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Patient Profile and Outcomes of Traumatic Extradural Haematomas as Seen at The Nakuru Level Five Hospital in Kenya

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Background: ***An extradural haematoma (EDH) also referred to as epidural haematoma is a collection of blood between the skull and the dura. Extradural haematomas are present in 1-2% of all head injury patients. In those who present in coma, extradural haematomas are present in 10% of them. Mortality rates have been reported to range from 5-43% in different regions of the world. Mortality is reportedly nil in patients who present without coma and 20% for those who present comatosed.***
Methods: ***A prospective cross sectional descriptive study of patients diagnosed with extradural haematoma by CT scan conducted at the Nakuru level five hospital between 1st January 2015 and 30th November 2015. Descriptive patient demographic data, clinical presentation data, investigations, surgical treatments offered, length of hospital stay and outcomes were captured using a questionnaire.***
Results: ***A total of 32 patients with extradural haematoma were recruited into the study. There was a male preponderance that accounted for 96.8% of patients. Their ages ranged from 5 to 64 years with a mean age of 30.75 years (± 13.6) and. The commonest cause of injury was assault at 31.3% of all head injury patients followed by motorcycle related accidents at 28.1%. There were 34.4% mildly injured patients, 43.8% moderate and 21.9% of patients severely head injured. There were 8 deaths (25%) of the patients and 59.4% of the patients had good recovery. Low GCS, rhinorhoea, otorhoea, presence of an intracerebral haematoma, admission to the ICU, convulsions and loss of consciousness were associated with poor outcome.(p=0.00, 0.001, 0.022, 0.002, 0.009, 0.000, and 0.044 respectively).***
Conclusion: ***The extradural haematoma patient is mostly a young male. The commonest cause of extradural haematoma is assault/violence related followed by motorcycle accidents. There is an important co relationship between Glasgow coma score and outcome. Likewise Convulsions, loss of consciousness at any time after injury, otorhoea , rhinorhoea and presence of associated injuries worsened outcomes in this subset of extradural haematoma patients.***

Key words: Profile, outcomes, traumatic, extradural, haematomas
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Introduction

Extradural haematoma (EDH) also referred to as epidural haematoma is a collection of blood between the skull and the dura. Extra dural haematomas (EDH) have been known for more than 140 years [1]. They are present in 1-2% of all head injured patients and in 20% of those who present in coma [2]. Majority of the extra dural haematomas are known to occur in the young as fewer than 10% are reported in those of age above 50 years due to a strong and adherent dura to the skull [3]. More than 70% of the extradural haematomas are associated with a skull fracture in adults but the figure is notably low in children [3]. Mortality ranges from 5-43% in various jurisdictions [4, 5]. A high mortality rate is noted in the extremes of age, fewer than five years and those over 55 years of age [5]. Patients who present with a GCS of 3 with dilated and fixed pupils have specifically been reported to have a very high mortality rate [6]. Survival has been reported to depend on: the age of the patient, the speed of haematoma formation, the size and location of the clot, the pre operative GCS and the presence of intra cerebral lesions and finally the interval between the onset of pupillary changes and surgery [5, 6, 7, 8, 9]. This study aims to highlight the presentation, incidence, the functional outcome as measured by the Glasgow outcome scale [10] at discharge of patients with extradural haematomas as seen at the Nakuru level five hospital.

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Patients and Methods

A prospective cross sectional descriptive study of patients diagnosed with extradural haematoma by CT scan conducted at the Nakuru level five hospital between 1st January 2015 and 30th November 2015. All patients diagnosed to have extradural haematoma on CT scan were included .Descriptive patient demographic data, clinical presentation data, imaging investigations done, surgical treatments offered, intensive care admission and the length of stay in the unit, length of hospital stay and Glasgow outcome scores[10] at discharge were captured using a questionnaire. This data was entered into SPSS version 21 and analyzed. Discrete variables were compared using the chi square test while continuous data was analyzed using the Students' T test. A p value $\leq$ 0.05 was considered significant. Ethical approval was obtained from the institutions' ethics review board.

