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Outcome and predictors in traumatic acute sub-Dural hematoma in tertiary centers: A retrospective study

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Abstract

Background: Traumatic subdural hematoma has a raising trend of deaths in head injury cases in developing countries causing economical, and functional burden on country and emotional burden to dependents.

Objectives: We aim to establish a database and find relationship between significant factors with mortality, morbidity and recovery of traumatic acute subdural hematoma patients presented to a tertiary health care center.

Methods: A retrospective analysis is done on 150 patients diagnosed with traumatic subdural hematoma in head injury patients presented to career institute of medical sciences and hospital, Lucknow which is a tertiary health care Centre. Patients' demographic data, time delay, Glasgow coma scale (gcs), Glasgow outcome score (gos) and outcomes are tabulated and formulated to establish the relationship in predicting the mortality, morbidity of patients.

Results: Out of 150 patients, we observed 37 deaths ,19 patients with functional disability and remaining have functional recovery, and also observed high mortality rate in extremities of age with no significant relationship between gender in terms of mortality and outcome. High mortality rate with 22 patients noted with low Glasgow coma score (≤8).

Conclusion: Conclusion can be drawn as that glasgow coma scale and age plays a significant role in outcome of patients with head/brain injury. with the advent of computerized tomography and standardized emergency and intensive care, mortality rate has seen decline in recent phase.

Keywords: Traumatic Subdural Hematoma, Glasgow Coma Scale (GCS).

Introduction

Traumatic brain injury forms a major part of deaths and cases presenting to neurosurgical department. [1], in which traumatic acute subdural hematoma have a major contribution. Prevalence and occurrence of subdural hematoma has been rising tremendously. Generally ,there is a high incidence and prevalence rate in males compared to females with 20% prevalence of parietal lobe involvement in males and observed that there is bilateral involvement of subdural involvement also.[2,3].traumatic subdural hematoma occurrence is about 10-20% of patients with severe head injuries[2].presentation of traumatic subdural hematoma varies ,it depends upon the degree of concomitant brain injury and its pathogenesis, its associated factors like severe axonal injuries, brain contusion and other hematoma conditions like intracerebral and epidural hematomas[2].

In infants and toddlers, etiologies of subdural hematomas could be credited to causes unlike other age groups. These etiologies include hydrocephalus, trauma during birth, hematologic diseases, genetic diseases, infections and sepsis, and vascular malformations [4,5]. subdural hematoma is defined as an extracerebral blood collection, which can be occur as a clot or in liquid form, located between the dura mater and the middle layer of the meninges (arachnoid) and, which does not expand in the subarachnoid area or in the basal cisterns (interpeduncular cisterns. It was first described by Virchow, in 1857, as “an internal hemorrhagic pachymeningitis”. Later, in 1914, trotter launched the theory of traumatic brain injury and the consecutive lesion of the “bridging veins”, as being the cause of what he called “hemorrhagic subdural cyst [2,3]. factors that aid the expansion of subdural hematomas. These include the recurrence of bleeding that could be due to elevated levels of fibrinogen and plasmin, the liquefaction of subdural hematomas leading to an osmotic gradient and an enlarging subdural hematoma compartment, and the inflammatory process that is associated with neovascularization leading to more bleeding. [5]

Subdural hematomas are categorized into acute, subacute, and chronic. Acute subdural hematoma presents within 3 days of the bleeding, subacute subdural hematoma presents within four to twenty days of the bleeding, and chronic subdural hematoma presents any time after twenty days of the bleeding [3]. The diagnostic methods of choice for the diagnosis of subdural hematomas are CT or MRI imaging techniques. Most acute subdural hematoma cases can be attributed to venous bleeding following traumatic rupture of bridging veins and leading to increased intracranial pressure. About 20% of acute subdural hematoma cases can be due to an arterial rupture.

several factors have been implicated in the prognosis of asdh. These include glasgow coma scale (gcs) score, pupillary abnormalities, systemic blood pressure, respiratory rate, glycaemia status, length of hospital stay, hypoxia, presence or absence of a subarachnoid bleed, and intraventricular hemorrhage [1].

Hence we analyzed the traumatic acute sub dural patients admitted in career institute of medical sciences, Lucknow from march 2019 to December 2022, we aim to postulate and review the factors affecting the outcomes in these patients after intervention and also evaluate its relation with post discharge follow up.

