Original Article

ASSOCIATION OF TRAUMATIC BRAIN INJURY WITH MIDFACE FRACTURES IN PATIENTS REPORTING TO ORAL & MAXILLOFACIAL SURGERY, KHYBER COLLEGE OF DENTISTRY

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ABSTRACT

Objective: *To determine the association of traumatic brain injury with midface fractures in patients reporting to oral and maxillofacial surgery, Khyber College of Dentistry, Peshawar.*

Material and Methods: *This retrospective cross sectional study was carried out at Khyber College of Dentistry, Peshawar during a period of one year (Aug 2014-Aug 2015). A carefully structured proforma was used to obtain data from the trauma patients reporting to the facility. The aim was to assess the evidence of traumatic brain injury in the presenting patients and its association with fractures of the midfacial complex. The collected data was analyzed using SPSS version 22.*

Results: *124 patients reported to the Oral and Maxillofacial Department of Khyber College of Dentistry with mid face and zygomatic bone fractures. Road traffic accident was the most common cause of trauma (87.4%) The types of fracture were documented as isolated zygomatic complex fractures, Lefort I,II and III as well as different combination of all of these fractures. 71 (57.3%) patients presented with zygomatic complex fracture. The diagnosis for post traaumatic brain injury was made upon the need of neurosurgical consultation and intervention. Total 4 patients presented with skull fracture and pneumocephalis out of which only 2 were reported with skull fracture and pneumocephalis at the same time. Only 8 patients needed neurosurgical intervention, out of which 1 patient underwent surgical intervention while the rest were managed conservatively.*

Conclusions: *It was concluded that with midface fractures the risk for potential brain injury was relatively low.*

Key words: *Midface fractures, Traumatic brain injury, Facial fractures*

INTRODUCTION

Craniofacial trauma includes trauma to the facial bones as well as associated injuries to the head and neck, including the brain[1]. A thorough review of literature indicated that the frequency of neurological injury with facial fractures was as high as 76%[2]. This finding is worrying as serious injuries can pose to life long neurological disabilities resulting in long term hospital care[3].

Haugg[2] stressed that incase of trauma to the midface, energy will be directly transmitted to the cranium, causing more damage to the brain. Loss of consciousness, vomiting and amnesia are few other signs and symptoms indicating neurological injury along with traumatic facial fractures.

Knowledge of associated injuries can lead to the rapid assessment and initial treatment of these patients[4]. The closeness of facial bones to the cranium would suggest that there are chances of cranial injuries occurring simultaneously[5] .Extensive facial trauma is associated with fractures to skullbase, cribriform plate and sphenoid sinus[6].

According to Pappahaun, there is limited evidence regarding the correlation between maxillofacial fractures and head injury[4]. The recently published articles have emphasized more on a sole type of associated injury, such as cervical spin injury,or brain

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injury. Comprehensive analysis of associated injuries in patients with facial fractures are scarce[7]. There is insufficient data on such injuries in our region as well.The aim of our study is to find out the relation between mid face fractures and associated brain injuries, which may require neurosurgical intervention along with treatment of facial fractures. It will highlight the need for quick assessment and intervention of neurological injuries. This further supports the concept of multidisciplinary approach for management of traumatic injuries of head and neck region. Apart from that, it will help us to understand whether midface serve as protective shock absorber for brain or not.

METHODS AND MATERIALS

This retrospective cross sectional study was carried out at Khyber College of Dentistry, Peshawar during a period of one year (Aug 2014-Aug 2015). A carefully structured proforma was used to obtain data from the trauma patients reporting to the facility. The aim was to assess the evidence of traumatic brain injury in the presenting patients and its association with fractures of the midfacial complex. Approval to carry out the study was sought from the Ethical Review Committee at Khyber College of Dentistry. Total 124 patients were reported as having sustaines facila fractures. Alongwith the demographic data, facial fractures were grouped into Fractures of midface at lefort levels I,II and III and ZMC fractures. Features of potential brain injury were recorded as history of vomiting and unconsciousness, GCS at the time of presentation, any discharge from the nose or ear, any sign of skull fracture and pneumocephalis. The collected data was analyzed using SPSS version 22.

Table-1: Characteristics of injury

Variables		n	%
Gender	Male	110	88.7
	Female	14	11.3
Cause of trauma	RTA	105	84.7
	Fall	14	11.3
	Assault	5	4
Features of potential brain injury	History of unconsciousness	49	39.5
	History of vomiting	28	22.5
	GCS 15/15	124	100
	Discharge from nose	39	31.5
	Discharge from ear	11	8.9
	Isolated Skull fracture	1	0.8
	Isolated Pneumocephalis	1	0.8
	Combined skull fracture and pneumocephalis	2	1.6
Neurosurgical consultation		30	24.2
Neurosurgical intervention	Conservative	7	5.7%
	Surgical	1	0.8

RESULTS

Over a period of one year (Aug 2014-Aug2015), 124 patients reported to the Oral and Maxillofacial Department of Khyber College of Dentistry with mid face and zygomatic bone fractures. The mean age was 29.98 years (S.D±13.88) with range from 10-80 years. 110 (88.7%) out of the total reported patients were male. Road traffic accident was the most common cause of trauma (87.4%) followed by fall (11.3%) and assault (4%). (Table 1) The types of fracture were documented as isolated ZMC, Lefort I,II and III as well as different combination of all of these fractures. No patient reported with isolated lefort III fracture. 71 (57.3%) patients presented with ZMC fracture. ZMC and Lefort I combined made the second common group (7.3%). (table 2)

