ORIGINAL ARTICLE

Pattern and presentation of spine trauma in Gwagwalada-Abuja, Nigeria

Kawu AA

Department of Orthopaedics, Spine Unit, University of Abuja Teaching Hospital, Gwagwalada, PMB, Abuja FCT, Nigeria, FCT-Abuja-Nigeria

Abstract

Objective: The objective was to demonstrate the correlations and effects of age, gender, and cause of accident on the type of vertebral fracture as well as on the likelihood to sustain neurological deficit following trauma in Nigeria.

Background: Spinal column injury is a well-documented problem but literature has been mute on this problem in Nigeria unlike the many papers on spinal cord injury.

Materials and Methods: A retrospective review of spinal cord injured (SCI) patients was performed. Age, sex, cause and level of injury, fracture pattern and distribution, and neurologic presentation of SCI patients from 1997 to 2007 were studied from case notes.

Results: There were 202 patients with male preponderance and a mean age of 38.9 ± 11.4 years over the 11-year period. The most common cause of spine injury was road traffic injury (79.7%). Cervical spine injury (10.4%) accounted for the highest number of cases with complete neurologic deficit. The majority of patients, 119 (58.9%) sustained a type A fracture, 37 (18.3%) a type B fracture, and 41(20.3%) patients experienced a type C fracture. All patients had neurologic deficits. Age (*P*=0.032) and road traffic injury (*P*=0.029) were independently associated with type of fracture after multivariate analysis. Age (*P*=0.038), road traffic injury (*P*=0.027), and cervical spine fracture (*P*=0.009) were also independently associated with neurologic deficit.

Conclusion: These data showed the correlation between trauma mechanism and the type of fracture seen, and also the type of fracture and the incidence of neurologic deficit. The predictors of fracture types are age and road traffic injury while age, road traffic injury, and cervical spine fractures predict neurologic deficit.

Key words: Cervical spine injury, correlate, Gwagwalada, road traffic injury

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Introduction

Spinal trauma in Nigeria is an age-old problem.[1-9] Although spine fractures represent only a minority in all trauma patients, their influence on the patients' social and financial environment is more significant than other injuries.[10] The major cause of spine injury is road traffic injury (RTI).[10-13]

In Nigeria, studies have focused on spinal cord injury but none has critically examined spine fractures and their consequence.[1-9] This study is performed to demonstrate the correlations and effects of age, gender, and cause of accident on the type of vertebral fracture, as well as on the likelihood to sustain neurological deficit at the University of Abuja Teaching Hospital Gwagwalada Abuja, Nigeria.

Materials and Methods

This is a retrospective study of all patients with spinal fracture seen from January 1, 1997 to December 31, 2007 at the University of Abuja Teaching Hospital Gwagwalada,

Address for correspondence:
Dr. Kawu Ahidjo A,
Spine Unit, Department of Orthopaedics, University of Abuja Teaching Hospital, Gwagwalada, PMB 228, Abuja FCT, Nigeria.
E-mail: ahidjokawu@yahoo.com

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Nigeria. All SCI patients whose plain radiograph was available were included in this study. Diagnoses were made with plain radiograph using the lateral and anteroposterior views. Ethical approval was given at the commencement of the study.

Data extracted were patients related (age at the time of accident, gender), cause of accident (road traffic injury (motor vehicle, motorcycle, pedestrian), fall, industrial, penetrating injury, and miscellaneous), fracture location, and fracture type (according to the AO classification[11] for spine fractures) and neurological deficit.[12] Level of injury was defined as cervical spine injury when it includes C1-C7; thoracic injury when it is T1-T10 and thoracolumbar injury when it is T11-L2. Frankel grading Table 1 was used to assess the neurologic status of the SCI.

The conservative treatment for cervical spine injury involved keeping patients in bed with decompression and alignment maintained by longitudinal traction with skull traction using Gardner-Wells, Crutchfield's caliper or Cone's traction for 3 weeks, patients are then mobilized gradually over 3 weeks on a wheel chair with Philadelphia collar applied for additional 3–6 months. This protocol was adopted in our unit to get patients to rehabilitation early and to reduce the burden of the hospital care cost. Thoracic and lumbar fractures are managed with thoracolumbar brace in bed for 6 weeks and patient gradually mobilize into sitting position as tolerated in a body jacket before being discharged in a brace for another 3 months irrespective of the neurologic status of the patients. Predischarge plain radiographs are employed to assess bone healing.

To compare characteristics with specific, directional hypotheses, the Student two-sample *t*-test or Mann–Whitney rank-sum test was used for continuous variables and the corrected χ^2 test or Fisher's exact test was used for categorical variables. Continuous variables were then transformed to categorical variables for analysis. Statistical Package for Social Sciences (SPSS) 17.0 (SPSS Inc. Chicago, Illinois, USA) was employed; $P<0.05$ is significant.

Results

Two hundred and two patients, 166 (82.2%) male and 36 (17.8%) female (M: F=4.6: 1), were studied. The mean age was 38.4 ± 13.6 years (male=36.8 ± 12.1; female=40.4 ± 12.4). The age distribution is as shown in Figure 1.

A total of 161 (79.7%) patients sustained injury following RTI; fall accounted for 27 (13.4%) cases, 10 (4.9%) cases were from assault, 2 cases (1.0%) from penetrating injuries while in the other 2 (1.0%) patients the cause was not clearly defined.

