ORIGINAL ARTICLE

CERVICAL SPINAL INJURIES IN MODERATE TO SEVERE HEAD INJURIES

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Background: Traumatic Brain Injury (TBI) is the leading cause of death in all age group. The incidence of CSI increases with the severity of TBI so prompt care of cervical spine is necessary in all patients with moderate to severe head injury. The objective of this study was to determine the frequency of cervical injury in patients with moderate to severe head injury and different types of trauma. **Methods**: This descriptive cross sectional study was conducted in department of Neurosurgery Ayub Medical College, Abbottabad from October 2011 to October 2012. A total of 369 patients were included in this study by consecutive (non probability) sampling. All patients were subjected to X-rays and CT-Scan of the skull for evaluation of head injury. X-rays and CT scan with MRI of cervical spine were done for evaluation of cervical spinal injury. **Results:** A total of 369 patients were included in our study, out of which 276 (74.8%) were males and 93 (25.2%) were females. Age of the patients ranged from 3–90 years with mean of 31.93±21.35. Among these patients most common cause of injury was fall 196 (53.1%), whereas the RTA was 159 (43.1%) and assault was 14 (3.8%). Out of the 369 patients 42 (11.3%) were found to have cervical spinal injuries. **Conclusion:** The frequency of cervical injury associated with moderate to severe head injury remains the same in all over the world with minor difference in percentages; that we have observed in our study. Furthermore, we have observed that cervical injury is directly proportional to the severity of head injury. All the head injured patients should be suspected of having cervical spinal injury unless proved otherwise.

Keywords: spinal injury, cervical injury, head injury.

INTRODUCTION

Traumatic Brain Injury (TBI) is the leading cause of death in all age group. In various series, the mortality estimated to be, is about 20–30%. According to severity the head injuries are 80% mild, 10% are moderate and 10% are severe.[1] The common causes of TBI are falls 51%, Road Traffic Accidents (RTAs) 21%, assault 14% and other minor causes are 14%. RTA is a predominant cause of head injury in adults while fall is the commonest cause of TBI among children less than 10 years. The incidence of TBI in male gender is more than female gender with a ratio 1.7:1.[2] The incidence of CSI increases with the severity of TBI, so prompt care of cervical spine is necessary in all patients with moderate to severe head injury.[3] The majority of spinal injuries are noted between C4 and C6 level, as the cervical canal is narrowest at this level. In industrialized areas, RTAs account for 36% to 57% of this type of injury. However, in our region, most injuries are due to fall from trees, bicycles, sporting accidents and slips from mountain tops besides RTAs. The commonest CSI is dislocation of C5-C6 vertebra 33% followed by C6-C7, 29% and about 20% patients present with complete cervical cord injury.[4]

Moderate to severe TBI may cause misdiagnosis of CSI, which results into devastating long term consequences.[5] It is stated that CSI with moderate to severe TBI should be considered in each and every patient until proven otherwise.[6] That is why when associated CSI is clinically suspected, adequate cervical immobilization should be maintained and cervical radiography performed on a high priority basis. TBI due to automobile and pedestrian or motorcycle accident may be more likely to be the cause of CSI.[7] In all patients with polytrauma and obtunded conscious level, CSI must be evaluated. Furthermore for excellent diagnosis of the cervical spine, CT scan with Magnetic Resonance Imaging (MRI) of the cervical spine should be done.[8] Brain damage was more frequently associated with upper cervical injury than lower cervical injury. CSIs are significantly more common in persons sustaining frontal impacts than lateral or rear impacts. Despite normal cervical bony alignment, and normal neurology, after moderate to severe TBI, MRI and dynamic radiological studies may reveal marked translational cervical motion segment instability which requires segment fusion for the sake of preventing further damage of the cervical spinal cord.[9]

In one study about 29% patients developed permanent neurological deficit with missed injuries due to ineffective diagnosis. So in all traumatised patients, a systematic and detailed examination of the cervical spine should be done.[10] All patients with pain, tenderness, neurological deficit, altered mental status, a distracting injury and obtunded level of consciousness must have radiographic evaluation.

The aim of this study was to determine the frequency of cervical injury in patients with moderate to severe head injury and common types of trauma leading to it.

MATERIAL AND METHODS

This descriptive cross-sectional study was conducted in department of Neurosurgery Ayub Medical College, Abbottabad from October 2011 to October 2012. Approval was obtained from the institution's ethical committee before starting the study A total of 369 patients were included in this study by consecutive (non probability) sampling. All patients with moderate to severe head injury of either gender above 2 years were included in the study after taking informed consent. Patients with soft tissue injury over cervical region or with history of other cervical pathologies like Pott's disease or malignancy or previous history of cervical injury were excluded from the study.

Patients were recruited through ER department and admitted in the Neurosurgery Department. All patients were subjected to X-rays and CT-Scan of the skull for evaluation of head injury. X-rays and CT scan with MRI of cervical spine were done for evaluation of cervical spinal injury. Any traumatic brain injury with GCS 9–12 was taken as moderate head injury while traumatic brain injury secondary to blunt trauma with GCS <8 was labelled as severe head injury. History of fall from height at least 6 feet high were taken into account as a cause of injury after fall. Data were analysed on SPSS-14.0.

RESULTS

A total of 369 patients were included in our study, out of which 276 (74.8%) were males and 93 (25.2%) were females. Age of the patients ranged from 3 to 90 years with mean age 31.93±21.35 years. Distribution of patients in different age groups is tabulated in Table-1.

