Traumatic Brain Injury in the Elderly With High Glasgow Coma Scale and Low Injury Severity Scores : Factors Influencing Outcomes

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Introduction

- In the elderly, GCS may not be an accurate indicator of prognosis since this population has more brain atrophy and thus more intracranial space to bleed into.[1]
- They are also a high risk population for TBI and intracranial bleeding due to relatively low velocity mechanisms such as falls from a standing position.[2-4]
- Falls in the elderly result in an identical injury severity scale (ISS) when compared to high velocity motor vehicle accidents (MVAs) or more significant mechanisms in a younger population, yet do not result in the same level activation on arrival.
- More than 70% of the initial evaluation of elderly fall patients recorded a mild ISS score while at the same time their mortality and morbidity were 12% and 33.5%, respectively.[3] This is twice as high as younger patients with equivalent injury severity scores.[5]
- Current trauma activation guidelines do not address age as an independent risk factor when leveling trauma patients.
- Glasgow coma scale (GCS) and Injury Severity Scale (ISS) play a major role in leveling trauma patients.
- We studied the above relationship in our elderly patients presenting with traumatic head injury.

Hypothesis

Trauma patients 65 and older with a high GCS of 14 or 15 and an ISS less than or equal to 14 score have increased mortality when compared to patients 64 and younger.

Methods

- This study was IRB approved on November 12, 2019.
- This study was a retrospective chart review of patients who presented to the emergency department with traumatic head injuries.
- Inclusion Criteria: Patients 18 years or older who were admitted with head trauma.
- We classified the 270 patients into two groups. Group A was 64 years and younger, and group B was 65 years and older.
- Variables: GCS, ISS, age, sex, comorbidities, and anticoagulant use were abstracted.
- The primary outcome was mortality.
- The groups were compared using an independent student's t-test and Chi-square analysis. The Cox regression analysis was used to analyze differences in the outcome while adjusting for the above factors.

Results

- There were 140 patients in group A, and 130 patients in group B who presented to the ED with a GCS of 14 or 15 and an ISS of below 15.
- The mean ISS significantly differed between group A (6.2 ±6.8) vs (7.9 ±3.2) in group B ($p<0.0001$).
- The most common diagnosis in group A was cerebral concussion (57.3%), while in group B was intracranial hemorrhage (55%).
- In group A, 52.1% presented as a level one or level two trauma activation.
- The mean hospital and intensive care stay for group A was 2.1 (±1.9) days and 0.9 (±1.32) days, respectively, versus 4.2 (±3.04) days and 2.4 (±2.02 days) for the elderly group B.
- Mortality in group A was zero and in group B was 3.8%.
- Cox regression analysis showed age as an independent predictor of death as well as length of stay.

	Younger group (≤ 64 years) n=140	Elder group (≥ 65 Years) n=130	P Value
Age (Mean SD)	38.9 (15.8)	78.8 (7.5)	<0.0001
Gender (n, %) Male Female	 82 (58.6) 58 (41.4)	 46 (35.4) 84 (64.6)	<0.0001
ISS (Mean, SD)	6.2 (6.8)	7.9 (3.2)	<0.0001
Mortality (n, %)	0 (0)	5 (3.8)	0.02
Comorbid Conditions (n,%) 3 or more Less than 3	 3 (2.1) 137 (97.9)	 16 (12.3) 114 (87.7)	0.001
Anticoag/Antiplatelet Therapy (n,%) Yes No	 23 (16.4) 117 (83.6)	 91 (70.0) 39 (30.0)	<0.0001
ICU LOS (Mean SD)	0.9 (1.3)	2.4 (2.0)	<0.0001
Hospital LOS (Mean SD)	2.1 (1.9)	4.2 (3.0)	<0.0001
Surgery (n,%)	0 (0)	2 (1.5)	<0.0001
Level III Trauma Activation (n,%)	67 (47.9)	112 (86.2)	<0.0001
Level I & II Activation (n,%)	73 (52.1)	18 (13.1)	<0.0001
Cerebral Concussion (n,%)	106 (57.3)	34 (15.5)	<0.001
Subarachnoid & Subdural Hematoma (n,%)	32 (17.3)	121 (55)	<0.001

Discussion

- The current trauma activation system set by the American College of Surgeons in 1990[6] lists Levels two and three based largely on mechanism of injury.
- The elderly are more likely to present due to low velocity mechanisms such as falls.
- The elderly have multiple comorbid conditions and take medications such as anticoagulants and beta blockers that predispose them to bleeding and blunt their physiological response to trauma.
- Elderly patients have more spacious intracranial space due to age related brain atrophy which allows more accommodation for space occupying lesions such as bleeding and edema. This translates into slower neurological deterioration and mental status changes that are usually catastrophic when they present.
- The mortality from traumatic brain injury in our patients was higher in the elderly group compared to the younger group and this may well reflect the impact of the comorbid conditions which limit the physiological reserve in the elderly patients.
- The reassuring GCS and ISS scores, combined with the minor mechanism of injury sustained lead to an inappropriate assumption of stability, lower trauma activation levels, inappropriate triaging, and delayed treatment and surgical intervention.

Conclusion

Elderly patients presenting to the ED with traumatic head injury with high GCS and low ISS should be triaged as a priority. Age should be considered an independent risk factor in trauma.

References

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