Materials and methods

A retrospective analytical study was done ,in which 150 patients who are diagnosed with traumatic acute sub dural hematoma ,excluding non-traumatic acute sub

dural hematoma, chronic sub dural hematoma diagnosed patients admitted in career institute of medical sciences during the time period march 2019-december 2022.subjects are evaluated and compared among the variables like demographic data (age and sex), the time between the trauma and surgery, glasgow coma score at admission, and glasgow outcome scale (gos) score.

Glasgow coma scale is the main method for the evaluation of conscious level in patients with head injury [5]. the gcs is divided into 3 categories: eye opening (e), motor response (m), and verbal response (v). The score is determined by the sum of the score in each of the 3categories, with a maximum score of 15 and a minimum score of 3 [6]. According to gcs, head injury is classified as: mild head injury (gcs of 13–15), moderate head injury (gcs of 9–12), and severe head injury (gcs of 8 or less).

The Glasgow outcome score (gos) is a scale to evaluate the outcome of patients with brain injury [6]. the glasgow outcome score (gos) is categorized into grades: grade 1 for death, grade 2 for persistent vegetative state, grade 3 for severe disability, grade 4 for mild disability and grade 5 for low disability, considering that 2–3 with a poor outcome and 4–5 with a favor able outcome [4,5,6,7].

Above scale are known for their validity and interobserver invariability and standard means of describing outcomes of head injury, so we used them in this study as a protocol.

Results

Out of the 150 patients diagnosed with traumatic acute sub dural hematoma treated surgically,135 patients are men ,15 are females, with male; female ratio 9:1among 150 patients, mortality rate is 37 patients,19 have functional disability, functional recovery is seen in remaining 94 patients. The age group distribution ranges between 3yrs to 70 years with highest distribution noted in 21yrs-40yrs, followed by 41-60 yrs. with highest mortality rate in extremities of age group with 27 out of 37 patients, functional recovery highly observed in 21-40 yrs. age group (40), functional disability mostly noted in 21-60 age group with 14 out of 19 patients.

Table 1: Age and Gender Incidence Comparison

Clinical Variables	No. of Patients	Mortality N=37	Functional Disability N=19	Functional Recovery N=94
Gender				
Male	135	35	15	85
Female	15	2	4	9
Age				
1-20	30	8	2	20
21-40	55	6	9	40
41-60	40	10	5	25
More Than 60	25	13	3	9

While analyzing the severity of head injury based on GSC score, we observed 35 out of 150 patients fall in severe head injury (GCS<8),39out of 150 had moderate head injury(GCS 8-12) ,77 out of 150 sustained mild head injury with good outcome (GCS >12).on comparing the mortality rate, it was observed patients with severe head injury had death of 22 patients, followed by 13 deaths with moderate GCS SCORE, while good functional recovery in noted in patients with mild GCS SCORE (12-15) i.e. mild head injury and observed most functional disability in patients with moderate head injury patients that is with GCS score 8-12

Table 2: Comparison Based On Glasgow Coma Scale (GCS Score)

Glassgow coma scale	Mortality N=37	Functional disability N=19	Functional recover N=94
Severe (<8)	22	7	4
Moderate (8-12)	13	9	18
Mild (12-15)	2	3	72

While computing the results on the time between the incident and the time of surgery which is also known as total delay, it was observed that the mean average total delay is 49.8hours (±75.3 hrs.), of which 41.2% operated in first 24 hours,44.30% within 1-3 days,5.70% of 4-7 days with 8.80% in more than 7 days of injury.

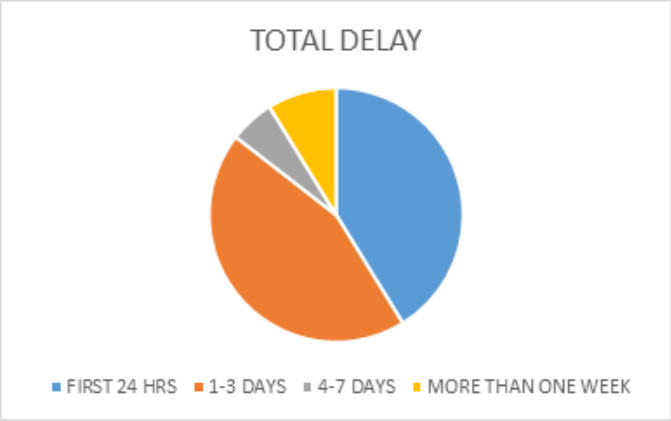

Figure:1 Pie diagram of total delay

Discussion

from the above results, it was assumed that relationship between the variables and outcomes of traumatic acute sub dural hematoma is significant in terms of gcs score and severity of brain injury. It was observed that prevalence of traumatic sub dural hematoma was more seen in males when compared to females with ratio of 9:1 when compared to previous study which implies to the fact that brain injuries are more common in persons indulged with unskilled works and involving most of the travelling, which mostly men are involved, but coming to mortality and the functional recovery and disability, there is no significant relationship and variation between both sexes.

