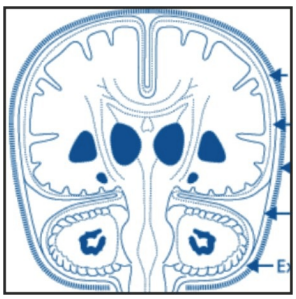
ORIGINAL PROF-882

SEVERE HEAD INJURY;
CURRENT TRENDS



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ABSTRACT... Objective: To assess the outcome of severe head injury in patients with GCS 8 or below. **Design:** Retrospective study. **Setting:** Department of Neurosurgery, Allied Hospital, Punjab Medical College, Faisalabad. **Period:** Two years Aug 2002 to July 2004. **Material and Methods:** Two hundred patients admitted in the department of Neurosurgery, Allied Hospital, with Glasgow Coma scale 8 or below irrespective of mode of injury and age were selected with a follow up of up to twelve months. The patients were assessed on arrival in the emergency room on the basis of GCS. The patients were managed accordingly. **Results:** 71% patients were managed conservatively and 29% patients under went surgical intervention. Overall mortality was 40%. Outcome was good in 15% where as 11% patients remained vegetative. **Conclusion:** Severe head injury has a mortality of 40%, especially in very young and very old patients.

INTRODUCTION

Neurotrauma is a major public health problem. The incidence varies from 67 to 317 per 10000 in different contents and the mortality rates are in the range of near 1% for minor injury and 48% for severe head injury. It is the main cause of death and disability in people under 40 years of age[1].

The Glasgow Coma scale at the time of admission is the single most important predictor of outcome. Pre-hospital hypothermia, intra-cranial hypertension, hypoxia, associated injuries and delayed transportation lead to secondary insults to already injured brain. Preventing secondary brain insults will remain the goal of management for the foreseeable future.

Primary severe head injury can be prevented by strict public laws, observation of safety measures and mass education about the consequences of severe head injury and of course an efficient medical transfer system. A

concept of centers of excellence and an educational programmes. “Advance Brain Life Support” has been proposed to decrease the mortality and morbidity[1].

MATERIAL AND METHODS

This study includes 200 patients with severe head injury with GCS 8 or below at the time of admission. This was retrospective study conducted at Neurosurgery Department, Allied Hospital, a tertiary care facility affiliated with Punjab Medical College, Faisalabad. This study covers a period of 24 months with a minimum follow up of 12 months.

On arrival in emergency ward, patients were assessed clinically by using Glasgow Coma Scale. These include GCS = 8 (34%), GCS = 7 (28%), GCS = 6 (12%), GCS = 5 (8%), GCS = 4 (12%), GCS = 3 (6%).

These patients were managed initially in the Emergency and accident department and later on shifted to the Neurosurgery ward. Patent air way was ensured by removing secretions from air way and use of soft air way devices. Twenty patients needed tracheostomy. Oxygen was given. Mannitol was given in a dose of 0.5 to 1g/kg. N/G and indwelling Folley’s catheter were passed. Antibiotics were given in patients who has CSF leakage, or contaminated wound.

Anticonvulsant drugs were given for patients of paediatric group or in those who had epileptic fit at the time of injury. X-ray skull, Cervical spine and CT scan brain was done in all these patients. In addition to neurosurgical team, these patients were also attended by the General and Orthopaedic Surgeons, as and when required. Necessary investigations for associated injuries and definitive management was also provided. Emergency operative neurosurgical intervention was offered in the minimal possible time.

RESULTS

Two hundred patients having GCS 8 or below were selected ranging in age from 5-80 years for this study (Table I).

Table I. Age Incidence

Age	Years	% Age
00	05	19%
06	10	15%
11	20	16%
21	40	35%
41	50	06%
51	60	03%
61	70	05%
71	80	01%

Table II. Causes of head injury

RTA	57%
Fall	23%
Assault	10%
Medical Trauma	08%
Fire arm injury	02%
Unknown mode	

Table III. Associated Injuries

Femur	02%
Mandible	01%
Nasal Bone	01%
Skull Fracture	
Linear	25%
Depressed	07%

Of these 36 were with GCS 3 and 4, forty with GCS 5 and 6 and 124 with GCS 7 and 8. 142(71%) were managed conservatively (Table V).

118(59%) of this conservatively managed group were treated without ventilatory support and 24(12%) patients

were subjected to assisted ventilation. 68(29%) patients underwent surgical intervention. 18(9%) patients were operated for the evacuation of Extra-dural Haematoma, 4(2%) for Extra-dural Haematoma and Depressed fracture of skull, 10(5%) Depressed fracture, Acute sub-dural haematoma, 4(2%) intracerebral haematoma, 20(10%) Tracheostomy (Table-V).

Table IV. CT Scan Brain Findings	
Brain contusion	17%
G. Oedema	14%
EDH	11%
AC, SDH	08%
ICH	02%
IVH	01%
Tr. SAH	02%
Infarction	02%
Depressed fracture	07%
Fire arm injury	02%

4(2%) only need surgical debridement. As regard outcome, overall mortality was 40%, 11% remained vegetative, 22% were moderately dependent, 12% with mild dependency and 15% has good recovery.

