

## Pattern of Cranial Injuries Associated with Maxillofacial Trauma: A Single Institutional Study

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### Abstract:

**Objective:** The aim of the study was to identify the pattern of cranial injuries associated with maxillofacial trauma in Government Dharmapuri Medical College Hospital situated near the national highway, which receives a lot of road traffic accident cases.

**Method:** This retrospective study was carried out with computer tomographs and their reports of polytrauma patients who were brought to this trauma centre. Majority of the cases were road traffic accident cases. Data was collected from the year 2016 to 2020, including age, gender, and anatomical site of fracture and brain injuries.

**Result:** In these hundred cases studied, Frontal bone fracture was predominant and frontal combinations like frontoparietal, frontotemporal were also noted. Many patients also had associated traumatic brain injuries like SDH, EDH and SAH. Two patients had diffused axonal injury.

**Conclusion:** Any patient with maxillofacial injury irrespective of associated fracture or not is always at a risk of TBI. We should be able to suspect and diagnose head injuries.

**Key Words:** Cranial injuries, computerized tomography, Subdural haemorrhage, Extradural haemorrhage, Subarachnoid haemorrhage, Axonal injury, Maxillofacial injury.

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### I. Introduction

Maxillofacial injuries are common in the practice of emergency medicine. More patients have multisystem trauma that is managed by multispeciality surgical personals, especially otolaryngologists, plastic surgeons, ophthalmologists, neurosurgeons, and maxillofacial surgeons.

Many times, facial fractures tend to distract our attention from more severe life-threatening injuries. Studies have shown that facial fractures have a strong association with cranial injuries and traumatic brain injuries. Presence of head injuries in patients with maxillofacial injury is a life-threatening condition. Prompt determination of head injuries in these patients is crucial to prevent morbidity and mortality. Hence, the need to know about the cranial injuries associated with maxillofacial injuries becomes important.

The aim of the study is to identify the pattern of cranial injuries associated with maxillofacial trauma in Government Dharmapuri Medical College Hospital.

### II. Material and Methods

The present study includes 100 computerized tomography films and their reports of patients with maxillofacial trauma brought to the trauma ward of Dharmapuri Medical college hospital from 2016 to 2020. The data includes age, gender, and anatomical site of fracture.

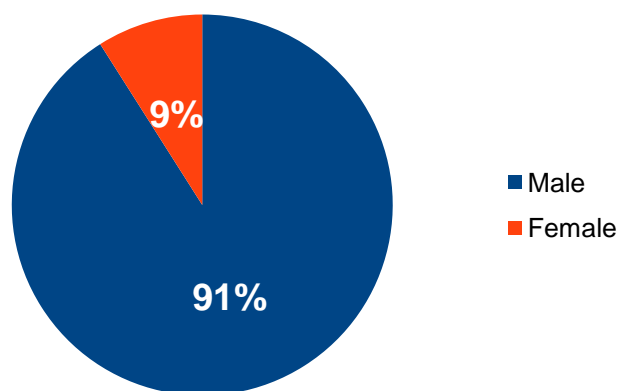
### III. Result

This descriptive study (retrospective) was conducted to evaluate the pattern of cranial injury that are associated with maxillofacial trauma in 100 polytrauma patients brought to Government Dharmapuri Medical College.

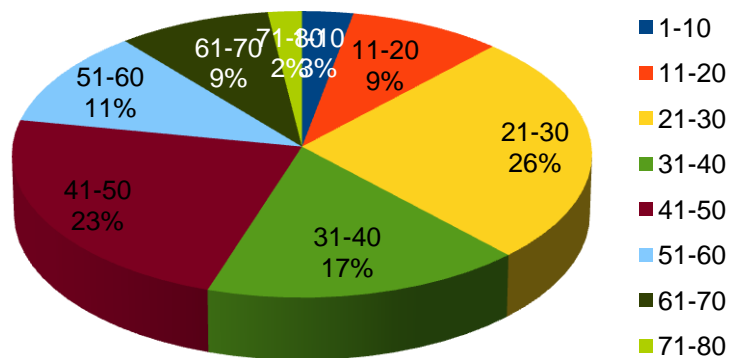
Our study shows that the age of the studied patients ranged from 7 to 80 years, with the majority of them between 20 to 40 years, and the mean age is 39. Majority of the patients were male (91%), while 9% of them were female. The majority of patients were road traffic accident patients.

