

## Lower Limb Injuries Arising From Motorcycle Crashes

\*Kortor JN, \*\*Yinusa W., \*Ugbeye ME

\*College Of Health Sciences, Department Of Surgery, Benue State University , Makurdi \*\*National Orthopaedic Hospital, Lagos

### Abstract

**Background:** Motorcycle accidents are the second most common cause of road traffic accidents in both developing and developed countries. In this study we aim to look at the pattern and characteristics of lower limb injuries arising from motorcycle accidents and evaluate early outcome of treatment.

**Methods:** All the patients with lower limb injuries arising from motorcycle accidents who presented in our hospital between 1<sup>st</sup> October 2006 and 30<sup>th</sup> September 2007 were reviewed. History was obtained and detailed examination was done after resuscitation to determine the site, nature and the characteristics of injuries. Definitive treatment (conservative or operative) given was based on the pattern and type of injuries.

Patients were followed up in the clinic for both clinical and radiological review. Functional outcome assessment was commenced after the onset of weight bearing. The data were recorded on a designated proforma and analyzed using a statistical programme.

**Results:** A total of 429 motorcycle accident victims were seen during this period and lower limb injuries represented the commonest type of injury (238, 55.5%). Male: female ratio was 2.2:1 with a mean age of 43.1 years. Fractures were the commonest lower limb injuries (73.4%) and closed fractures were commoner than the open fractures. The commonest anatomical location of fractures in lower limbs was tibial shaft. Joint stiffness was found to be the commonest post treatment complication.

**Conclusion:** Lower limb injuries represent the commonest form of injuries among the motorcycle accident victims. Fractures were the commonest type of injury seen and the most common location was shaft of tibia.

**Keywords:** Motorcycle, Accident, Lower limbs, injuries, fractures, Joint stiffness

Date Accepted for Publication: 1<sup>st</sup> September 2010

Niger JMed 2010: 475 - 478

Copyright©2010 Nigerian Journal of Medicine

### Introduction

Motorcycle accidents are the second most common cause of road traffic accidents in both developing and developed countries<sup>1,2</sup>. Both the case fatality and the injury rate are higher in motorcycle accidents than automobile accident<sup>3</sup>. According to the UK Department of Transport figures from 1983 to 1993, there is a much higher death rate per mile when riding a motorcycle compared to any other commonly used mode of transport. Riding a motorcycle has twice the death rate compared to riding pedal cycle, 24 times the death rate of driving a car and 515 times the rate of air transport respectively<sup>4</sup>. Motorcyclists represent a vulnerable breed of road users. They are often missed or not noticed by other drivers due to relatively small size compared to other vehicles<sup>5,6,7</sup>.

Lower limb injuries are among the most common injuries sustained by motorcycle riders in crashes and often may lead to extended and costly medical treatment and permanent disabilities<sup>8,9,10,11</sup>. Fractures of the lower limbs from motorcycle accidents are more serious and significantly more likely to become complicated<sup>12,13,14</sup>. Permanent effects of lower limb injuries range from decreased weight bearing capability to permanently restricted activity because of joint damage or traumatic arthritis<sup>8,15,16,17</sup>. Because motorcycle accident injuries occur overwhelmingly among the young, disability represents many cumulative years of limited activity.

This study aimed to assess and characterize lower limb injuries arising from motorcycle accidents, evaluate early outcome of management and suggest possible counter measures.

### Patients And Methods

This is a prospective study of all the motorcycle accident victims with lower limb injuries who presented at Emergency department of the National Orthopaedic Hospital, Lagos (NOHL) for treatment between 1<sup>st</sup> October, 2006 and 30<sup>th</sup> September, 2007

All the new cases of motorcycle accident victims were seen on the day of presentation at the emergency medical department. Patients who were lost to follow up, and those discharged against medical advice were excluded from the study. History was obtained and detailed physical examination was done after resuscitation to determine the site, nature and the characteristics of the injuries. For those with lower limb injuries, the following information were gathered: biodata, the date and time of injury, mode of involvement, mechanism of injury, type of injury(closed or open), anatomical location of fractures and injury severity score.

Patients were followed up regularly in clinic. Clinical review was to ascertain adequacy of casts, post treatment complications and when the patient would commence weight bearing. X rays were done monthly to assess radiological union.

