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Traumatic Brain Injury in Geriatric Population: Epidemiology and Outcomes

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Abstract: ***Background*: Elderly trauma patients present specific challenges and face more significant impediments in recovery than their younger counterparts. They usually show higher morbidity and mortality and have, worse functional, intellectual outcomes. *Methods*: Authors conducted a study to understand the epidemiological profile of elderly TBI, the influence of comorbidities on outcomes in such patients as well as the management issues. The study included a total of 150 patients admitted over a period of 2 years. *Results*: The most common mechanism of injury is fall accounting for 55% patients, and Chronic SDH was the most common pathology seen in 35.5 % of patients. Out of the 150 patients, 87 patients underwent surgery for various pathologies in which chronic SDH was the most common operated pathology followed by EDH. Glassgow outcome scale (GOS) was used as the measure of outcome in these series of patients. *Conclusions*: The need to study TBI in older adults is urgent, as there is a need for specific prognostic and management guidelines for the elderly that can lead to early diagnosis, better care, recovery, and eventual short- and long-term outcomes in the elderly.***

Keywords: Traumatic brain injury, chronic subdural hematoma, acute subdural hematoma, Glassgow outcome scale

1. Introduction

Traumatic brain injury (TBI) is a serious public health problem and the leading cause of injury-related illness and death[1,2]. Over the past few decades, a normal patient with TBI has evolved from a young man injured in a high-energy injury to an elderly man or woman injured in a low-energy crash [3–4]. According to the World Health Organization, traumatic brain injury (TBI) will become the leading cause of death and disability by 2022.Patients features, trauma mechanisms and biological consequences of TBI in the elderly differ from those in the young and require specific approaches to treatment and investigation. Epidemiologically, falls are the most prevalent mechanism of injury in the elderly population, and TBI is more common in females, whereas most TBIs in young adults occur in males due to road traffic accidents[5-10]. Older people with TBI have higher morbidity and mortality and, on average, experience worse functional, cognitive, and psychological outcomes over a long period of time injury than younger patients[11-14]. Ageing is associated with poor treatment outcomes after TBI [15–18]. This can be a direct result of biological ageing and comorbidities prior to injury [19–22]. Some centres impose age restrictions for even offering treatment, such as neurointensive care admission or neurosurgical intervention, for seniors with severe TBI[23,24]. However, the number of older people with TBI, including severe TBI, may be improving, suggesting that relative age and severity of TBI are insufficient predictors [25-28]. The authors conducted a study of 150 cases of adults admitted to these wards with head injuries after a fall or RTA over a 2-year period to study the etiopathogenesis and outcomes.

2. Material and Methods

Inclusion criteria

Head injury patients over the age of 60 were included in these studies.

Exclusion criteria

All patients aged less than 60 years were excluded. In addition, patients who could not be resuscitated and died in the accident itself before admission were excluded from the study. The research period is a period of 2 years from January 2020 to January 2022. Study population includes all aged individuals (> = 60 years) presented to this neurosurgery department after head injury. The methodology was expected observational research study conducted in the Neurosurgery Department, Dr. S.N Medical College and affiliated MDM hospital, Jodhpur Rajasthan India. The following information was obtained on the basis of the mechanism of injury, age, other associated injuries, sex, Glasgow Coma Score (GCS) on admission, computed tomography (CT) results, if surgery was performed, and Glasgow Coma Score. Patients' outcome was rated as good recovery, moderate disability, severe disability, vegetative state, or death one month after injury according to Janet and Bond's Glasgow Outcome Scale.

3. Results

The age and sex distribution of 150patients are shown in Fig.1. 40% were male patients and 60% were female patients.

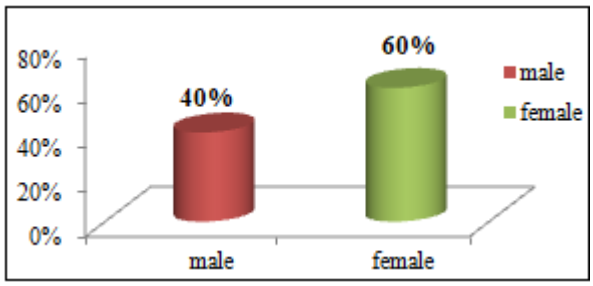

Figure 1: Sex ratio

Patients aged 60–65 years were 62.5%, those aged 65–70 years were 22.5% and those aged over 70 years were 15% (Figure 2).

