Traumatic Extradural Hematoma in Enugu, Nigeria

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ABSTRACT

Aim: Acute traumatic extradural hematoma (EDH) is life threatening and requires prompt intervention. This is a study of incidence and outcome of consecutive patients with EDH managed in Enugu, Nigeria against a background of delayed referral. **Materials and Methods:** We retrospectively examined all consecutive trauma cases managed between 2003 and 2009 and analyzed patients with acute traumatic extradural hematoma in isolation or in combination with other intra cranial lesions. Age, sex, cause of injury, time of presentation, Glasgow Coma Score (GCS), pupil reactivity, treatment and clinical outcomes were determined. **Results:** Of 817 head injuries, 69 (8.4%) had EDH, a mean of 9.9 patients per year. Males were 57 (83%) and females 12 (17%). Peak age incidences were the second and third decades of life, with a mean age of 30.2 years. Causes were road traffic accidents (57%), assault (22%) and falls (9%). Twenty-six (38%) patients presented within 24 h of injury and only one patient presented within 4 h. The average time lag before presentation was 94.2 h. At presentation 39% had GCS of 13-15, 27% had 9-12 and 34% had 3-8. The most common location of hematoma was temporal (27.5%). Forty (59%) patients had surgery while 14 (20%) were managed conservatively. Ten patients (14.5%) died and of these 70% had GCS <8 and 60% had a seizure. **Conclusion:** We conclude that early appropriate treatment of EDH results in good high quality survival (Glasgow Outcome Score 4 or 5). Low GCS should not be an absolute contraindication for surgery. Seizure prophylaxis should be considered in patients with GCS <8.

KEYWORDS: Demography, extradural hematoma, head injury, outcome

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INTRODUCTION

Acute extradural (epidural) hematoma (EDH) is a neurosurgical emergency and timely surgical intervention for significant EDH is the accepted standard for treatment. Acute (EDH) occurs in approximately 1-3% of patients with head injuries and in 5 to 15% of patients with severe head injuries.[1] It is rare before the age of 2 years and after the sixth decade of life and has a male to female ratio of about 4:1. Computed tomography (CT) scan remains the imaging modality of choice for diagnosis of this often life threatening condition.[2,3] The decision and timing for treatment of EDH has to be made individually in each case depending on patient's age, hematoma size, location, patient's neurological status and course.[4]

Early diagnosis and treatment reduces mortality and improves outcome. Mortality was 20-55% prior to the CT era but this has improved to about 12-20%.[5] The standard recommendation for symptomatic patients is surgical intervention within the golden hours.[6] However, neurosurgical service in Nigeria and other developing countries is still evolving and as such, there tends to be an unacceptable delay before an appropriate referral of patients to a competent neurosurgical center.

A lot of factors acting independently affect outcome in patients with acute traumatic EDH. Admission Glasgow Coma Score (GCS) and the presence of associated intracranial lesions appear to be the most important predictors of outcome.[7,8] Other important factors that determine outcome includes the age of the patient, time from injury to treatment, immediate coma or lucid interval, presence of pupillary abnormalities, GCS-motor score on admission, CT findings (hematoma volume, degree of midline shift, presence of signs of active hematoma bleeding, associated intradural lesion) and post-operative intracranial pressure.[7] Associated co-morbidities and the injury severity score (ISS) in cases of polytrauma may also affect eventual outcome.

Zero mortality from acute extradural hematoma is a realistic goal for a modern, well-run care system for head-injured patients that include prompt referral and suitable hospital facilities for constant access to emergency neurosurgery.[9] In developing countries with inadequate manpower and lack of essential diagnostic imaging support services, factors like late recognition and delay in seeking proper expert intervention may also indirectly affect the outcome in these patients. The situation is further compounded by a poor

health insurance scheme. Therefore, results from developing countries in terms of morbidity and mortality may not be at peer with reports from developed countries with more streamlined healthcare services.

This is a study of incidence and outcome of consecutive patients with traumatic EDH managed in a major private neurosurgical center in Enugu against a background of delayed referral.

Materials and Methods

The study is a retrospective analysis of prospectively collected data for all consecutive trauma cases seen at Memfys Hospital for Neurosurgery (MHN), Enugu, Nigeria between 2003 and 2009. Acute EDH was diagnosed by CT scan in all cases. Patients with EDH in isolation or in combination with other intracranial lesions treated in the MHN were further analyzed. Patients with other significant intracranial lesions were excluded. Age, sex, cause of injury, time of presentation, Glasgow Coma Scale, pupil reactivity, treatment and clinical outcomes were determined.

