Original Research Article

Risk factor assessment and outcome analysis in elderly (≥60 years) patients of severe head injury

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ABSTRACT

Background: Incidence of head injuries is rising all over the world. Only few studies have been performed regarding severe head injury in elderly people. We aimed to study the epidemiology, mode of injury, management, co-morbidity, associated injuries which affects the outcomes. Severe head injury is unconsciousness >6 hours and GCS 3-8. In India 6.63% of the total population above 60 years is considered elderly. Falls are the major contributor to TBI in elderly but in India RTA is still the main contributor. Outcomes of TBI, both in terms of mortality and function, are significantly worse in the elderly.
Methods: Objective of this study was to find the risk factors affecting the outcome in severe head injury. This was a prospective study and carried on 56 patient in Department of surgery of M. L. N. Medical College, Prayagraj from September 2018 to September 2019.
Results: Male were most commonly affected but the gender had no significant prognostic effect on outcome. RTA were the most common cause of head injury. GCS at admission was directly related to outcome. Bilateral non-reactive pupils had poor outcome. Type of hematoma and midline shift had also affected the outcome. Operated cases had better outcome than non-operated cases. Any associated injury with TBI had worsened the outcome in patient. Any co-morbid condition associated with brain injury had slower recovery and worsen the outcome. Overall mortality in this series was 64.28% and unfavourable outcome was 76.79%.
Conclusions: Severe head injury in elderly people had worst outcome.

Keywords: Elderly, GCS, Head injury, TBI

INTRODUCTION

Traumatic brain injury (TBI) is an alteration in function of brain or evidence of brain pathology, caused by an external force. TBI is a major global health concern. Traditionally, the classification of the severity of head injury has been based on Glasgow coma scale, GCS≤8 is considered as severe head injury.[1] Severe head injury is defined as loss of consciousness greater than 6 hours and GCS of 3 to 8.

TBI is a major public health concern. The incidence of TBI in the elderly is increasing day by day because of more survival of older people due to availability of good medical care and facility. In India age above 60 years is considered elderly which is 6.63% of total population.[2] Falls are the major cause TBI in the elderly population, several unique physiologic and clinical factors make the elderly more prone to a TBI with greater disability including greater frailty, chronic health condition, polypharmacy, and poor health and balance but in India still RTA is the main contributor of TBI in the young and elderly people.[2]

Two major factors which place older adult at greater risk of TBI. First, the ages, the dura becomes more adherent

to skull. Second, aspirin and anticoagulant therapies that is received by older adults as a part of routine management of chronic condition. Thus, the mechanism of injury most likely to be seen in elderly persons increase the risk of TBI.

Older age is independent predictor of worse outcome from TBI. The financial and human costs are extensive for treating TBI in older adults. Mortality rates in older adults with severe TBI aged 55 years or older range from 30% to 80% that is significantly higher than those reported in younger patients. Younger TBI survivors have lesser dependence than older adult using global outcome measures including the functional independent measure and Glasgow outcome scale.

METHODS

The objective of the study was to evaluate the age/gender, mode of injury, pupillary response, GCS score at time of presentation, co-morbid conditions, associated injuries and management affecting the outcomes in severe head injury occurring in elderly people.

Method

It was a prospective study carried out in P. G. Department of surgery, S. R. N. Hospital (Trauma Centre) associated with M. L. N. Medical College, Allahabad from September 2018 to September 2019.

The study included a total of 56 patients. All elderly patients with severe head injury (GCS≤8), and polytrauma patients of age ≥60 years were part of the study after applying exclusion criteria.

Inclusion criteria

Must be traumatic brain injury; patient must be age ≥60 years of age.

Exclusion criteria

Conditions which in the view of the investigator might interfere with assessment, safety, results, outcomes of the study; head injury due to fall because of cerebrovascular accident.

Statistical analysis

SPSS Software V22 used for structural analysis of data. Test applied were chi-square test.