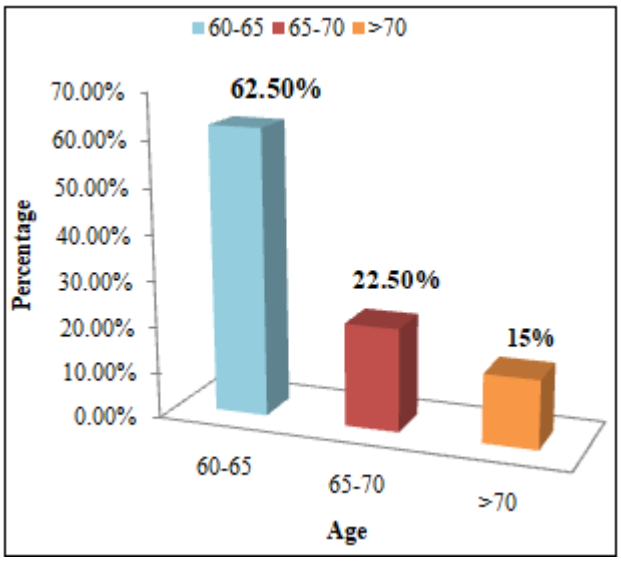

Figure 2: Age distribution

Approximately 50% of these patients had some form of comorbidities such as chronic kidney disease, coronary heart disease, diabetes, hypertension, etc. 32% of patients had GCS between 13-15, 44% between 9-12, and 22.72% with GCS 8 and lower (Figure 3). This corresponded to a mortality rate where 54.5% of patients with GCS 8 or below did not survive trauma.

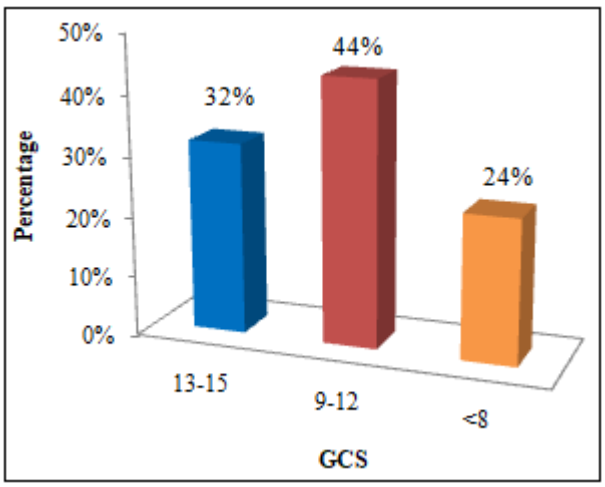

Figure 3: GCS score

The total mortality rate was 30.2% and 8.5% of patients survived a state of vegetation. Increase in mortality with age: The highest mortality rate was seen in patients over the age of 70 years (52%). The mortality rate was 23% in patients aged 65–70 years, while it was 25% in patients aged 60–65 years (Figure 4).

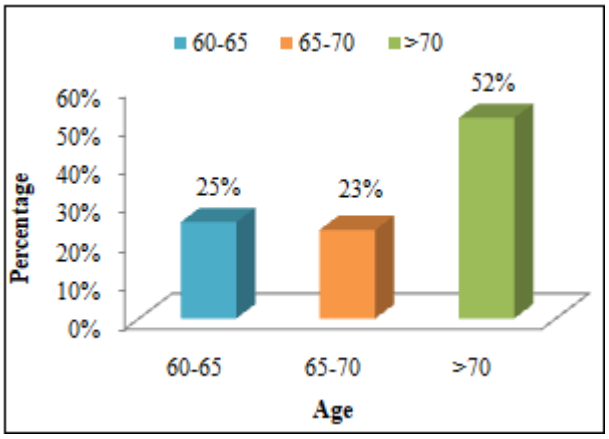

Figure 4: Age wise mortality rate

In this study, the mortality rate was slightly higher in males (65%) than in females (35%) (Figure 5).

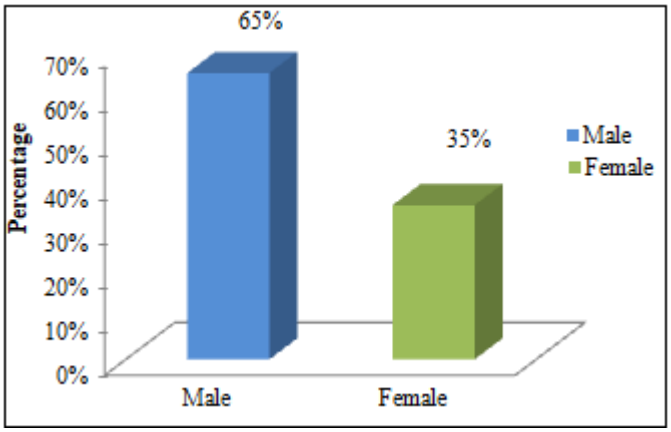

Figure 5: Sex wise mortality rates

The proportion of injuries caused by falls was the largest single group in 55% of patients, road traffic accidents in 42% of patients, and physical assault in 3% of patients (Figure 6).