Features of potential brain injury was recorded as a set of separate variables associated with the aforementioned fractures, namely, history of vomiting and unconsciousness, GCS at the time of presentation, any discharge from the nose or ear, any sign of skull fracture and pneumocephalis. Based upon these features, the diagnosis for post traumatic brain injury (PTBI) was made upon the need of neurosurgical consultation and intervention. 49 (39.5%) patients presented with a history of unconsciousness, 28 (22.6%) had a positive history for vomiting. Mostly stable patients report to

Table-2: Pattern of fractures / injuries

Type of fracture	**n**	**%**
Lefort I	6	4.8
Lefort II	5	4
ZMC	71	57.3
I,II,III	3	2.4
ZMC+lefort I	9	7.3
ZMC+I+III	2	1.6
I+II	6	4.8
ZMC+I+II	6	4.8
ZMC+I+II+III	8	6.5
ZMC+II	8	6.5
Total	**124**	**100**

our unit so the presenting GCS score for almost all of the patients was 15. 39 (31.5%) had discharge from the nose and 11(8.9%) reported with discharge from the ear. Total 4 patients presented with skull fracture and pneumocephalis out of which only 2 were reported with skull fracture and pneumocephalis at the same time. Neurosurgical consult was requested in 30 patients. Only 8 patients needed neurosurgical intervention, out of which 1 patient underwent surgical intervention while the rest were managed conservatively. (Table 1)

DISCUSSION

The results from the study showed the mean age was approximately 29.98 with predominance of male patients. Only 14 patients were female. The most common cause of trauma was reported to be road traffic accident (87.4%) which is in agreement with many other studies[1-15]. Other etiologies documented were fall and assault; fall (11.3%) being the second most common cause of trauma. 57.3 % of the cases were found to have fractures of the ZMC making it the most common type of fracture encountered. 6.5% patients reported with a combination of zmc, lefort I, II and III fractures.

The main aim of the study was to look for an association between midface fractures and traumatic brain injury. 1.6% reported with a combined skull fracture alongwith pneumocephalis as well as midface fractures. Only 0.8% were in need of invasive neurosurgical intervention.

Maxillofacial fractures have been thought to have an association with the presence of simultaneous brain injury[2,5]. Mostly, fractures of the maxillofacial fracture and their association with skull fracture or cervical spine injury has been studied extensively[13,15]. Midface complex, however, has been proposed to act as a protection from any traumatic injury to the brain[14].

In the current study a systematic approach towards the diagnosis of traumatic brain injury was adopted. But since the setting of the hospital was not a tertiary care facility, mostly patients considered were old trauma cases. Mostly stable patients reported to the facility after initially being treated at a tertiary care centre elsewhere.

In a one year study conducted by Rajandaram[3] at the National University of Malaysia, the occurrence and association of facial fractures with traumatic brain injury was explored. Their study differed from the current study in being set up at a tertiary care hospital. This allowed them to assess the patients undergoing any neurosurgical intervention under the same roof. The sample size was large. The severity of traumatic brain injury and the type of facial fractures were carefully grouped and classified. 17.5% patients had traumatic brain injury and facial fractures in contrast to the 1.6% patients reporting to our unit with the same complaint. Other variables that were taken into account and differed from our studies were the ethnicity of the patients, structural imaging, and history of amnesia and inclusion of all facial fractures. The main focus of our study, however, was solely on midface fractures.

Salentjin[1] studied the the association of maxillofacial trauma and traumatic brain injury, a study which spanned over 10 years in a level one trauma centre. Road Traffic accident was reported to be the most common case of trauma with ZMC fracture as the most commonly encountered type of fracture which is in agreement with our study. On the contrary, the diagnosis for TBI was made using modified Marshal CT classification as well as consultation from neurosurgical department. Patients with neurological deficits were grouped separately and the neurosurgical consultation as well as intervention along with the management of the facial fractures was also documented. These variables were not a part of ur study due to time constraints and the fact that neurosurgical consultation was requested from another centre. The, however, concluded that maxillofacial fractures were related to traumatic brain injury. Here, again, midface fractures were not singled out.

Plaiser and his colleagues[18] observed the pattern of specific types of facial fractures and their association with any neurological injury that led to death. From the 4 year study, they concluded that mid- and upper facial fracture patterns had a predilection for death due to neurologic injury. Our study did not explore the mortality in patients having neurological injury.

Our study confirmed road traffic accident as the most common cause of trauma. Only 2.4 % reported to our facility with a combination of lefort I, II and III fractures[3]. patients were diagnosed with pneumocephalis and only 1 out of 3 was treated surgically by the neurosurgical department[2]. Patients were conservatively managed. Thus, we can safely conclude that

with midface fractures the potential for traumatic brain injury is relatively low. As fractures of nasoethmoidal complex and frontal sinus were not considered in the study, therefore any relationship of these fractures to traumatic brain injury couldn't be established. Since stable patients report to our unit, the full impact of this study could not be established. Further research in this area is needed in a level one trauma centre to explore the association of midface fractures with any potential traumatic brain injury. Attention should be drawn to the fact that despite the risk for any neurological injury is low when it comes to the fractures of the midfacial complex, still, thorough evaluation of almost every trauma patient by the neurosurgical team must be emphasized.

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