**Table no 1** Demographic data

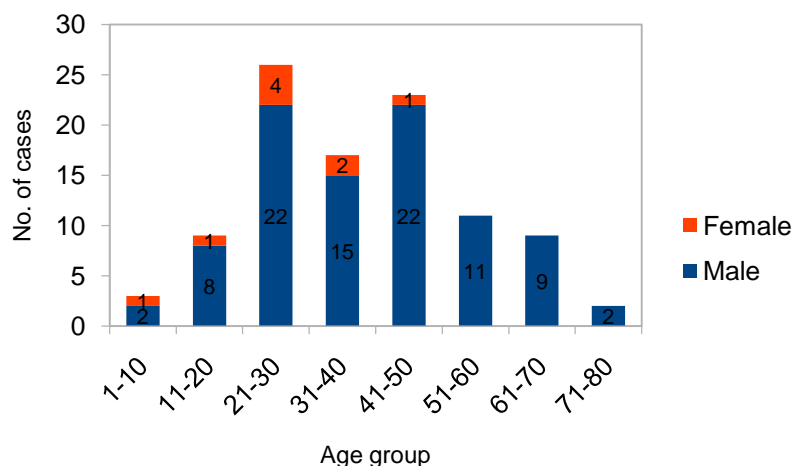
Age Group	Count	%	Male	Female
1-10	3	3%	2	1
11-20	9	9%	8	1
21-30	26	26%	22	4
31-40	17	17%	15	2
41-50	23	23%	22	1
51-60	11	11%	11	0
61-70	9	9%	9	0
71-80	2	2%	2	0
Avg age	39			



**Fig 1** Gender share



**Fig 2** Case by age group

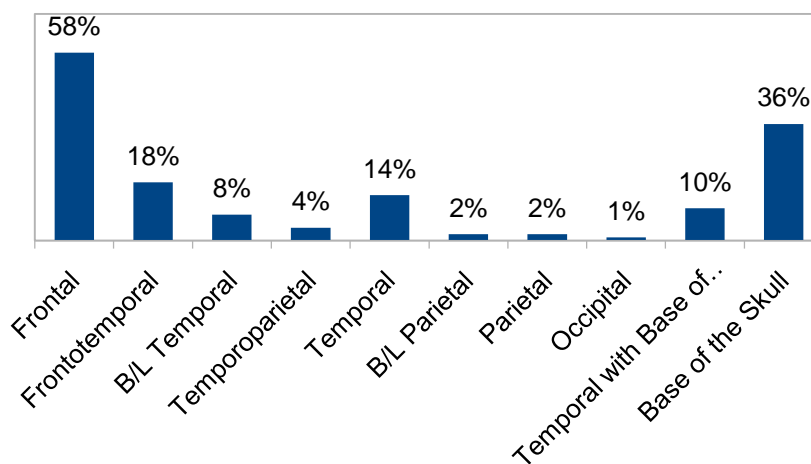


**Fig 3**Case by age group

This study demonstrates the pattern of cranial injury along with neural injuries.

We observed single cranial bone fractures, combined cranial bone fractures, bilateral fractures, and fractures associated with TBI. The most common bone fracture noted was frontal bone (58%). Next most common bone fracture, associated with maxillofacial injury, is the base of the skull (36%). This mostly includes sphenoid bone fractures. Next common bone is the temporal bone (14%). Of the analysed patients, parietal bone fractures were 2%. In this order, the least fractured bone is occipital bone. We have noticed only one occipital bone fracture among all 100 cases.

