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The Pattern, Presentation and Outcomes of Surgical Management of Traumatic Acute Subdural Hematoma in Bauchi, Nigeria

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Abstract
INTRODUCTION: acute subdural hematoma is a clinical entity with increased morbidity and mortality. For optimum outcome, urgent surgical intervention is needed. It is a common pathology following traumatic brain injury with associated brain contusions and edema. The aim of the study was to review the presentation and surgical outcomes of traumatic acute subdural hematoma in our facility.
MATERIALS AND METHOD: This retrospective study was conducted on 51 patients who had surgical operation for traumatic cute subdural hematoma in our hospital from October 2018 to October 2022. All patients with surgical lesion of traumatic ASDH were reviewed. Age, sex, mechanism of trauma, associated intracranial pathology and Glasgow Coma Scale (GCS) score at the time of admission and Glasgow Coma Outcome Score (extended) on discharge were all studied.
RESULTS: Young adults of our population in their 2nd an 3rd decades of life were the majority of the subjects in our study. 70% of the patients had favorable outcomes with a mortality rate of 12%. Age and GCS score were seen to be an independent prognostic factors among our study subjects (p =0.000 and 0.001respectively).
CONCLUSION: Traumatic ASDH is still a major neurosurgical emergency with significant unfavorable outcome despite surgical intervention. Age and GCS score were shown to be predictive factors for outcomes, since these two variables are unmodifiable, prevention of the occurrence of traumatic ASDH should be vigorously pursued by advocacies and enforcement of road traffic laws.

Keywords: Trauma, acute subdural hematoma, outcomes.

Introduction
Acute subdural hematoma is a clinical condition with high morbidity and mortality despite advancement in neurosurgery and favorable outcome still largely dependent on prompt intervention (1, 2). Traumatic ASDH occurs in one third of severe traumatic brain injuries (sTBI) with high mortality rate of 60% (3). It is seen to be commonly associated with brain edema, brain contusion, diffuse axonal injury and subarachnoid hemorrhage (4, 5). ASDH is also commonly seen in younger individuals compared to the elderly but incidence of ASDH becomes higher with simple head trauma in the elderly (3).
It is usually develop from rupture of bridging veins between the dural and cerebral cortex into the potential subdural space (6). An arterial causes accounts for about 30% of the ASDH and this results from cortical arteies (7). The bleeding above usually follow an acceleration-deceleration mechanism of injury (8). The aetiology could predispose to the location of subdural heamatoma; by arterial rupture, the SDH is more likely to be found in temporoparietal, while SDH from tearing of bridging veins are predominately located in the frontoparietal region (8).
The extent and rapidity of ASDH responsible for the clinical presenttation and with a wide spectrum consisting; asymptomatic, headache, altered level of consciousness, loss of consciousness, seizures, ipsilateral /contralateral neurologic deficit (6). The current guidelines in the management of ASDH stipulates that an ASDH with a thickness greater

than 10mm or a midline shift greater than 5mm on computed tomographic (CT) scan should be surgically evacuated, regardless of the patient's Glasgow Coma Scale (GCS) score. Also, a comatose patient (GCS score less than 9) with an ASDH less than 10mm in thickness and a midline shift less than 5mm should undergo surgical evacuation of the hematoma if the GCS score decreased between the time of injury and emergency room admission by 2 or more points and/or the patient presents with asymmetric or fixed and dilated pupils and/or the intracranial pressure (ICP) exceeds 20 mmHg (9). This study aimed to share our experiences in the presentation, surgical management and surgical outcomes of the patient who had operative care for ASDH in our centre.

Materials and Methods

This is retrospective study of 51 patients who were operated with a diagnosis of acute subdural heamatoma (ASDH) at Neurosurgery Unit of Abubakar Tafawa Balewa University Teaching between October 2018 and October 2022. Ethical approval was obtained from our institution ethical research committee. Age, sex, mechanism of injury, location of hematoma, other brain pathology, GCS score at admission and at discharge, in-hospital mortality were reviewed. Craniotomy and decompressive craniectomy were performed for therapeutic purposes to induce brain relaxation and this decision was based on clinical condition, hematoma size, and parenchymal edema of each patient. The data were collected using a prepared proforma from patients's clinical notes and operation notes.

