ORIGINAL ARTICLE

Spectrum of Surgically Treated Closed Head Injury in Department of Neurosurgery Lady Reading Hospital Peshawar

WEFAQ ULLAH, MUMTAZ ALI, KHALID MEHMOOD
Bilal Khan
Department of Neurosurgery, PGMI Lady Reading Hospital, Peshawar, Pakistan

ABSTRACT

Objective: *To know the burden of surgically managed closed head injury in neurosurgery unit Lady Reading hospital Peshawar.*

Material and Methods: *This is descriptive cross sectional study was conducted from December 2012 to may 2013 (6 month) in neurosurgery unit lady reading hospital Peshawar. All cases of TBI including fall, RTA and physical assault requiring surgical intervention were included. Cases of penetrating head injury, bomb blast injuries and compound depressed skull fracture were excluded. Once the target population was identified, further data were collected on a designed proforma from the hospital charts and operative records of the patients. Data was entered into statistical program SPSS 16 software and was expressed in percentages. Data was presented in different charts and tables.*

Results: *A total of about 1087 patients of head injury were admitted through emergency in neurosurgical unit Lady reading hospital Peshawar during 6 month duration, out of which 247 patients were operated for different intracranial injuries. There were 196 males and 51 females with a male to female ratio of 4:1. The age range was from1 to 72 years and the mean age was 29.05 years. Out of the 247 patients about 96 (38.88%) were having extradural hematoma, 80 (32.38%) with depressed skull fracture,38 (15.38%) with chronic subdural hematoma and 33 (13.36%) were having acute subdural hematoma.*

Conclusion: *Almost every fourth case of a closed head injury patients require surgical intervention. Extradural hematoma and Depress Skull Fracture were the common surgical entities. Most of the patients were male and in the age group of 21 – 40 years reflecting that surgical intervention carries significant impact.*

Key Words: *Head injury, Extradural hematoma, Depress skull fracture, Acute subdural hematoma, Chronic subdural hematoma.*

INTRODUCTION

Traumatic brain injury or closed head injury is a non degenerative, non-congenital insult to the brain from an external physical force, possibly leading to permanent or temporary impairment of cognitive, physical and psychosocial function, with an associated diminished or altered state of consciousness.

Closed head injury or traumatic brain injury with or without skull fracture and intracranial hemorrhages remain a common clinical entity encountered by a neurosurgeon. Although these injuries were most commonly seen in young patients, the aging of our population and the relatively common use of anticoagulation in the elderly have resulted in second peak of traumatic brain injury in the geriatric population.

Closed head injury is classified as primary or secondary. A primary injury results from initial anatomical and physiological insult, which is usually direct trauma to head regardless of the cause and include extradural hematoma, subdural hematoma, subarachnoid, intraventricular hemorrhage, contusions and concussion. A secondary injury results from hypotension, hypoxia, acidosis, edema or other subsequent factors that can secondarily damage brain tissue.

Cerebral concussion is defined as an altered mental state that may or may not include loss of consciousness that occurs as a result of head trauma. Concussion is also known as mild traumatic brain injury (MTBI). Sport – related concussions are frequent, with 300,000 cases reported each year.[1]

Cerebral contusions are commonly seen in frontal and temporal lobes. Pure cerebral contusions are fairly common, found in 8% of all TBI[2,3] and 13% to 35% of severe injuries.[2] They may accompany skull fracture, the so-called **fracture contusion**. The most worrisome trait of these contusions is their tendency to expand. This usually occurs from 24 hours to as long as 7 – 10 days after the initial injury. For this reason, cerebral contusions are often followed with a repeat head CT scan within 24 hours after injury.

Types of intracranial hemorrhage are roughly grouped into intra-axial and extra-axial. The hemorrhage is considered a **focal brain injury**. Intra-axial hemorrhage is bleeding within the brain itself, or cerebral hemorrhage. This category includes intraparenchymal hemorrhage, or bleeding within the brain tissue, and intraventricular hemorrhage, bleeding within the brain's ventricles (particularly of premature infants). Intra-axial hemorrhages are more dangerous and harder to treat than extra-axial bleeds.[4] **Extra-axial hemorrhage**, bleeding that occurs within the skull but outside of the brain tissue, falls into three subtypes.

