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Original Research Article

Outcome in elderly individuals with moderate and severe head injury: a tertiary centre experience

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ABSTRACT

Background: The prognosis of patients with moderate and severe head injuries is poor in elderly individuals which affects not only their families and also the society. An accurate and early prediction of survival and functional outcome becomes essential and important to decide the aggressiveness of treatment after the informed counselling of relatives. The aim of the present study was to assess the impact of the age on the outcome of the elderly individual with moderate and severe head injury and to compare it with the outcome of younger age group.
Methods: Authors retrospectively evaluated 250 patients with moderate (GCS 9-13) and severe (GCS 3-8) TBI after categorizing them into group A (above 60 years of age) and group B (20-59 years of age). Age, sex, mode of injury, level of consciousness as in GCS, management and CT findings were assessed for outcome and comparisons were made.
Results: The mean age for good outcome in elderly group is 66.8 and for bad outcome is 70.1 years. The mean age for good outcome in younger group is 33.2 and for bad outcome is 47.5 years. Elderly patients fare worse in all factors assessed when compared to younger group.
Conclusions: Head injuries in old age associated with poor GCS serves as a basis for making early prediction for the likelihood of poor outcome.

Keywords: Elderly age, GCS, Outcome, TBI

INTRODUCTION

In developing countries like India with increase in industrialization and urbanization the incidence of head injuries is on the rise. The socio-economic burden due to the loss of resources and increase in dependency consequent to head injury on the family as well as society is enormous. The change of traditional joint family to western type nuclear family system and lack of awareness on geriatric care in India are playing a major role in increasing the morbidity following head injury among elderly individuals. Longer hospital stays requiring multidisciplinary rehabilitative and supportive care results in heavy financial and emotional burden to the families following traumatic brain injury especially in elderly individuals. Multiple independent risk factors predicting the poor outcome in patients with severe head injuries have been identified. In particular, older age has been cited as significant risk factor for the poor outcome in several studies. Many studies have revealed poor outcome at all levels in the elderly patients even with good Glasgow Coma Score (GCS) on admission.[1,2] Often questions have been raised whether these elderly patients need to be treated aggressively, and whether they have any chance of a meaningful recovery. Hence, an accurate as well as early prediction of survival and functional outcome appears to be of paramount importance and allows for informed counselling of relatives and helps in

deciding the aggressiveness of treatment. Aim of the present research was to study age as an important prognostic factor in the prediction of outcome in Head Injury patients, to assess outcome of head injury in elderly patients and to compare with the outcome of younger age group

METHODS

To evaluate this protocol, we decided to review elderly patients (group A) with moderate and severe traumatic brain injuries (TBI) and their outcomes compared to younger (group B) patients managed on a standardized protocol. The severity of head injury is divided based on Glasgow coma scale at the time of admission and after resuscitation.

- Mild - GCS 15 and 14
- Moderate - GCS 9-13
- Severe - GCS 3-8.

Based on the above said severity scale we retrospectively evaluated and included 250 patients with moderate (GCS 9-13) and severe (GCS 3-8) traumatic brain injury admitted during the period of January 2007 to December 2008 at Govt. Rajaji Hospital (GRH), Madurai.

Of the 250 patients selected, 101 (40%) were aged >60 years and categorized as Group A. The remaining 149 (60 %) were aged between 20-59 years and categorized as group B. They were admitted in the Neurosurgical Intensive care unit and were managed on a standardized protocol. Special attention was given for the prevention and early detection and management of secondary insults like hypotension, hypoxia, hyperpyrexia and hypoglycemia. Neurological deterioration associated with traumatic mass lesions were treated surgically, rest of the patients were critically observed and managed as per protocol.[1-3] Corticosteroids were avoided.[4,5] Surgical interventions either craniotomy or decompressive craniectomy with evacuation of mass lesions performed according to the existing criteria.[6,7] All patients were managed in Neuro ICU with specific ventilator protocols and multi-modality monitoring of physiological parameters. Further specific guidelines regarding nutrition, infection surveillance and DVT Prophylaxis were followed.

Data regarding patients' demographics, clinical findings, admission and post - resuscitative GCS, presence of poly trauma, cervical spine injuries, ingestion of alcohol and mechanism of injury were collected. Further, findings in CT scan of brain were graded using the classification suggested by Marshal et al.[8] If multiple CT scans were available the one with worst finding was taken for consideration. Patients in whom any trauma related lesion removed surgically was categorized as type V and those with hemorrhagic mass volume >25ml who did not undergo surgery was categorized as Type VI. The outcome was assessed at the time of discharge using the Glasgow outcome scale (GOS). For analysis we divided outcomes into 3 categories.

