

Profiles and Outcomes of Head Injury at Nakuru Level 5 Hospital

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Abstract

Background: Head injury patients commonly present to our health facilities with the resultant morbidity, mortality and economic losses being enormous. This study aimed to document the causes, characteristics, current practices in diagnosis, management and the outcomes of head injury. **Methods:** A prospective descriptive study conducted at Nakuru level five hospital from January to November 2015. Descriptive patient data, clinical presentation, investigations, treatments offered and outcomes were captured using a questionnaire. **Results:** A total of 445 patients were recruited with a male preponderance at 88.7%. The mean age was 30.5 years. The commonest cause of injury was assault at 25.6%. Sixty-five percent (65.4%) of the patients had a mild head injury, 22.5% and 12.1% had moderate and severe head injury respectively. Fifty-four patients (12.1%) died and the

rest had varying degrees of recovery. A lower GCS, transfer into hospital, convulsions, otorrhoea, rhinorrhoea, loss of consciousness, presence of other injuries and admission to the ICU were associated with poor outcomes. **Conclusion:** The commonest causes of head injury are; violence /assault, pedestrians, motor cycle crashes, motor vehicle accidents and falls in reducing order amongst others. There's need for training to care givers on head injury at the Nakuru level five hospital.

Key words: Head trauma, Brain injury, Hematoma.

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Introduction

Worldwide head injury is a leading cause of death and disability; this is despite improvements in pre-hospital care, diagnostics and neuro critical care (1-3). In Kenya, 34.4 per 100,000 population die of road traffic crashes (WHO 2010) with up to thirty percent due to head injury. Head injury is reported to have accounted for 7% of all surgical admissions at the Nakuru level five hospital (4) and the mortality rate from severe head injury in Kenya is reported at 56-59 % of patients admitted (5-7). These data from central teaching hospitals with appreciable numbers of neurosurgeons are not necessarily applicable to peripheral hospitals where majority of the patients are managed by the general surgeons. Nakuru level five hospital is located along the major highway that is the northern corridor i.e. Nairobi- Eldoret highway. It also serves as the main

referral facility for the greater Nakuru being the only public health facility in the region with computerized tomography (CT) scan services and an intensive care unit (ICU). The pattern of traumatic brain injury and determinants of brain injury outcomes in the facility has not been recently documented. This study aims to document patient demographic statistics, clinical presentation data, investigations, surgical treatments offered and outcomes of head injuries at the hospital.

Methods

Design

An eleven months' prospective cross sectional descriptive study conducted at the Nakuru level five hospital for patients with a diagnosis of head injury.

Setting

The Nakuru level five hospital is a six hundred

and twenty-two bed capacity university teaching hospital and Nakuru County's referral hospital. It is situated in Kenya's Rift valley region along the North corridor. The hospital serves a population of 3.6 million inhabitants of the south rift region of the province but also attends to patients from Western, Nyanza, North Rift and Central parts of the country. It has four general surgeons who handle most of the general surgery cases in addition to the management of head injured patients.

Subjects

All patients admitted to the hospital with head injury during the study period were included in the study. A Glasgow Coma Scale of 13- 15, 9-12 and 8 and below was used to categorize patients into mild, moderate and severe categories respectively. Patients who had neurologic deficits, extra/intra axial hematoma more than 15 mm thick or causing a midline shift more than 5mm on CT scan had the hematomas evacuated. Patients whose injuries were deemed too severe to be handled in the facility were referred. Patient's demographic details, clinical presentation data, investigations, the surgical treatments offered and outcomes were the variables documented using a questionnaire administered by two qualified and practicing nurses. Data were coded and entered into a statistical package for social sciences version 21.0. Descriptive statistics were employed in analysis. Categorical data were analyzed by the chi square test and the Fischer's exact tests as appropriate and a *p* value of ≤ 0.05 was considered significant. The study was conducted after approval by the hospital's ethics and review board. Consent was obtained from the patients or the next of kin.

