AN AUDIT OF THE MORTALITY DUE TO SEVERE HEAD INJURIES IN A NEURO-SURGICAL INTENSIVE CARE UNIT

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ABSTRACT

Objective: *To analyze the data of patients died in neurosurgical intensive care unit due to severe head injuries.*

Methodology: *This retrospective study was conducted in neurosurgical intensive care unit in Lady Reading Hospital, Peshawar from January to December 2007. The Clinical record of all the patients presenting with severe head injuries, who then expired in neurosurgical intensive care unit was collected. The record was analyzed accordingly for discussion and recommendations.*

Results: *Out of 112 patients, majority were young adults (n=64, 57.14%) followed by children (n=34, 30.35%) and elderly (n=10, 8.92%). Road traffic accidents were the major cause of presentation (n=75, 66.96%) followed by history of fall (n=23, 20.53%) and fire arm injuries (n=13, 11.60%). The correctable surgical causes were present only in 18 patients (16.07%) and the majority 94 (83.92%) were given conservative management. Among the non-surgical cases, both ventilatory therapy in 7 (6.25%) and tracheostomy in 39 (34.82%) patients failed to change the outcome.*

Conclusion: *Road traffic accident was the major contributor in the mortality in patients presenting to neurosurgical intensive care unit. Most involved were young adults.*

Key Words: *Audit, Intensive Care Unit (ICU), Tracheostomy*

INTRODUCTION

Although people from all age groups may be affected; the head injury (Traumatic brain injury, TBI) is more common in young age because of the exposure of this age to more chances of accidents on roads, work place and during leisure activities. In Pakistan and especially Khyber Pukhtoonkhwa, firearm injuries are more common and children are more prone to fall. To determine the incidence and outcome of neuro trauma in developing countries, it is necessary to use standardized assessment parameters for global interpretation[1]. In United States about 500000 patients with TBI are severe enough to require hospitalization leading to 9 deaths per 100000 populations. In United Kingdom about 1 million people attend hospital each year following head injury [2].

More recently in some centers in United States, a management plan based on brain tissue oxygen monitoring has been shown to decrease the mortality rate[3]. The recent recommendation thus is to have both ICP and brain tissue PO_2 monitors to patients with severe traumatic brain injury. The goal in this regard is the intra cranial pressure (ICP) of less than 20 mmHg[4]. In ordinary non neuro-surgical centers if one aims at a systolic blood pressure of more than 90mm Hg and a diastolic blood pressure of more the 70mm Hg one can hope to get some what closer to the above objectives[4]. Glasgow Coma Score at admission and the status of pupils and hemodynamic situation seem to be the most significant predictors of outcome in penetrating craniocerebral gunshot wounds. Computed tomography scans, bi- or multilobar injury, and intraventricular hemorrhage were correlated with poor outcome. Patients with a GCS score >8, normal pupil reaction, and single lobe of brain injury may benefit from early aggressive management [5, 6]. Fatal outcome could be predicted in fasting hyperglycaemia above 14

mmol/l, and unchanged basal insulin level, extremely high cortisol level and decreased plasma epinephrine level[7].

Present study was conducted to analyze data of patients died in neurosurgical ICU due severe head injuries from different perspectives in order to help in improving the health care delivery to this group of patients in future.

METHODOLOGY

It was a retrospective study and patients ward record was studied and the required information's were collected and analyzed for the outcome. This retrospective study was conducted from January to December 2007 in the neurosurgery ICU. Neurosurgery ICU of the Lady Reading Hospital, Peshawar which is the main tertiary care center providing neurosurgical care to about 20 million of the Khyber Pukhtoonkhwa as well as Afghan border population. The ICU is closely attached to operation theatre for a rapid shift to the operation theatre, if needed. All necessary investigations were carried out and the patients were monitored and were offered appropriate antibiotitics, midazolam, steroids and mannitol, ventilatory support, surgery was offered where appropriate. The facility of CT scan was used judiciously in case a repeat scan was needed.

Only those patients with severe head injuries who expired in ICU were included in this study. A record of the age, sex, address, modes of injuries, the clinical condition, the treatment offered and CT scan abnormalities was collected on a proforma. The data is expressed as mean and standard deviation. SPSS v.10 was used for all the statistical analysis.

