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Cranial injuries secondary to community mob assault

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Abstract

Background

Community mob assault is a significant social problem in the townships of South Africa. We aimed to evaluate the prognostic variables associated with cranial injuries secondary this mechanism of injury over a 2 year period in patients referred to a single Neurosurgical center.

Materials and methods

Descriptive cross-sectional data analysis of cranial injuries following community mob assault, from January 2015 to December 2016, was performed. Medical records were analyzed in terms of patient demographics and the subsequent continuity of care from initial patient referral to eventual discharge. The Outcome measure utilized was the Glasgow Outcome Scale (GOS).

Results

Of the 41 patients treated, 100% were male. Mean age was 30.5 +/-9.1 years. No statistical significance was demonstrated between age and GOS (p=0.94). Socioeconomic status revealed that 33 (81%) were unemployed and 8 (19%) were employed. Alcohol involvement was confirmed in 14 (34%) of subjects and excluded in 3 (7%) of subjects, however in 24 (58%) of subjects this was unknown. Only 3 (7%) of subjects has isolated head injuries while 38 (93%) had additional injuries. Severity of head injury analysis showed that 15 (41%) presented with mild head injuries, 20 (49%) presented with moderate head injuries, 5 (2.4%) presented with severe head injuries and 1 patient presented with a critical head injury. Statistical significance was demonstrated with outcome (p=0.02). Site of head trauma recorded showed that 11 (37%) of subjects had isolated parietal injuries, 9 (30%) had isolated frontal injuries, 4 (13%) had base of skull fractures and 5 (17%) had multiple sites of cranial injury. CT features showed that 9 (26.4%) of subjects had an acute subdural hematoma, 8 (24%) of subjects had an extradural hematoma, 7 (21%) of subjects had an intracerebral contusion and 4 (12%) had cerebral edema. At discharge 6 (14.5%) of subjects were GOS 1, 10 (24%) were GOS 3, and 6 (15%) were GOS 4. Only 19 subjects (46%) were GOS 5 at discharge.

Conclusion

The study revealed that secondary to Community mob assault 39% of subjects either demised or are so disabled they are dependent in their daily life due to physical or mental disability. Less than half (46%) of subjects resumed normal life post community mob assault. The severity of the head injury was found to be statistically significant in predicting outcome.

Keywords

Traumatic brain injury; Community assault; Group assailants

Introduction

Patients admitted to the Neurosurgical unit at our institution post Community mob assault are commonly severely injured and a considerable proportion of this group ultimately have an unfavorable outcome. Various factors such as poverty; socioeconomic inequality; perceived police injustice; and dissatisfaction in the reconciliation of a discriminative historical legacy have resulted in township communities increasingly deciding to take the law into their own hands. This community vigilantism constitutes an increasing social problem that carries with it not only significant consequences for the victimized individual and their family, but also places a considerable burden on limited hospital resources. While the link between socioeconomic stratification and risk of suffering a traumatic head injury post assault requiring admission has been confirmed, Further analysis has also shown geographic clustering in poorer communities increases risk when compared to more affluent communities [1]. There is currently no South African literature that exclusively considers the Neurosurgical outcomes of this patient group. The aim of this article is to highlight the serious head injuries associated with this mechanism of injury as well as document the neurological consequences these victims commonly face.

We analyzed cranial injuries secondary to community mob assault with reference to patient demographics, patient presentation, pattern of injury, and Glasgow Outcome Scale (GOS) at discharge in a series of patients treated at a single neurosurgical unit situated in the province of Gauteng, South Africa, over a 2 year period.

Methods and materials

This is a retrospective chart review of patients with cranial injuries as a result of community mob assault presenting to the Department of Neurosurgery at Dr George Mukhari Academic Hospital located located in Pretoria, Gauteng, South Africa. The study period was from January 2015 to December 2016. The study was granted approval by the Medical Research Ethics Committee of the Sefako Makgatho Health Sciences University reference SMUREC/M/38/2017:PG.