Table-1: Distribution of patients (n=369)

	Male		Female	
Age Groups (Yrs)	**Number**	**%**	**Number**	**%**
<20	103	27.91	40	10.84
21–40	90	24.39	27	7.32
>40	83	22.49	26	7.05

Among these patients most common cause of injury was fall 196 (53.1%), whereas the RTA was 159 (43.1%) and assault was 14 (3.8%). Out of the 369 patients 42 (11.3%) were found to have cervical spinal injuries. Head injury after fall from height was predominantly seen below 20 years of age accounting for 85 (43.4%) of cases. In age group of 21–40 years, 53 (27%) and above 40 years 58 (29.6%) patients sustained head injury after fall. In patients below 20 years of age 54 (34%), between 21 to 40 years 56 (35.2%) and above 40 years 49 (30.8%). A total of 98 (26.6%) were found to have severe head injury out of which 22 (22.4%) had cervical spinal injury. In rest of 271 (73.4%) patients with moderate head injury had cervical injuries in 20 (7.4%) patients. Among various types of traumas, fall accounted for 196 (53.1%) incidences, out of these cervical injuries were noted in 26 (13.3%) cases. Similarly, RTAs accounted for 16 (10.1%) cases and no case of cervical injury was related to assault. Out of 276 (74.8%) male patients 30 (10.9%) cases were noted with cervical injuries whereas among 93 (25.2%) females 12 (12.9%) had cervical injuries.

As far as cervical injury among different age groups is concerned, below 20 years, the frequency of cervical injuries were 10 (7%) out of 143 (38.8%), between 21–40 years cervical injuries were 17 (4.5%) out of 117 and above 40 years the cervical injuries were 15 (13.7%) out of 109.

DISCUSSION

Head injury is the leading cause of death in all age group. In various series, the mortality estimated to be, is about 20–30%. According to severity the head injuries are 80% mild, 10% are moderate, and 10% are severe. Kamp *et al*[1] reported that moderate and severe head injuries were almost equal in occurrence, whereas in our study showed that most of the patients had moderate head injury is 271 (73.4%) and severe head injuries were 98 (26.6%). This may be due to higher incidence of deaths sustaining severe head injuries that occur during transport of severely head injured patients due to poor transport facilities from the scene of trauma to proper neurosurgical unit within proper time line. Moreover it could also be attributed to the fact that being hilly area and poor roads, severe head injuries in RTAs which is the second biggest cause of head injuries, are not so high as compared to the developed regions of the world where most of the road accidents are due to very high speed, which is not the case in our area. The GCS of the head injured patient also has a great relationship with the incidence of cervical injury. Tian *et al*[11] estimated that with GCS 3–8 the incidence of cervical injury is 11.62%. Demetriades *et al*[12] showed that 6.8% of the patients with moderate head injury had cervical injury while the severe head injury had a percentage of 10.2%. Our study has shown that the severe head injuries were associated with cervical injuries 22 (22.4%) which is twice to the reported ones while in moderate head injury in our patients only 20 (7.4%) which closely relates to Demetiades *et al*[12], i.e., 6.8%.

Heskestad *et al*[2] have reported that frequency of head injuries were 51% fall, 21% RTA and 14% assault, whereas our study has showed that falls contribute 53.1% RTA 43.1% and assaults are 3.8%. The Occurrence of Cervical injury was reported by Santos *et al* [13], as fall 42% RTA 21% and assault 4%, while our study showed fall associated cervical injuries 13.3%, RTA 10.1% and assault 0%. This shows that our results are closer to Heskestad[2] except the assault, which is lower than reported because of relatively peaceful people in Hazara.

Also our results are less than the reported one because of confounding factor of poor first aid response and poor patients transportation system for the injured people which cause death of many patients before reaching hospital, hence they could not be included in our study. It is further noted that head injury associated cervical injury is directly proportional to the frequency and severity of the head injury and our study shows that cervical injury with head injury is more in severe head injuries as according to Paiva *et al*[5], as severity of head injury increases the incidence of cervical injury also increases. According to Lefler *et al*[14] the incidence of cervical injuries with head injuries are up to 13%, which is almost equivalent to our study. The incidence of cervical injury in male and female patients in our study are found to be almost same as described by Paiva *et al*[5], i.e., male 7.5% and females 8.9%.

The frequency of cervical injury associated with head injury remains the same all over the world with minor difference in percentages, the small variations that we have observed in our study as compared to other studies can be related to the geographical variations, social factors, quality of life and working environment. This region is notorious for cervical injuries associated with different types of trauma for example fall, and RTAs etc. specially the hilly area of Kashmir, Torghar and Kohistan region. The Cervical injury association with age is more interesting because the study of the Kreykes *et al*[15] has found that the incidence of Cervical injury for age group in children (which is up to 19 years is 1–4%, which is near to our study, i.e., 2.7%). Between age group of 21–40 years the incidence of cervical injury by Ahmad *et al*[16] is 2.1%, while in our study it is 4.6%, which is almost double. It is because in our study the incidences of fall are 53.1% and of RTAS are 43.1%, and since fall associated cervical injuries are more 42% than RTAs 21% as described by Singh *et al*[17], so the double incidence is justified by more fall associated cervical injuries. Similarly, between age 40 years and above, our study shows cervical injury of 15 (4.1%) which is closer to Paiva *et al*, i.e., 5.3%.[5]

CONCLUSION

The frequency of cervical injury associated with moderate to severe head injury remains the same in all over the world with minor difference in percentages that we have observed in our study. Cervical injury is directly proportional to the severity of head injury. This is of paramount importance to improve our health care system for proper evaluation, transportation and management of trauma patients keeping in mind the strong association of severe head injury with cervical spinal injury to avoid the deleterious effects of cervical injury if missed or improperly dealt with.

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