RESULTS

Out of 112 patients who expired in the one year period in the neurosurgical ICU; 98 (87.5%) were male and 14 (12.5%) were female with M:F 7:1.

The presented age group for the study ranged from 2 to 85 years with a mean age of 34±6.3 years. Pediatric age group included 34 (30.35%) cases, young adults 64 (57.14%) elderly 10 (8.92%) and geriatrics 4 (3.57%) (Table 1).

The causes of head injuries included RTA (Road Traffic Accidents) in 75 (66.96%) cases [of these n=75, there were 24 (32%) children, 41 (54 .66%) young adults 8 (10.66%) elderly and 2 (2.66%) geriatric patients] history of fall in 23 (20.53%) cases [of these n=23, 11 (47.82%) were children, 8 (34.78%) young adults, 2 (8.69%) elderly and 2 (8.69%) geriatric patients] fire arm injuries to the brain in 13 (11.60%) cases [of these n=13, 2 (15.38%) were children and 11 (84.61) were adults, no elderly was noted for this cause of death] and a lonely patient (0.89%) received with physical insult to the brain was a male of 35 years (Table 2).

The maximum stay (n=112) in the hospital was 13 days with a mean stay of 8±4.2 days.31 patients (31.25%) died within 24 hours; 35 (31.25%) within 48 hours, 16 (14.28%) within 72 hours, 24 (21.42%) within 7 days and 6 (5.35%) survived for over 1 week (Table 3).

Among the 75 patients with RTA (n=75) 30 (40%) died within 24 hours; 28 (37.33%) in 48 hours; 14 (18.66%) in 72 hours and 3 (4%) survived for over one week.

Among the 23 patients with history of fall (n=23) 9 (39.13%) died within 24 hours, 8 (34.78%) died within 48 hours, 5 (21.73%) died in one week and 1 (4.34%) died after one week.

Among the 13 patients presenting with fire arm injuries (n=13); 5 (38.46%) died within 24hours; 3 (23.07%) within 48hours; 3 (23.07%) in one week and 2 (15.38%) died after 7 days. The

Table 1: Age wise presentation(n=112)

Age Group	Total Number	Percentage %
Pediatric upto 15 years	34	30.35
Adults (16–45 years)	64	57.14
Elderly (46–69 years)	10	8.92
Geriatrics (more than 70 years)	4	3.57

Table 2: Causes of severe head injuries (n=112)

Causes	Total number (n=112)	Percentage %
Road traffic accident	75	66.96
History of fall	23	20.53
Fire arm injuries	13	11.60
Physical trauma	1	0.89

Table 3: Duration of stay in the neurosurgical ICU (n=112)

Duration of stay	Total Number	Percentage %
Up to 24 hours	31	27.67
24 – 48 hours	35	31.25
48 – 72 hours	16	14.28
4 – 7 days	24	21.42
More than 7 days	6	5.35

Table 4: Initial CT scan findings (n=112)

CT san findings	Total Number	Percentage %
Cerebral edema and midline shift (diffuse neuronal injuries)	46	41.07
Basal cistern effacement	17	15.17
Cerebral contusions	28	25
Heamatoma (SDH, EDH)	5	4.46
Intra cerebral bleeding with and without ventricular extension	10	8.92
All of the above	6	5.35

Table 5: Assisted ventilatory support Vs Tracheostomy (The mode of ventilatory assistance) (n=112)

Mode of Assistance	Total Number	Percentage %
Mechanical ventilator only	7	6.25
Tracheostomy only	39	34.82
Both mechanical ventilator & Tracheostomy	4	3.57
Only face mask and nasal cannulae	62	55.35

only case with physical violence died within 24 hours.

The initial CT scan findings (n=112) included cerebral edema and midline shift (diffuse neuronal injuries) in 46 (41.07%) cases, cerebral contusions in 28 (25%) cases, basal cistern effacement in 17 (15.17%) cases; intra cerebral bleeding with ventricular extension in 10 (8.92%) case, subdural and extradural heamatoma in 5 (4.46%) cases, and all of the above findings in 6 (5.35%) cases (Table 4).

Haemodynamic instability on presentation was present in the 23 cases (20.53%) only 89 (79.46%) patients were noted to have desired systolic and diastolic blood pressure.