- Death (GOS - 1)
- Unfavorable (GOS - 2 and 3)
- Favorable (GOS -4 and 5)

Exclusion criteria

Patients who had low level of consciousness due to alcohol, drug over dosage and early epilepsy were excluded from study. Patients who had multiple injuries associated with hypotension, hypoxia or partial respiratory obstruction recovered dramatically to normal consciousness after initial resuscitation were also excluded from the study. Also, all the patients who were apnoeic with dilated and fixed pupils at the time of admission were excluded.

Statistical analysis

The information collected from the selected patients was recorded in a master chart. Data analysis was done with the help of computer using Epidemiological Information Package (EPI 2002). Using this software range, frequencies, percentages, means, standard deviations, chi square and 'p' values were calculated. Kruskul Wallis chi-square test was used to test the significance of difference between quantitative variables and Yate's test for qualitative variables. A 'p' value less than 0.05 is taken to denote significant relationship.

The following factors were assessed for outcome

- Age
- Sex
- Mode of injury
- Level of consciousness as in Glasgow Coma Scale
- Management
- CT findings.

RESULTS

Age and outcome

The range of age for elderly patients (group A) is 60-86 years with mean age of 67.3. In the younger cohort (group B) age ranges from 20-56 with mean age of 39.3. In Group A the mean age for good outcome was 66.8 years and bad outcome was 70.1 years. In group B the mean age for good outcome was 33.2 years and for bad outcome was 47.5 years.

Sex

Of the 101 patients aged above 60 yrs old, 73 were male and 28 were female. In the younger cohort aged 20 to 59 years 107 were male and 42 were female (Table 1).

Sex and outcome

There was a significant poor outcome in older age group in both sexes compared to younger age group (Table 2).

Glasgow coma scale (GCS)

In group A, GCS of 3-8 were 74.3% and GCS of 9-13 were 25.7% and in group B it was 58.4% and 41.6% respectively (Table 3).

Table 1: Sex distribution.

Sex	Group A (study cases)		Group B (control cases)		Total	
	No.	%	No.	%	No.	%
Male	73	72.3	107	71.8	180	72
Female	28	27.7	42	28.2	70	28

Table 2: Sex and outcome.

Sex	Outcome in group A (Study Cases)				Outcome in group B (Control Cases)				Total			
	Good		Poor and death		Good		Poor and death		Good		Poor and death	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Male	22	30.1	51	69.9	63	53.8	54	46.2	85	34	105	66
Female	12	42.9	16	57.1	18	56.2	14	43.8	30	50	30	50
Total	34	33.7	67	66.3	81	54.4	68	45.6	115	46	135	54

Table 3: GCS distribution.

Glasgow Coma Scale	Group A (study cases)		Group B (control cases)		Total	
	No.	%	No.	%	No.	%
3-8	75	74.3	87	58.4	162	64.8
9-13	26	25.7	62	41.6	88	35.2

GCS and outcome

There is a significant difference in the outcome of older cohort compared to younger group according to GCS. Older individuals fared poor in both GCS 3-8 and 9-13 categories (Table 4).

Glasgow outcome scale (GOS)

In Glasgow outcome scale among group A patients deaths were 39.6%, poor outcome was 29.7% and good outcome was 30.7%. GOS in group B showed 27.5% deaths, 24.8% poor outcome and 47.7% good outcome (Table 5).

Mechanism of injury

Analyzing the mechanism of injury in group A, RTA (Road traffic accident) cases were 63.4% followed by 26.7% accidental fall and 9.9% assault cases. In group B RTA, fall and assault were 77.2%, 17.4% and 5.4% respectively (Table 6).

Mechanism of injury and outcome

In group A 76.6% following RTA, 55.6% after fall and 70% after assault showed poor outcome where in Group B the poor outcome was 47% in RTA, 42.3% in accidental fall and 62.5% in assault cases (Table 7).

CT findings

Prevalence of traumatic mass lesions was similar in both elderly (47.5%) and in younger (45.6%) groups. Higher grades of diffuse injury type III and type IV were more common (20.8%) in younger group than in elderly group (14.8%) (Table 8).

Table 4: GCS and outcome.

GCS	Outcome in group A (study cases)				Outcome in group B (control cases)				Total			
	Good		Poor and death		Good		Poor and death		Good		Poor and death	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
3-8	21	28	54	72	46	52.9	41	47.1	67	41.4	95	58.6
9-13	9	34.6	17	65.4	33	53.2	29	46.8	42	47.2	46	52.8
Total	30	29.7	71	70.3	79	53	70	47	109	43.6	141	56.4

Table 5: Glasgow outcome scale.

