average in Group 1 is 14.3 and group 2 is 5.

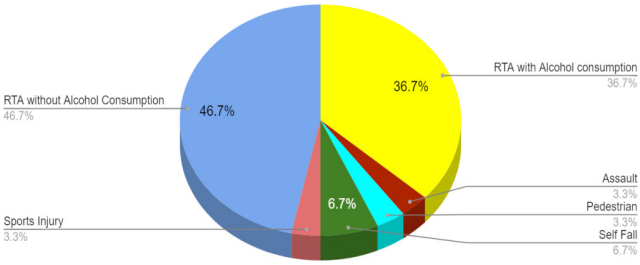

Fig.2 Aetiology and Trauma Distribution

With an incidence rate of 83.3%, mandibular fractures are the most frequent fractures seen in patients in Group 1 and Group 2(Table 2). Parasymphysis is the most frequently fractured site in the mandible, followed by the condyle,body and angle area in both the groups.13.3% of the study participants of group 1 had a comminuted fracture of the mandible.After mandibular fractures, zygomatico-maxillary complex (ZMC) fractures account for 23.3% of all fractures in individuals in group 1.Approximately 13.3% of the solitary fractures in group 1 patients involved a nasal bone fracture, which was followed by infraorbital rim and lateral wall of orbit fractures, which accounted for 6.6% of the fractures.

Lefort 2 fractures, depressed frontal bone fractures, and Panfacial fractures account for 6.6% (each) of the patients in group 1, suggesting that Maxillofacial fractures along with concomitant injuries result in severe or widespread facial fractures.

Following mandibular fractures, group 2 patients exhibit an equal distribution of nasal bone, infraorbital rim, and lateral wall of orbit fractures, accounting for 13.3% of cases in each category.Lefort 2 fractures account for 6.6% of patients in group 2.

All the maxillofacial fractures were treated by open reduction

and internal fixation(ORIF)

In our study we have observed that Facial fractures associated with concomitant injuries usually result in more than one fractured site in the Maxillofacial region.

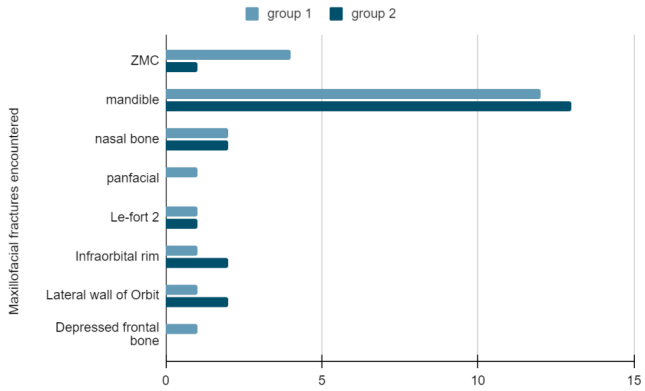

Table 2 Distribution of Maxillofacial Fractures in group 1 and group 2 patients

Subarachnoid haemorrhage (SAH) is the most frequent concurrent injury observed, accounting for 26.6% of all cases(Table 3).The next most common conditions after SAH were rib fractures, pneumothorax, pneumocephalus, femur bone fractures, and subdural haematoma (SDH), accounting for 20% of cases res;pectively.Pubic diastasis and radius fracture each account for 13.3% of cases. The remaining study subjects had 6.6% of them with non displaced cervical bone fracture, transverse process of lumbar fracture, tibia/fibula fracture, extradural haematoma(EDH), and liver laceration.

The greatest number of cases of cerebral injury are associated with SAH, which is followed by SDH and then EDH.The most frequent orthopaedic injury identified in our study is femur fracture, which is followed by fractures of the radius and then the tibia/fibula.Rib fractures and Pneumothorax and are the most frequent injuries involving the chest, followed by haemothorax.The most severe injury found in our study is an Internal carotid artery(ICA) aneurysm that has ruptured. Initially, a CT scan indicated SAH and multiple haemorrhages following RTA; later, an MRI brain sequence, diffusion weighted imaging (DWI), and vessel wall imaging with contrast confirmed the diagnosis.