Results

Fifty-one patients with traumatic cute subdural hematoma were operated in neurosurgery unit of our facility within the study period. The mean age was 39 ±3.5 years, with the ages range between 11 and 58 years old. More than 60% of the patients were between the 3rd and 4th decades of life. Male patients were made up of 78.4% of the study population (Table 1). Traumatic brain injury (TBI) is the only causes of acute subdural hematoma in all our patients, though road traffic accident accounted for the largest mechanism of injury, 56.9% and this is followed by assault (27.4%). Associated pathologies seen includes; cerebral contusion, sub-arachnoid hemorrhage (SAH), depressed skull fracture, intracerebral hematoma and extradural hematoma in order of higher frequencies (Table 2).

Table 1: Patients demographic background (n= 51).

Variables	Number (%)
Age range (years)	
0-10	0 (0)
11-20	7 (13.7)
21-30	13 (25.5)
31-40	25 (49)
41-50	4 (7.8)
>50	2 (4)
Sex	
Male	40 (78.4)
Female	11 (21.6)

Table 2: Patients distribution based on trauma mechanism and other pathology.

Variables		Number (%)
Mechanism of trauma	Road traffic accident	29 (56.9)
	Fall	8 (15.7)
	Assault	14 (27.4)
Additional pathologies	Depressed skull fracture	16 (31)
	Extradural heamatoma	4 (8)
	Cerebral contusion	28 (55)
	ICH	8 (16)
	SAH	20 (39)

ICH-Intracerebral heamotoma, SAH-Subarachnoid heamorrhage

Regarding the severity, more than half of the patients had moderate head injury while 23. 5% had severe head injury (Figure 1).

Thirty percent of the patients had poor outcomes while 70% of the patients recorded favorable outcomes. The mortality rate in our study is 12% (Figure 3). Age and GCS score were seen to be an independent prognostic factors among our study subjects (p =0.000 and 0.001respectively).

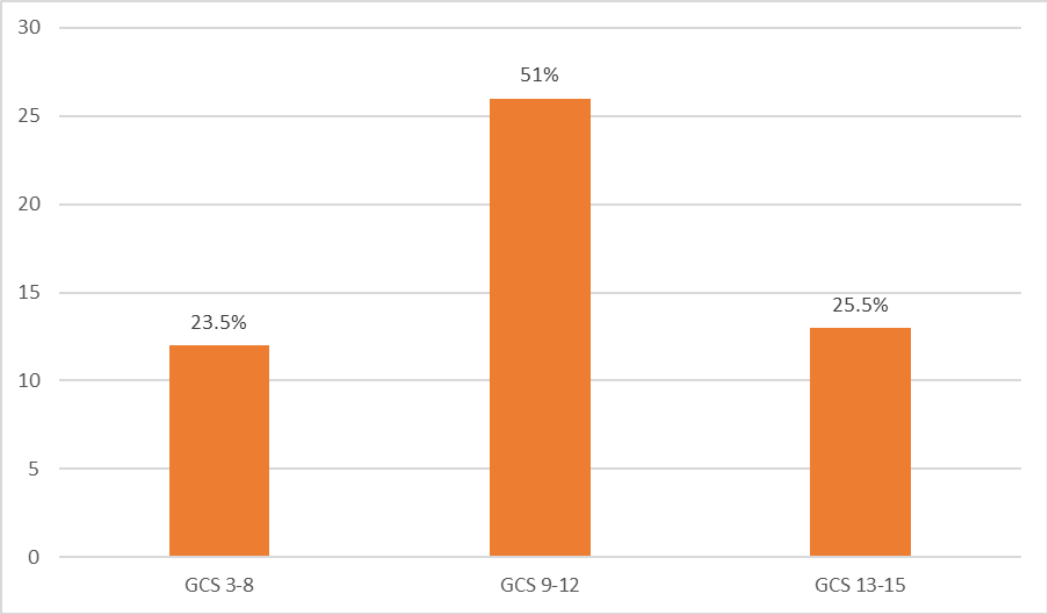

Fig. 1: Severity at presentation using GCS-Glasgow coma score.