Epidural hemorrhage (extradural hemorrhage) which occur between the Dura mater (the outer most meninx) and the skull, is caused by trauma. It may result from laceration of an artery, most commonly the middle meningeal artery. Head CT shows lenticular (biconvex) deformity.

Subdural hemorrhage results from tearing of the bridging veins in the subdural space between the Dura and arachnoid mater. Head CT shows crescent–shaped deformity.

Subarachnoid hemorrhage, which occur between the arachnoid and pia meningeal layers, like intraparenchymal hemorrhage, can result either from trauma or from ruptures of aneurysms or arteriovenous malformations. Blood is seen layering into the brain along sulci and fissures, or filling cisterns (most often the suprasellar cistern because of the presence of the vessels of the circle of Willis and their branch points within that space).

The need for imaging in patients who have suffered a minor head injury is debated. A non-contrast CT of the head should be performed immediately in all those who have suffered a moderate or severe head injury, an MRI is also an option.[5]

In the United States, the incidence of closed head injury is estimated to be approximately 200 cases per 100,000 persons per year.[6] In a population of 291.6 million people, this rate equates to more than 570,000 patients annually.[7]

In the United States, traumatic brain injury (TBI) is associated with the death of 51,000 people each year, about one third of all injury deaths.[8] Traumatic brain injury is a cause of long-term disability that annually affects an estimated 70,000 to 90,000 people. Given these serious consequences and the large number of people affected, public health efforts to prevent the occurrence and mitigate the consequences of TBI have received increased attention in recent years.[9]

Comprehensive data about head injury is available in western world, but in our setup it is scanty.

In order to plan preventive measures for head trauma it is essential to know the exact demographic profile and etiology. The aim of this study was to know the burden of closed head injury and the frequency of different intracranial lesions related to closed head injury in neurosurgery unit lady reading hospital Peshawar.

MATERIAL AND METHODS

A descriptive cross sectional study was conducted in neurosurgery unit lady reading hospital Peshawar from December 2012 to May 2013. All case of TBI including fall, RTA and physical assault requiring surgical intervention were included and all penetrating injuries, bomb blast injuries and compound depressed skull fractures were excluded. DATA was collected by examining the medical records of the patients and was analyzed using different tables. Four types of intracranial lesions (epidural hematoma, acute subdural hematoma, chronic subdural hematoma and depressed skull fracture) were compared on the basis of their frequency and distribution regarding age and gender.

RESULTS

The total number of emergency admission during the study period was 1087. We operated about 247 cases out of these 1087 cases. It means that about 22.72% of admitted cases were operated for different intracranial lesions (Table 1). Out of the 247 operated patients about 96 patients 38.88% were having extradural hematoma, 80 patients 32.38% were depressed skull fracture, 38 patients 15.38% were chronic subdural

hematoma and 33 patients 13.36% were having acute subdural hematoma (Table 2).

Table 1: *Total No. of Operated Cases.*

Total No of Admissions	No. of Operated Cases	Percentage
1087	247	22.72

Table 2: *Burden of Different Injuries.*

Type of Injury	No. of Cases	Percentage
Extradural hematoma	96	38.88
Depress skull fracture	80	32.38
Chronic subdural hematoma	38	15.38
Acute subdural hematoma	33	13.36
Total	247	100%

Gender Incidence and Pattern of Trauma

Out of the 96 extradural hematoma patients 74 patients 77.08% were male and 22 patients 22.91% were female (Table 3). 25 patients, 75.75% of the acute subdural hematoma were male and 8 patients, 24.24% were female (Table 4). 32 patients 84.21% of chronic subdural hematoma were male and 6 patients 15.78% were female (Table 5). Similarly 65 patients 81.85% of the depressed skull fracture were male and 15 patients 18.15% were female (Table 6).