Results

There were 817 head injuries of which 69 (8.4%) had EDH, with a mean of 9.9 patients per year. There were 57 (83%) males and 12 (17%) females. The peak age incidence was in the second and third decades of life, with a mean age of 30.2 years [Table 1]. Causes of EDH were RTA 39 (57%), assault 15 (22%) and falls 6 (9%) [Figure 1]. Only 26 (38%) patients presented within 24 h of injury with one presenting within 4 h. The average time lag before presentation was 94.2 h [Table 2]. At presentation 39% had GCS of 13-15, 27% had GCS 9-12 and 34% had GCS 3-8 [Table 3]. The most common locations of hematoma were temporal (27.5%), frontal (17.4%) and parietal (13%).

Table 1: Age distribution of patients

Age group	Frequency	%
0-10	6	8.7
11-20	17	24.6
21-30	17	24.6
31-40	13	18.9
41-50	4	5.8
51-60	6	8.7
61-70	4	5.8
71-80	2	2.9
Total	69	100

Forty patients (59%) had surgery while 14 (20%) were managed conservatively [Figure 2]. Of the remaining 15 patients, 3 died on admission and 12 returned to their referral hospital after CT scanning and were excluded from further analysis. Twelve patients presented with hemiparesis of varying grades and were managed surgically with complete recovery in 9 (75%). The remaining 3 patients showed improvement in power from grade 3 to 4 in 2 patients and grade 1 to 3 in 1. Two patients with hemiparesis were managed conservatively. One patient had recovered fully at discharge and one died. All 3 patients with speech impairment on presentation had surgery and had recovered speech fully at discharge [Table 4]. Of the 4 patients that presented with pupillary dilatation, two died post-operatively and at discharge pupil size had returned to normal in 2.

Overall, 10 patients (14.5%) died. Three patients died shortly after admission and of those that received treatment 3 (%) in the conservative group and 4 (%) in the surgical group died. Seven (70%) of the deaths occurred in patients with GCS <8 [Figure 3] and 6 of these had a seizure as part of their presentation [Table 5]. The overall frequency of seizure was 23.7%. Six of 13 patients admitted with a GCS of 7 survived. Patients who presented early had better outcomes. Of 37 patients presenting within 72 h of injury only 1 patient died while 9 of the 22 presenting later than 72 h died. This was significant at $P < 0.001$. In addition, persisting morbidity in the form of seizures were commoner in patients presenting late [Table 3]. Pediatric patients and the elderly are more likely to die [Figure 4].

Discussion

This study has similar demography profile with results from other studies in the literature with few peculiarities. EDH represents 8.4% of all head injuries that we managed. This figure is higher than the 1-3% reported in some other studies.[10-12] although a study from Hong Kong had similar rate.[13] This may represent

Table 2: Clinical outcome at discharge by time from injury to presentation

Presentation time	Outcome					
	No.	Seizure	Hemiparesis	Pupil change	Speech impairment	Death
<24 h	26	2	7	2	2	-
25-48 h	6	1	2	1	1	1
49-72 h	5	2	-	-	-	-
73-96 h	7	3	1	-	-	2
5-7 days	9	3	-	1	-	2
8-15 days	8	2	-	-	-	3
>15 days	3	-	-	-	-	1
Unknown	5	1	-	-	-	1
Total	69	14	10	4	3	10

