

AETIOLOGICAL PATTERNS AND MANAGEMENT OUTCOME OF PAEDIATRIC HEAD TRAUMA: ONE-YEAR PROSPECTIVE STUDY

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ABSTRACT

Background: Trauma is the most common cause of paediatric deaths. In 75% of paediatric trauma deaths, head injury is responsible, and most are from falls. Recent reports from Nigeria, however, appear to indicate a predominance of road traffic accidents, instead of falls.

Objective: To evaluate the aetiology of paediatric head trauma, management protocols and outcome from our Centre, in order to acquire a baseline data base and recommend measures to reduce childhood trauma.

Patients and Methods: A prospective study of all paediatric head trauma cases presenting to Nnamdi Azikiwe University Teaching Hospital, Nnewi, for 12 months from April 21, 2006 to April 20, 2007, was done and collated data subsequently analyzed. The paediatric age group was taken as ≤ 15 years, and grading of head injury was with the Glasgow Coma Scale (3-15) and the modified scale for non-verbal children; while outcome was measured with the Glasgow Outcome Scale (1-5).

Results: Out of 334 patients treated within the period of study, 210 were head trauma cases. Of these, 52 were paediatric head trauma, representing 24.8% of all head trauma cases; and 19.2% (10 of 52) of them were aged 0-2 years. About 62% (32 of 52) were males. Falls and RTA were each responsible in 25 (48.1%) cases. Mild head injury occurred in 31 (59.6%), and 49 (94.2%) patients were evaluated by plain radiography. Treatment was conservative in 39 (75%) cases; with satisfactory outcome in 36 (69.2%), and a mortality rate of 15.4%.

Conclusions: Road traffic injury, mostly from motorcycles, has become the major cause of morbidity and mortality amongst the paediatric age group, especially the male gender, and outcome from management is mostly satisfactory.

Key Words: Head injury, Motorcycle, Road, Radiography, Traffic

(Accepted 8 July 2009)

INTRODUCTION

Trauma is the most common cause of death in children (and in adults aged less than 45 years), and head injury is the most common cause of paediatric trauma death in children aged 1 year and above^{1,2}. In 75% of paediatric trauma deaths, head injury is responsible³. Worldwide, paediatric head trauma is predominantly caused by falls at home down the stairs, off baby-walkers, from beds or down the railings^{4,5,6}. In Nigeria, however, recent reports are suggestive of paediatric trauma deaths arising mostly from road traffic accidents^{7,8}.

In the South-East zone of Nigeria, neurosurgical services were recently commenced in one of the tertiary health institutions. We undertook a prospective study of the patterns of paediatric head trauma to determine the baseline data, evaluate our management protocols and outcome from them, and suggest ways to reduce head injury in our children. Our Centre is located in a sub-urban commercial

community, with facilities for medical and paramedical training, both at the undergraduate and postgraduate levels. It is presently the only public health institution in the South-East zone that offers neurosurgical services.

PATIENTS AND METHODS

All head trauma patients aged ≤ 15 years treated in our service in 12 months from April 21, 2006 to April 20, 2007, were prospectively recruited for the study from the point of presentation to the time of discharge and follow-up in the out-patient department. Every patient that was referred to the Neurosurgical Unit with head injury was included in the study, while those treated and discharged in the Accident/Emergency and Outpatient Units without neurosurgical referral were excluded. Grading of injury was with the Glasgow Coma Scale (GCS) mild injury GCS 13-15, moderate 9-12 and severe 3-8. The modified scales for verbal and non-verbal children were employed as appropriate. Cranial imaging was with plain radiography for every patient with neurological deficits, and Computerized

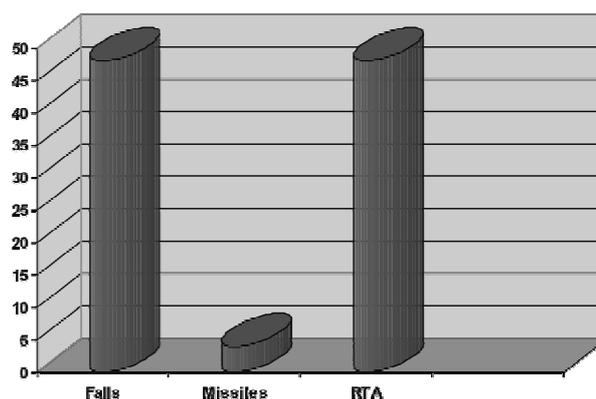
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Tomography was requested for those with persistent lateralizing signs, progressive neurological deficits, open head injury, fluctuating levels of consciousness and persistent coma, although only those who could afford it eventually had the scan. Basal skull fractures were diagnosed clinically with the presence of epistaxis, haemotympanum, rhinorrhoea, otorrhoea, periorbital ecchymosis and/or subconjunctival haemorrhage as well as opacification of paranasal sinuses on plain radiography. The indications for surgery were compound depressed skull fractures, intracerebral haematoma, subdural and extradural haematomata, and impacted intracranial foreign body. Outcome grading was with the Glasgow Outcome Scale (GOS) good outcome GOS 5, moderate deficits GOS 4, severe deficits GOS 3, persistent vegetative state GOS 2, and death GOS 1.