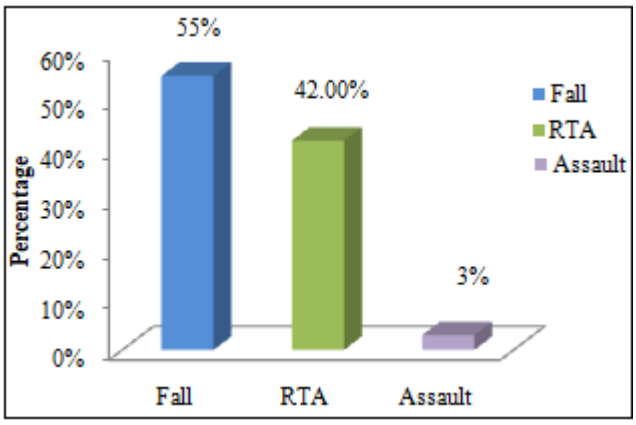

Figure 6: Mode of injury

Chronic SDH was the ultimate common pathology observed in 35.5% of patients and brainstem contusions were noted as the least common in 3% of patients. Acute SDH was

observed in 23.5% of patients, and contusions were observed in 6.3%. Diffuse axonal injuries were observed in 7% of patients, EDH observed in 12.5% and SAH observed in 5% while 7.2%were observed in normal CT scan head (Figure 7).

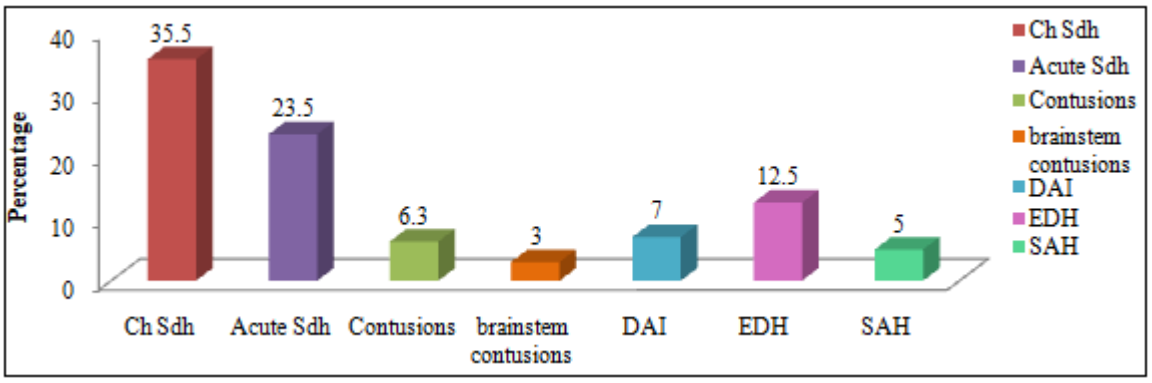

Figure 7: Various pathologies of traumatic brain injury

The highest mortality was recorded in patients in the DAI group (66%), followed by 62% seen in brainstem contusions, 60% in acute SDH, and 55% in contusions. Mortality seen in subarachnoid hemorrhage/intraventricular bleed was 35%.Chronic SDH had minimal mortality of 5% and EDH had low mortality of 10% (Figure 8).