* Only one patient presented within 4 h of injury

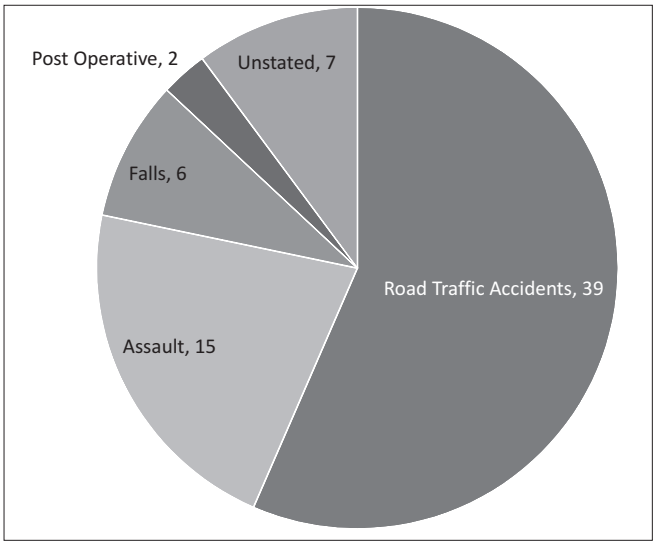

Figure 1: Mechanism of injury

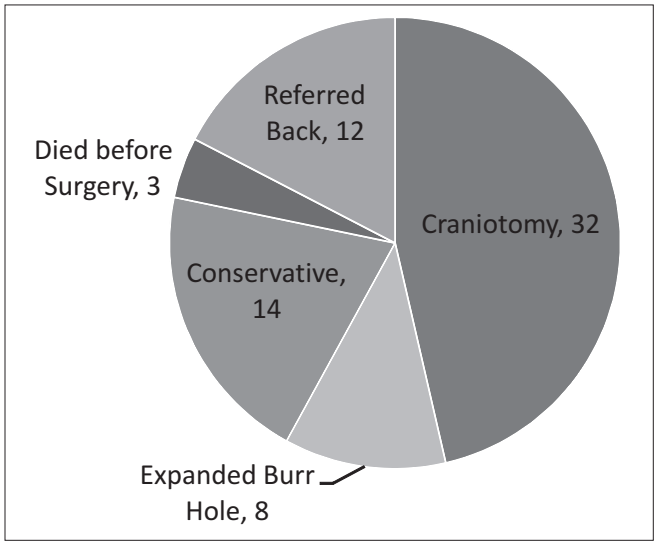

Figure 2: Treatment modality

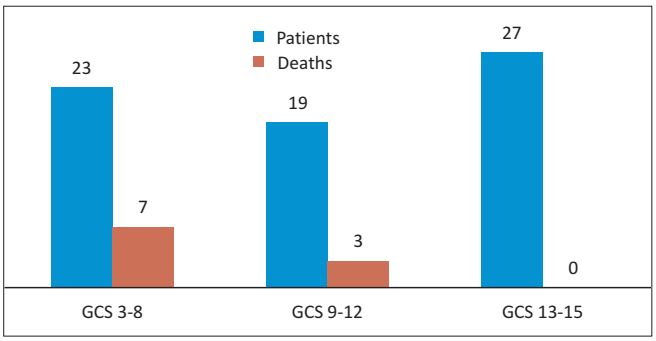

Figure 3: Relationship between admission Glasgow Coma Scale and mortality

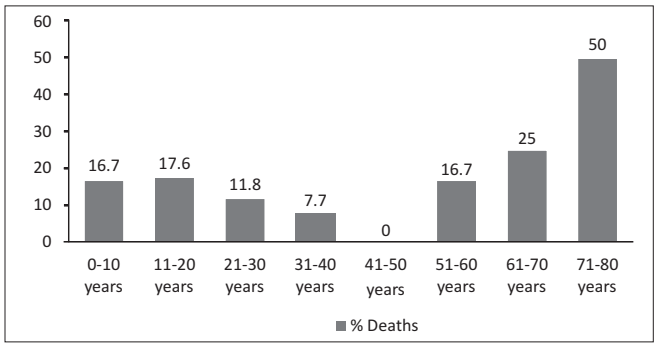

Figure 4: Analysis of death by age

a selection bias in that many patients with mild head injury may not present to a private center for neurosurgery consultation, unlike those with more acutely symptomatic and potentially life threatening condition such as EDH. In keeping with this, it has been reported that up to 9% of patients in coma have EDH requiring surgery.[14,15]

Road traffic accident and assaults are the predominant predisposing factors in our study, accounting for 78% of patients. This reflects the serious impact of road traffic accident and crime in our society. Since these two factors are eminently preventable by proper enforcement of driving regulations and security networking, coordinated efforts may significantly reduce the rate of head trauma generally. Studies in pediatric populations indicate a high incidence of falls[16] and this is also modifiable.

The preferred surgical intervention for EDH is craniotomy and evacuation of hematoma. In certain emergency situations and/or in less equipped centers however, use of this procedure may not be feasible. Forty seven percent of our patients had craniotomy and 12% had extended burr holes as treatment for their hematoma. Patients that were unstable and required emergency decompression were offered expanded burr hole procedure. Burr hole evacuation followed by drainage under negative pressure has been shown as a safe and effective method for emergency management of a pure acute traumatic epidural hematoma.[17] In such patients however, craniotomy should be performed if consciousness does not improve within several hours.[17] Conservative management has been advocated in patients in good clinical state, with small sized collections located in non dangerous areas and when serial CT facility is available.[18] Some patients managed conservatively will subsequently deteriorate and require surgical intervention.[4] Fourteen patients in our series were managed conservatively initially but 6 (42.9%) of them had to have surgery. The decision to manage conservatively should be undertaken where close surveillance and prompt neurosurgical intervention is available.

