ORIGINAL ARTICLE

Profile of spinal injuries in Lagos, Nigeria

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Study design: Retrospective study.

Objective: To describe the pattern and outcome of spinal cord injuries in Lagos, Nigeria.

Setting: Nigeria, Lagos.

Methods: This retrospective review of cases was conducted at Lagos University Teaching Hospital (LUTH), Lagos, between January 1992 and December 2006.

Results: A total of 468 cases of spinal cord injury over the 15-year period were studied. Three hundred and twelve of them (66.2%) were aged 40 years and below, with the peak age incidence as 21–30 years. There were 328 males (70.1%) and 140 females (29.9%) showing a male to female ratio of 2.34:1. Road traffic accident accounted for 362 (77.4%) patients. At presentation, 430 (91.9%) of the injuries were of ASIA (American Spinal Injury Association) class A. Lumbar spine was affected in 278 (59.4%) of patients, whereas cervical spine accounted for 142 (30.3%). The most frequently seen complication was bedsores, seen in 163 (59.9%) of 272 patients that had complications. On discharge, 230 patients (49.1%) were in ASIA class A and 34 (7.5%) in ASIA E. Eighty-two patients (17.5%) died.

Conclusion: Spinal injuries in Lagos occurred mostly in young adult males affecting mainly the lumbar spine. Traffic-related incidents were the leading cause and bedsores the most common complication.

Spinal Cord (2009) 47, 134–137; doi:10.1038/sc.2008.93; published online 5 August 2008

Keywords: spinal injuries; trauma; Nigeria

Introduction

Injuries to the spine can affect a spectrum of structures, ranging from the vertebrae to soft tissues and spinal cord. Injury affecting the spinal cord has serious implications. Spinal cord injury (SCI) is an insult to the spinal cord resulting in a change, either temporary or permanent, in its normal motor, sensory or autonomic functions.¹ It is one of the most devastating conditions that can be encountered by patients and their careers² resulting to profound and long-term disability.³

Spinal cord injury mainly affects young people, mostly males,^{3–6} causing significant morbidity with huge human and economic losses. This is because most victims are left with permanent disability and may require specialist care for the rest of their lives.⁴ It is estimated that there are 40 000 patients in the UK with SCI, giving a prevalence of 1 in 1500 (0.7%).⁷ There are about 800 new patients presenting with SCI annually in the UK,⁷ whereas in the United States 30–60 new cases per million or 10 000 new cases per year are recorded.⁸ Annual incidence of SCI is also reported as 16.9 per million of population in southeast Turkey⁹ and 18.8 in

Taiwan.⁶ There is paucity of comparative epidemiological data on the incidence and prevalence of SCI in Nigeria because mainly of lack of case registers at local, state and federal levels. Also, census figures in Nigeria are always controversial. These make it difficult to conduct population-based studies to generate data for comparison against other countries.

Globally the most common cause of SCI is road traffic accident (RTA), followed by falls.^{3,6,10–13} In the USA, RTA causes over 44.5% of SCI,^{3,8} whereas falls account for over 18.1%.⁸ However, falls is the most common cause in southeast Turkey⁹ and in persons over 45 years of age in the USA.⁸ Gunshot injury is also a common cause in urban settings. Other causes include assaults, domestic accidents and sports, of which diving is the sport where SCI occurs most frequently. Neural tissue in the spinal cord cannot regenerate when damaged. This leads to permanent neurologic deficits. However, many patients show some degree of recovery in terms of reduction of the degree of disability through rehabilitation.¹²

The rising number of cases and devastating outcome of these injuries presenting in our centre when considered beside the possibility of a fair outcome when properly managed stimulated this retrospective review. We sought to document the profile of spinal injury at our institution to form a prelude for further prospective studies.

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Received 21 April 2008; revised 25 June 2008; accepted 6 July 2008; published online 5 August 2008

Materials and methods

This study was conducted at Lagos University Teaching Hospital (LUTH), Lagos, Nigeria from January 1992 to December 2006. LUTH is one of the foremost tertiary hospitals in Nigeria. It receives a large number of SCI patients from the densely populated Lagos metropolis.

Utilizing registers at the emergency room and wards, 485 case records of patients with SCI over the 15-year period were retrieved. The medical records of 468 had sufficient data and were included in this study. Data extracted included the following: age, gender, aetiology, injury characteristics, severity, complications and outcome. Seventeen patients with incomplete records were excluded.