Apart from single bone fracture, we have also noted a combination of cranial bone fractures and bilateral fractures. In this category, we have noticed the highest number, about 18%, were frontotemporal fractures and about 8% bilateral temporal fractures and another 4% temporoparietal combination. 2% had bilateral parietal fractures. About 10% had temporal bone with the base of the skull fracture. Of the total analysed data., there were no combinations with occipital fractures.

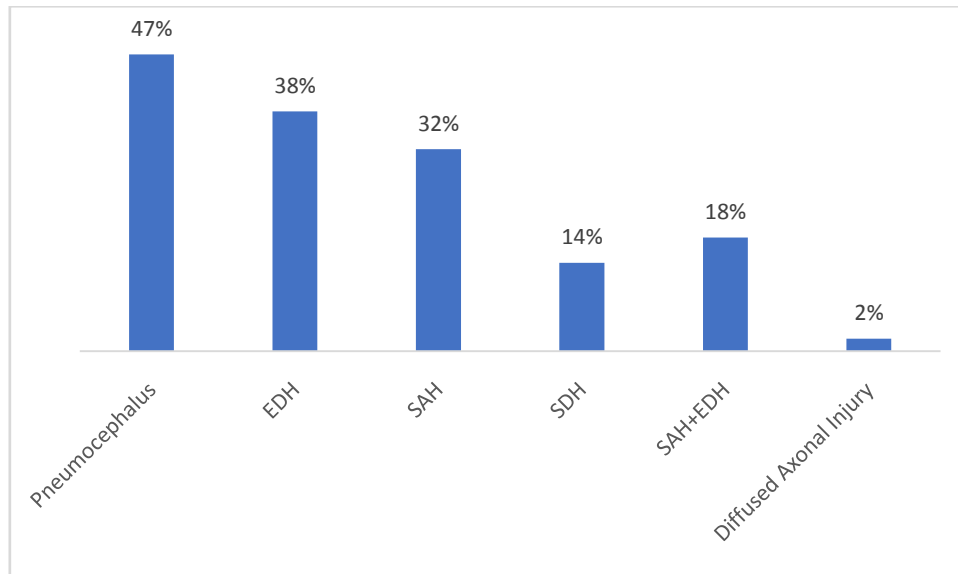


**Fig 4**Type of cranial bone fractures

A majority of the patients, about 78%, had midface fractures; the rest had upper and lower third facial fractures.

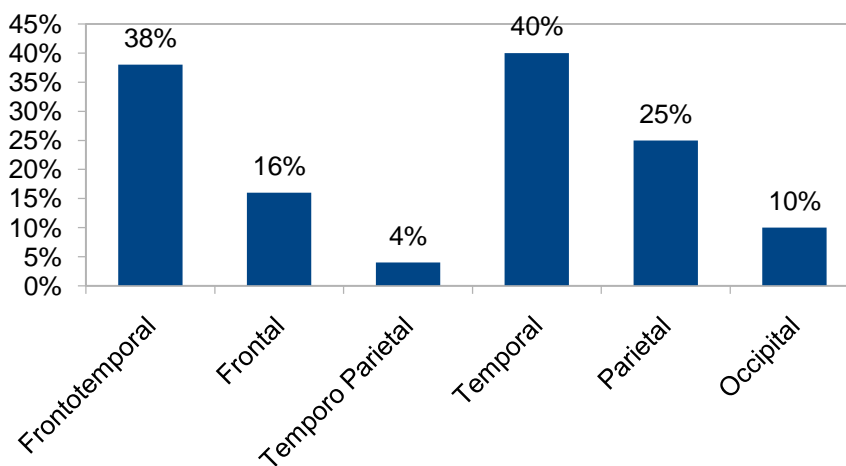
Although cranial bone fractures alone do not pose many problems for the treating maxillofacial surgeon, what we have noticed is that most of the patients with cranial bone fracture (68%) also had TBI. This is where the maxillofacial surgeon's perspective comes in analysing and planning for combined treatment planning with neurosurgeons.