It was interesting to note that 98(49%) patients with reacting pupils had a mortality of 22% compared to the group of 102(41%) with pupillary abnormality who had a mortality of 55% (Table VI).

Table V. Management	
Conservatively managed	71%
I.C.U. management without hyperventilation	59(118pts)
Hyperventilated	12%(24pts)
Operated	29%
EDH	09%
EDH + depressed #	02%
Depressed #	05%
Ac. SDH	08%
ICH	02%
Tracheostomy	10%
Surgical debridement of scalp wound	02%

Table VI. Outcome on the basis of Glasgow outcome scale at the time of discharge					
	Death	**Vegetative**	**Moderately dependent**	**Mildly dependent**	**Good**
Overall outcome	40.0%	11.0%	22.0%	12.0%	15.0%
Pupil size					
Equally reacting (98)	22.49%	08.19%	32.65	16.32%	20.40%
Pupil abnormality (102)	54.90%	13.72%	11.76%	11.76%	7.84%

Table VII. Outcome on the basis of Glasgow Coma scale at the time of discharge					
Age	**Death**	**Vegetative**	**Moderately dependent**	**Mildly dependent**	**Good**
0-5 years (38)	36.84%	5.26%	10.52%	31.57%	15.78%

6-20 years (64)	31.25%	12.50%	28.125%	12.50%	15.625%
21-40 years (70)	40%	8.57%	25.70%	5.70%	20%
41-60 years (16)	62.50%	12.50%	12.50%	0.00%	12.50%
61-80 years (12)	66.66%	0.00%	0.00%	16.66%	16.66%
Glasgow coma scale (GCS)					
GCS-3+4 (36)	66.66%	11.11%	5.55%	5.55%	11.11%
GCS-5+6 (40)	55%	10%	20%	5%	10%
GCS-7+8 (124)	27.41%	8.06%	30.64%	16.13%	17.74%

Table VIII. Only vegetative patients came for follow up. Among the vegetative patients only 12(54.54%) patients came for follow up.

	Death	Vegetative	Moderately dependent	Mildly dependent	Good
Overall outcome	16.6%(2pts)	66.6%(8pts)	16.66%(2pts)		

DISCUSSION

Unlike most western countries there is no entity like "medical transportation" where highly specialized and equipped ambulance services with trained para-medics evacuate and transfer the patients to the neurosurgery/trauma centers. We do not have services like " Flying Squads" or air ambulances. Most of the patients reach the hospital in private or at the more police vans. So the morbidity and mortality of the patients with severe head injury is very high in our set up.

The efficient use of human resources, vigilant clinical examinations and monitoring of the vital signs and efficient nursing care has enabled us to achieve the mortality rates comparable to mentioned in the international literature[2].

In all patients CT scans of brain were obtained in the Emergency ward. X-rays of the skull and cervical spine were also done in most of these patients (97%). In patients with poly trauma x-rays of appropriate region were obtained and latter on managed accordingly.

We use high dose Mannitol rather than the conventional dosage in the preoperative management of patients with acute intra-cranial haematomas[3]. We did not have the facility of ICP monitoring in our ICU, nor we could induce mild hypothermia ($34^{O}C$) in patients with severe head injury (ICP more than 40 mm of Hg). It is important to monitor P(bt) (brain tissue oxygen pressure), BT (brain tissue temperature), CBF (cerebral blood flow), SO_2 (jv) jugular venous oxygen saturation in hypothermic therapy. Mild hypothermia has been shown to be effective for preventing brain damage or patients with severe head injury, as well as reducing mortality and improving the prognosis[4]. Specialists Neurosurgical care with protocol driven therapy aimed at intra-cranial pressure and cerebral perfusion pressure targets is associated with a significant improvement in outcome for all patients with severe head injury[5].

Most of our patients > 50% were young adults from 20 to 40 years of age and most of them were the victims of road traffic accidents. 10% patients presented with history of assault and surprisingly only 2% were with fire arm injuries. 23% patient presented with falls and most of them were children up to the ages of 10 years.

As for as brain injury was concerned it was revealed that

the most common injuries were brain Contusions in 17% followed by generalized brain odema in 14% patients. 11% patients had Extra-dural haematoma, 8% subdural and 2% were with Intra-cerebral clots.

What is the most important factor in the determination of out come of severe head injury? Some patients have primary brain injury which is so overwhelming that death is almost inevitable. These patients usually present with GCS 3 or 4. We have included all patients with GCS 8 or below in this study. Initial assessment was carried out in the emergency ward and then these patients were managed in the Neurosurgery Department[2]. In addition to GCS other prognostic factors which were noted were the pupillary size and abnormalities, associated injuries (poly trauma) and seizures at the time of injury or later in hospital stay. In addition to GCS, types of trauma and brain lesion, hypoxia and hypotension, hemocoagulative disorders (DIC), hypoglycaemia, and early post traumatic seizures are predictors of GOS (Glasgow Outcome score)[2]. A knowledge of these prognostic factors followed by correct management improves outcome and decreased morbidity and mortality.