Repeat CT scan was done only in 69 cases only; of these (n=69) 62 (89.85%) showed worsening of the initial scan features while it was static in 7 (10.14%) cases Surgical management was offered only in 18 (16.07%) cases while conservative management was advised for 94 (83.92%) cases The mode of ventilatory assistance included face mask oxygenation in 62 (55.35%) cases, tracheostomy in 39 (34.82%) cases; mechanical ventilator alone in 7 (6.25%) cases and both the mechanical ventilator and tracheostomy in 4 (3.57%) cases. Among the 18 cases who were operated (n=18) 11 belonged to fire arm group (61.11%) 5 (27.7%) belonged to RTA group and 2 (11.1%) belonged to fall group (not tabulated). Pathologically the lesions noted included cervical cord injuries in 2 (29.57% of n=7) and closed head injuries 5 (69.42% of n=7) among the non fire arm group (Table 5).

Forty five (40.17%) cases travelled less than 70 km before reaching Lady Reading Hospital Peshawar; 14 (12.5%) had to travel 70 – 150 km and 53 (47.32%) travelled a distance of more than 150 km.

The central districts of Peshawar, Charsadda and Mardan shared the bulk (n=41, 36.6%) followed by FATA (n=28, 25%), northern districts of Dir and Swat (n=19, 16.96%) and the southern districts of Bannu, Dera Ismail Khan, Karak and Kohat (n=15, 13.39%) cases. Nine patients (8.03%) patients belonged to Afghanistan.

DISCUSSION

The predominance of males (87.5%) is obvious due to their dominant involvement and presence in the setting of roads and their exposures to FAI; the young obviously (57.14%) being the more vulnerable among the group. Our study appreciates both these factors according to our local conditions.

The children (30.35%) in our study mainly present both with history of fall and RTA compared to a study from Egypt which shows that out of the total skull fractures, 47.84% were fissure fracture and 24.31% were depressed fractures. Data analysis revealed increased risk for skull fractures and brain injuries in traffic accidents were 84.78%, 94.20%, respectively, but the probability of soft tissue injuries increase in traffic accident and violence[8].

One of the reasons for hasty referral from periphery is the non availability of the imaging techniques like CT scan or MRI; however measures like administration of IV fluids, IV dexamethasone and intravenous mannitol are too obvious and simple to be excused in addition to securing the airways. This service has to be improved in District Headquarter Hospital / Agency Headquarter Hospitals.

The utility of CT scan in our study is comparable to international studies. Once in the Lady Reading Hospital the facility of CT scan was used efficiently both for the diagnosis and follow up.

More patients presenting to the Neurosurgeon in Navratil O et al [9] were given surgical first aid (67%), and 12% received delayed surgical treatment with only 21% receiving conservative management compared to 83.92% in our study who were not offered any surgery. The limitations of our study were its retrospective nature, the end point targets (death) and obviously no follow up. It is for this reason that another study where survival and good prognostic indicators are studied is advisable. Petroni G et al [10] have shown up to 58% mortality at 8 months and Navratil O et al[9] has demonstrated 56% death in 6 months time, a domain which our study could not establish. Moreover the 3 months and 6 months survival in our set up is not achievable, a fact which should raise an eyebrow among the researchers in this field. Management of trauma patients relies on a simple but obvious concept: Time is life! This is a challenge to the emergency radiologist in his evaluation of the radiological admission survey of severe trauma patients, since the latter need a quick and thorough survey of craniocerebral, cervical, thoracic, abdominal, and limb lesions [11]. Our study is almost comparable to that in the department of Neurosurgery Bangalore by Santhanam R et al [12] who like our study have concluded that predictors of mortality by logistic regression were initial GCS of less than 8, diastolic blood pressure of less than 70mm Hg, overall haemodynamic instability and the effacement of cisterns on repeat CT scan. No ICP monitoring was done in their study also.

It is recommended that our ICU staff need to be trained for the proper care; measures like the provision of the sensitive medicines in the hospital represent a major administrative problem in cases that are given surgical care. The outcomes are closely associated with the provision of microbiologist services which are usually deficient in our setting and can contribute to the poor out come. The best lesson from our study is that the staff should know the basic principles of management and should be trained and dedicated because it is not always the costly equipment which will change the out come.

CONCLUSION

Road traffic accident was the major contributor in the mortality in patients presenting to neurosurgical intensive care unit. Most involved were young adults.

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