GOS	Group A (study cases)		Group B (control cases)		Total	
	No.	%	No.	%	No.	%
Death	40	39.6	41	27.5	81	32.4
Vegetative and severely disabled	30	29.7	37	24.8	67	26.8
Moderately disabled and good	31	30.7	71	47.7	102	40.8

Table 6: Mechanism of injury.

Mechanism of injury	Group A (study cases)		Group B (control cases)		Total	
	No.	%	No.	%	No.	%
RTA	64	63.4	115	77.2	179	71.6
Fall	27	26.7	26	17.4	53	21.2
Assault	10	9.9	8	5.4	18	7.2

Table 7: Mechanism of injury and outcome.

Injury	Outcome in group A (study cases)				Outcome in group B (control cases)				Total			
	Good		Poor and death		Good		Poor and death		Good		Poor and death	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
RTA	15	23.3	49	76.6	61	53	54	47	76	42.5	103	57.5
Fall	12	44.4	15	55.6	15	57.7	11	42.3	27	51	26	49
Assault	3	30	7	70	3	37.5	5	62.5	6	33.3	12	66.7
Total	30	29.7	71	70.3	79	53	70	47	109	43.6	141	56.4

Table 8: CT findings types.

CT findings	Group A (study cases)		Group B (control cases)		Total	
	No.	%	No.	%	No.	%
Diffuse injury I	23	22.8	28	18.8	51	20.4
Diffuse injury II	15	14.9	22	14.8	37	14.8
Diffuse injury III	9	8.9	16	10.7	25	10
Diffuse injury IV	6	5.9	15	10.1	21	8.4
Evacuated mass lesion Type V	43	42.6	65	43.6	108	43.2
Nonevacuated mass lesion Type VI	5	4.9	13	2	8	3.2

Table 9: CT findings and outcome.

CT findings	Outcome in group A (study cases)				Outcome in group B (control cases)				Total			
	Good		Poor and death		Good		Poor and death		Good		Poor and death	
	No	%	No	%	No	%	No	%	No.	%	No.	%
Diffuse injury I	12	52.8	11	47.8	17	60.7	11	39.3	29	56.9	22	43.1
Diffuse injury II	6	40	9	60	10	45.5	12	54.5	16	43.2	21	56.8
Diffuse injury III	4	44.4	5	55.6	8	50	8	50	12	48	13	52
Diffuse injury IV	2	33.3	4	66.7	6	40	9	60	8	38.1	13	61.9
Evacuated mass lesion Type V	9	20.9	34	79.1	29	44.6	36	55.4	38	35.2	70	64.8
Nonevacuated mass lesion Type VI	0	0	5	100	0	0	3	100	0	0	8	100
Total	35	34.7	66	65.3	70	47	79	53	103	41.2	147	58.8

Table 10: Types of management.

Treatment	Group A (study cases)		Group B (control cases)		Total	
	No.	%	No.	%	No.	%
Surgery within 24 hours	24	23.8	37	24.8	61	24.4
Observation and conservative	58	57.4	84	56.4	142	56.8
Surgery after 24 hours	19	18.8	28	18.8	47	18.8

Table 11: Management and outcome.

Treatment	Outcome in group A (study cases)				Outcome in group B (control cases)				Total			
	Good		Poor and death		Good		Poor and death		Good		Poor and death	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Surgery within 24 hours	10	41.7	14	58.3	19	51.3	18	48.7	29	47.5	32	52.5
Conservative	17	29.3	41	70.7	44	52.4	40	47.6	61	43	81	57
Surgery after 24 hours	8	42.1	11	57.9	9	32.1	19	68.9	17	36.2	30	63.8
Total	35	34.7	66	65.3	72	48.3	77	51.7	107	42.8	143	57.2

CT findings and outcome

Elderly age (group A) showed poor outcome in 79.1% whereas in younger (group B) cohort the poor outcome was 55.4% among operated cases irrespective of the time of operation (Table 9).

Management

About 23.8% cases in group A and 24.8% in group B were operated within 24 hours. Each 18.8% of group A and group B patients underwent surgery 24 hours after admission (Table 10).

Management and outcome

About 48.3% in the younger age group and 34.7% in the elderly group had good outcome following surgery for head trauma. Similarly, the poor outcomes in younger as well as older groups were 51.7% and 65.3% respectively (Table 11).