Results

Four hundred and forty five (445) patients were admitted to the hospital with a diagnosis of head injury during the study period. Of these, 32 (7.2%) of them had extradural haematomas.

Table 1. Characteristics of the Patients with Extradural Haematoma.

Feature	Finding	No	%	P value
Gender	Male	31	96.9	0.872
	Female	1	3.1	
Was patient a transfer in	Yes	23	71.9	0.554
	No	9	28.1	
Cause of brain injury	Falls from heights	2	6.3	0.719
	Motor vehicle accidents	2	6.3	
	pedestrians	5	15.6	
	Assault/violence	10	31.3	
	Motorcycle rider/passenger	9	28.1	
	unknown	4	12.5	
Glasgow coma score	13-15	11	34.4	0.003
	9-12	14	43.8	
	3-8	7	21.9	
Presence of convulsions	yes	8	25	0.000
	No	24	75	
Presence of otorrhoea	Yes	5	15.6	0.022
	No	27	84.4	
Presence of raccoon eye	yes	8	25	0.289
	No	24	75	
History of loss of consciousness	yes	8	25	0.044
	No	24	75	
Presence of rhinorrhoea	Yes	2	6.25	0.001
	No	30	93.75	
Associated subdural haematoma	Yes	1	3.1	0.872
	No	31	96.9	
Associated brain contusion	yes	3	9.37	0.550
	No	29	90.62	
Associated linear skull fracture	yes	3	9.37	0.363
	No	29	90.62	
Associated depressed skull fracture	Yes	1	3.1	0.377
	No	31	96.9	
Intra cerebral haematoma	yes	3	9.37	0.002
	No	29	90.62	
Admitted to the ICU	yes	5	15.62	0.009
	No	27	84.37	

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The 32 patients with extradural haematoma were recruited into the study during the period of eleven months giving an average monthly hospital incidence of 3 cases of extradural haematoma. Men accounted for 31 cases, The male to female sex ratio was 31:1. Most (71.9%) of the patients were transferred to the Nakuru level 5 hospital from neighboring institutions. The rest (28.1%) presented to the institution as their first health care provider (Table 1).

The patients' ages ranged from 5 years to 64 years with a median of 30 years and a mean of 30.75 years ±13.59). Most (90.6%) of the patients were young being aged 48 years and below. Only 9.3% of cases were 50 years and above (figure 1). Advanced age was associated with bad outcome (*p<001).*

The main cause of traumatic extradural haematoma in this subset of patients was assault/ violence in 31.3%. Motorcycle accidents were responsible for 28.1% of the extradural haematomas, injuries to pedestrians at 15.6%, motor vehicle accidents and falls at 6.3% each while in 12.5% of the patients the cause could not be established (Table 1). Regarding the severity of injury, 34.4% of the patients had mild head injury, 43.8% had moderate while 21.9 % had severe head injury. A low GCS was associated with a poor outcome (*p= 0.003*). Eight patients (25%) presented having convulsed or had a convulsion while undergoing treatment in the hospital. Of these eight patients who had convulsed at some time after injury six died, one recovered with severe disability (GOS 2) and one had a good recovery (GOS 5).

A convulsion at any time after injury was associated with a poor outcome (*p value 0.000*). An extradural haematoma patient who had a low GCS was more likely to convulse (*p value 0.000*). Likewise a history of loss of consciousness after injury was associated with a poor outcome (*p= 0.044*). All the extradural haematomas in this series were found to be unilateral.