The role of CT scan in early diagnosis, proper localization of hematoma and planning of surgery is emphasized by the fact that only 27% of the lesion in this study was in the temporal region and the classical presentation of clinical features was seen in only 25% of cases. This is consistent with other reports suggesting that the classical description of a lucid interval is observed in only 10 to 27 % of the patients.[2]

There is an established relationship between outcome of patients and the time lag between injury and surgical intervention.[9,19,20]

Table 3: Glasgow coma scale of patients at presentation

Score	Number	%
3-8	23	34
9-12	19	27
13-15	27	39
Total	69	100

Table 4: Treatment modality and outcome

Treatment	Hemiparesis	Seizure*	Speech impairment	Pupil change	Death+
Surgery					
Admission	12	5	2	4	4
Discharge	3	-	-	-	
Conservative					
Admission	2	3	-	-	3
Discharge	1	-	-	-	
Death+	1	4	-	2	

*All seizure patients were still on antiepileptic drugs at discharge. +Three patients who died before treatment were not captured.

Table 5: Analysis of outcome of EDH patients that presented with seizures

Status	Number	%
Survived	8	57.1
Died*	6	42.9
Total	14	100

*Two died before surgery

Guidance from the Royal College of Surgeons of England recommends that surgical decompression should be carried out within 240 min (4 h) of the onset of significant symptoms in order to ensure good result.[6] This was not achievable in our series where only 38% of patients presented within the first 24 h of injury and the average time lag before presentation was 94.2 h. In fact only one patient presented to our hospital in the first four hours following the injury. About 23.2% of our patients presented after the first week of injury. We assume that presentation with acute EDH in most of these patients represent delayed onset EDH, which has an incidence of 13-30%.[4,21] The frequency of delayed onset EDH could not be determined with certainty in this study since earlier brain scans were not available and patients were only scanned on presentation. In our experience, these patients have poorer outcome, which agrees with the finding by Korinth *et al.,* that delayed EDH results in worse outcome.[4] Adequate surveillance of high-risk patient is essential. The barriers to achieving the target time were varied but include the time taken to make the diagnosis, time taken to make a referral to a neurosurgical center, and the time taken to transfer the patient to the neurosurgical center. Financial constraint was also a significant social factor.

Only 39% of our patients came with GCS ≥13. Admission GCS is one of the most important predictors of eventual patient prognosis, outcome being better when the initial GCS is high.[9,11] In our study, no patient with GCS ≥13 died following hematoma evacuation. In contrast, 30% and 16% respectively of patients admitted with severe and moderate head injuries died.

Among the EDH cases that had seizures, 42.9% died. Sixty percent of all patients that died had seizure as a part of their presentation suggesting that seizures may be a poor prognostic factor in outcome of EDH. The seizures appeared late in the symptomatology of the patients that present with seizures and died. The influence of seizures on observed mortality in these patients may be explained by additional brain swelling on already critically raised intracranial pressure. Seizure prophylaxis should be considered in all patients with EDH who present late or with a GCS less than 8.

The overall mortality rate from this study was high (14.8%) but is similar to some other studies.[9,22,23] This finding could largely be explained by delayed presentation to neurosurgical center. Three patients died even before significant resuscitation could commence. In patients presenting after 72 h mortality was significantly higher ($P < 0.001$) than in those presenting earlier. Among the patients that died, 70% had a GCS <8 at presentation. However, six of the 13 patients admitted with a GCS of 7 in our study survived. This emphasizes the high proportion of good outcome with prompt intervention in patients presenting with EDH compared with other types of severe head injury. Unlike most forms of TBI, people with EDH and a GCS as low as 3 may still have good outcome if they can receive surgery quickly.[13] Low GCS at presentation adversely affect outcome but should not be an absolute contraindication for surgery. Pediatric patients and the elderly are more likely to die.[24] and this is also the finding in this series.

Conclusion

Intracranial EDH is a serious complication of head injury, requiring immediate diagnosis and surgical intervention. Survival from traumatic EDH was 85.5% and most of the survivors had a Glasgow Outcome Score of 4 or 5. The transfer time was very late. Low GCS adversely affected outcome but should not be an absolute contraindication for surgery. Prompt referral of suspected cases of EDH for CT would further improve the outcome. We advocate seizure prophylaxis in patients with EDH presenting with a GCS less than 8.

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