Outcome

Outcome was measured using Glasgow outcome scale score 3 at discharge and divided into two groups fair

outcomes (GOS 4, 5) and poor outcomes (GOS 1, 2, 3). Ethical approval for the study was taken by ethical committee of M. L. N. Medical College, Prayagraj.

Table 1: Glasgow outcome scale.

Good recovery (able to return to work or school)	5
Moderate disability (able to live independently, unable to work or school)	4
Severe disability (able to follow commands/ unable to live independently)	3
Vegetative state	2
Death	1

RESULTS

Amongst the 56 patients, the male female ratio was approximately 3.3:1 (43 male and 13 female patient). Mean age of the study population was 67.5 years.

Three patients were unknown/unattendent at the time of presentation. Male were most commonly affected (M:F::3.3:1) but the gender had no significant prognostic effect on outcome.

Most common mode of injury was road traffic accident (RTA) in 78%, followed by fall from height in 16% and assault in 5%.

GCS at admission was directly related to outcome. Mean GCS at presentation was 5 (range 3-8.)

In responsive (n=8) and in anisocoric group (n=3) patient had favorable outcomes. Patients with bilateral fixed pupils at surgery had high mortality rate, bilateral non-reactive pupils has a positive predictive value for a poor outcome.

After initial stabilization, all patients underwent a NCCT head. Type of hematoma and midline shift (>5 mm) has also affect the outcome of patients.

Mode of treatment of head injury affect the prognosis, operative lesion has better outcome than non-operative lesion.

The associated injuries included- tibia=1 patient, clavicle=5, both bone leg=3, both bone forearm=1. Any associated injury with TBI has worsened the outcome in patient.

Any co-morbid condition associated with brain injury has slower recovery and worsen the outcome in the patient like DM, CAD, thyroid disorder etc.

Table 2: Factors significantly related to outcome.

| Variables | No. of patients | percentage | Outcome | | Statistical test |
			Favourable outcome (GOS 5 and 4)	Unfavourable outcome (GOS 3-1)	P value<0.05 (significant)
Age distribution (years)					
60-70	44	78.57	9	35	χ²= 0.8015 p=0.3706
71-80	10	17.85	4	6	
81-90	2	3.57	0	2	
>90	0	0	0	0	
Sex distribution					
Male	43	76.78	9	34	χ²=0.1306 p=0.7177
Female	13	23.22	4	9	
Mode of injury					
RTA	44	78.57	10	34	χ²=0.0618 p<0.8036
Fall form height	9	16.07	3	6	
assault	3	5.35	0	3	
GCS at admission					
5-8	26	46.42	9	17	χ²=3.5391 p<0.0599
3-4	30	53.57	4	26	
Pupillary response					
Responsive	17	30.35	8	9	χ²=9.3639 p<0.0022
Anisocoric	6	10.71	3	3	
nonresponsive	33	58.94	2	31	
Type of haematoma					
Contusion	27	48.21	7	20	χ²=1.6597 p<0.1976
EDH	2	3.57	0	2	
SDH	8	14.28	4	4	
SAH	3	5.35	1	2	
Multiple hemorrhages	13	17.85	1	12	
DAI	3	5.35	0	3	
Midline shift (>5 mm)					
Present	14	25	1	13	χ²=2.7048 p<0.1000
Absent	42	75	12	30	
Management					
Operated	19	33.92	8	11	χ²=5.7572 p<0.0164
Non-operated	37	66.08	5	32	
Comorbid condition					
Present	17	30.36	4	13	χ²=0.0014 p<0.9705
Absent	39	69.64	9	30	
Associated Injury					
Present	10	17.85	2	8	χ²=0.0706 p<0.7905
Absent	46	82.15	11	35	

DISCUSSION

Regarding age, this study showed that the 6th decade (60-70) of life were the most affected (n=44, 78.57%), and other age group contribute only 21.43% (n=12). We have not found any other study, who classify the age group in elderly people >60 years. Mean age of patients was 67.5 years. Majority of patients (n=44, 78.57%) were of age group 60-70 years followed by the patients (n=10, 17.85%) of age group 71-80 years. In this study most favourable outcome was in age group 60-70 years (69.23% of patients had GOS 5 and 4) followed by age group 71-80 years (30.76% of patients had GOS 5 and 4). Most unfavourable outcome was in age group 60-70 years (85.36% of patients had GOS 3-1).

