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Interrelation of maxillofacial fractures and cranial injury – A prospective study

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Abstract
Background: What is the role of maxillofacial trauma in head injury and does the presence of faciomaxillary fractures protect the brain from trauma?
Aim: To document the pattern of maxillofacial trauma and head injury in patients with craniofacial injuries and to identify whether craniofacial fracture patterns predispose patients with maxillofacial fractures to different types of intracranial haemorrhages.
Materials and methods: Patients with Maxillofacial trauma treated in the Dept. of Oral & Maxillofacial Surgery, Govt. Dental College, Kottayam for a period of 6 months, November 2013 – April 2014 were included in the study. Patients were divided into 3 groups, group a patients with maxillofacial fractures, group B patients with head injury and group C combined craniofacial fractures. The association between facial bone fracture and head injury pattern evaluated using Chi-Square test.
Results: There were total 130 patients of which 119 (91.5%) were males and 11 (8.5%) were females. Group A had 53 patients, Group B had 38 patients and Group C had 39 patients. Isolated facial bone fractures showed a higher prevalence of nasal bone (22%) fracture followed by zygomatic complex fracture (20%). The most common intracranial haemorrhage in the present study was SDH. Lefort III fracture of maxilla is mostly associated with intracranial haemorrhage.
Conclusion: Patients with Lefort III fractures and zygomatic complex fractures should thus be thoroughly evaluated for associated head injury.

Keywords: Head injury, maxillofacial, facture, interrelation

Introduction
The prevalence of road traffic accidents and the accompanying morbidity and mortality is increasing day by day. Patients presenting with maxillofacial fractures may also have accompanying injuries such as head injury, spinal injury, intrathoracic or intra-abdominal injuries. Studies have reported that patients with multiple facial bone fractures have a higher prevalence of intracranial hematoma. The type of facial bone fracture wich predisposes to intracranial hematoma is not much reported.
Intracranial hematoma is an acute emergency and immediate decompression can reduce the extent of brain injury. Patients who present with symptoms of intracranial injury such as vomiting, nausea, loss of consciousness, low GCS score are evaluated for head injury. Many patients with head injury deteriorates suddenly and necessitates intervention for intracranial hematoma. The anatomy of the facial skeleton injury is very complex with multiple interdigitation with surrounding bone. Hence isolated facial bone fracture is comparatively rare and trauma to the facial region can cause fracture of multiple nearby bones. This makes patients with facial bone fractures at high risk of accompanying intracranial injury, as reported in literature.
Today, CT scanning is routinely performed in patients with impaired consciousness or neurological signs. The purpose of the present study is to document the pattern of maxillofacial trauma and head injury in our casuality department. The interrelation of facial injury and cranial injury was evaluated with an attempt to identify which type of facial injury predisposes to intracranial injury. Comparison of maxillofacial trauma and head injury among alcoholics and non-alcoholics, with and without helmets & with and without seat belts was also done. Such data could support a more efficient use of computed tomography to detect intracranial haemorrhages in maxillofacial fracture patients.

Materials and methods

The patients with craniofacial trauma presenting to the casualty department of Govt Medical/Dental College Kottayam Kerala from November 2013 to April 2014 were included in the study. The data was collected after providing emergency lifesaving procedures and stabilising the patient. Age, sex, smell of alcohol, details of the road traffic accident including the use of helmet/seat belt at the time of accident, head injury and the facial bone fracture details were recorded. The facial bone fractures taken into consideration were that of frontal bone, zygomatic complex, isolated zygomatic arch fracture, orbital floor fracture, Lefort I, II, III fractures of maxilla and mandible fracture. Cranial vault fractures, cerebral contusions, epidural haemorrhage, subdural haemorrhage, subarachnoid haemorrhage and intracranial haemorrhage were recorded. Patients with inadequate investigations were not included in the study.

Cases with subarachnoid hemorrhage, subdural hemorrhage, epidural hemorrhage, and intracranial hemorrhage were classified as the intracranial hemorrhage group. Cases with pneumocephalus, non-displaced skull fractures and open head trauma were classified as the skull fracture group. Cases with cerebral contusion and laceration were classified as the cerebral contusion group.

Patients were divided into three groups. Group A patients with only facial bone fractures. Group B patients with isolated skull fractures and intracranial haemorrhage group. Group C patients with both facial bone fracture and head injury. The facial bone fractures which is most commonly associated with head injury were recorded.

Results

There were total 130 patients of which 119 (91.5%) were males and 11 (8.5%) were females. (Table 1)

Table 1: showing sex distribution.