Patients were followed up for at least one year. The eventual functional outcome of treatment of all the patients in the study were reviewed and recorded as any one of three possible outcomes: satisfactory, unsatisfactory and dead. A satisfactory outcome is one in which the patient had fully recovered by one year of follow up but if the patient still has complications, the outcome was considered unsatisfactory. All the information obtained were entered into a designed proforma. The data was analyzed and statistical analysis was done using SPSS .

### Results

From 1<sup>st</sup> October, 2006 to 30<sup>th</sup> September, 2007, a total of 429 motorcycle accident victims presented at the Emergency medical services of our hospital. Lower limb injuries represented the predominant type of injury seen(238, 55.5%)(Table I). These were followed by head injuries(75, 17.5%), upper limb injuries(61, 14.2%) and facial injuries(34, 7.9%)(Table I). Injury severity score of the patients ranged between 4 and 42.

Body region	No. of patients	Percentage %
Lower limb injuries	238	55.5
Head injuries	75	17.5
Upper limb injuries	61	14.2
Facial injuries	34	7.9
Abdominal injuries	12	2.8
Chest injuries	8	1.9
Spinal injuries	1	0.2
<b>Total</b>	<b>429</b>	<b>100</b>

Table I: Types of injuries by body region

The ages of the patients ranged from 4 to 81years with a mean of 43.1years. More than 60% of these patients were less than 40years old, the age group 30-39years being the most commonly affected(fig.I).

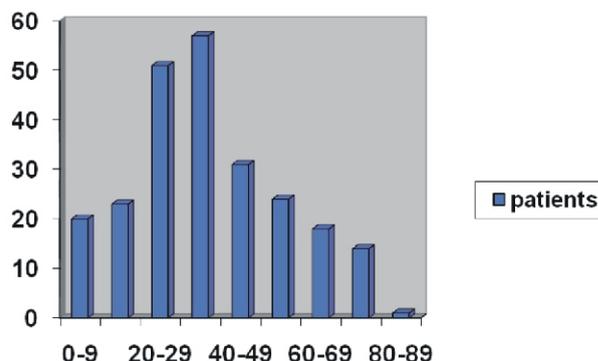


Fig. I: Age distribution

There were 126(64.5%) males and 58(35.5%) females, representing male:female ratio of 2.2:1.

57(31.0%) patients were riders, 67(36.4%) were passengers and 60(32.6%) were pedestrians.

The relationship between the age group and the patient's mode of involvement is shown in fig.II.

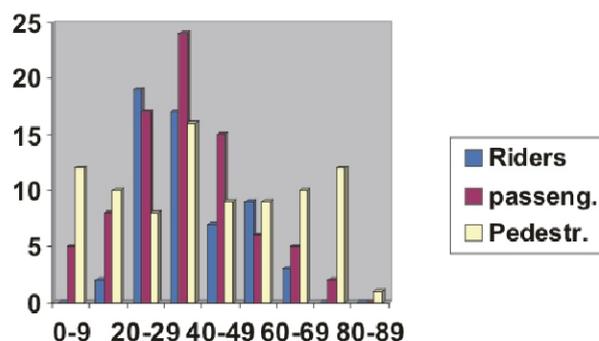


Fig. II- Age group and patient's mode of involvement.

Seventy six(76,41.3%) of the cases involved the right lower limb, 106(57.6%) involved the left lower limb and only 2(1.1%) affected both lower limbs.

Of the 184 patients with lower limb injuries, 135(73.4%) accounted for fractures, 22(11.9%) were dislocation/subluxation, 17(9.2%) were laceration/abrasions, 8(4.4%) were sprains/strain and 2(1.1%) represented traumatic amputation(Table II).

Diagnosis	No. of patients	Percentage-%
Fractures	135	73.4
Dislocation/subluxation	22	11.9
Laceration/abrasions	17	9.2
Sprain/strains	8	4.4
Traumatic amputation	2	1.1
<b>Total</b>	<b>184</b>	<b>100</b>

Table II: Distribution of diagnoses.

There were more cases of closed fractures, 82(60.7%) compared to open fractures, 53(39.3%). The commonest type of fracture seen was that of shaft of tibia, 59(43.7%) and this was followed by fracture femur, 27(20.0%), fractures around the ankle, 17(12.6%) and knee, 10(7.4%).

