Geriatric Traumatic Brain Injury: Risk Factors of Morbidity and Mortality

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Background

- Older adults have the highest incidence of traumatic brain injury (TBI) of any age-group.[1]
- Patients aged 65 and older comprise 15% of the population and account for 50% of TBI deaths[2]
- Few studies have examined risk factors of morbidity and mortality in elderly, TBI patients

Aim

- Determine risk factors of severe disability and mortality in elderly patients with severe traumatic brain injury.

Methods

- ***Study Design:*** A retrospective analysis of 127 elderly patients, aged 65 and older, presenting to the UC Davis Medical Center with a severe traumatic brain injury (Glasgow Coma Scale of 3-8)
- ***Patient/injury characteristics:*** See Table 1.
- ***6-month outcomes:*** Glasgow Outcome Scale-Extended (GOSE) was used to assess severe disability, which was defined as a GOSE score≤4
- ***Analysis:*** Univariate logistical regression was performed to identify predictors that were statistically significant. Multivariable logistical regression was then performed at 6 Months with the predictors considered statistically significant.

Results

Table 1. Demographics & Injury Characteristics

Demographics and Injury Characteristics	TBI Cohort
Number of patients	127
Age, y, mean ± SD	77.7±9.2
Gender (% male)	56.7
Race, n (%)	
African American	8 (6.3)
White	88 (69.3)
Other	31 (24.4)
Glasgow Coma Scale, n (%)	
3	41 (32.3)
4	14 (11.0)
5	4 (3.2)
6	19 (15.0)
7	29 (22.8)
8	20 (15.7)
Mechanism of Injury, n (%)	
Assault	3 (2.4)
Auto vs. Pedestrian	16 (12.6)
Fall	68 (53.5)
Found Down	18 (14.2)
MVC	16 (12.6)
Other	6 (4.7)

Table 2. Univariate Logistical Regression of Mortality & Morbidity at Hospital Discharge and 6 Months After Injury

	In-Hospital Death		Death at 6 months		Severe Disability at 6 Months	
	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)
Contusion	0.593	1.36 (0.44-4.26)	0.764	1.21 (0.36-4.07)	1.000	1.00 (0.20-4.91)
Traumatic Subarachnoid	0.082	1.90 (0.92-3.91)	0.524	1.29 (0.59-2.82)	0.886	1.08 (0.38-3.09)
Intraparenchymal Hemorrhage	0.481	1.31 (0.62-2.78)	0.709	1.17 (0.51-2.66)	0.881	0.92 (0.31-2.73)
Subdural	0.002	4.05 (1.68-9.72)	0.010	3.18 (1.32-7.69)	0.010	4.2 (1.41-12.55)
Epidural	0.445	0.63 (0.19-2.07)	0.121	0.38 (0.11-1.29)	0.721	0.74 (0.15-3.76)
Cistern (absent or compression)	0.004	3.04 (1.43-6.48)	0.008	3.15 (1.35-7.34)	0.007	16.84 (2.14-132.17)
Midline Shift	0.017	2.43 (1.17-5.05)	0.030	2.43 (1.09-5.41)	0.018	4.26 (1.29- 14.09)
Fracture	0.300	1.63 (0.65-4.10)	0.806	1.13 (0.43-3.00)	0.660	0.76 (0.22-2.59)
Intracranial Surgery	0.240	0.64 (0.30-1.35)	0.241	0.62 (0.28-1.38)	0.181	2.46 (0.66-9.17)
Intracranial pressure monitor	0.377	1.49 (0.61-3.63)	0.531	1.36 (0.52- 3.56)	0.656	1.35 (0.36-5.14)
Positive Toxicology	0.192	0.57 (0.25-1.33)	0.354	0.65 (0.26-1.61)	0.858	0.89 (0.26-3.07)
Positive EtOH	0.498	1.77 (0.34-9.24)	0.748	1.31 (0.25-6.91)	0.360	0.45 (0.08- 2.49)
Platelets	0.153	1.00 (0.99-1.00)	0.242	1.00 (0.99-1.00)	0.555	1.00 (0.99-1.00)
Partial Thromboplastin Time (PTT)	0.006	1.13 (1.03-1.23)	0.019	1.12 (1.02-1.22)	0.032	1.19 (1.01-1.39)
Admission Age	0.002	1.07 (1.02- 1.11)	0.004	1.07 (1.02- 1.12)	0.096	1.06 (0.99- 1.13)
GCS	0.000	0.59 (0.47- 0.73)	0.000	0.66 (0.52- 0.82)	0.001	0.52 (0.35-0.77)

- Univariate logistical regression demonstrates subdural hemorrhage, cistern effacement, midline shift, PTT, age and GCS as statistically significant predictors of morbidity and mortality at hospital discharge and 6 Mo (Table 2)

Table 3. Multivariate Logistical Regression at Hospital Discharge and 6 Months

Multivariable logistical regression	Hospital Death	
	p-value	OR (95% CI)
Cistern (absent or compression), y	0.212	1. 87 (0.70-5.03)
Subdural	0.102	2.74 (0.82-9.20)
PTT	0.042	1.11 (1.00- 1.23)
Admission age	0.001	1.10 (1.04- 1.16)
GCS	0.009	0.71 (0.55-0.92)

Multivariable logistical regression	Death at 6 Months	
	p-value	OR (95% CI)
Subdural	0.042	3.75 (1.04-8.17)
PTT	0.106	1.15 (0.98-1.20)
GCS	0.054	1.08 (0.60-1.00)

- Multivariate analysis demonstrates PTT, subdural, GCS, and age as statistically significant predictors of mortality at different timepoints (Table 3)

Conclusions

- Reconfirmed that age and GCS are strong predictors of mortality after traumatic brain injury.
- Subdural hemorrhage and prolonged PTT are strong predictors of morbidity and mortality in elderly patients with severe TBI.
- Future studies should examine the effects of CT pathology and coagulopathy on mortality and morbidity of elderly patients with mild and moderate TBI.

References

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