In this study the TBI noted along with cranial injuries were: pneumocephalus, which was the most common (47%), next common is EDH (38%), followed by SAH (32%), SDH (14%), a combination of SAH and EDH (18%), and diffused axonal injury (2%). The majority had moderate brain injury, a minority with severe TBI.

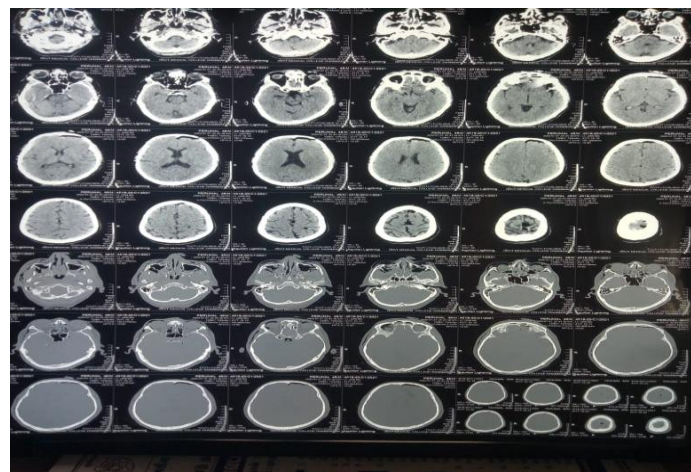


**Fig 5** Type of TBI

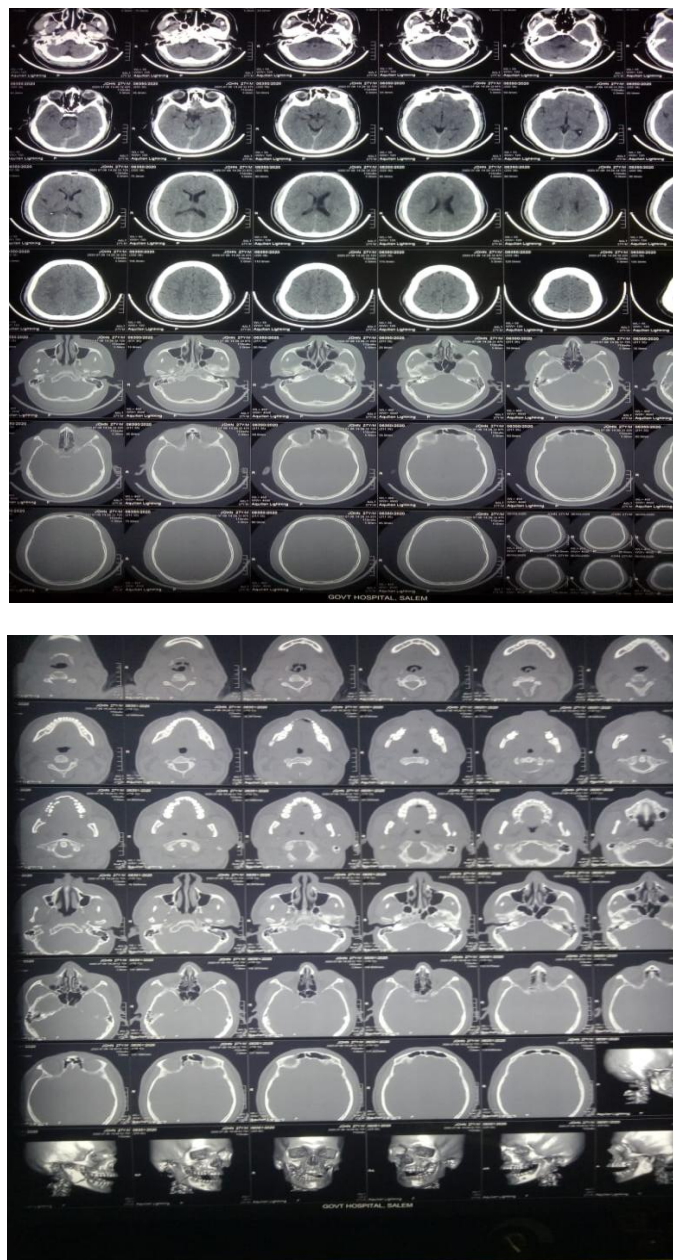
Another analysis made in our study is the area of TBI. 38% had frontotemporal region TBI, 16% had frontal region TBI, 40% had temporal region TBI, 4% had temporo-parietal region TBI, 25% had parietal region TBI, and 10% had occipital region TBI. Majority of the brain injuries were in the frontal and temporal region.