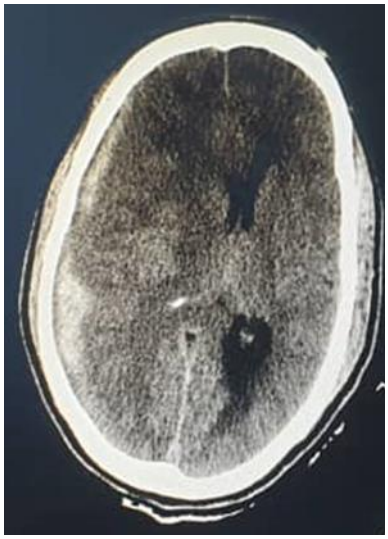

Fig. 2: CT Brain image showing a right sided acute EDH with significant midline shift.

Sex, mechanism of trauma and other associated shows no significant significance as independent prognostic factors (Table 4).

Table 3: Comparison of Age and GCS Score with Clinical Outcomes.

	Mean	**Clinical outcomes**		p* value
		Favourable	Unfavourable	
Age	39.2±3.5	36 (71)	15 (29)	0.000
GCS Score	10	36 (71)	15 (29)	0.001

Table 4: Comparison of Sex, mechanism of injury and other pathologies with clinical outcomes.

Variables		**Outcomes**		p* value
		Favourable	Unfavourable	
Sex	Male	27 (67.5)	13 (32.5)	0.508
	Female	10 (91)	1 (9)	
Mechanism of injury	Road traffic accident	23 (79.3)	6 (20.7)	0.006
	Fall	5 (62.5)	3 (37.5)	
	Assault	9 (64.3)	5 (35.7)	
Other pathologies	Depreesed skull fracture	12 (75)	4 (25)	0.031
	EDH	3 (75)	1 (25)	
	Cerebral contussion	20 (71.4)	8 (28.6)	
	ICH	5 (62.5)	3 (37.5)	
	SAH	16 (80)	4 (20)	