Results

There were four hundred and forty-five patients admitted within the study period with head injury. The proportion of direct and transfer admissions was 53.5% and 46.5 % respectively. There were 395 male patients and 50 female patients representing a male to female ratio of 8:1. The mean age was 30.5 (SD 16.7) years with a range (4-100 years). Majority of the injured were aged between 13 and 49 years (Figure 1).

The most common mechanism of head injury in males was related to violence where a person was struck by an unspecified weapon (25%).

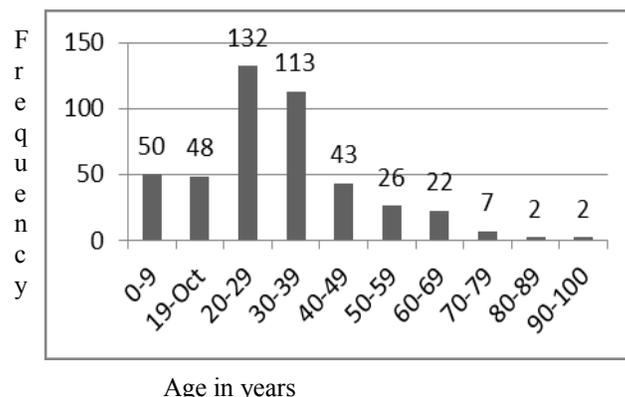
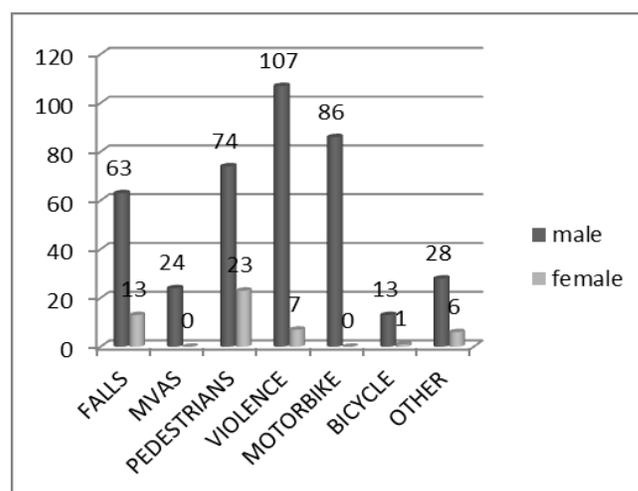


Figure 1: Age Distribution of Patients.

In females, domestic violence was the common mode of violence and it was perpetrated by a spouse. Motorcycle riders were the second largest group injured and were exclusively male (Figure 2). Approximately 19.5% of the patients had taken alcohol (by self-reporting and through subjective assessment of the clinician by detection of smell of alcohol in the patients' breath) Majority of them were male (95.4%). The proportion of patient with mild, moderate and severe head injuries were 65.4%, 22.5% and 12.1% respectively.



MVA; motor vehicle accident,

Figure 2: Gender vs. Cause of Brain Injury.

Majority of patients (69.6%) accessed hospital within twenty-four hours of injury. The rest had gone through other lower facilities before arriving in our hospital thus increasing delay. Approximately 10.8 % of patients reported a convulsion, while 82.7% had no convulsion. There was incomplete data in 7.1%. Seven percent and 58% of patients with mild and severe head injury reported a convulsion respectively (figure 3).

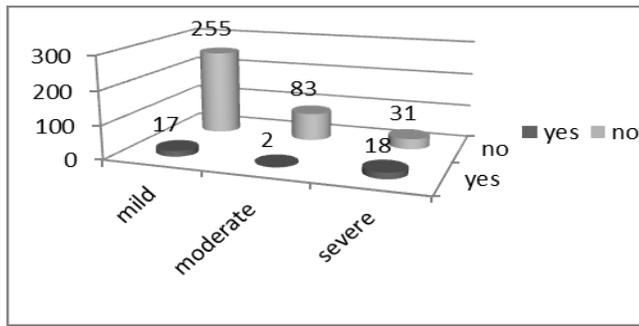


Figure 3: Comparison of convulsion and severity of Head injury

Transfer-in status ($p=0.003$), low GCS ($p<0.001$), loss of consciousness ($p=0.006$), presence of extradural hematoma ($p=0.016$), presence of contusions ($p=0.008$) and intracerebral hematoma ($p<0.001$) predicted the likelihood of developing a convulsion. (Table 1)