Injury Distribution on the Basis of Gender

Table 3: *Extradural Hematoma.*

Gender	No. of Cases	Percentage
Male	74	77.08
Female	22	22.92
Total	96	100

Table 4: *Acute Subdural Hematoma.*

Gender	No. of Cases	Percentage
Male	25	75.75
Female	08	24.24
Total	33	100

Table 5: *Chronic Subdural Hematoma.*

Gender	No. of Cases	Percentage
Male	32	84.21
Female	06	15.79
Total	38	100

Table 6: *Depressed Skull Fracture.*

Gender	No. of Cases	Percentage
Male	65	81.85 %
Female	15	18.15 %
Total	80	100%

Age and Pattern of Trauma

Patients were distributed on the basis of age as well. Extradural hematoma was common in the age group of 21 – 40 years i.e. 35.42% and less common in the age of > 40 years i.e. 11.45%. Acute subdural hematoma was more common in the age group of 21 – 40 years i.e. 42.4% and less common in the age group of 11 – 20 years i.e. 6%. Chronic subdural hematoma was more common in the age group of > 40 years i.e. 94.7% and was absent in the age group of < 20 years. Depressed skull fracture was more common n the age group of 1 – 10 years i.e. 41.25% and less common in the age group of > 40 i.e. 7.5% Table 7.

Table 7: *Injury Distribution on the Basis of Age.*

Injury Type	1 To 10 Years	11 To 20 Years	21 To 40 Years	> 40 Years	Total
Extradural Hematoma	28.12%	25%	35.42%	11.46%	100%
Acute Subdural Hematoma	18.18%	6%	42.46%	33.36%	100%
Chronic Subdural Hematoma	0%	0%	5.26%	94.74%	100%
Depress Skull Fracture	41.25%	21.25%	30%	7.50%	100%

DISCUSSION

Among trauma patients, head injury is responsible for up to 50% of fatalities and for a large component of continuing care among survivors.[10,11] Head injury remains the most common cause of death and disability in young people. Several types of head injury are amenable to neurosurgical intervention, and improved outcomes have been reported in patients receiving prompt treatment of post-traumatic extra-axial cerebral mass lesions, including EDHs and SDHs. This study is an evaluation of patients who presented with head injuries requiring acute surgical evacuation of an EDH, SDH and depress skull fracture. Surgical intervention was at the discretion of the treating neurosurgeon.[12,13]

We were interested to know the burden of traumatic intracranial lesion in pts who were going to be operated in emergency. When we compared this data with other hospitals, there was a big difference and the incidence was much more in neurosurgery unit lady reading hospital Peshawar. About 1087 pts of head injury were admitted in emergency and every 4th pt was operated for some imtracranial lesion. In our study the most common intracranial lesion was extradural hematoma ie 33.88% where as in John M. Tallon, et al, it is 33%.[14] Subdural hematoma in John M. Tallon, et al, is 49% and in our study it accounts for about 28.86 % (Acute + Chronic SDH). We operated 96 patients for extradural hematoma in about six months as compare to other hospitals like shifa international Islamabad in which only 110 patients were operated for extradural hematoma in a 5 years study by Inayat Ullah Khan, et al.[15] In another study by Pablo perel and colleagues the incidence of subdural hematoma is 30% while extradural hematoma and intraparenchymal hemorrhage is 22%.[16] The incidence of extradural hematoma in our study is higher as compare to other study because we operated small symptomatic extradural hematomas as well because we have found some adverse effects of managing symptomatic extradural hematoma conservatively and the other centers may used to manage such patients conservatively.

The frequency of depressed skull fracture in our study is 32.38%. In another study by Abhishek Yadav and colleagues the frequency is 9.3%.[17] A study by Sabir Hussain Bhatti and colleague have shown the frequency of depress skull fracture as about 2.3%.[18]

CONCLUSION

This study has described the epidemiology of surgically treated traumatic brain injuries.

1. The most common injury is extradural hematoma followed by depress skull fracture, chronic subdural hematoma and acute subdural hematoma.
2. Extradural hematoma and acute subdural hematoma are more common in the age group of 21 – 40 years whereas chronic subdural hematma is common inelderly patients and depressed skull fracture is more common in children.
3. Male are more prone to traumatic brain injury as compare to female.