Twelve of the patients (37.5%) had other associated injuries such as fractures of the pelvis, chest injuries in addition to their head injury while 11 of the patients had associated injuries on the head. There were three patients with linear skull fractures and one patient with a depressed skull fracture comprising 12.5% of the patients as diagnosed on the preoperative x ray and CT radiographs. Five patients were admitted to the ICU for a period of one to thirteen days with a mean of 6.5 days (± 5 days). A patient admitted to the ICU was more likely to have a bad outcome (*P=0.009*). The range of hospital stay was one to thirty four days with a mean of 7.58 days (± 7.852 days). The presence of rhinorhoea, otorhoea and intracerebral haemorrhage carried a poor outcome (*p=0.001, 0.022 and 0.002 respectively*).

The imaging investigations done included skull X ray in 14 (43.8%) patients. All the patients had CT scan of the head. None of the patients had an ultrasound of the head since none of the patients was in the age range where this could be done. Similarly no patient had MRI done as an investigation to aid in the diagnosis of their extradural haematoma.

There were eight deaths which was 25% of all patients treated with extradural haematoma. A further five patients recovered with varying levels of disability on the Glasgow outcome scale[10] at discharge as below. All 8 deaths were males (Table 3). Two of the patients were assaulted, two were pedestrians, two were motorcyclists, one was hit by a log of wood while the last one sustained the injury as a result of a fall. Seven of the eight patients who succumbed had been referred to the Nakuru level five hospital from another facility while six of them had other associated injuries apart from the extradural haematoma and head injury.

Table 2. Showing the Severity of Head Injury versus the GOS at Discharge

	Glasgow outcome scale at discharge				Total
	Death	Severe disability	Moderate disability	Good recovery	
Mild	1	0	0	10	11
Moderate	2	0	3	9	14
Severe	5	1	1	0	7
Total	8	1	4	19	32

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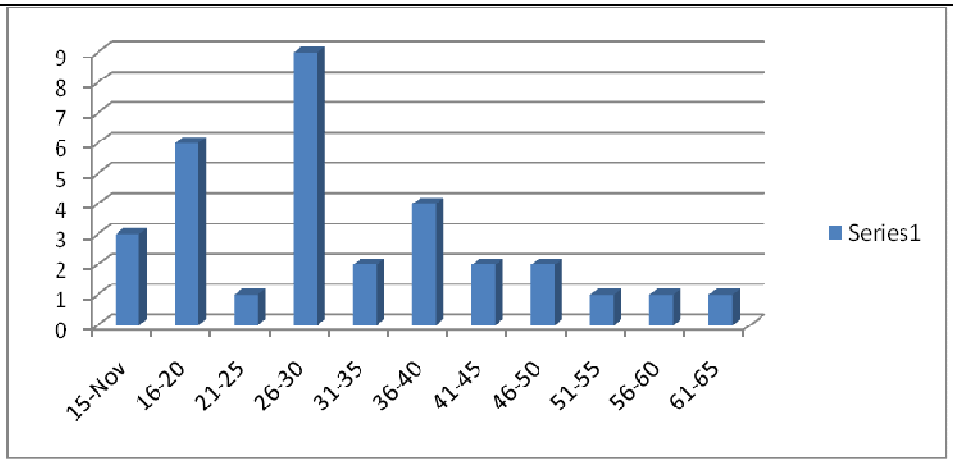

Figure 1. The Age Distribution of the Patients

Table 3. The Characteristics of the Patients who died

Age	Gender	Cause of injury	GCS at admission	Other injuries	hospital stay	Alcohol use	Transfer into the hospital
41	M	motorcyclist	4	none	1 day in ICU	yes	yes
36	M	pedestrian	14	Pelvic and Depressed skull fracture	2 days	yes	yes
36	M	assault	6	Linear skull fracture	1 day	no	no
26	M	motorcyclist	3	ICH	13 hours	yes	yes
46	M	fall	3	none	1 day in ICU	unknown	yes
37	M	assault	3	ICH and multiple injury	30 mins	unknown	yes
60	M	Hit by a log	5	Skull and Radio ulna fractures	2 days	unknown	yes
64	M	pedestrian	9	Cerebral contusion	13 days ICU 34 days	unknown	yes