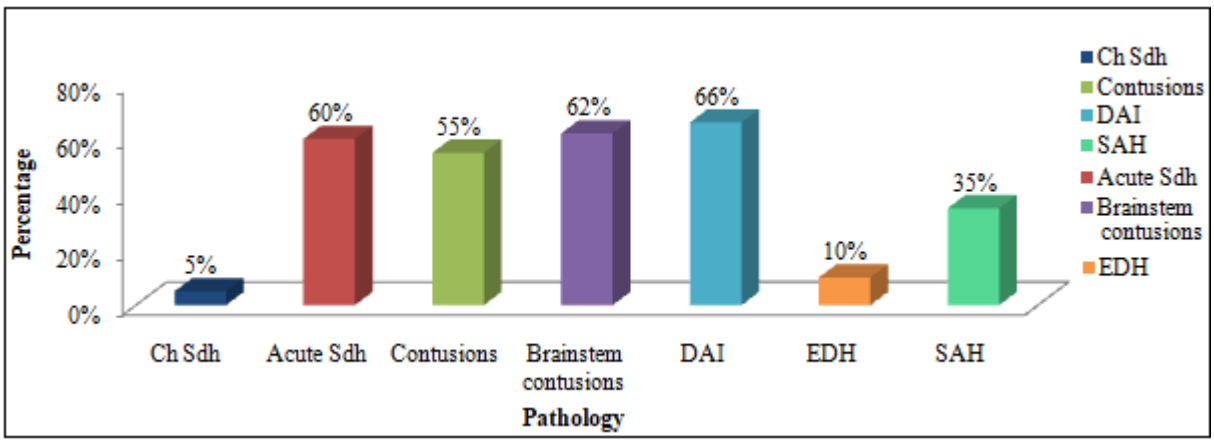

Figure 8: Mortality rates of various pathologies.

There are 150 patients in this study among which 87 patients underwent surgery for various pathology. Chronic SDH and EDH were the frequently encountered surgical pathology which was followed by acute SDH (Figure 9).Both of these pathologies had a good outcome compared to other pathologies such as acute SDH and contusions.

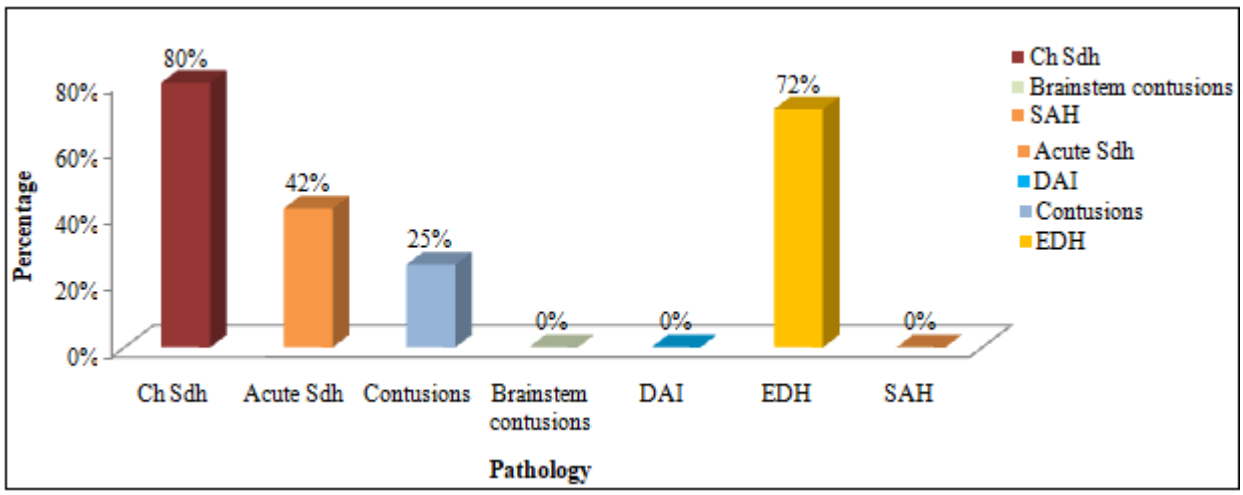

Figure 9: Surgical rates in various pathologies

Glassgow outcome scale measures the outcome of patients in a series. GOS was 1 point in 30% of patients, and 2 points in 10% of patient. 15% of patients remained disabled with a score of 3, and 15% with a score of 4, and 30% patients recovered (GOS-5). (Figure 10)