DISCUSSION

Age and outcome

Most of the studies confirm that the age is the most significant factor in deciding the outcome of patients with moderate and severe head injury.[9] Mortality is very high in the elderly age group in many series.[10] In general younger cohorts (group B) makes relatively better recovery after severe head injury. The mean age for good outcome in group A is 66.8 and for bad outcome is 70.1 years. The mean age for good outcome in group B is 33.2 and for bad outcome is 47.5 years. The same findings were also confirmed by Carlsson and his associates in their study.[11] However, the mortality is often associated with systemic complications such as chest infection, MI and other co-morbid conditions in older age group. About 45% of patients aged 60 and above had high blood urea level and 22% had florid lung infection at the time of death.

Sex and outcome

In group A male patients showed 30.1% good outcome and 69.9%, poor outcome in contrast to 53.8% of good outcome and 46.2% of poor outcome in group B which is very significant. Only 42.9% of elderly female fared better when compared to 56.2% in younger counterpart. The poor outcome in elderly female (57.1%) is significantly higher than poor outcome (43.8%) in younger group of females.

GCS and outcome

A GCS of <8 on admission was statistically significant in the elderly group in predicting poor outcome and mortality. About 74.3% in elderly and 58.4% in younger were under GCS 8 and 25.7% in elderly and 41.6% in younger were under GCS 9 to 13 after resuscitation. There was a trend of poor outcome at all levels of GCS in the elderly patients compared to the young.[12,13]

Although GCS is not intended to be used as a prognostic indicator, the depth and duration of coma is related to the outcome.[14] In general, there was a strong correlation between deteriorating GCS and poor outcome. GCS <8 is associated with poor outcome of 72% in elderly (Group A) and 47.1% in younger age group (Group B). Likewise, the poor outcome was 65.4% in elderly and 46.8% in younger cohort when GCS was >8. In the Becker et al, series, the mortality increases with decrease in GCS.[15]

Glascow outcome scale

Of the 101 patients in the elderly 39.6% died and 29.7% survived in a vegetative and severely disabled state. The mortality in the elderly group was about 10% more than that of the younger group.

Injury and outcome

The mechanism of injury between two groups was more or less similar. In elderly group, accidental falls accounted for up to 26.7% of injuries and 63.4% of patients sustained injuries in road traffic accident (RTA) and 9.9% of patients due to assault. Multiple injuries were more in younger age group (34%) compared to elderly group (14%). Co-existing cervical spine injury was also high in younger cohort (9%) when compared to 1% in the older group.

In group A, 76.6% following RTA, 55.6% after fall and 70% after assault showed poor outcome where in Group B the poor outcome was 47% in RTA, 42.3% in accidental fall and 62.5% in assault cases.

Management and outcome

In the younger group, 37 patients were operated in less than 24 hours of admission whereas 28 patients were operated after 24 hours with the poor outcome of 48.7% and 68.9% in respective category. In elderly group 24 patients had undergone surgery within 24 hours and 19 patients after 24 hours with the poor outcome of 58.3% and 57.9% respectively. About 48.3% in the younger age group and 34.7% in the elderly group showed good outcome following surgery for head trauma. Collectively the poor outcomes in younger and older groups were 51.7% and 65.3% respectively.

CT Findings and outcome

CT scan findings of brain were graded using the classification suggested by Marshal et al. [8,16] Prevalence of traumatic mass lesions was similar in both elderly (47.5%) and in younger (45.6%) groups. Higher grades of diffuse injury type III and type IV were more common (20.8%) in younger group than in elderly group (14.8%). The incidence of traumatic sub-arachnoid hemorrhage and intraventricular hemorrhage as well as the types of intra cranial hematoma were not considered separately as in Marshal's classification of CT scan of brain. Becker et al, had shown that traumatic intra cranial mass lesion had a worst outcome.[15,17,18] In this series elderly age group showed 79.1% poor outcome whereas in younger cohort the poor outcome was 55.4% among operated cases irrespective of time of operation.

The poor outcome rates quoted in other studies on closed head injury in the elderly 46% and above shows the age of the patient as a strong prognostic indicator.[19-24] In this review, the poor outcome in the elderly with closed head injury is in line with other studies. Although elderly patients have a much higher incidence of pre-existing systemic diseases, older age is a significant predictor of poor outcome. Despite recent advances in the management of moderate and severe traumatic brain injury the outcome was poor in most of the elderly people.[25,26]

The poor prognosis for elderly patients with severe traumatic brain injury has important ethical consequences in pursuing the intensive care and surgical management in this group.[27] Perhaps an individualized approach may be more appropriate.

CONCLUSION

An elderly head injured patient with poor GCS and significant co-morbidities, counselling and discussions of the potential poor outcomes with their families should be done before further therapies are instituted. This will help in the judicious use of limited resources available as well as to reduce the emotional and financial burdens to the families concerned. The elderly age and poor GCS in resuscitated head injured patient serve as a basis for making early and accurate predictions of the likely poor outcome.

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