Address for Correspondence:
Dr. Wefaq Ullah
Resident Neurosurgery, PGMI Lady Reading Hospital
New TMO Hostel Room No# C13
Lady Reading Hospital Peshawar, Khyber
Pukhtoonkhwa – Pakistan
Phone No: +92-928-210845
Cell No: + 92-3339723982
Email: wefaqullah@yahoo.co.in

REFERENCES

1. Klonoff H, Thompson GB. Epidemiology of head injuries in adults: a pilot study. *Can Med Assoc J*. Feb 1 1969; 100 (5): 235-41.
2. Jho HD, Carrau RL, Ko Y. Endoscopic pituitary surgery. In: Wilkins H, Ringachary S. eds. Neurosurgical operative atlas. Park Ridge, IL: American Association of Neurological Surgeons, 1996.
3. Cavallo LM, Messina A, Cappabianca P, et al Endoscopic endonasal surgery of the midline skull base: anatomical study of clinical considerations. Neurosurg Focus, 2005; 19: E2.
4. Seidenwurm DI 2007. "Introduction to brain imaging". In Brant WE, Helms CA. Fundamentals of Diagnostic Radiology. Philadelphia: Lippincott, Williams and Wilkins. p. 53.ISBN 0-7817-6135-2. Retrieved 2008-11-17.
5. "www.nice.org.uk" (PDF). NHS. Retrieved December 12, 2008.
6. Kraus JF. Epidemiology of head injury. In: Cooper PR, ed. Head Injury. 2nd ed. Baltimore: Lippincott Williams and Wilkins; 1987: 1.
7. US Census Bureau, Population Division. Data as of July 2003.
8. Thurman DJ, Alverson C, Dunn KA. et al. Traumatic brain injury in the United States: a public health perspective. J Head Trauma Rehabil. In press.
9. Kraus JF, McArthur DL. Epidemiologic aspects of brain injury. Neurol Clin. 1996; 14: 435-450.
10. McKhann GM II, Copass MK, Winn RH. Prehospital care of the head – injured patient. In: Narayan RK, Wil-

berger JE, Povlishock JT, editors. Neurotrauma. New York: McGraw – Hill, 1996: p. 103-18.
11. Gennarelli TA, Champion HR, Sacco WJ, et al. Mortality of patients with head injury and extracranial injury treated in trauma centers. J Trauma, 1989; 29: 1193-201.
12. De Souza M, Moncure M, Lansford T, et al. Nonoperative management of epidural hematomas and subdural hematomas: Is it safe in lesions measuring one centimeter or less? J Trauma, 2007; 63: 370-2.
13. Offner PJ, Pham B, Hawkes A. Non-operative management of acute epidural hematomas: a "no – brainer". Am J Surg. 2006; 192: 801-5.
14. John M. Tallon, Stacy Ackroyd – Stolarz, Saleema A. Karim and David B. Clarke The epidemiology of surgically treated acute subdural and epidural hematomas in patients with head injuries: a population – based study. Can J Surg. 2008 October; 51 (5): 339–345.
15. Inayat Ullah Khan, Muhammad Nadeem. There is high Incidence of Skull Fracture associated with Extradural Hematoma in Patients with Head Injury Rawal Med J. 2008; 33: 228-230.
16. Pablo Perel1*, Ian Roberts1, Omar Bouamra2, Maralyn Woodford2, Jane Mooney2 and Fiona Lecky2. Intracranial bleeding in patients with traumatic brain injury: A prognostic study BMC Emergency Medicine, 2009; **9**: 15.
17. Abhishek Yadav, Anil Kohli, N.K. Aggarwal Study of pattern of skull fractures in fatal accidents in northeast Delhi Vol. 8, No. 2 (2008-07-2008-12.
18. Sabir Hussain Bhatti, Ishfaq Ahmed, Nazeer Ahmed Qureshi, Maqsood Akram and Junaid Khan Head Trauma Due to Earthquake October, 2005 - Experience of 300 Cases at the Combined Military Hospital Rawalpindi. Journal of The College of Physicians and Surgeons Pakistan, 2008; Vol. 18 (1): 22-26.

AUTHORS DATA

Name	Post	Institution	E-mail
Dr. Wefaq Ullah	Resident Neurosurgery	Department of Neurosurgery PGMI Lady Reading Hospital Peshawar – Pakistan	wefaqullah@yahoo.co.in
Dr. Mumtaz Ali	Professor NS Unit 2		
Dr. Khalid Mehmood	MO, Neurosurgery		
Dr. Bilal Khan	Resident Neurosurgery		