Factors Influencing the Outcomes in Extradural Haematoma Patients

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Abstract

Background: Extradural hematomas are neurosurgical emergencies and are one of the most common causes of mortality and disability after traumatic brain injury. This study aimed at evaluating the current management and factors that influence outcome in patients treated for extradural hematoma in an African setting. **Methods**: A total of 224 consecutive patients who were admitted to the neurosurgical unit at the Kenyatta National Hospital and diagnosed with extradural hematoma between January 2007 and December 2011 were included in this study. **Results**: There was a male predominance of 96.9%. The median age was 29 years. The most common cause of injury was assault (45%). Good functional recovery was achieved by 190(86.2%) of the patients in our series, whereas residual disability accounted for 6.7% and mortality for 7.1%. The proportion of patients who achieved functional recovery significantly decreased with increasing age (p=0.011). A lower GCS score at admission was associated with a poorer outcome (p=0.032). The time elapsed from initial trauma to surgery significantly influenced outcome (p=0.007). **Conclusion**: A longer duration between trauma and decompression, a low preoperative GCS score, pupillary abnormalities and those older than age 61 are poor prognostic indicators.

Key Words: Extradural hematoma, Head injury, Intracranial hematoma, Outcome

Introduction

Extradural hematoma (EDH) is hemorrhage between the inner table of the skull and the dura mater and is a neurosurgical emergency with early diagnosis and intervention being essential for adequate management. Many reported series show great differences in post-operative results between patients operated on when comatose, compared with patients showing no alteration in their level of consciousness up to the time of surgery (1–4). Studies show that mortality may range from 41% in patients with a Glasgow coma scale (GCS) score of 8 or less, to zero in patients who are alert at the time of the operation (5).

There have been great improvements in diagnostic and monitoring tools, evacuation and rescue, and early treatment options which have positively influenced the outcome of patients with extradural hematomas especially in Africa. These improvements have included the introduction of the computed tomography (CT), aggressive rescue and evacuation to specialised centers and introduction of standardised surgical techniques for removal of intracranial haematomas (2). Even with these improvements, studies have shown that the quality of outcome varies dramatically between hospitals (5,6).

The aim of this study was to evaluate the clinical pattern and factors that influence outcome in patients treated for extradural hematoma in a single institution in Kenya.

Methods

This retrospective study was conducted in Kenyatta National Hospital (KNH) the largest neurosurgical unit in East and Central Africa after ethical approval by the hospital's ethics board. Two hundred and twenty four records of patients admitted between January 2007 and December 2011 were retrieved. Data was collected from the patient records using a standardized structured questionnaire. The data variables collected included gender, age, GCS on admission, pupil abnormalities, mechanism of injury, accompanying injuries, loss of consciousness,

focal limb weakness, sensory loss, CSF rhinorhea and otorhea. Pre-morbid risk factors, surgical variables such as type of surgery and time elapsed from accident to surgery (time to diagnosis and time to surgery) and outcome at discharge were also documented.

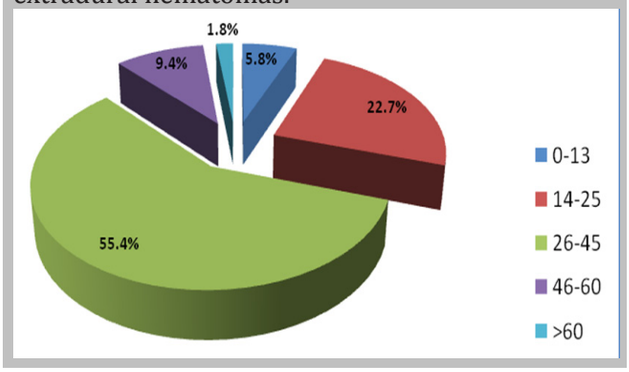
The Glasgow Coma Scale (GCS) was used to classify the severity of the injuries. Patients with GCS of ≤8, 9-12 and 13-15 were classified as severe, moderate, mild head injuries respectively. Outcome of these patients was measured using a Glasgow Outcome Scale (GOS) at the point of discharge. GOS 1 indicated death and GOS 2-4 (GOS 2-vegetative state, GOS 3-severe disability, GOS 4-moderate disability) were used to indicate residual disabilities or poor outcomes, whereas GOS scores of 5 (good functional recovery) indicated a favorable outcome. This scale was chosen because it is widely accepted as a standard means of describing outcome in head injury and has established validity and interobserver invariability.