Table 1: Patient Characteristics vs. Convulsion Status

Patient Characteristics	Presence of Convulsion		P value
	Yes	No	
Sex			0.179
	Male	46	
	Female	3	43
Transfer into hospital status			0.003
	Yes	32	
	No	17	211
GCS			0.000
	Mild	17	
	Moderate	13	
	Severe	19	31
Cause of injury			0.643
	Falls	9	
	MVAs	2	
	Pedestrians	10	
	violence	17	
	motorbike	6	
	bicycle	1	
	Unknown	4	25
Otorrhoea			0.093
	Yes	9	
	No	40	327
Raccoon eye			0.350
	Yes	8	
	No	38	282
Loss of consciousness			0.006
	Yes	35	
	No	11	166
Rhinorrhoea			0.556
	Yes	3	
	No	21	345
Brain contusion			0.008
	Yes	12	
	No	37	327
Subdural hematoma			0.340
	Yes	9	
	No	40	309
Extradural hematoma			0.016
	Yes	8	
	No	41	341
Intracerebral hematoma			0.001
	Yes	9	
	No	40	344
ICU Admission			0.001
	Yes	6	
	No	42	351
Alcohol Intake at time of injury			0.319
	Yes	12	
	NO	10	111
GOS at discharge			0.000
	GOS 1	15	
	GOS 2	1	
	GOS 3	1	
	GOS 4	7	
	GOS 5	25	309

GCS, Glasgow coma scale; GOS, Glasgow Outcome Score; ICU, Intensive Care unit; MVA, Motor Vehicle Accidents.

The most common imaging modality utilized for these patients was skull x ray in 75 % of the patients. Cervical spine x rays were performed in 4.5% of the head injured patients. CT scan was utilized in 211 (47.5 %) patients. CT scans were utilized in 37.1% of mild

Table 2: Utility of Head CT scans in Head Injury

Severity of head injury	CT Scan done	CT scan not done	Total
Mild	108 (37.1%)	183 (62.8%)	291
Moderate	69 (69%)	31 (31%)	100
Severe	34 (62.9%)	20 (37.1%)	54
total	211	234	445

head injured and missed out in 37% of patients with severe head injury. (Table 2) Only two patients were investigated using MRI. Cranial ultrasound was the imaging modality utilized in two pediatric patients. There were 54 mortalities (12.1%), 4 patients (0.9%) remained in a vegetative state, 32(7.1%) patients recovered with various levels of disability while 355 (79.8%) patients had good recovery based on the Glasgow outcome score (GOS) at discharge (Table 2). Several factors including low GCS, transfer in status, convulsions, extradural hematoma, intracerebral hematoma, brain contusion, other injuries, and admission to the ICU were associated with poor outcomes (Table 2). However, 6 of the mild head injury patients and 10 patients with moderate head injury who were initially admitted with a good GCS died. Two mild head injured patients progressed onto vegetative state.

Discussion

This study confirms the high burden of head injury patients in Kenya. This number is notably high due to the geographic location of the hospital in an urban environment and on a major highway that is the northern corridor. Noting that, there were several episodes of industrial action during the study period by the hospital staff; this may have reduced the total number of patients attended to and the number could have been higher. Almost half of the patients were transferred into the hospital from the neighboring facilities. The Nakuru Level 5 Hospital is the only public health facility in the region with CT scan and ICU services both of which are necessary in the management of these patients. This study is in keeping with other studies that majority of head injured victims are young men (8-11). In the US the ratio of head injured men to women is 2:1(12, 13) while in our set up it is 7.9:1. The proportion of moderately and severely injured patients is higher than the 10 % reported in other jurisdictions (12, 13).