A total of 246 patients were referred to our Neurosurgical Unit during this period with traumatic brain injuries secondary to assault, of which 41 (17%) had been victims of community mob assault. In terms of referral of this community mob assault sample, 16 (39%) were referred from local hospitals, 8 (19.5%) were referred from local clinics, and 17 (41%) were referred from the scene of the assault. Our institutional policy keeps record whether a patient is employed or not for the process of billing as well as a patient's mechanism of referral. The referral doctor's letter or the attending Trauma doctor's assessment records whether the patient was intoxicated with alcohol at the time of presentation. In the same Emergency department the patient receives a full assessment and emergency treatment of their injuries. If indicated this includes a CT scan of their brain.

At our center these patients are commonly jointly managed by the Trauma department and the Department of Neurosurgery in view of the concomitant injuries these patients often incur requiring interdisciplinary care. The post resuscitation Glasgow Coma Score (GCS) is used to grade the severity of the head injury and is a corner-stone in our Neurosurgical evaluation of these patients. All patients with a GCS of 14/15 or below with/without the presence of an intracranial abnormality, and all patients with an intracranial abnormality on CT scan are admitted at our institution.

Patients with skull fractures are managed according to standard Neurosurgical principles namely elevation of closed depressed skull fractures or debridement and craniectomy of compound depressed skull fractures. Wound sepsis at presentation is a rarity as our patients are acutely referred and in the study population of 246 patients with traumatic brain injury (TBI) secondary to assault only 6 (2.4%) presented with wound sepsis. In the study sample of the 41 subjects whom incurred TBI secondary to community mob assault no patients presented with wound sepsis during the study period. At our institution patients with compound skull fractures are placed on antibiotic prophylaxis for 72 hours to prevent the development of wound sepsis. With regards compound skull fractures this prophylaxis comprises gram positive cover using intravenous cloxacillin 1g administered 6 hourly, gram negative cover using intravenous ceftriaxone 1g administered 12 hourly and anaerobic cover with intravenous metronidazole 400mg 8 hourly. If the patient is taken to the operating room this is changed to a first generation cephalosporin namely intravenous cephazolin 1g administered 8 hourly for 3 days. We rarely encounter a problem with this regimen however will readjust according to pus swab culture and susceptibility results if indicated. Patients with closed injuries only receive prophylaxic antibiotics if managed operatively and this comprises a first generation cephalosporin namely intravenous cephazolin 1g administered 8 hourly for 3 days.

With regards post-traumatic seizure prophylaxis all patients with depressed skull fractures, extradural or acute subdural hematomas, intracerebral hematomas or intracerebral contusions are loaded with intravenous phenytoin 15mg/kg in 200ml saline over 20-30 minutes (50mg/minute) to prevent early post-traumatic seizures. Post loading these patients are given intravenous phenytoin 100mg 8 hourly. This seizure prophylaxis is continued for 7 days and stopped if no seizures develop.

At our institution we are particularly aggressive when a dural breech is suspected and this is considered a Neurosurgical emergency. Clinically this is confirmed when cerebrospinal fluid or brain matter is oozing form the head wound, and radiologically this is suspected when pneumocephalus, indriven bone or a subdural abscess is present. These patient are urgently taken to the operating room for surgical exploration and dural repair.

The presence of a skull fracture is commonly associated with an extradural hematoma [2] which may or may not require management in its own right which we determine according to the 2007 Brain Trauma foundation guidelines [3]. Here a volume exceeding 35ml, a maximum thickness exceeding 15mm or midline shift of 5mm or greater are immediate surgical indications. If not meeting these criteria a patient is routinely re-scanned 6 hours later and a decision for operative or conservative management is made according to these same rules [3]. The presence of an acute subdural hematoma is managed according to a completely different set of guidelines as dictated by the 2007 Brain Trauma Foundation guidelines. Here an acute subdural hematoma of 10mm thickness or greater, or midline shift of 5mm or greater is managed surgically irrespective of the admission GCS. An acute subdural hematoma of less than 10mm thickness or midline shift of less than 5mm is managed surgically if there is a drop in GCS of 2 or more points from injury to presentation, the patient presents with lateralizing signs for example anisocoria, or the intracranial pressure is more than 20mmHg [3]. In acute subdural hematomas that are managed conservatively by not meeting the above guidelines we routinely repeat the CT brain 12 hours later and reassess the surgical indications according to the same set of rules.