The data was coded and analyzed using Statistical Package for Social Sciences (SPSS), version 18.0. Discrete variables were compared using the chi square test while continuous variables were compared using Student's t test. Logistic and univariate linear regression models were conducted to determine which variables were independently associated with functional recovery and mortality. A value of $p < 0.05$ was considered significant.

Results

A total of 224 (217 male, 7 female) cases of extradural hematoma were retrieved. The mean age was 30.66 years (±12.434), with a range from 1 year to 82 years. There was an uneven age distribution with most of the patients (55.4%) being in the 26-45 year age group (Figure 1).

Figure 1: . The distribution by age of patients with extradural hematomas.



The leading causes of injury were assault (45%), road traffic accidents (32.9%) and falls (15.3%) The most common injuries that accompanied the extradural hematoma included skull fractures (53.1%) and scalp lacerations (46.4%). The most common presenting symptom was loss of consciousness (66.5%). The classically described lucid interval was recorded for only 30.8% of the patients. Other common symptoms included headaches (32.6%) and nausea (29.5%). Additional neurological symptoms that were encountered were confusion (27.7%), focal limb weakness (26.8%), convulsions (14.7%), memory loss (6.7%), visual disturbances (5%) and sensory deficits (0.4%). At admission, 33 (14.7%) patients had severe head injury while 48 (21.4 %) and 133 (59.4%) had moderate and mild head injury respectively. Examination findings revealed scalp lacerations, cranial nerve palsies (6.7%), anisocoria (17%), papilledema (0.9%), hemiparesis (20.1%), and CSF rhinorhea and otorhea (12.1%). Patient pre-morbid risk factors included cigarette smoking (27.7%), alcohol use (47.3%), anticoagulant use (3.6%), hypertension (0.4%) and arterio-venous malformations (0.4%). One hundred and nineteen (53.1%) had a diagnostic CT Scan done within 24 hours of injury while 24 (10.7%), 28 (12.5%) and 49 (21.9%) had a definitive diagnosis of extradual hematoma at 24-72 hrs, 72-120 hrs and greater than 5 days respectively.

Eighty six percent of the patients had a good functional recovery whereas 7.2% had residual disabilities.Males were more likely to have functional recovery (86.9%) than females (71.4%) (p= 0.495). In addition, none of female patients had residual disabilities as compared to 7.4% of male patients (p= 0.685). The proportion of patients who achieved functional recovery significantly decreased with increasing age (p=0.011). It was highest in those aged between 26 and 45 years (90.8%) and lowest in those older than age 60 years (75%). Mortality was highest in those older than age 61(25%) (p=0.007). Patients who were involved in motor vehicle accidents were less likely to have functional recovery (83.3%) than those who fell (85.3%) or were assaulted (89.8%) (p=0.478).

The percentage of patients with poor outcome increased from 8.6% (GCS 13-15) to 16.7% (GCS 9-12) and finally to 30.3% (GCS<8) (p=0.003). The proportion of patients who achieved functional recovery was 90.7% of those who had mild head injury as compared to 83.3% and 69.7% for those with moderate and severe head injury, respectively (p=0.032).

A negative history of loss of consciousness resulted in better outcomes with a functional recovery rate of 90% in contrast to those who had loss of consciousness (83.9%) (p=0.427). It was noted that

more patients with bilateral reactive pupils achieved a functional recovery (87.4%) than those who had anisocoric pupils (78.9%) (p=0.015).

Majority of the patients (83.5%) in our study underwent surgical evacuation of the extradural hematomas. Residual disabilities were more common among conservatively managed (8.6%) than surgically managed patients (6.9%) (p=0.001). However, of those patients who had surgical intervention, 85.9% achieved a good functional outcome as compared to 86.5% in those managed conservatively. It was noted that patients who were evacuated within 24 hours had a better outcome (p=0.007). In our series, only 10 patients were evacuated within 24 hours. They had a functional recovery rate of 90% and no residual disabilities. Those evacuated more than 4 days after the trauma had a decreased functional recovery rate (85%) and had increased residual disabilities (10.3%) (Table 1).