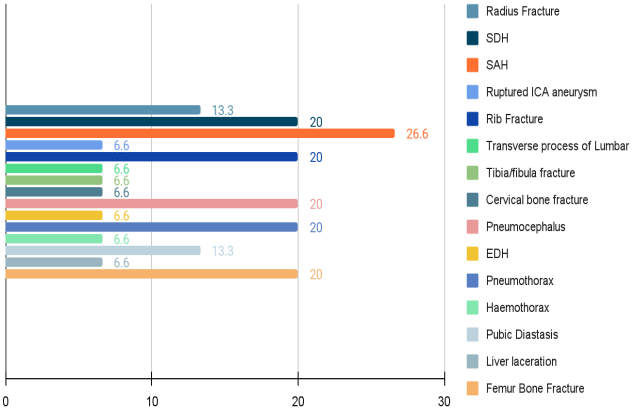

Table 3 Concomitant injuries in Group 1 Patients

Each patient's GCS score was determined and noted; for group 1, it was 12.1, and for group 2, it was 15. Patients with concomitant injuries who had maxillofacial fractures stayed in the hospital longer than those with just maxillofacial fractures,Group 2 had an average hospital stay of three days, while Group 1 had an average of fourteen days.

Significant interventions for patients who sustained Maxillofacial Trauma with Concomitant injuries included intubation,tracheostomy,Craniotomy, Craniectomy,Vascular surgery,Closed/Open reduction with internal fixation of Long bone fractures.

In Group 1, intubation was performed for 60% of the patients, 20% of the patients required a tracheostomy,and the remaining 20% neither required intubation or tracheostomy. One patient had a ruptured ICA aneurysm with a Bilateral nasal bone fracture. Digital Subtraction Angiography was then carried out, and a flow diverter was placed at the site of the ruptured aneurysm with intra-arterial nimodipine infusion.

Three patients suffered femur fractures; two underwent open reduction and internal fixation with an intramedullary interlocking nail followed by thromboembolic prophylaxis and one patient, a 12-year-old child, underwent closed reduction of the femur bone fracture with Titanium Elastic Nail (TEN) implantation under general anaesthesia.

The patient who sustained tibia and fibula fracture was managed by closed reduction and external fixator application over the lower leg region with DVT Prophylaxis.A patient who sustained head injury was diagnosed with SDH underwent a craniotomy, while a patient who suffered from SAH and cerebral oedema underwent a craniectomy.An exploratory laparotomy followed by surgical repair was done for a grade 4 liver laceration case.

The remaining concurrent injuries were treated conservatively. The patient was placed in a 30° Fowler's position to control their pneumocephalus.Pneumothorax and hemothorax associated with rib fractures were treated conservatively, with frequent monitoring of SpO2 levels. Fentanyl patches were used to treat pain, covering the lateral aspect of the chest.

The patient was placed in a supine posture and catheterized to treat the transverse process of the lumbar fracture. The cervical bone fracture(undisplaced) was treated with a cervical collar.A pelvic binder was given to the patient with pubic diastasis, and flowtron therapy was linked.

Challenges faced by Maxillofacial Surgeons as primary team in treating trauma patients included abdominal distension in a patient who had sustained transverse process of lumbar fracture and was advised to stay in Supine position and Procto Clysis Enema had to be performed without placing the patient in lateral position.

Urine culture positive for Candida albicans for another patient who was catheterised due to femur bone fracture and fluconazole was given.

Endotracheal Tube(ET) culture positive for Pseudomonas Aeruginosa,was treated with Inj.Piptaz 4.5gm .

Drop in SpO2 levels below 85% was managed with oxygen mask 2L/min.