In this study data captured included patient demographics, patient referral pattern, presence of alcohol intoxication at presentation, presence of wound sepsis at admission, post resusitation Glasgow Coma Scale, Computerized Tomography (CT) scan findings and GOS at discharge.

Results

A total of 41 patients with cranial injuries secondary to community mob assault were treated from January 2015-December 2016. All of the patients treated were male. The mean age was 30.5 +/- 9.1 years, the median age was 28 years, and the youngest patient was 17 years old and the oldest patient was 55 years old. Although not statistically significant (p=0.94) a trend was demonstrated where the highest proportion of the GOS 1 (deceased) group were 21-30 years old. In terms of referral 16 (39%) of patients were referred from local hospitals, 8 (19.5%) were referred from local clinics, and 17 (41%) were referred from the scene of the assault. A clinical trend was demonstrated whereby the highest percentage of GOS 1 (deceased) were referred from the scene of the assault and the highest percentage of GOS 5 were referred from local clinics. This was however not statistically significant (p=0.19). Looking at the socioeconomic status of subjects, 33 (81%) were unemployed and 8 (19%) were employed. There was no statistical significance demonstrated between socio-economic status and GOS (p=0.36).

Alcohol involvement was confirmed in 14 (34%) of subjects and excluded in 3 (7%) of subjects, however in 24 (58%) of subjects this was unknown. No statistical significance could be determined as in the majority of subjects alcohol status on admission was unknown (p=0.42).

Only 3 (7%) of subjects has isolated head injuries while 38 (93%) had additional injuries. A clinical trend was demonstrated where in the GOS 1 (deceased) group 100% of subjects had a cranial injury and additional injuries. This was however not statistically significant (p=0.63).

Severity of head injury analysis showed that 15 (41%) presented with mild head injuries, 20 (49%) presented with moderate head injuries, 5 (2.4%) presented with severe head injuries and 1 patient presented with a critical head injury. In GOS 5, 19 (100%) of subjects presented with mild/moderate head injuries while in GOS 1 (deceased) group 3 (50%) of subjects had severe/critical head injuries. Statistical significance was demonstrated between the severity of the post resusitation GCS used at a measure of the severity of the head injury and GOS (p=0.02).

Site of head trauma recorded showed that 11 (37%) of subjects had isolated parietal injuries, 9 (30%) had isolated frontal injuries, 4 (13%) had base of skull fractures and 5 (17%) had multiple sites of cranial injury. A trend was demonstrated in the GOS 1 (deceased) group where 3 (75%) of subjects had multiple sites of cranial trauma while in GOS 5 group 11 (68%) of subjects had either an isolated frontal or isolated parietal injury. No statistical significance was however demonstrated between site of cranial injury and patient outcome (p=0.12).

CT features showed that 9 (26.4%) of subjects had an acute subdural hematoma, 8 (24%) of subjects had an extradural hematoma, 7 (21%) had an intracerebral contusion and 4 (12%) had cerebral edema. A clinical trend was demonstrated where in the GOS 1 (deceased) group, while 4 (67%) of subjects had either an acute subdural hematoma or contusion, while in the GOS 5 group the highest percentage of subjects had an extradural hematoma. No statistical significance was however demonstrated between type of intracranial pathology and GOS (p=0.32).

At discharge 6 (14.5%) of subjects were GOS 1 (deceased), 10 (24%) were GOS 3, and 6 (15%) were GOS 4. Only 19 subjects (46%) were GOS 5 at discharge. The study reveals that secondary to Community mob assault 16 (39%) of subjects either demised or are so disabled they are dependent in their daily life due to physical or mental disability. Only 19 (46%) of subjects resumed normal life post community mob assault.

