Traumatic Brain Injuries related to work accidents: A retrospective study

Abstract

Background: The United Arab Emirates (U.A.E.) is a rapidly developing country with recent expansion in construction and manufacturing.

Aims: To investigate the occurrence and outcomes following occupational traumatic brain injury (TBI) using hospital records.

Methods: All cases seen in Sheikh Khalifa Medical City (SKMC) diagnosed as TBI between 2005 and 2009 were selected and reviewed. Injuries sustained in an occupational setting were noted along with mechanisms of injury, Glasgow Coma Scale (GCS) on admission and Glasgow Outcome Scale (GOS) on discharge. The data was then analysed using SPSS.

Results: Out of the 581 TBI cases reviewed, ~10% of cases were reported as occupational by either the patient or the informant accompanying the patient. Male migrants accounted for 100% of these cases and the 25-44 age group accounted for 63%. Mechanisms of injury included falls (63%), falling objects (34%) and motor vehicle collisions (>3%). Median GCS score was 13 for all causes. Mean hospitalisation stay was 29 days. 34% were admitted into ICU with a mean ICU stay of 7 days. Outcomes as measured by GOS demonstrated 81% made a good recovery, 11% suffered moderate-to-severe disability and 8% died.

Conclusion: This study demonstrates that TBI occurs in the workplace most frequently due to falls and falling objects with potentially grave consequences. These are largely preventable with the correct precautions in place.

Keywords: Traumatic Brain Injury, U.A.E., Construction, Head Injury

Introduction:

TBI is defined by the Brain Injury Association as a "non-degenerative, non-congenital insult to the brain from an external mechanical force, possibly leading to permanent or temporary impairment of cognitive, physical, and psychosocial functions, with an associated diminished or altered state of consciousness."[1]

Worldwide, there are about 10 million people afflicted by TBI each year.[2] In the Emirate of Abu Dhabi (capital of the U.A.E.), there has been a massive expansion in construction, manufacturing, real estate, retail and tourism, which has resulted in the employment of many foreign workers. In 2008, of the 2,949 recorded deaths, trauma and accidental injuries were reported to be the second most common cause of fatalities (30%) after cardiovascular disease (44%).[3]

A few studies have addressed occupational head injuries but there is little information about outcomes in terms of mortality and morbidity following these hospitalisations. Furthermore, the two differ as TBI need not result from direct impact to the head as it may also occur following acceleration-deceleration injuries, such as in motor vehicle collisions and falls. One epidemiological study demonstrated high levels of severe occupational injuries in the U.A.E., with head and neck injuries accounting for 12% of occupational injuries.[4] To this date however, there are no studies which have specifically examined occupational TBI.

Hence, this study was undertaken to determine the profile of TBI in a tertiary hospital in Abu Dhabi, in an attempt to identify the causes, mechanisms, and outcomes for need-based intervention.

Methods:

Following approval by the Ethics Committee of Sheikh Khalifa Medical City (SKMC), all cases of TBI admitted between 2005 and 2009 were initially selected for study using the CDC administrative definition and its corresponding ICD 9 codes. The archive team at SKMC retrieved a total of 640 relevant cases. Each case was then scrutinised using the CDC clinical records definition of TBI for inclusion; i.e. using Glasgow Coma Scale (GCS) as well as indicators of neurological deterioration [5]. Since this is a record based study, we depended on the GCS score recorded by the attending physician in the charts.

Preliminary review of the 640 cases resulted in the rejection of 59 cases due to a lack of information or failing to meet the inclusion criteria. This left a total of 581 cases which were used in the study. Of these 581 cases, 56 were reported to have taken place during work-related activity either by the patient himself or by an accompanying informant.

The data collected was analysed using SPSS, which was used to create cross-tabulations and figures.

Results:

Of the 640 charts that were reviewed, 581 met the inclusion criteria. Of these, 56 cases were found to be occupational (~10%). The demographic profile of those injured showed that 52% were in the 25-34 age group, 27% were < 25 years old, 10% were aged 35-44 and 10% were > 45. Their nationalities were Bangladeshi 39% (21), Indian 20% (11), Pakistani 19% (10), Egyptian 15% (8), Syrian 6% (3) and one was from another unspecified Asian country.

