Epidemiology of open tibial fractures in a Teaching Hospital

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Abstract

Background: Open tibial fracture is a common orthopaedic challenge in Nigeria with adverse economic implications. The aim of study is to investigate the epidemiology of the problem.

Methods: This is a prospective observational study of all open tibial fractures seen at the Accident and Emergency department of the University of Port Harcourt Teaching Hospital (UPTH) over a twelve-month period (July 2002- June 2003). Data from a pre-designed proforma for the study was analyzed and descriptive statistics of the epidemiology is presented.

Results: Seventy-two open fractures were seen in 70 patients. The male to female ratio was 2.5:1 and the peak age incidence was in the 20-29 years age group (38.6%) followed by the 30-39 years age group (31.4%). The extremes of age were least affected. Road accidents constituted most of the injuries (91.4%), of which 51.5% was motorcycle related. The passenger was the most at risk of injury (56.3%). Gustilo and Anderson type III open injuries were the most frequent followed by the type II injuries.

Conclusion: The burden of open tibial fractures in Nigeria is significant. Most fractures of the tibia are open and results from high-energy injuries. They are usually associated with other injuries, which are the major contributors to morbidity and mortality. Poverty and lack of social infra structures are contributory factors.

Key words: Open tibial fractures, Epidemiology, Road accidents, Motorcycle accidents, Safety legislation

Introduction

The tibia is predisposed to injuries because of its subcutaneous disposition in its anteromedial surface. Trauma and particularly road traffic accidents cause the bulk of these injuries. Unfortunately, the young and economically active males are the most at risk group.

The evolving management strategies and consequent controversies make open tibial fractures a challenging area of interest amongst orthopaedic/trauma surgeons.

These injuries are common in the Niger Delta region of Nigeria due to the attendant high human and vehicular traffic consequent upon oil exploration and exploitation in the area.

The aim of this study is to establish the epidemiology of these fractures including determinants, and distributions using a hospital-based observational and prospective analysis of open tibial fractures seen at the University of Port Harcourt Teaching Hospital (UPTH).

Patients and Methods

This is a 12-month prospective, hospital-based and observational study from July 2002 to June 2003. Data on demography, aetiology and pattern of presentation from patients with open fractures of the tibial were entered into a proforma designed for the study. Statistical Package for Social Sciences (SPSS) software version 10.0 was used for analysis. Result is presented with bar charts and multi way frequency tables. Cross tabulations were done to reveal associations with statistical significance. χ² was used for differences between non parametric categorical variables while analysis of variance (ANOVA) was used for differences between variables within same group. Results with p value < 0.05 were accepted as significant.
Results

During the 12-month period under study, 548 patients presented with various fractures in the Accident and Emergency department of University of Port Harcourt Teaching Hospital, Nigeria. Of these, 105 fractures involved the tibia of which 72 were open in 70 patients.

There were 50 males and 20 females giving a male to female ratio of 2.5:1. The most affected age group was 20-29 years [n=27 (38.6%)] followed by the 30-39 group [n=22 (31.4%)]. The extreme ages were least affected (Figure 1). Students were most predisposed to the injury [n=23 (32.8%)] followed by manual workers and petty traders [n=21 (30%)]. Professionals and business executives were the least affected [n=2 (2.9%)] [Table 1].

Figure 1. The age distribution of patients with open tibial fractures

Table 1. Occupational distribution in open tibial fractures

<table>
<thead>
<tr>
<th>Occupation</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual Workers &amp; Traders</td>
<td>21</td>
<td>30</td>
</tr>
<tr>
<td>Cyclists &amp; Drivers</td>
<td>8</td>
<td>11.4</td>
</tr>
<tr>
<td>Civil Servants &amp; Clerical Workers</td>
<td>16</td>
<td>22.9</td>
</tr>
<tr>
<td>Executives &amp; Professionals</td>
<td>2</td>
<td>2.9</td>
</tr>
<tr>
<td>Students</td>
<td>23</td>
<td>32.8</td>
</tr>
<tr>
<td>Total</td>
<td>70</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 2. Classification of the injuries (Gustilo & Anderson)

<table>
<thead>
<tr>
<th>Class</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type I</td>
<td>20</td>
<td>28</td>
</tr>
<tr>
<td>Type II</td>
<td>24</td>
<td>33</td>
</tr>
<tr>
<td>Type III A</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>Type III B</td>
<td>16</td>
<td>22</td>
</tr>
<tr>
<td>Type III C</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 3. Associated injuries of tibial fractures