Discussion

Looking at patient demographics the study result that all 41 (100%) of the subjects who fell victim to community mob assault were male is a typical finding echoed in another South African study that considered cranial injuries secondary to machete injuries where 93% of subjects were male [4]. An Australian study that considered traumatic brain injury secondary to assault supports this were 97% of the subjects were male [5]. The study result that the mean age of subjects was 30.5 years is another typical finding seen in the above South African study [4]. This finding that a significant number of subjects are unemployed is supported by a study done in Wales where socioeconomic geographic clustering was evaluated in relation to the risk of suffering a traumatic brain injury secondary to assault [1]. In this study the highest clustering existed for residents of the poorest communities [1].

Considering alcohol intoxication at the time of presentation it must be noted that at our institution no actual blood alcohol measurement was done and hence the note of whether or not there appeared to be alcohol involvement is the subjective opinion of the attending Doctor. This is a study limitation regarding this finding as for example diabetic ketoacidosis can give a similar odour to a patient's breath. The association between alcohol intoxication and the risk of suffering a traumatic brain injury secondary to assault is however clearly established in the literature as put forth in the above Australian study that specifically considered this variable and noted that in 73% of cases of traumatic brain injury secondary to assault the use of alcohol was confirmed [5]. Alcohol use increased an individual's chance of being both the aggressor and victim [5].

Our study finding noting the significant role that the post resuscitation severity of head injury grading makes in prognosticating patients post traumatic brain injury finds extensive support in the literature [6;7]. Major studies such as the International Mission for Prognosis and Analysis of Clinical Trials in Traumatic Brain Injury (IMPACT study) which identified prognostic variables determining outcome in Traumatic Brain Injury identified severity of head Injury as a major determinant in outcome [7].

The study finding that Isolated frontal or parietal injuries resulted in the greatest chance of an individual having a favorable outcome is supported by the literature [8]. The frontal area of the brain is an area that can accommodate considerable mass lesions before neurological deterioration [8] as opposed to multiple area involvement as would for example accompany an acute subdural hematoma which due to the lack of anatomical barriers would expand within the subdural space to involve the frontal temporal and parietal areas simultaneously [8].

The study finding noting the prognostic significance of the type of abnormality seen on the CT scan whereby a poorest prognosis associated with an acute subdural hematoma and the most favourable prognosis associated with an extradural hematoma is supported extensively in the literature. Marshall's landmark paper looked specifically at the odds ratio in terms of predicting outcome based of the presence of each of these lesions and found that while the presence of an acute subdural hematoma carries with it a mortality rate of 50%, The presence of an extradural hematoma carries with it a mortality rate of 18% [9]. The IMPACT study also found an acute subdural hematoma to carry with it an independent poor prognostic predictive value [7]. An acute extradural hematoma on the other hand carries with it a much more favorable predictive outcome [7].

In our study no patients had a Glasgow Outcome Score of 2 and this is explained by the fact that a GOS of 2 indicates a patient whom is in a persistent vegetative state. These patients need continuous specialized nursing care as they cannot provide for any of their needs. Our institution does not have a step-down facility and the patient's family are often unable to care for the individual in the home environment. These patients hence remain in our ward where they are either optimized to a GOS of 3 and they can be discharged or they become part of the deceased group (GOS 1) secondary to complications such as drug resistant lower respiratory tract infections or systemic sepsis.

In conclusion our study aimed to evaluate the impact that community mob assault has on an individual who falls victim to this devastating mechanism of injury. The study revealed that secondary to Community mob assault 39% of subjects either demised or are so disabled they are dependent in their daily life due to physical or mental disability. Less than half (46%) of subjects resumed normal life post community mob assault.

Declaration

We the authors declare that this article has not been published previously, nor is it under consideration for publication elsewhere, and that, if accepted, will not be published elsewhere in the same form, in English or in any other language, without the written consent of the publisher

Conflict of interest

We the authors listed have no conflicts of interests with regards to material contained and disseminated in this article.

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