Table 1: Frankel grading to assess spinal cord injury

Frankel grading for spinal cord injury
A completeparalysis
B sensory function only below the injury level
C incomplete motor function below injury level
D fair to good motor function below injury level
E normal function

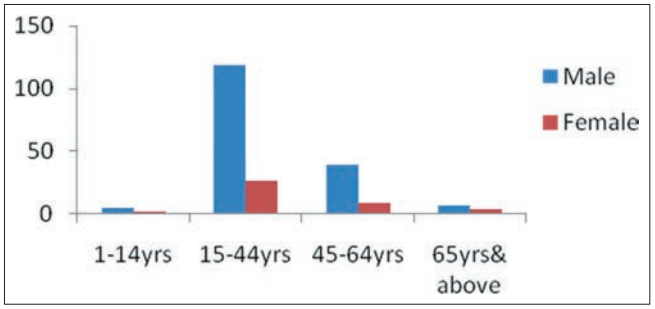

Figure 1: Age distribution

A total of 119 (58.9%) patients sustained a compression fracture (type A), 37 (18.3%) patients had distraction injury (type B), 41 (20.3%) patients had rotational injury (type C), and 5 (2.4%) patients showed no abnormality on a plain radiograph.

Frankel's grading at presentation showed 27 (13.4%) patients with grade A, 136 (67.3%) patients with grade B, 21 (10.4%) patients with grade C, and 18 (8.9%) patients with grade D. Incomplete neurologic deficit was noted in 131 (64.8%) patients with cervical spine fracture, 29 (14.3%) patients with thoracic spine fracture, and 18 (8.9%) patients with thoracolumbar spine fracture. Twenty-one (10.4%) patients with cervical spine injury, 4 (1.9%) patients with thoracic spine fracture, and 2 (0.9%) patients with thoracolumbar fracture had complete neurologic deficit following injury. Age ($P=0.008$), gender ($P=0.008$), and road traffic injury ($P=0.004$) were significantly associated with type of fracture; age ($P=0.003$), gender ($P=0.003$), road traffic injury ($P=0.008$), and cervical spine injury ($P=0.006$) were also significantly associated with neurologic deficit.

After the univariate analyses, a significant association was found between age and gender ($P=0.008$: 0.003) as a correlation of type of fracture and neurologic deficit respectively. To avoid multicollinearity in the final multivariate regression analysis; a multimultivariate analysis was done including age and gender with type of fracture and neurologic deficit as outcome.

Results indicated that age remained significantly associated with type of fracture and neurologic deficit ($P=0.032$, $P=0.038$ respectively). Age ($P=0.032$) and road traffic injury ($P=0.029$) were independently associated with type of fracture after multivariate analysis. Tables 2 and 3 show

Table 2: Correlation factors of type of fractures noted in this study

Risk factors	*P* value multivariate
Age	0.032
RTI	0.029

Table 3: Correlation factors of neurologic deficit in this study

Risk factors	*P* value multivariate
Age	0.038
RTI	0.027
Cervical spine fracture	0.009

that age ($P=0.038$), road traffic injury ($P=0.027$), and cervical spine fracture ($P=0.009$) were also independently associated with neurologic deficit.

Discussion

The population involved in this study shows male predominance and a young age group. This agreed with findings in other reports.[1-9,13-17] In the fracture types (B and C) which resulted from high-energy accidents, there was male predominance. This agrees with the findings of Leucht *et al.*[15] In this study, type A fracture showed male predominance unlike that in the study of Leucht *et al.*[15] that found a nearly balanced gender distribution. The reason may be the small number of female population in this study. Type A fractures include compression fractures, which are the main fracture type in osteoporotic patients.[10,18-19] The relative young age of the females in this study group preclude osteoporosis and this may also be a reason for the findings noted.

Road traffic injury is found to be the most common cause of spinal column injury in this study. This was noted in previous studies reviewed.[1-2,4-9,15,17-18,20] Road traffic injury was responsible for 86% of type B and C fractures in this study, though slightly higher but agreeing with that noted by Leucht *et al.*[15]

Neurologic deficit was found in about 14–38% of all vertebral fractures.[10,15-17] In this study the neurologic deficit found was 100%. Our hospital a referral center within the north-central state of Nigeria deals with different patient stock compared to other hospitals. Therefore, patients with spinal cord injury associated with spinal trauma might have been overrepresented in this current study. The other reason is the absence of prehospital care in our country.[20] Hence, patients with spinal trauma rescued by bystanders without knowledge of basic life support, the unconventional evacuation, poor transport to primary healthcare, and multiple hospital visits before admission into a tertiary institution may complicate spinal trauma with neurologic deficit. This could explain this alarming rate of neurologic deficit in patients with spinal column injury in this study.

The lowest number of neurological deficits was seen in the type A fracture group and with type B and C fractures, the incidence of neurological impairment increased further, as has been previously reported.[15,18]

Our data showed the relationship between motor vehicular accident, type of fracture, and the occurrence of a neurological deficit, which was most likely due to the increased number of high-energy trauma. This finding has been previously reported.[15]

Conclusion

This study shows that there was a correlation between trauma mechanism and the type of fracture seen; and also the type of fracture and the incidence of neurologic deficit. The predictors of fracture types are age and road traffic injury while age, road traffic injury, and cervical spine fractures predict neurologic deficit.

This study would guide caregivers in the assessment of patients with spine trauma with the hope that appropriate treatment would be instituted in a resource challenge country like ours.

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