Table 3: Patient Characteristics and Glasgow Outcome Scores

Patient characteristics.		Death	Variable disability			Good recovery		P value
		GOS 1	GOS 2	GOS 3	GOS 4	GOS 5		
Sex	Male	44	2	4	24	321	0.031	
	Female	10	2	0	4	34		
Transfer into hospital	Yes	26	4	4	14	159	0.044	
	No	24	0	0	14	196		
GCS	Mild	6	2	0	13	270	0.000	
	Moderate	10	0	2	10	78		
	Severe	38	2	2	5	7		
Treatment offered	Burr holes	3	0	0	3	33	0.809	
	Craniotomy	3	0	0	0	10		
	Non surgical	36	2	4	24	297		
Convulsions	Yes	15	1	1	7	25	0.000	
	No	35	1	3	20	309		
Otorrhoea	Yes	17	3	1	5	26	0.000	
	No	35	1	3	25	324		
Raccoon eye	Yes	8	1	0	9	71	0.227	
	No	43	1	3	17	274		
Loss of consciousness	Yes	49	4	3	18	183	0.000	
	No	5	0	1	10	164		
Rhinorrhoea	Yes	10	1	1	1	14	0.000	
	No	42	2	3	27	335		
Other injuries	Yes	35	1	1	17	79	0.000	
	No	17	3	3	10	273		
Brain contusion	Yes	4	1	2	9	38	0.001	
	No	49	3	2	19	312		
Subdural hematoma	Yes	11	0	0	5	51	0.562	
	No	42	4	4	23	300		
Extradural hematoma	Yes	8	0	1	4	19	0.028	
	No	45	4	3	24	333		
Intracerebral hematoma	Yes	9	1	1	6	11	0.000	
	No	44	3	3	22	339		
ICU Admission	Yes	6	3	1	2	2	0.000	
	No	46	1	3	26	341		
Alcohol Intake at time of injury	Yes	14	0	0	5	68	0.573	
	No	10	1	2	10	105		
	Unknown	30	3	2	13	182		

This could be due to the fact that most patients are referred from other facilities which were more likely to refer severe cases. Convulsions are an important secondary insult to the brain. About 11% of our patients were reported to have convulsed at some point after head injury and this was associated with a subsequent poor outcome (table 3) This may strengthen the current practice of prophylactic anticonvulsants in head injured patients. Close to 48% (nearly half) of all the patients were imaged with a head CT scan. Noteworthy, however, is the indiscriminate use of CT scan in

patients who otherwise would not require it, with over 37% of mildly injured patients receiving CT scans far above, the recommended levels of below 25% (14-16). This however is a big improvement compared to a study at Aga Khan University Hospital where before they introduced the Canadian CT scan head rules, 95.2% of mildly injured patients underwent CT scans. This fell to 21.4% after introduction of the rules (14-16). While 62 % of patients with severe head injury had a CT scan, 38% missed out. It is widely expected that all patients with severe head injury would have been imaged using CT scan. Cervical spine x rays were done in a paltry 4.5% of patients. This may represent the low level of awareness of the fact that spine injuries accompany head injury and therefore missing these injuries could present a very poor outcome for the patient. Further education and policy direction will be needed to increase use of c spine X ray radiographs as well as halt the overuse of CT scans. Mortality was noted in 54 patients, they mostly had severe head injury, however the deaths, vegetative state and severe disability outcomes of patients initially classified as mild head injury is a cause for concern. One would expect good recovery Glasgow outcome scale for this subset of patients though mild head injured patients may rapidly progress to death as noted above. Additionally, 70.4% of severely head injured patients died. This figure is unacceptably high even within Kenya where 56-59% of this group of patients succumb as seen in previous studies (5-7). It probably indicates less than optimal management and follow up of these patients.

Conclusion

Head injured patients at Nakuru level five hospital are mostly young males in the third and fourth decades of life. The commonest causes of head injury are violence /assault, motor cycle crashes, motor vehicle accidents and falls; and alcohol is an enabler in these incidences. Poor outcomes noted reflect suboptimal patient care.

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