Discussion

This study has confirmed that the majority of patients with extra dural haematoma are youthful (≥ 48 years which represented 90.6% of the patients) males. The male: female ratio is 31:1 similar results were reported in a study done at Kenyatta National Hospital [11] and notably very high compared to 4; 1 reported in Nigeria [12]. This is a reflection of how active the youthful male population in Kenya is in terms of outdoor activities whether those activities are involving assault/violence to riding motorcycles to eke out a living as opposed to their female counterparts. Fewer than ten percent (9.4%) of our patients were of age above fifty years which is similar to what has been observed elsewhere [3]. The involvement of this mainly youthful male population has huge economic implications to the nation. This finding is similar to what has been observed elsewhere where it is reported that patients younger than 20 years account for sixty percent of the injured and that extradural haematomas are uncommon in the elderly [3, 11, 13].

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The study has further revealed that the incidence of extradural haematoma at our single hospital is at average three patients per month. The leading cause of extradural haematoma in our set up is assault (31.3%) followed by motorcycle accidents (28.1%). This seems to be in agreement with findings reported at Kenyatta National Hospital by Kiboi [11]. This study shows a direct strong relationship between Glasgow coma score and Glasgow outcome score (p=*0.003)*. This finding has been reported similarly by several other researchers elsewhere [11, 14, 15].

Convulsions occurring at any time after injury were associated with a poor outcome ($p<0.001$). Convulsions are an important cause of secondary brain injury and therefore they must be anticipated and prevented before they occur. There exists low quality evidence supporting the use of phenytoin to prevention of early post trauma seizures and no evidence to show that phenytoin use prevents late onset seizures or that it prevents mortality [16] the results here seem to indicate that convulsions should be prevented. Otorrhoea, loss of consciousness, rhinorrhoea, Intra cerebral haematoma and admission to the ICU were all associated with poor outcomes. Admission to ICU however is indicative of the severity of the brain injury and thus may more likely be an indirect way of assessing how low the GCS was at admission.

Coexistence of other injuries with extradural haematoma were noted in twelve patients a further eleven patients had injuries specific to the head ranging from linear skull fractures, depressed skull fractures, brain contusions and intra cerebral haemorhages. This study found that 12.5% of patients with EDH had a radiologically identifiable associated skull fracture which is significantly lower compared to studies which have reported that more than 75% of patients with extradural haematoma have an associated skull fracture [17, 18]. The difference may be due to the fact that not all patients in this series were operated on, hence, it was difficult to ascertain whether for sure the patients who had no fractures on radiograph really didn't have one or it was just missed and could have been found had all the patients been operated. The yield therefore would most likely have increased if the criteria was both radiographic and the findings at surgery. Subdural haematoma was coexistent with an extradural haematoma in 3.1% of patients which is a lower figure as compared to the reported rate of up to 20% in other studies [14]. Similar to other studies advanced age was associated with poor outcome $p\leq0.001$[11].

This study recorded a mortality rate of 25% of the patients which falls within the reported mortality rate that ranges between 5 to 43 %[19]. This figure is similar to that reported at KNH[11]. The mortality rate increased with increasing severity of the head injury. This is expected as mortality rate has been reported as nil in the non coma patients and increases to 20% in the comatose [19].Towards zero mortality in extradural haematoma patients [20] is a dream we should all aspire to achieve and hopefully a study as this goes a long way to help elucidate the determinants of poor outcomes and therefore ways and means of eradicating or avoiding those determinants.

Conclusion

This study has shown the extradural haematoma patient is mostly a youthful male. The commonest cause of extradural haematoma is assault / violence related followed by motorcycle accidents. There is an important co relationship between Glasgow coma score and outcome. Likewise Convulsions, loss of consciousness at any time after injury, otorhoea, rhinorhoea and presence of associated injuries worsened outcomes in this subset of extradural haematoma patients.

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