In out study 71% patients were managed conservatively, out of these 59% (118) were treated without ventilatory support. 12% (24) patients were put on the ventilators. 29% patients were operated and most of them were having intra-cranial haematomas.

Our study showed an overall mortality of 40% which is comparable with the studies of Basso-A, previghans-I et al[1].

When we analyzed the mortality & morbidity with respect to the age, it revealed that it was highest 66.66% in the age group 61-80 years, 62.50% in the group with ages from 41-60 years (Table).

Indirect measurements of effects of primary and secondary brain injury through the study of the ICP or CPP directed management. CBR monitoring, Sj O_2 monitoring and TCD monitoring has led to improved care of person with brain injury. Micro sensors and micro dialysis technology is also being used intra-operatively to determine the “safe” temporary clipping time. The ultimate application of the new technology is to improve long term outcomes for patients with severe brain injury through the reduction of secondary brain injury. In one study[6] it was concluded that vigilant monitoring of both intra-cranial pressure and arterial pressure is required to lower the incidence of secondary insults.

Gleorn, T.C. Kelly, DF Boscardin et al studied the energy dysfunction as a predictor of outcome after moderate or severe head injury. Six month Glasgow outcome scale was most strongly associated with the mean cerebral metabolic rate of oxygen utilization (CMRO), mean arterial lactate level, mean arterial glucose, mean cerebral blood flow, post resuscitation GCS and pupillary status. During the first six days after head injury $CMRO_2$ and arterial lactate level are the strongest predictors of neurological outcome.

Post traumatic seizures can be serious complication of head injury in children, because they can worsen secondary brain damage. Appropriate management of head trauma patient must include suitable and immediate prophylaxis with anti epileptic drugs.

Several problems appear when outcome measurements, rehabilitation programs and treatment options are considered[1]. Avoiding secondary brain injury (hypoxaemia, hypotension and intra-cranial hypertension) will remain the goal of management for the foreseeable future. Halting the evolution of primary injury remains a highly sought after goal. The concept of centers of excellence and an educational programme. Advanced Brain Life Support is a normal obligation because morbidity and mortality tend to decrease in Centres of Excellence. The implementation of a full time trauma service is associated with improved time lines of triage and therapeutic intervensions and improved patients outcomes[8].

CONCLUSION

Severe head injury has high mortality of 40%.

Patients with pupillary abnormalities have high mortality of 55.7% as compared to normal reacting pupil which have 22.49%.

Extreme of age has also poor outcome.

Educational programme like Advanced Brain Life Support, Centers of Excellence, implementation of full time trauma service are associated with improved time lines of triage, therapeutic interventions and improved patients outcome.

There is a need for a brain trauma data bank in Pakistan along with formation of an interdisciplinary brain trauma working group in order to control whether guidelines and standardized therapeutic modalities are being followed.

REFERENCES

1. **Advances in management of Neurological trauma in different continents.** Basso, A; Previglino-I; Durate, J-M; Ferrari N, World-J-Surg. 2001 Sep; 25(9): 1174-8.

2. **Prognostic factors and outcome of children with severe head injury. An eight year experience.** Chiaretti, A; Piastra, M. Pulitano, S et al. Child Nerv. Syst 2002 Apr; 18(3-4): 129-36.

3. **Mannitol for acute traumatic brain injury.** Poberts,-I; Schiverhout,–G; Wakai,-A; Cochane-Database. Sus. Rev 2003; (2): CD 001049.

4. **Study on therapeutic mechanism and clinical effect of mild hypothermia in patients with severe head injury** Zhi,-D; Zhang,-S; Lin,-X; Surg-Neurol-2003 May; 59(5): 381-5.

5. **Specialist neurocritical care and outcome from head injury.** Patel-H-C; Menon, D-K; Tebbs-S; Hawker,-R; Hutichinsan,-P-J; Kirkpatric,-P-J. Intensive care-Med. 2002 May; 28(5): 547-53.

6. **The cause and incidents of secondary insults in severely head injuries adults and children chambers-I-R;** Tread Well,-I; Mendelow-A-D, Br-J Neurosurg 2000 Oct; 14(5): 424-34.

7. **Energy dysfunction as a predictor to outcome after moderate or severe head injury; indices of oxygen, glucose and lactate metabolism.** Crlenn,-T-C; Kelly,-D-F; Hovda, D-A; Bergsneider, M; Hillered, L; Martin,NA.J-Cereb-Blood-Flow-Metab. 2003 Oct; 23(10): 1239-50.

8. **Enhanced Trauma programe commitment at a level-I trauma center: effect on the process and outcome of care.** Cornwell,-K-A. Arch-Surg. 2003 Aug; 138(8): 838-43.

Patience and perseverance; Guarantees success.

Shuja Tahir