For the purpose of classifying injury severity, we used the American Spinal Injury Association (ASIA) scale.¹⁴ Outcome was defined by the state of the patient on discharge, which can be ASIA A–E or death. The causes of death as recorded in the case notes were based on clinical scenarios because in Nigeria, autopsy rates are low due to cultural and religious reasons.

The institution-based nature of this study may limit the scope of the results, as some cases of SCI in Lagos go to other institutions. Incomplete records, which reflected in our inability to extract type of crash among RTA victims, were a limitation inherent to retrospective studies that we encountered. Also, long, recurring medical workers' strikes in Nigeria affected our study, especially in low case counts in 2001 and 2002.

The data was collated and analyzed using Statistical Package for the Social Sciences version 11 software. Continuous variables are presented as means $\pm$ s.d., whereas categorical variables are presented as frequencies.

Results

Demographic profile and aetiology

There were 468 patients managed for SCI over the 15-year period giving an average of 34 patients per year. The number of cases reviewed showed a consistent rise over the years of the study with 16 cases in 1992, 16 in 1993, 18 in 1994, 18 in 1994, 27 in 1996, 29 in 1997, 30 in 1998, 32 in 1999, 44 in 2000, 8 in 2001, 10 in 2002, 47 in 2003, 56 in 2004, 58 in 2005 and 59 in 2006. Three hundred and twenty eight (70.1%) were males and 140 (29.9%) were females showing a male to female ratio of 2.34:1. Three hundred and twelve (66.2%) of the patients were aged 40 years and below with the peak age incidence as 21–30 years. These are shown in Table 1. Table 2 showed that RTA was the cause of 362 (77.4%) cases of injuries. Of these 362 patients, 128 (35.4%) were motorcycle riders or passengers. Falls accounted for 44 cases (9.4%). Gunshot was the aetiology in 34 (7.3%). Spinal injuries due to assaults and due to sports each accounted for eight (1.7%).

Clinical characteristics

At presentation, the most frequently encountered injury severity was ASIA class A, which was seen in 430 (91.9%) patients. Grade B injuries were seen in 6 (1.3%), grade C in

Table 1 Age distribution of cases

Age, range	Frequency	Percentage
0–10	2	0.4
11–20	38	8.1
21–30	136	29.1
31–40	134	28.6
41–50	98	21.0
51–60	36	7.7
> 60	24	5.1
Total	468	100

Table 2 Causes of spinal injuries

Cause	Frequency	Percentage
Road traffic accident	362	77.4
Falls	44	9.4
Violence	10	2.1
Sports	8	1.7
Assault	8	1.7
Domestic accidents	2	0.4
Gunshot	34	7.3
Total	468	100

Table 3 Spinal injury severity grading at presentation

Grades	Frequency	Percentage
A	430	91.9
B	6	1.3
C	12	2.6
D	18	3.8
E	2	0.4
Total	468	100

12 (2.6%), grade D in 18 (3.8%) and grade E in 2 (0.4%). These are shown in Table 3. Injuries to three different levels of spine were recorded. They were lumbar 278 (59.4%), cervical 142 (30.3%), thoracic 48 (10.3%). Two hundred and seventy two patients (58.1%) developed complications in hospital. One hundred and sixty three (59.9%) of these patients with complications had bedsores. Seventeen (10.4%) of those with bedsores presented to LUTH with bedsores developed from feeder hospitals, while a majority (146, 89.6%) of them developed bedsores in LUTH. Sixty-eight patients (25.0%) had urinary tract infection and 22 (8.1%) had faecal impaction. Twenty (7.4%) of them had multiple complications. Duration of hospital stay ranged from 2 weeks to 60 weeks with a mean of 12 ± 8.6 weeks.

Outcome

On discharge, 230 patients (49.1%) were in ASIA class A, 45 (9.6%) in ASIA B, 36 (7.7%) in ASIA C, 41 (8.8%) in ASIA D, 34 (7.5%) in ASIA E, while 82 (17.5%) died (Table 4). Thirty-two (39.0%) deaths were because of respiratory failure, while associated head injury accounted for 24 (29.3%) deaths.

Most deaths (72.0%) were of patients with cervical spine injury. These are shown in Table 5.