Falls were the most common mechanism of injury leading to TBI (63%), followed by being struck by falling or moving objects (34%) and motor vehicle collisions (3%). Of the cases where the height of the fall was known (71%), 80% were reported to have fallen a height ≥ 3m. Falls were the most frequent cause leading to severe TBI in an occupational setting, with 91% of severe TBI studied being due to falls.

The mean length of stay at the hospital was 29 days (SD 54), with 50% staying for > 1 week. Where ICU admission data was available (84%), 34% (16) were reported to have been admitted into the ICU with a mean length of stay of 7 days (SD 22). 7.1% (4) died after admission.

Outcome data following TBI was available for 95% (53) of cases as measured on the Glasgow Outcome Scale. 81% (43) made a good recovery, ~6% (3) suffered from long-term moderate disability, ~6% (3) suffered from long-term severe disability and 7.5% (4) died. Among those who suffered TBI as a result of a fall, 21% (7) either died or suffered from severe long-term disability which rendered them unable to take care of themselves, and another 6% (2) were left unable to return to the workforce due to moderate disability. Such outcomes did not result from TBI suffered through other mechanisms of injury, with 95% (19) making a good recovery and only one case suffering from moderate disability.

Discussion:

This study showed that occupational TBI accounted for ~10% of all TBI cases reviewed. This figure may be an underestimate as there may have been instances where the occupational setting

was unreported in the patient history.

Prolonged hospitalisation and admission into ICU were common. Those suffering from TBI as a result of a fall at the workplace suffered the worst outcomes in terms of morbidity and mortality, further highlighting the importance of fall prevention. This is consistent with the findings of other studies that falls are an important mechanism leading to severe injury in the workplace. [6, 7]

The strength of this study stems from its access to all admission and follow-up data, which allowed us to explore the precipitating factors leading to TBI as well as the events that followed. However, as this was a record-based study looking at physician testimonials, there is inherently some room for error when eliciting a patient history either due to communication barriers or other mysteries surrounding the patient's injuries.

To conclude, as the U.A.E. keeps growing at its phenomenal speed requiring the employment of expatriate workers, the relevant authorities should prioritise safety measures at the workplace, in particular aimed at reducing the incidence of falls and collisions with falling objects. A large multi-centre study is recommended in order to achieve better representation of the burden of occupational TBI across the U.A.E.

References:

[1] Dawodu ST. Traumatic Brain Injury (TBI) - Defnition, Epidemiology, Pathophysiology. Med scape Reference [Internet] 2009 Mar 30 [cited 2012 May 23]. Available from: http://emedicine.medscape.com/article/326510

[2] Hyder AA, Wunderlich CA, Puvanachandra P, Gururaj G, Kobusingye OC. The impact of trau matic brain injuries: a global perspective. Neurorehabilitation. 2007;22(5):341-53

[3] Statistical Yearbook of Abu Dhabi 2009, Statistics Center - Abu Dhabi, Abu Dhabi Emirates, United Arab Emirates, 2009.

[4] Barss P, Addley K, Grivna M, Stanculescu C, Abu-Zidan F. Occupational Injury in the United Arab Emirates: epidemiology and prevention. Occupational Medicine (Lond). 2009 Jul 29; 59: 493-498. doi: 10.1093/occmed/kqp101

[5] Centers for Disease Control and Prevention: Report to Congress. Mild Traumatic Brain Injury in the United States: Steps to Prevent a Serious Public Health Problem. Centers for Disease Control and Prevention [Internet]. 2003 [cited 2012 May 23]. Available from: http://www.cdc.gov/ncipc/pub-res/mtbi/mtbireport.pdf

[6] Noe R, Rocha J, Clavel-Arcas C, Aleman C, Gonzales ME, Mock C. Occupational injuries identified by an emergency department based injury surveillance system in Nicaragua. Inj Prev 2004;10:227-232. doi:10.1136/ip.2004.005165

[7] Sanati KA, Yadegarfar G, Naghavi SHR, Sadr AH, Gholami M, Hadipour M, Sanati JGH. Occupational injuries in a synthetic fibre factory in Iran. Occup Med (Lond) (2009) 59 (1): 62-65. doi: 10.1093/occmed/kqn161