RESULTS

Out of a total of 334 patients treated in the first year of commencing neurosurgical services in our Centre, 62.9%(210) were from head trauma, and 24.8%(52) of them were in the paediatric age group, males were 61.5%(32). The youngest was 9months with a fall from height, whereas the oldest was 15 years and sustained a missile injury (flying stone). Overall, falls were the aetiological factor in 48.1%(25), RTA 48.1%(25) and missiles 3.8%(2), see figure 1. About 72%(18/25) of the RTA was pedestrian. Nearly 60%(31) had mild injury, 13.5% moderate and 26.9% severe. Persisting neurological deficits despite full resuscitation and recovery of consciousness was the most frequent presentation in traumatic brain injury 40.4%(21), followed by full neurological recovery after transient impairment in sensorium 38.5%(20); and then, scalp injury 23.1%(12). There were associated skull fractures in 36.5%(19), and most were basal fractures 23.1%(12) followed by depressed 7.69%(4) and linear 5.77%(3). Imaging was with plain skull radiography (antero-posterior, lateral and Towne's views) in most cases 94.2%(49), Computerized Tomography (CT) in 15.4%(8); whereas treatment was non-operative in 75%(39) and operative in 15.4%(8). Outcome was good (GOS 5) in 69.2%(36), moderate deficits 1.92%(1), severe deficits 1.92%(1), persistent vegetative state 1.92%(1) and death 15.4%(8); 5 (9.62%) opted for treatment outside our facility, see table 1.

Figure 1: A bar chart showing the aetiologic factors of paediatric head trauma in our Centre.



DISCUSSION

With an equal number of incidents of RTA as falls, our findings appear to be at variance with previous reports by several other workers like Bruce (USA), Ingebrigtsen (Norway) and Greenes (USA)^{4,5,6}, see figure 1. However, it appears to corroborate other local reports from Nigerian workers like Odebode (Ilorin) and Adesukanmi (Ile Ife)^{7,8}, thereby confirming a peculiar trend where the roads in Nigeria have become the most dangerous places for children. Why would children die mostly on our roads?

Bad roads, rickety vehicles, weak enforcement of road traffic regulations and bad driving habits are the major reasons. The driving culture in our country to a significant extent appears to disrespect the rights of our children, as drivers and riders appear to ignore the immature judgment of children generally, and specifically, in terms of road usage, see figure 2. Worse still, a significant number of these vehicular operators appear not to have been properly licensed.

Table 1: Outcome from treatment using the Glasgow Outcome Scale (GOS).

Outcome (GOS 1 – 5)	No.	%
Good (GOS 5)	36	69.2
Moderate Outcome (GOS 4)	1	1.92
Severe Neurological Deficits (GOS 3)	1	1.92
Persistent Vegetative State (GOS 2)	1	1.92
Death (GOS 1)	8	15.4

As they play about their daily lives, return home from church or school, or set about the daily business of hawking on the streets in some unfortunate cases, children get knocked off the roads as careless drivers, sometimes under the influence of alcohol, using rickety vehicles, meander their ways through potholes and crevices on our dilapidated roads. It is very indicting to note that pedestrian accidents make up the majority (72%), with much fewer passenger accidents (28%), a ratio of 2.6:1 in this study. Majority of these were motorcycle accidents 30.8%, whereas 17.3% were motor vehicular.

In their separate reports, Adogu, Falope and Oginni working independently at different Centres in Nigeria concluded that (besides bad roads) illiteracy, inadequate training and inadequate knowledge of road safety measures like crash helmets among Nigerian commercial motorcyclists appear to have contributed remarkably to the phenomenal rise in motorcycle crashes involving all age groups, including infants^{9,10,11}, see figure 3. The preponderance of the male gender in this report, a ratio of 1.6:1, is in keeping with previous observations in all forms of trauma, not least, in head trauma^{12,13}. Bener (2.3:1), Shokunbi (1.8:1), Routledge (2:1), Odebode (1.8:1) and others, all had a male preponderance^{14-16,7}. Most of our cases were mildly injured (59.6%), in keeping with Odebode, Adesukanmi, Bener, Shokunbi, Cseperegi and others' reports^{7,8,14,15,17}; and imaging was mainly with plain radiography which usefulness has been questioned by some previous reports^{18,19}.

We did not find plain radiography helpful in most of our cases, since the majority was managed conservatively, and even amongst those treated operatively the main indications for intervention were neurological deterioration and/or CT findings. Of the 94.2% that had radiography, only 9.62% eventually needed operative treatment. These findings appear to give further credence to previous reports by Toupin and others, that plain radiography has minimal value in the management of paediatric head trauma, especially in mild injuries^{20,19}. And we are inclined to agree with this position in the management of head injuries. In fact, in the latest protocols of our service, we no longer image head trauma children routinely, unless there is a severe or open head injury or both.

We had good outcome in majority of cases 69.2% (36), and the mortality rate of 15.4% is only marginally higher than Greenberg's 10-13% report²¹, see table 1. There was one case (1.92%) each of moderate deficits, severe deficits and persistent vegetative state. Being a new Centre, with fledgling facilities, and workers who are adjusting to the stringent demands of neurosurgical trauma care, we expect to lower the mortality rate in subsequent

series as our services and facilities improve.

It is worth noting that 62.5% of the deaths resulted from RTA (mainly motorcycle accidents), corroborating the findings in Johnstone's large series in the United Kingdom, where RTA accounted for 84% of the deaths². This further exposes the massive contribution of RTA to paediatric trauma morbidity and mortality in our Centre.

CONCLUSION

Road traffic injury, mostly from motorcycles, is the major cause of morbidity and mortality amongst the paediatric age group, especially the male gender, in our service. Though most are mildly injured, with favourable outcome, the avoidable mortality burden warrants an urgent effort to provide modern imaging facilities in our neurosurgical centres to aid accurate diagnoses. There is also an enormous need for the review of the traffic laws of the country, and enforcement of stringent sanctions on erring vehicular operators by the government in order to protect this very vulnerable age group, and enforce one of their fundamental human rights the right to safe living.

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