Discussion

Spinal cord injury are on the rise in Lagos, Nigeria. This rise may be due to many accidents from dilapidated automobiles on our bad roads with a pervasive poor driving culture under weak ineffective road traffic law enforcement that abound in Lagos in particular and Nigeria in general. Spinal injuries remain an important cause of devastating disability, long hospitalization and death. This is especially significant as it affects mainly the young active segment of the population who are crucial to the economy. The cost of SCI is enormous. Devivo¹⁵ reported total direct cost for all cases of SCI in the United States as 7.736 billion dollars. This is only a small proportion of the aggregate economic losses resulting from loss of productivity of young people that are most affected by SCI.

Our study showed a preponderance of males less than 40 years of age affected by SCI. This finding is buttressed by other studies^{3,5,9} and further highlights the devastating effect of SCI on the economy due to the loss of productivity following invalidation, death or disability on this young vital productive sector of the economy. The adverse effects of SCI are not limited to the individual; it also affects the family, health facility, society and national economy.

Road traffic accidents were found to be the commonest cause of SCI in our study, followed by falls. This remains a consistent pattern generally reported by authors.^{3,6,10–13} This unenviable place of RTA can be improved by rehabilitating dilapidated road network, improved driving culture and adherence to road traffic regulations. The use of poorly maintained and road-unworthy second-hand imported vehicles should also be regulated.

The long hospital stay found in this study may be due to the incorporation of acute, subacute and chronic care in the hospitalization of SCI patients in Nigeria. The patients are only discharged home when in a state that their relatives can care for them. There are no hospices, no special treatment or rehabilitation centres. This is contrary to the structured care obtainable in developed countries. Also some patients end up in churches and mosques under the care of their spiritual leaders; while some go to traditional bonesetters.

The outcome of SCI in Nigeria remains poor with the twin tragedy of high morbidity and high mortality.^{10,11} This stems mainly from the absence of designated specialized spinal centres running independent budgets with specially trained staff. Such centres allow for optimum care and systematic studies of all aspects of epidemiology, management and outcome of SCI patients with the aim of achieving scientific improvement in the methods and results of treating SCI.

At presentation, most patients in our series were of ASIA class A injury severity. Owing to the paralysis and anaesthesia, as well as inadequate care, most of them developed several complications, among which the major complication is bedsores. This was mainly due to non-availability of the appropriate mattress for SCI patients and the high patient to nurse ratio that reduces nursing time. There is no dedicated ward for SCI patients. This underscores the importance of dedicated spinal centres that can afford the requisite time and care that these patients deserve.

In our study, over half of the patients ended up with significant neurologic deficits. Windrope *et al.*¹⁶ had found similarly in 2004 that most patients with SCI had the outcome as paraplegia or quadriplegia. The mortality rate of 17.5% recorded in this study is higher than 6.6% reported by Chen *et al.*⁶ in Taiwan. However, head injury remained a major cause of death among SCI patients in our study, as had been documented in southeast Turkey.⁹ The impact of head injuries in this study may be due to rare use of helmets among our motorcycle riders. However, recently the government is enacting laws to encourage such usage. These outcomes coupled with the case-fatality rate of 17.5% paints a hopeless picture when SCI is discussed in Nigeria.

One of the limitations of our study is that inherent to retrospective studies, such as incomplete records and non-uniform documentation of data. This posed problems during data retrieval from patients' medical records. Computerization and better training of medical records staff would greatly facilitate this kind of research. Also, we lack normal unselected population-based epidemiological studies and

Table 4 Outcome of spinal injuries

Outcome	Frequency	Percentage
Death	82	17.5
ASIA A	230	49.1
ASIA B	45	9.6
ASIA C	36	7.7
ASIA D	41	8.8
ASIA E	34	7.5
Total	468	100

Table 5 The level of spine affected versus cause of death

Cause of death	Sepsis	Associated head injury	Associated abdominal injury	Diabetic-related metabolic derangement	Respiratory failure	Not stated in case note	Total (%)
<i>Level of spinal injury</i>							
Cervical	6	18	0	3	30	2	59 (72.0)
Thoracic	4	5	2	2	2	2	17 (20.7)
Lumbar	2	1	1	1	0	1	6 (7.3)
Total (%)	12 (14.7)	24 (29.3)	3 (3.7)	6 (7.3)	32 (39.0)	5 (6.1)	82 (100)