**Fig 6**TBI by region



**Fig 7**Midface Fracture with Pneumocephalus and Base of the Skull Fracture



**Fig 8** Mandibular Fracture with Tentorial SAH

#### **IV. Discussion**

Road traffic accident injuries are the most common in developing countries like ours, and now a global health problem causing permanent disabilities to the affected individuals, especially young generations.

Maxillofacial injuries are commonly encountered in RTA; more than 50% of the patients with these injuries have multisystem trauma requiring coordinated management between a neurosurgeon, maxillofacial surgeon, ENT surgeon, and ophthalmologist.

Patients with maxillofacial injuries remain a significant management challenge.

A thoughtful approach to management has the potential to optimize the outcome. Injury to the head and cervical spine are amongst those that demand due considerations on account of their life-threatening behaviour.

Head injuries can be either primary or secondary in nature. The release of biochemical substances along with the primary injury causes neural damage, that leads to secondary injuries. Prompt diagnosis and early interventions are fundamental to prevent morbidity as well as mortality, especially with regards to the presentation of TBI.

Therefore, maxillofacial surgeons must be aware of the possible concomitant head injury. We must also have a thorough understanding of the pathophysiology of cranial injuries and underlying brain injuries for initial recognition and management.

The early signs of intracranial haemorrhage include nausea, vomiting, seizures, and skull fractures. This is of clinical importance as it indicates that in severely injured patients with facial fractures, emergency CT should be performed without delay and early neurosurgical intervention is needed to prevent morbidity associated with TBI.

Patients with maxillofacial fractures have a high risk of intracranial haemorrhage when compared to patients without maxillofacial fractures. Many times, facial fractures tend to distract our attention from more severe and often life-threatening injuries. Usually, conscious patients with Glasgow scale score of 15 with no clinical and neurological abnormalities are not expected to have an intracranial pathology. However, high-velocity impacts can result in intracranial haemorrhages. About 2.8% of neurologically normal patients suffer from intracranial hematomas. Hence the early diagnosis of these intracranial haemorrhages can lead to prompt treatment which is essential to improve the outcome.

Focal injuries like SDH, EDH, and SAH may lead to loss of function and diffuse injuries like axonal injuries may lead to coma or death of the patient. So, the purpose of the present study is to evaluate and provide a comprehensive overview regarding the full scope of maxillofacial trauma with associated cranial injuries to assist the clinician in the assessment of this highly specialized area.

## V. Conclusion

Many times, maxillofacial surgeons encounter patients with maxillofacial trauma with a concomitant head injury. Any patient with maxillofacial injuries, irrespective of associated cranial fracture or not, is always at risk of TBI. We should be able to suspect and diagnose head injury and also provide adequate initial management. All maxillofacial injury patients should undergo neurosurgical observation and follow up. Patients with cranial injuries remain a significant management challenge. A thoughtful approach to management has the potential to optimize treatment outcome for these conditions.

The final decision should take into account future functionality, the patient demeanour, and surgeon's enthusiasm and skill. Neurosurgeons, emergency physicians, and plastic surgeons should participate at all levels of planning, care, and management for patients with maxillofacial fractures and cranial injury.

## Limitation of the Study

There are a few limitations to this study that should be taken into consideration. This study was done in a single institution with a limited number of samples. Therefore, the results obtained from this study cannot be generalized, as further research with a larger number of samples is required to determine the extensive nature of this condition.

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