Coming to relationship between outcome in view of age, we observed high mortality rate in extremities of age compared to young population, may be attributed to their clinical entities, there physiological strengths to cope with altered mechanisms, and also associated co morbidities. This is in line with the results of kulesza et al., and leitgeb et al., that reported a statistically significant relationship between age and outcome in acute subdural hematoma in their study of 100 and 218 patients, respectively [(1)]

There is a significant relationship observed between the gcs severity and head injury to mortality, morbidity of patients. Patients presented with severe gcs score has high mortality rate and disability, when compared to mild gcs score implies the more the brain injury, chances of brain insult to blood circulation and brain tissue function which makes to irreversible damage and chances of revival of tissue more difficult, making the outcome post operatively poor. gcs score plays a standard entity in predicting the outcome of patient with sub dural hematoma and also any brain injury.

Though literature tells that there is increased chance of favorable outcome in traumatic acute sub dural hematoma patients when treated surgically within first 4 hours, we found that time delay alone significantly contributes to favorable outcome, even patients treated within 1-3 days shows good outcome if gcs score and age factors are in favorable conditions.

A reduction in mortality rate from 90% to 30% was reported if surgical evacuation for hematoma is done within four hours [(1,7)]. In our study, no significance between the time interval from injury to surgery and surgical outcome at par with study. Several studies went

in vain to identify the effect of time to surgery on surgical outcomes. This finding can be explained by a theory that suggests a consequent increase in brain edema after early decompressive craniotomy due to changes in interstitial fluid pressure gradients [(1)]. Another theory suggests cerebral infarction with hemorrhagic transformation after early decompressive surgery.

in our study, all the traumatic acute subdural hematoma patients are surgically hematoma evacuated. The aim of surgery is to protect against brain herniation as well as secondary ischemic brain injury. The treatment modalities suggested for traumatic acute sub dural hematoma are craniotomy, twist drill trepanation, decompressive craniotomy [(5,6,7)]. But the surgical evacuation and the type of procedure depends upon edema, midline shift of shaft and more. Decompressive craniotomy was used in patients with lower gcs and severe edema to provide enough space for brain relaxation and to prevent herniation [(1,4)]. Bullock et al. Described the indications for surgical evacuation in asdh, these include (i) thickness greater than 10mm or midline shift greater than 5mm on ct and (ii) gcs less than 9 plus sdh less than 10mm or midline shift less than 5mm if the gcs score decreased at any point in the delays between injury and hospital admission [(1,5,6)].

Computerized tomography plays an important role in reducing the mortality [(3,4,5,6)], as it makes easy, affordable, less consuming in diagnosing sub dural hematoma in brain injury patients. With the advent of computerized tomography, able to diagnose the hematoma in brain as early as possible and also able to knows the status of the hematoma, its location and the involvement of the bleeding in brain aiding the clinician to decide the appropriate management and intervention required for evacuation of hematoma and also follow up post-surgery for any untoward event. The use of CT scan imaging in the detection of subdural hematoma has several advantages including the wide availability, rapid results, and high sensitivity and specificity, which can reach 96% and 98% respectively. On the other hand, MRI imaging techniques are still preferred due to sensitivity and specificity that reach 100%, the ability to detect even minimal bleeding, and the ability to identify etiologies. [(3,8)]

Conclusion

We can conclude from this study that the with the advent of computerized tomography, mortality rate with traumatic acute subdural hematoma has seen tremendous decrease compared to mortality rates in 1970[s].faurable outcome include gcs score, age and the glassgow outcome scale plays an important significant relationship in predicting the patient's chance of mortality, disability, and recovery. With timely diagnosis, and intervention and availability of standardized intensive and emergency care, mortality and morbidity can be in control and improved in developing countries.

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