Patients who had maxillomandibular fractures along with na-

sal bone fractures were recommended to use Ryle's tube.Patients may move the Ryle's tube, necessitating more X-rays to verify the position. This is an additional difficulty that the Maxillofacial team faces more frequently.

Subdural Haematoma (SDH) was identified in one patient who had suffered a head injury with a mandibular angle and symphysis fracture. The patient also experienced several intraventricular haemorrhages and a delayed recovery.The patient's cognitive function declined as a result of the head injury.The mandibular fractures were repaired by ORIF, and because of the neurological disability, it was technically difficult to remove the arch bar and wires used for intermaxillary fixation four weeks after surgery. Keeping up with oral hygiene presented another difficulty for these patients.

DISCUSSION

This study was done to obtain demographic information, identify etiological risk factors, assess the impact of concomitant injuries and challenges encountered in the overall management of patients in a tertiary care hospital in Bangalore.

Our study shows,Road traffic accidents (RTAs) were the main source of trauma, which is consistent with the findings of multiple other studies[3,4]. Self-fall was the second most common cause of trauma in our study, Singh V et al reported the same[5]. Age range varied from 11 to 65, with a mean age of 39.8 years. Maximum trauma was experienced by the young population, aged 20 to 29 with a male preponderance.Male to female ratio is 9:1, suggesting that males were injured more compared to the females.This was consistent with a study conducted by khanTU et al,Males are at risk due to their greater participation in the active population, mainly in developing countries[6].36.7% of the study group had RTAs due to alcohol intoxication, indicating that alcohol use is a major contributing factor to injuries.

Mandibular fracture is the most frequent type of Facial fracture in groups 1 and 2 with Parasymphysis being the most commonly fractured location in the mandible, followed by the condyle, the body, and the angle area.Similar results were found in a survey done by P Agarwal et al[7].Our study revealed that nasal bone fractures were second most commonly detected in group 2 patients who were diagnosed with maxillofacial fractures, while ZMC fractures were the second most common injury in group 1 patients who had concurrent injuries with maxillofacial fractures. All the maxillofacial fractures were treated by open reduction and internal fixation(ORIF)

According to our study, patients with concurrent trauma and maxillofacial fractures have more than one fractured site in the maxillofacial region.

Out of all the concurrent injuries,cerebral injuries account for the most prevalent type.Several other studies are in concordance with this observation[8,9].Among the cerebral injuries,-SAH was the most frequent type of cerebral injury, followed by pneumocephalus and SDH and then the EDH as per our observations.The orthopaedic injury is the second most frequent concomitant injury observed. It follows the following pattern: femur bone fractures are the most prevalent, followed by radius fractures and then the tibia fibula fractures.However, a study by S. Dasukil et al. indicate that clavicle fractures are the most prevalent type of orthopaedic injury, which slightly deviates from the pattern of occurrence.[10].The orthopaedic displaced fractures were treated by open reduction and internal fixation , the paediatric case of fractured femur was treated by closed reduction and titanium elastic nail implantation.Use of TENs implantation is a reliable method as it causes minimal disturbance of growth, promotes rapid healing,early mobilisation and lesser hospital stay.Because of their retrograde entry, these TENs do not harm or interfere with the blood flow to the femoral head or the epiphysis.Titanium is very flexible and biocompatible, which makes it excellent for TENs. Above all, flexibility promotes callus formation by lowering the amount of stress shielding, which speeds up the union process[11].

Rib fractures are the frequent chest injuries encountered in maxillofacial trauma patients.Rib fractures are mostly associated with pneumothorax and haemothorax, whereas in our study isolated rib fractures were managed conservatively.The overall severity of the chest injury and/or the intensity of blood loss decide the conservative (no intervention) course of treatment. Conservative therapy with observation, aggressive respiratory care, and pain control can be opted if the patient is hemodynamically stable and the hemothorax is verified to be less than 300 ml[12].