	Frequency	Percent	Valid Percent
Female	11	8.5	8.5
Male	119	91.5	91.5
Total	130	100.0	

The age of patients ranged from 8-88 yrs with peak incidence in 20-40 yrs of age group. Of the 130 patients 87 were alcoholic (with a single female alcoholic patient) and 41 were non-alcoholic. (Table 2)

Table 2: showing frequency of alcoholic patients

	Frequency	Percent	Valid Percent
Alcoholic	87	66.9	66.9
Non-alcoholic	41	91.5	31.5
Total	130	100.0	

93 patients were on two wheeler. Among the 93 patients, 65 did not wear helmet. 15 patients had head injury inspite of using helmet. 37 patients were on rikshaws and four wheeler. 26 patients did not use seat belt. Group A had 53 patients, Group B had 38 patients and Group C had 39 patients. (Table 3-5)

Table 3: showing facial bone fractures in group a patients

Facial bone fracture	Frequency	Percent
Frontal	7	13
Nasal	12	22
Orbital floor	6	11
zmc	11	20
Zygomatic arch	2	3.7
Lefort I	2	3.7
Lefort II	4	7.5
Lefort III	1	1.8
Mandible	8	15
Palatal	0	0
Total	53	100

Table 4: showing frequency of head injury in group B patients

		Frequency	Valid Percent
Valid	Skull fracture	12	31
	Intra cranial haemorrhage	18	47
	contusion	8	21

Table 5: showing frequency group C patients with head injury and facial bone fractures

Facial injury	Head injury	Frequency	Percent
Lefort III	SDH	8	20.5
Lefort III	EDH	3	7.6
Lefort III	SAH	2	5
Lefort III	Skull fracture	4	10
ZMC	Contusion	5	12
ZMC	Skull fracture	6	15
Condyle	Skull fracture	3	7.6
symphysis	EDH	3	7.6
Nasal	Contusion	2	5
frontal	Contusion	2	5
frontal	EDH	1	2.5
Total	39	39	100

The association of facial bone fractures and head injury was done with Pearson Chi-Square analysis. Statistically significant results were obtained with P value 0.000.

Discussion

The study showed higher number of male patients. Increased frequency of males using automobiles in our country has lead to a higher number of accidents in males. Literature also reports a male dominance [1-6]. Peak incidence of age group involved in road traffic accidents are usually between 20-40 years of age [7-10]. Violation of traffic rules has also caused an increased prevalence of accidents [11-12]. Failure from the part of people in wearing helmets has increased the morbidity and mortality associated with two wheeler accidents. In the present study also 93 patients reported with such accidents. 15 patients had head injury inspite of using helmets. Improper use of helmets and using helmets without a chin cap was the cause of head injury in these patients. Driving when under the influence of alcohol also causes a high prevalence of road traffic accidents. In the present study 87 were alcoholic.

In the present study 44% of patients had only facial injury. 29% of patients had only head injury. 30% of patients had both maxillofacial fractures and head injury. Isolated facial bone fractures showed a higher prevalence of nasal bone (22%) fracture followed by zygomatic complex fracture (20%). Nasal bone is the most prominent bone on the face. This anatomic position and increased fragility causes a higher incidence of nasal bone fracture compared to other facial bone fractures. Literature has also reported a higher incidence of nasal bone fracture [13].

The most common intracranial haemorrhage in the present study was SDH (13) followed by EDH (4). Temporal bone fracture was the most common type of skull fracture.

30 percent of patients had both maxillofacial fractures and head injury. Lefort III fracture of maxilla is mostly associated with intracranial haemorrhage. SDH was the most common type of head injury associated with maxillofacial fractures. This was followed by the zygomatic complex fracture. The complex interdigitation of multiple bones, causes a higher prevalence of skull fractures along with fractures in the zygomatic complex region. The presence of Lefort and zygomatic complex fractures in the facial skeleton must thus arise the suspicion of intracranial haemorrhage or skull fracture. The association between facial bone fracture and head injury pattern evaluated using Chi-Square test. The result was significant with a p value of <0.005. The association obtained in the study was similar to that reported in literature [14]. Patients with Lefort III fractures and zygomatic complex fractures should be thoroughly evaluated for head injury.

Conclusion

Facial injury should always be of clinical concern with associated brain damage, because it can be a marker for substantial transfer of energy to the brain. Hence a timely detection and prompt treatment of patients with craniofacial fractures is very important.

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