literature for incidence and prevalence of SCI in Nigeria. This would have enabled proper international comparative analysis of aetiology and outcome. Establishment of an SCI register would facilitate the provision of a national database for epidemiological and research purposes.¹⁷ The register is also useful for the prevention and treatment of SCI,¹⁷ assessing survival rates after SCI,¹⁸ forecasting annual case numbers¹⁹ and reporting on trends in SCI.²⁰ It is pertinent therefore to establish a national population-based SCI register. This involves establishment of special SCI centres as earlier highlighted, registration of cases as an integral part of the routine admission process in such centres and a process of case note review to identify earlier cases.¹⁷ These registers should be at local, state and federal levels. Training of field officers, strengthening of health information systems and strong political will/commitment by government at all levels are important for its successful design and implementation.

Conclusion

Spinal cord injuries in Lagos are mainly due to RTAs and affects mostly young adult males. Bedsore remains a common complication and majority of the patients end up with significant neurological deficits.

References

- DeVivo MJ. Epidemiology of traumatic spinal cord injury. In Kivshblums *et al* (eds). *Spinal Cord Medicine*, Vol 1 Lippincott Williams and Wilkins: Baltimore, 2002 pp 69–81.
- British Trauma Society. Guideline for initial management and assessment of spinal cord injury. 2003; **34**: 405–425.
- Price C, Makintubee S, Herndon W, Istre GR. Epidemiology of traumatic spinal cord injury and acute hospitalization and rehabilitation charges for spinal cord injuries in Oklahoma, 1988–1990. *Am J Epidemiol* 1994; **139**: 37–47.
- DeVivo MJ, Ruth RD, Black KJ. Trends in spinal cord injury demographics and treatment outcomes between 1973–1986. *Arch phys med Rehabil* 1992; **73**: 424–430.
- Agarwal P, Upadhyav P, Raja K. A demographic profile of traumatic and non-traumatic spinal injury cases: a hospital-based study from India. *Spinal Cord* 2007; **45**: 597–602.
- Chen HY, Chiu WT, Chen SS, Lee LS, Hung CI, Hung CL *et al*. A nationwide epidemiological study of spinal cord injuries in Taiwan from July 1992–June 1996. *Neurol Res* 1997; **19**: 617–622.
- Green D. Diagnosis, prevalence and management of spinal cord injury. *J spinal cord med* 2003; **26**: 329–334.
- Priebe MM, Waring WP. The interobserver reliability of revised American spinal injury association standards for neurological classification of spinal injury patients. *AmJ phys med Rehabil* 1991; **70**: 266–270.
- Karamahmetoglu SS, Nas K, Karacan I, Sarac AJ, Koyuncu H, Ataoglu S *et al*. Traumatic spinal cord injuries in southeast Turkey: an epidemiological study. *Spinal Cord* 1997; **35**: 531–533.
- Solagberu BA. Spinal Cord injuries in Ilorin, Nigeria. *West Afr Med* 2002; **21**: 230–232.
- Nwankwo OE, Kachy AU. Outcome of a 12-week programme for management of the spinal cord injured with participation of patient's relation at Hiltop orthopaedic hospital, Enugu, Nigeria. *Spinal Cord* 2003; **41**: 129–133.
- Leonard M, Sproule J, Mc Cormack D. Paediatric spinal trauma and associated injuries. *Injury* 2007; **38**: 188–193.
- O'Connor P. Injury to the spinal cord in motor vehicle traffic crashes. *Accid Anal Prev* 2002; **34**: 477–485.
- American spinal injury association. *International Standards for Neurological Classification of Spinal Cord Injury (revised)*. American spinal injury association: Chicago, 2000, 1–23.
- DeVivo MJ. Causes and costs of spinal cord injury in the United States. *Spinal Cord* 1997; **35**: 809–813.
- Windrope J, Ravischandran G, Locker T. Risk assessment for spinal injury after trauma. *BMJ* 2004; **328**: 721–723.
- O'Connor PJ. Development and utilisation of the Australian spinal cord injury register. *Spinal Cord* 2000; **38**: 597–603.
- O'Connor PJ. Survival after spinal cord injury in Australia. *Arch Phys Med Rehabil* 2005; **86**: 37–47.
- O'Connor PJ. Forecasting of spinal cord injury annual case numbers in Australia. *Arch Phys Med Rehabil* 2005; **86**: 48–51.
- O'Connor PJ. Trends in spinal cord injury. *Accid Anal Prev* 2006; **38**: 71–77.