In this study 43 (76.78%) patients were male and only 13 (23.32%) patients were female. Male: Female ratio was 3.3:1. Thus males were more prone to head injuries. 9 (20.93%) male patient had favourable outcomes (GOS 5 and 4) and 4 (30.76%) female patients had favourable outcome (GOS 5 and 4).

RTA were the most common cause of injury which contributed to (60.56%) of the total. Similar result was also present in study done by Broker at al, Kumar et al, Khadka et al and Agrawal et al.[2,4,5,9] RTA (78.57%) and falls (16.07%) were common mechanism of head injury in this study.

26 patients had a GCs score 5-8, 9 (34.61%) patients out of these had favourable outcome and remaining 15 patient had unfavorable outcomes. 30 patient had GCA score (critical TBI) 3-4, 4 (13.33%) patients out of these had favorable outcomes and remaining 26 patient had unfavorable outcomes.

Patients with reactive pupil had better outcomes as compared to those anisocoric pupil and worst outcome was seen in patient with non-reactive pupils. In this study 17 patients had reacting pupil, 6 patient had anisocoric pupil and 33 patients had non responsive pupils. Patients who had bilateral reactive and anisocoric pupil had more favourable outcome as compared to the non-reactive pupil.

In non-reactive group out of 33 patients only 2 (6.06%) had favorable outcome and 31 had unfavorable outcome.

Most common hematoma on NCCT scan was intra parenchymal hemorrhage in 48.21% (n=27) of patient followed by multiple hemorrhage 17.85% (n=10) and least common hematoma was EDH 3.57% (n=2).

Regarding management, 19(33%) patients are managed surgically and 37 (67%) patients managed conservatively. The decision to operate on a head injured patient is based on pre-morbid state, severity of initial injury, the onset and rapidity of neurological deterioration and patients assessment on arrival at the neurosurgical unit. Favorable outcomes present in 42.10% (n=8) in operated patients and 13.51% (n=5) in medically managed patients.

Table 3: Summary of published series regarding severe head injury in the elderly.

Year	Author	No. of patients (years)	Mortality/ unfavorable outcome (%)
2003	Hukkelhoven et al[16]	2664 (>55)	74
2008	Sinha et al[6]	186 (>60)	67.8
2011	Brokar et al[2]	100 (>60)	70
2019	Present study	56 (>60)	76.79

In this study 17 patient (30%) patient presented with co-morbid condition and 70% (n=39) patients presented without any co-morbid condition along head injury. In this study only 10 patients (17%) had associated injury together with head injury. Maximum patient in this study were not having any associated injury.

CONCLUSION

Severe head injury in elderly people had worst outcome. Male are most commonly affected (M:F::3.3:1) but the gender of patients has no significant conclusion prognostic effect on outcome of patients. RTA is the most common cause of head injury, mode of injury has indirect effect on outcome of patient. GCS at admission is directly related to outcome of patients. Bilateral non-reactive pupil has a positive predictive value for a poor outcome and patient who had bilaterally reactive pupil made a better outcome. Type of hematoma and midline shift (>5 mm) has also affect the outcome of patients. Mode of treatment of head injury affect the prognosis, operative lesion has better outcome than non-operative lesion. Any associated injury with TBI has worsened outcome in patient. Any comorbid condition associated with brain injury has slower recovery and worsened the outcome in the patient. Overall mortality in this series is 64.28% and unfavorable outcome is 76.79%.

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