<table>
<thead>
<tr>
<th>Body Part</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Long Bones And Pelvis</td>
<td>13</td>
<td>18</td>
</tr>
<tr>
<td>Head and Neck</td>
<td>16</td>
<td>22.2</td>
</tr>
<tr>
<td>Chest</td>
<td>2</td>
<td>2.8</td>
</tr>
<tr>
<td>Abdomen</td>
<td>3</td>
<td>4.2</td>
</tr>
<tr>
<td>Fibula</td>
<td>55</td>
<td>76.3</td>
</tr>
<tr>
<td>Others</td>
<td>22</td>
<td>30.6</td>
</tr>
</tbody>
</table>
Road traffic accidents / collisions (RTA) was the agent of trauma involving majority of the patients \([n = 64 \ (91.4\%)]\) followed by assaults \([n = 3 \ (4.3\%)]\), gunshot injuries \([n = 2 \ (2.8\%)]\) and falls \([n = 1 \ (1.4\%)]\). The RTA role was statistically significant \((P < 0.05)\) when compared with other causes. Most of the RTA were motorcycle related \((51.4\%, n=38)\) while car collisions affected 24 patients \((32.4\%)\). The passenger either in cars or pillion rider on motorcycle was more at risk of being injured \([n = 36 \ (56.3\%)]\) followed by the pedestrians \([n = 20 \ (31.2\%)]\) while the drivers /cyclists were the least affected \([n = 8 \ (12.5\%)]\). There was a significant seasonal variation of the injuries. April to October contributed 40 cases \((57\%)\), which was statistically significant \((P < 0.05)\) when compared to the rest of the year. There was a second seasonal peak in December \([n = 11 \ (15.7\%)]\) \(\text{[Figure 2]}\).

The left leg was more injured \([n = 44 \ (61.1\%)]\) than the right leg \([n = 26 \ (36.1\%)]\) and in one patient, the injury was bilateral. Gustilo & Anderson Type III open injuries were commonest \([n = 28 \ (39\%)]\) followed by type II injuries \([n = 24 \ (33\%)]\) while 20 of the injuries were type I \((28\%)\) \(\text{(Table 2)}\).

Injuries to other body regions commonly associated with open tibial fracture were those of the head, neck and spine, \(n = 16 \ (22\%)\), long bones and pelvic fractures, \(n = 13 \ (18\%)\). There was an associated fibular fracture in 76 \%(n = 55) of the cases \(\text{(Table 3)}\).

**Discussion**

Open tibial fracture is a significant challenge in the environment because they are easily infected, slow to heal and there is a dearth of facilities for adequate medical care \(\text{[2,4,11,12]}\).

The male as it is in most places was more affected \(\text{[2,5,13,14]}\) with a male to female ratio of 2.5:1. This male preponderance is said to be due to higher activity and higher increase in exposure to accidents \(\text{[2,3,13,16]}\).

Majority of the victims in this study were in the lower income class, students constituted 32.8\%, traders and manual workers 30\% while civil servants and clerical workers 22.9\%. This agrees with findings of Alabi in Ilesha \(\text{[2]}\). A large proportion of the injuries \((91.4\%)\), resulted from RTA, conforming with the findings in other studies in Nigeria \(\text{[4,16,17]}\) and other parts of the world \(\text{[1]}\). The lower income earners usually ride as pillion passengers on commercial motorcycles as it is easily available and more affordable \(\text{[4,13]}\). This may explain why the lower income earners are more at risk of these fractures when compared to professionals and business executives who own their own cars.

The passenger had the highest risk of being injured \([56.3\% \ (n = 36)]\) followed by pedestrians \([31.2\% \ (n = 20)]\) while the driver /cyclist had the lowest risk of injury \((2.5\%, n = 8)\). This is different from the findings in the series by Kumar et al \(\text{[22]}\) which showed that the lower pedestrian is the least likely to be injured. International comparisons show that most developed countries have a pedestrian death rate of approximately two per 100,000 population \(\text{[22]}\). Sevitt in Birmingham reported predominantly pedestrian injuries \(\text{[21]}\). Apart from the fact that more passengers occupy a vehicle with a single driver/cyclist, drivers usually spot oncoming dangers first and react faster to avoid it. In addition, the drivers use seat belts in this country and the cyclists have an extra support from the handle of the motor bike \(\text{[2,18,24]}\). These factors decrease the driver /cyclist injuries leaving other road users more at risk.

Two seasonal peaks were observed in injury distribution. The first from April to October accounts for 57\% of cases and December with 15\% contribution. The first peak occurs in the rainy season with worsening state of the roads and reduced visibility. Previous studies agree with this finding in Nigeria \(\text{[4,18,24]}\). The second seasonal peak is during the end of year festivities with characterized by drunkenness, recklessness and heavy traffic in the cities and highways \(\text{[4,15,24]}\) which stresses Onabowale's perception that 80\% of road accidents are attributable to human errors \(\text{[25]}\).

In this series, open fractures of the tibia were mostly of the severe type. The severity of these injuries is a consequence of high-energy dissipation at impact. This is a product of high speed, which most of the time is due to recklessness and occasionally due to intoxication \(\text{[2,13,16]}\).
commonest associated injury by virtue of proximity was a fracture of the fibula either at same level or at different level. This compares with a previous study in Calabar. Fifty-six (78%) of the fractures were associated with a spectrum of injuries ranging from minor bruises to severe head injuries. Head and spine injuries constituted the commonest cause of mortality which is similar to the findings of the Mersey Region Study on injury pattern from road traffic collisions and another on motorcycle accidents in Port Harcourt. Most of these accidental tibial fractures are preventable especially by adopting established road safety measures.

Conclusion

Open tibial fracture is a significant challenge in Port Harcourt and its environ. The young and economically active males are the most at risk. These tibial fractures tend to be very severe, and afflict mainly the low-income earners. Morbidity and mortality from these injuries increases in the presence of associated injuries. Road traffic accidents being the main cause of the injuries could be reduced by road safety legislation / enforcement and improvement in the quality of roads.

References

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