Considering the treatment given, 67(36.4%) patients underwent surgery while 117(64.0%) patients were managed non operatively. Out of the 67(36.4%) that had surgery, 24(35.8%) patients underwent wound debridement, 18 cases had application of external fixator for immobilization of their fractures after the initial debridement, 23(34.3%) had open reduction and internal fixation (ORIF) of their fractures, 10(14.5%) had split thickness skin grafting (SSG), 4(6.0%) had ankle arthrodesis, 3(4.5%) had below knee amputation, 1(1.5%) had hemiarthroplasty of the hip and 2(3.0%) underwent fasciotomy for compartment syndrome (Table III).

Type of surgery	No. of patients	Percentage(%)
Debridement ext. fix.	24	35.8
ORIF	23	34.3
SSG	10	14.5
Arthrodesis	4	6.0
Amputation	3	4.5
Fasciotomy	2	3.0
Hemiarthroplasty	1	1.5
<b>Total</b>	<b>67</b>	<b>100</b>

Table III: Types of surgical procedure

Table IV shows the distribution of the complications after treatment. The commonest complication was joint stiffness (42, 22.8%), followed by malunion (12, 6.5%), wound infection (11, 6.0%), joint deformity (6, 3.3%) and limb length discrepancy (3, 1.3%).

Complications	No. of patients	Percentage(%)
Joint stiffness	42	22.8
Mal-union	12	6.5
Wound infection	11	6.0
Non union	3	1.6
Compartment syndrome	2	1.1
Joint deformity	6	3.3
Gangrene	1	0.5
Limb length discrepancy	3	1.3
Pin tract infection	2	1.1
<b>Total</b>	<b>81</b>	

Table IV: Complications

Of these 184 patients, 138(75%) had initial treatment in the hospital (51.6% were resuscitated at the referring hospital before presentation in our centre and 23.4% were brought straight to our centre) while 46(25%) of the patients had initial treatment at TBS (traditional bone setters).

The relationship between time interval of presentation and functional outcome is shown in Table V. Most of the patients that presented within the first week of accident had satisfactory outcome whereas those presenting one month after the accident had most of the

complications. There was a significant association between time interval of presentation and functional outcome ( $p=0.028$ ).

Time interval	Satisfactory		Unsatisfactory	
	No. of pts	Percentage	No. of pts	percentage
1 day	58	56.9	2	2.5
2-7days	27	26.5	9	11.1
1wk-1month	11	10.8	14	17.3
1-6months	5	4.9	17	21.0
7month-1yr	1	0.9	21	25.9
>1year	-	-	18	22.2
<b>Total</b>	<b>102</b>	<b>100</b>	<b>81</b>	<b>100</b>

Table V: Time interval of presentation and functional outcome.

A clinical functional outcome assessment was done after at least six months of follow up. One hundred and two patients (55.4%) had satisfactory outcome (that is patients who had recovered fully by at least six months of follow up). Eighty one patients (44%) had unsatisfactory outcome (patients who had complications or physical deficit after their treatment) and only one patient (0.2%) died in resuscitation room from irreversible shock.

## Discussion

Motorcycle accidents are a leading cause of morbidity and mortality in our environment. Motorcycle riders are the most vulnerable road users and the lower limbs as seen in this study (55.5%) are the most commonly injured<sup>8,9,10,13</sup>. Many studies involving motorcycle accidents had reported the high morbidity and mortality associated with these injuries<sup>8,10</sup>.

Motorcycle accident victims are generally young adult, the productive age group in the society as seen in this study and studies from other centres<sup>8-11</sup>. The peak age of 30-39 years in this study slightly differs from 25-29 years and 20-29 years peak age reported in other series<sup>13,14</sup>. This could be due to increasing number of older adults engaging in commercial motorcycle business as a source of income. There is a preponderance of males over females with a ratio of 2.2:1. This is because the young male adults are more actively involved in daily activities than the females. However women and children formed the large percentage of pedestrian and passenger's victims. There were no riders in the extreme age groups but they form the large percentage of pedestrian injuries. This may be attributed to the poor riding habits of the riders.