Table1: Characteristics of patients

Clinical Variables	**No. of Patients (n=224)**	**Mortality (n=16)**	**Residual Disabilities (n=15)**	**Functional Recovery (n=190)**	**p-value**
Sex					
Male	217	14	15	185	0.495
Female	7	2	0	5	
Age (years)					
0–13	13	1	1	11	0.014
14–25	62	4	8	51	
26–45	124	7	4	109	
46–60	21	3	2	16	
≥61	4	1	0	3	
Mechanism of injury					
Assault	100	4	5	88	0.478
Motor vehicle collision	73	7	6	60	
Fall	34	3	2	29	
Others	15	2	2	11	
Glasgow Coma Scale score					
≥13	143	4	11	127	0.029
9–12	48	3	3	40	
≤8	33	9	1	23	
Pupillary abnormalities					
Anisocoric	38	4	2	30	0.018
Reactive to light	186	12	13	160	
Referral from another health facility					
Yes	127	9	9	107	0.689
No	90	7	6	77	
History of loss of consciousness					
Yes	149	12	10	125	0.076
No	72	4	5	63	
History of convulsions					
Yes	33	2	1	27	0.568
No	187	14	12	160	
Surgery done					
Yes	187	14	12	158	0.028
No	37	2	3	32	
Time from trauma to surgery					
<24 hours	10	1	0	9	0.003
1–4 days	71	5	2	61	
>4 days	102	6	10	85	

Discussion

The results of this study demonstrated that a good functional recovery was achieved by 86% with residual disability in only 7.2% of the patients in our series. This concurs with previous studies among Spanish and Italian populations which reported good functional recovery of 81.5% and 86% respectively (2,7).

Our data indicates better functional recovery decreased with increasing age. Taussky et al (8) reported that age was a more important influence on neurosurgical outcome than other associated factors. In fact, good outcomes from surgery in elderly patients rely on intervention, before coma or pupillary dilation occurs (9). The most important aspect of treatment in older patients is the rapid identification and surgical decompression of hematomas. Increased aggressiveness in performing computed tomography is therefore indicated (10). Hematomas in elderly patients may also present with atypical histories and often are not associated with focal signs hence emphasizing the importance of early computed tomography imaging (11).

Numerous authors have reported that there is a highly significant correlation between outcome and GCS score at admission (8,10,12). In our series it was observed that the proportion of patients with poor outcome increased with reducing GCS scores and the proportion of patients with functional recovery reduced with increased severity of head injury. Other authors have confirmed this finding (10,13).

Pupillary abnormalities have been associated with a poor prognosis. Damianos et al reported that patients with bilateral fixed pupils at surgery had favorable outcome, with a functional recovery rate of 25% and a mortality rate of 18% for patients with extradural hematomas (14). Haselsberger et al reported that the presence of anisocoria did not adversely affect the outcome unless it was associated with decerebrate rigidity or respiratory depression (12). A study conducted by Cohen et al reported 100% mortality in a series of acute EDH patients with mydriatic pupils for more than 70minutes (15). It has been widely documented that the timing of surgery is of prognostic significance in severely injured EDH patients (12,14). In our series, patients who were evacuated within 24 hours had 90.0% good recovery and 0% residual disability as compared to 85% and 10.3% of those evacuated more than 4 days after trauma. However, the mean time elapsing from accident to surgery was 6 days in our series, which is much longer than that reported in various other studies. Haselsberger et al documented a mean time elapsed of 2 hours, whereas Taussky et al reported a mean time of 3 hours (9,12).

The main limitation we encountered with our retrospective study design was a few incomplete data sets

Conclusion

One of the more easily modifiable variables that influences outcome is the time between trauma and decompression and we therefore we emphasize early decompression for extradural hematoma patients who have surgical indications to reduce risk of poor outcomes. Patients with a lower preoperative GCS score, pupillary abnormalities and those older than age 61 are at an increased risk of poor outcomes.

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