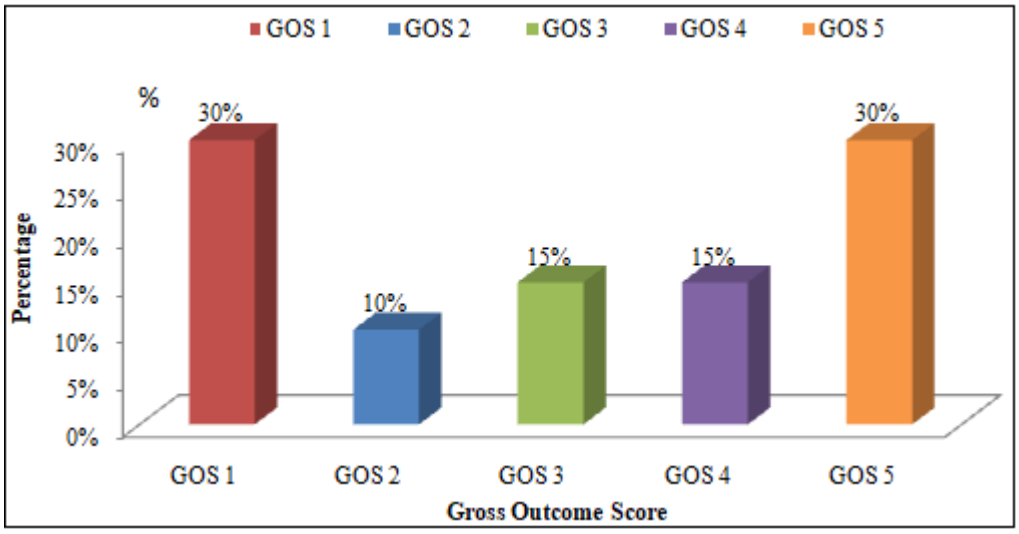

Figure 10: Outcome analysis with glassgow outcome score

4. Discussion

Falls were the most frequent injury mechanism in the geriatric age group, and the proportion of fall-related injuries increased gradually with increasing age, which is similar as seen with other recent TBI studies [29]. The most common mode of traumatic brain injury in the elderly age group is caused by fall either from the same level or low levels[30,31]. In this study also falls were the most common mode of injury. Mechanisms of injury is crucial because of the pathology produced such as fall-related TBIs more commonly result in subdural hemorrhage and road traffic accidents resulting in diffuse axonal injury and acute EDH. The World Health Organization has defined risk factors for falls, and these include comorbidities, age> 70 years, dementia, impaired vision, and environmental factors[32,33]. Comorbidities such as cerebrovascular disease, depression, and Diabetes mellitus are also associated with late-life incident TBI risk.In a study by Sinha et al, 68.2% were male and 31.74% were female and mortality noted was highest in patients aged 70 years and above 28.6% and 27% in patients in the age group of 66-70 years. GCS is the most commonly used parameter for the clinical assessment of the severity of TBI at presentation. Pre-existing dementia, comorbid conditions, and medication side effects can confound the accurate GCS assessment. Mortality rates in elderly patients with poor GCS are very high as shown in a study where mortality rates seen in age group of 60-70 years were as high as 90% for patients who had GCS of 5 or less. In this series, patients with GCS<8 also had high mortality rates of 68 %.Non-contrast CT head is the most widely used and important diagnostic tool in the evaluation and management of head injury. Pathology types seen on CT heads differ by age: Prevalence of subdural hematoma increases with age whereas the prevalence of extradural hematomas decreases with age. Similar finding was also noted in this series with 90 patients out of 150 patients presenting with SDH. This higher prevalence among elderly patients is thought to result from the following factors: age-related changes in blood vessels and white matter rendering white matter tracts more susceptible to shear injury and vessels more vulnerable to rupture, weakened musculature in the neck and trunk; such that even trivial falls are not well coped up by the body, pre-existing conditions, and medications such as antithrombotics also add to increased susceptibility to injury. Anticoagulant agents such as warfarin are associated with increased mortality, but a similar association is not observed with antiplatelet agents especially when surgical intervention is required. The outcome of ICP monitoring in the elderly is controversial, with some studies in favor and others showing no major benefit. The risk of post-traumatic epilepsy is higher in the elderly and also the risk of delayed seizures is greater than early seizures when compared in younger adults. Also, Pre-existing conditions such as Alzheimer's dementia (AD) can also increase the risk of epilepsy. Newerantiepileptics such as lamotrigine or levetiracetam may be preferable to first-line agents such as phenytoin due to their nonlinear kinetics. The GOS is the most commonly used and functional outcome measure in TBI. The elderly with TBI on average have slow rates of cognitive and functional recovery, worse functional outcomes, and higher mortality rates when compared to their younger counterparts. The mechanism of injury and GCS may be however less important predictors. Careful patient selection, good pre-injury health status, and aggressive treatment for such patients have been associated with lower short-term mortality among the elderly. There are no evidence-based national or international consensus guidelines and management guidelines for acute inpatient management or long-term outpatient follow-up of older adults with TBI. This is, in large part, attributed to the paucity of dedicated Class I prospective clinical trials of treatments for older adults with TBI.

5. Conclusion

With advancement intreatment options there is an increase in the number of elderly around the world, thus the number of elderly individuals presenting with TBI to the hospitals is also on the rise,the cause of which is falls rather than road traffic accidents. However, there are no specific management andprognostic guidelines to differentiate the patients who would benefit from aggressive or conservative treatment and specific prognostic models so that prevention, treatment and rehabilitation can be optimized. This can only lead to better diagnosis, care and recovery and eventual better short- and long-term outcomes in the elderly.

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