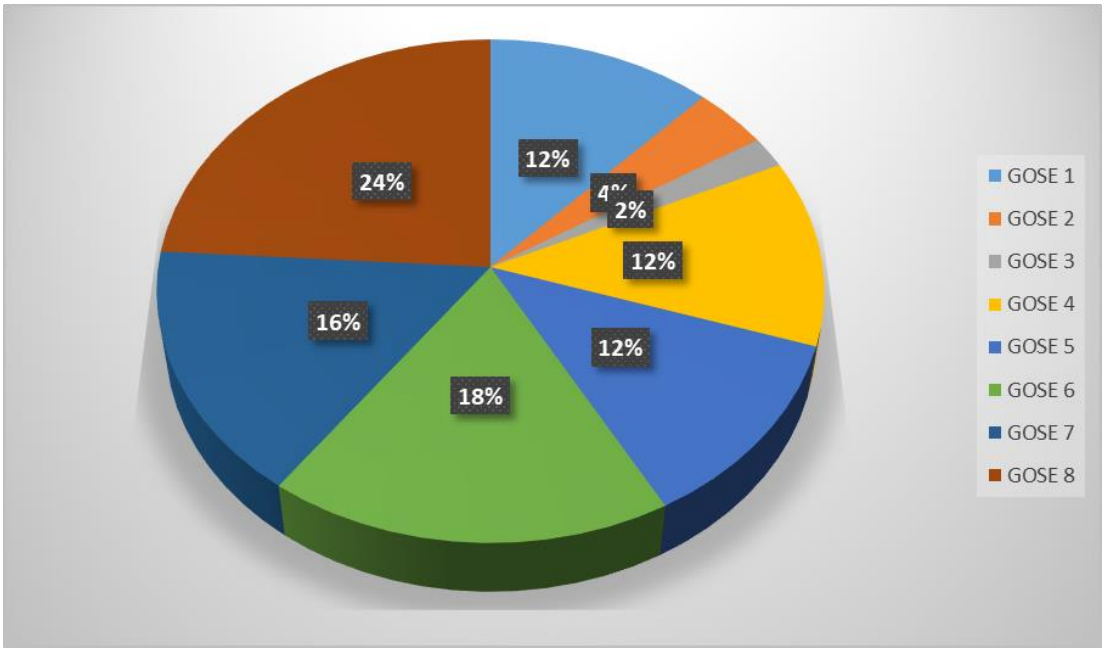

Fig. 3: Patients' clinical outcomes using GOSE- Extended Glosgow outcome score.

Discussion

This study gives insight into the presentation and prognosis of traumatic acute subdural hematoma. Male gender dominated the study population with 78.4% while the mean age of the population was approximately 39 years. Okten et al. studied a traumatic ASDH patient population with a mean age of 39 years and they observed that 76% of the patients were male (10). 63% of traumatic ASDH patients were male and the mean age of the study population was 58 years in study by Ryan et al (11). Shen et al. reported that the majority of the affected patients were male and the patient population had a mean age of 36 years (12). Yanagawa et al. reported that 67% of the patients of traumatic ASDHs were male and the mean age was 43 years (13). Li et al. reported a male percentage of 60% with a mean age of 51 years (14). Our study population mean age and male percentage showed similar pattern with reports from literature. Our population outdoor activities from driving to occupational hazards are the main reasons that may have accounted for mean age of our study population while higher frequent exposure of male population to risky jobs compared to women population in our community are also responsible for male higher percentage.

Head trauma has been the most common etiology of ASDH. Road traffic was the most common mechanisms of injury followed by trauma in our study. Yanagawa et al. observed that ASDH most commonly resulted from traffic accidents (13). Kaptanoglu et al. found similar results for the most common causes of ASDH, however, fall was the second most common mechanism (15). Some studies in contrast to ours have reported falls as te most commom followed by road traffic accident (11, 16). Geographical location could be responsible for these discrepancies coupled with level of societal development.

Parenchymal lesions and edema developing inside the brain are the most important factors determining the clinical course of ASDH (14). This is similar to our study where contusion was the most common additional pathologies among our patients. Closely related to our finding on this, was the studies by Leitgeb et al. and Son et al that reported SAH and contusion as the two most common pathologies among their study population (16, 17).

The mean GCS score in our study was 10. There has been varied mean score of GCS score in many studies. GCS has three components (verbal, motor, eye), each of which signifies separate areas of brain. Therefore, it has been reported that it is the most important factor that directly reflects brain damage, reflects clinical status, and provides information on survival during follow-up. It was reported in another study that most of the patients had a GCS score greater than 13, followed by patients with a GCS score lower than 6 (11) while Son et al. reported a mean admission GCS score of 13.2 (17).

Our study recorded an appreciable favorable outcome in 71% but mortality rate of 12%. So many factors have been proposed to be influencing the mortality rate, among which include age. Study with mortality rate similar to ours was by Ryan et al. which reported mortality rate of 14% (11). In contrast, mortality rate of traumatic ASDH of about 40% to 60% has been reported in different studies (16, 18). Previous studies have reported that the GCS score was strongly correlated to mortality (19, 20). Shen et al. reported that the mortality rate was higher in patients with a lower GCS score (12).

Conclusion

Traumatic acute subdural hematoma is a fatal condition with 29% of the patients that had surgical intervention having unfavorable outcome and with 12% mortality rate. Age of the patients and GCS score are important variables that correlate with unfavorable outcome. Randomized controlled trials involving many centers is recommended for further elucidation on the predictive factors on surgical outcomes for traumatic ASDH.

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Conflict of interest: Authors declared no conflict of interest

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