When treating trauma patients with complex injuries, such as those involving multiple systems, Maxillofacial surgeons confront formidable obstacles, increased infection risks, respiratory complications.Neurological conditions can impede healing, delay surgeries and result in cognitive decline.

CONCLUSION

This work significantly expands our understanding of maxillofacial trauma. Its demographic and injury analysis, overview of concurrent injuries, including their occurrence, pattern, and interventions, and treatment descriptions offer a more useful framework for comprehending and treating these injuries. It also highlights the necessity of a multidisciplinary approach to trauma care. A picture of challenges in treating maxillofacial trauma patients with concomitant injuries is given by the reporting of treatment-related difficulties.Additionally, this study implies that physicians who specialise in field of Maxillofacial surgery should have sufficient training in the diagnosis, treatment, and management of polytrauma patients with significant facial injuries.

FUNDING INFORMATION

No source of funding.

CONFLICT OF INTEREST

None

References

1. Hogg NJ, Stewart TC, Armstrong JE, Girotti MJ. Epidemiology of maxillofacial Injuries at trauma hospitals in Ontario, Canada, between 1992 and 1997. J Trauma 2000;49: 425–432.
2. Haug RH, Prather J, Indressano T. An epidemiologic survey of facial fractures and concomitant injuries. J Oral Maxillofac Surg 1990;48:926–932
3. Patil SG, Munnangi A, Joshi U, Thakur N, Allurkar S, Patil BS. Associated injuries in maxillofacial trauma: a study in a tertiary hospital in South India. Journal of maxillofacial and oral surgery. 2018 Dec;17:410-6.

4. Alvi A, Doherty T, Lewen G. Facial fractures and concomitant injuries in trauma patients. The laryngoscope. 2003 Jan;113(1):102-6.
5. Singh V, Malkunje L, Mohammad S, Singh N, Dhasmana S, Das SK. The maxillofacial injuries: A study. National journal of maxillofacial surgery. 2012 Jul 1;3(2):166-71.
6. Khan TU, Rahat S, Khan ZA, Shahid L, Banouri SS, Muhammad N. Etiology and pattern of maxillofacial trauma. Plos one. 2022 Sep 29;17(9):e0275515.
7. Agarwal P, Neeraj, Reddy GS, Chug A, Katiyar A, Rashid N, U V, Jain K. Risk factors and current trends in maxillofacial trauma: An epidemiologic study at a major Trauma Center of North India. Oral Surgery. 2023 Aug;16(3):258-65.
8. Scherbaum Eidt JM, De Conto F, DeBortoli MM, Engelmann JL, Rocha FD. Associated injuries in patients with maxillofacial trauma at the Hospital São Vicente dePaulo, Passo Fundo, Brazil. *J Oral Maxillofac Res.* 2013;4(3):1–8. doi: 10.5037/jomr.2013.4301.
9. Obuekwe ON, Etetafia M. Associated injuries in patients with maxillofacial trauma. Analysis of 312 consecutive cases due to road traffic accidents. *JMBR Peer Rev J Biomed Sci.* 2004;3(1):30–36.
10. Dasukil S, Verma S, Jena AK, Mohapatra M. Frequency of concomitant injuries in maxillofacial trauma in a tertiary health care centre in India: a 5-year retrospective study. Chinese journal of traumatology. 2024 Mar 22.
11. Kawalkar A, Badole CM. Percutaneous titanium elastic nail for femoral shaft fracture in patients between 5 and 15 years. Journal of orthopaedics. 2018 Jun 1;15(2):695-700.
12. Zeiler J, Idell S, Norwood S, Cook A. Hemothorax: a review of the literature. Clinical pulmonary medicine. 2020 Jan 1;27(1):1-2.

How to cite this article:

Sunil Vasudev, Asjadi Sheikh and Sahana MS.(2024) Analysis of concomitant injuries in maxillofacial trauma patients, *International Journal of Current Advanced Research*, 13(10), pp.3326-3330.

****