There is a predominance of left lower limb involvement in this study compared to other studies which reported a predominance of right lower limb<sup>6,15</sup>. This is because of the right hand system of driving in this country and as such motor vehicles are more likely to strike the

motorcycle on the left side. Fractures (73.4%) represented the commonest lower limb injuries seen in this study. This was also the trend seen in previous studies performed elsewhere<sup>8,10,13,14</sup>. There were more closed fractures(60.7%) compared to open fractures(39.3%). This is similar to the studies done by Oluwadiya<sup>13</sup> and Zettas<sup>7</sup>. The most common lower limb bone fractured in this study was the shaft of tibia followed by femur. This is similar to studies done by Drysdale<sup>18</sup> and Alabi<sup>15</sup>.

The outcome of treatment was found to be dependent on time interval before presentation. Patients who presented within the first week of injury had better functional outcome than those who presented late. Most of the serious complications were seen among patients that had initial treatment at the traditional bone setters.

The infection rate in this study was found to be 6.0%, which is less than the series reported by Mbamali<sup>16</sup> (13%) and Oguachuba<sup>17</sup> (27.4%). The only

case of leg gangrene was a sequelae to mismanagement by traditional bone setters. This is the reason for traditional bone setters to have reorientation and formal training on how to avoid some of these complications.

## Conclusion

Lower limb injuries represent the commonest form of injury among motorcycle accidents victims brought into the Emergency medical services at the National Orthopaedic Hospital, Lagos.

Fractures represent the commonest type of lower limb injuries and the commonest fracture seen was that of tibial shaft.

Motorcycle accident victims who presented within the first day of accident for treatment usually have the better functional outcome than those who presented late.

Traditional bone setters contribute negatively to the management of the motorcycle accident victims.

## References

1. Oyemade A. Epidemiology of road traffic accidents in Ibadan and its environs. *Nigerian Med. Journal* 1973; 3:174-177.
2. Deaner RM and Fitchett VH. Motorcycle trauma. *J. Trauma* 1975; 15:678-681.
3. Adeloye A and Odeku EL. The pattern of road Traffic Accident seen at the University college Hospital, Ibadan, Nigeria: A preliminary study. *W. Afr. J. Med.* 1970; 153-157.
4. Emin KA and Peter G. Trauma: A Scientific basis for care. Arnold. 1<sup>st</sup> ED. 1999. 1-20.
5. Drysdale WF, Krans JF, Franti CE, Riggins RS. Injury pattern in motorcycle collision. *J Trauma* 1975; 15(2):99-115.
6. Imran Y, Vishvanathan T. Does the right leg requires extra protection? Five year review of type3 open fractures of the tibia, *Singapore Med. J.* 2004; 45(6): 280-282.
7. Zettas JP, Zettas P and Thanasophon B. Injury pattern in motorcycle accidents. *J Trauma* 1976; 19:833-836.
8. Corrine P, Brauner ER, Shen H, Krans JF. Lower extremity injuries from motorcycle crashes: A common cause of preventable Injury. *J Trauma* 1994; 37(3): 358-364.
9. Ekere AU. Motorcycle accidents and lower limb bony injuries, the calabar experience. National Postgraduate Medical College, FMCS dissertation. May, 1990.
10. Craig GR, Sleet R, Wood SK. Lower limb injuries in motorcycle accidents. *Injury* 1983; 15(3):163-6.
11. Fatimoh L. Riding motorcycle; is it a lower limb hazard? *Singapore Med. J* 2002; 43(11): 566-569.
12. Findlay JA. The motorcycle tibia. *Injury* 4:75, 1972
13. Oluwadiya KS, Oginni LM, Olasinde AA and Fadiora SO. Motorcycle limb injuries in developing country. *W. Afr. J. Med.* 2004; 23(1):42-47.
14. Odelowo EOO. Pattern of trauma resulting from motorcycle accidents in Nigeria. A two year prospective study. *Afr. J. Med.* 1994; 23:109-112.
15. Alabi ZO. The pattern of tibial fractures in Ilesha, Nigeria. *Nig. Med. J.* 1981; 11:22-29.
16. Mbamali EL. Internal fixation of femoral fractures at the Ahmadu Bello university hospital, Zaria. *Nig. Med. Pract.* 1981; 2:81-82.
17. Oguachuba HN. The pattern of tibial/fibular fractures in Jos, Plateau state, Nigeria. *Nig. Med. J* 1986; 16: 83-87.
18. Drysdale WF, Krans JF, Franti CE, Riggins RS. Injury pattern in motorcycle collision. *J Trauma* 1975; 15(2):99-115.