



Complications and Causes of Death in Spinal Cord Injury Patients in Nigeria

Les complications et les Causes de décès chez blessés médullaires Au Nigeria

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ABSTRACT

BACKGROUND: There have been many reports on the problems of spinal cord injury (SCI) in Nigeria but few have reported on the complications and causes of death in spinal cord injured patients.

OBJECTIVE: The objective of this study was to determine the complications, causes of death and associated risk factors in patients with SCI within six months post injury.

METHODS: Patients were retrospectively identified from the hospital trauma database from January 1997 to December 2007. Complications and cause of death within the first six months of SCI were determined along with associated risk factors.

RESULTS: Five hundred and eighty-two patients were eligible for analyses and data were obtained for 422 (72.5%) patients with a mean age of 37.2 (± 14.2) years at six months follow-up. Muscle spasms 417 (98.8%) and neurogenic pain 382 (94.5%) were the main complications noted. The mortality during the review period was 144 (34.1%). Respiratory failure (44.4%) was the commonest cause of death. The independent predictors of mortality were mainly age, GCS<9, Frankel Type A at presentation and cervical spine injury (CSI) and while CSI and Frankel Type A injury were the main predictors of complications.

CONCLUSION: Most common complication and cause of death following SCI are muscle spasm and respiratory failure respectively. The risk factors associated with mortality are age, GCS<9, cervical spinal injury, and complete neurologic injury and those for complications were cervical spinal injury and Frankel Type A injury. *WAJM* 2011; 30(4): 301–304.

Keywords: Nigeria, spinal cord injury, complications.

RÉSUMÉ

CONTEXTE: Il ya eu de nombreux rapports sur les problèmes de la lésion de la moelle épinière (SCI) au Nigeria, mais peu ont fait rapport sur les complications et les causes de décès chez les patients blessés médullaires.

OBJECTIF: L'objectif de cette étude était de déterminer les complications, les causes de décès et les facteurs de risque associés chez les patients avec SCI dans les six mois après la lésion.

MÉTHODES: Les patients ont été rétrospectivement identifiés à partir de la base de données traumatologie de L'Hôpital de Janvier 1997 à Décembre 2007. Complications et cause de décès dans les six premiers mois de la SCI ont été déterminés ainsi que les facteurs de risque associés.

RÉSULTATS: Cinq cent quatre-vingt-deux patients étaient éligibles pour les analyses et les données ont été obtenues pour 422 (72,5%) patients avec un âge moyen de 37,2 ($\pm 14,2$) ans à six mois de suivi. Les spasmes musculaires 417 (98,8%) et la douleur neurogène 382 (94,5%) étaient les principales complications notées. La mortalité pendant la période sous revue a été de 144 (34,1%). L'insuffisance respiratoire (44,4%) était la principale cause de décès. Les facteurs prédictifs indépendants de mortalité sont principalement l'âge, le GCS <9, Frankel, type A lors de la présentation et la lésion du rachis cervical (CSI) et tout type CSI et Frankel Une blessure étaient les principaux prédicteurs de complications.

CONCLUSION: Complication la plus fréquente et la cause du décès à la suite SCI sont des spasmes musculaires et une insuffisance respiratoire, respectivement. Les facteurs de risque associés à la mortalité sont l'âge, GCS <9, une lésion médullaire cervicale, et complète lésions neurologiques et ceux des complications ont été un traumatisme médullaire cervicale et le type Frankel Une blessure. *WAJM* 2011; 30(4): 301–304.

Mots-clés: le Nigeria, lésion de la moelle épinière, des complications.

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Abbreviations: CSI, Cervical spine injury; GCS, Glasgow coma scale, SCI, Spinal cord injury; TLI, Thoracolumbar injury; TSI, Thoracic spine injury, RTI, Road traffic injury; SPSS, Statistical Package for Social Sciences.

INTRODUCTION

Spinal cord injury (SCI) in Nigeria is associated with significant morbidity and mortality.¹⁻⁸ Studies⁹⁻¹⁰ have identified many risk factors¹⁰⁻²³ for morbidity and mortality in SCI, but none of these risk factors has been studied in the West African sub-region. Complications have a considerable impact on those with SCI and are important cause of mortality.²⁴⁻²⁵ In order to optimize the individual rehabilitation process and outcome, it is important to predict and prevent complications in addition to recognizing and treating them when they do occur.²⁶ The aim of the present study was to assess the complications, causes and predictors of complications and mortality in SCI patients managed conservatively in Nigeria.

SUBJECTS, MATERIALS, AND METHODS

The records of patients admitted at the University of Abuja Teaching Hospital, Gwagwalada from 1st January 1997 to 31st December 2007; and at the National Orthopaedic Hospital Lagos for SCI from 1st January 2000 to 31st December 2007 were retrospectively reviewed. All SCI patients admitted onto the wards, conservatively managed and followed up for six months post-injury were included in this study. Patients who did not have any neurologic deficit, those who were lost to follow-up before six months post injury and surgically managed patients before reporting to the two study centres were excluded from this study.

Data extracted for analysis were age, sex, cause of accident, time of presentation, number of treatment facilities visited, Glasgow coma scale (GCS) score, level of injury, degree of neurologic deficit at presentation and mortality. Level of injury was defined as cervical spine injury (CSI) when it included C1-C7; thoracic spine injury (TSI) when it was T1-T10 and thoracolumbar injury (TLI) when it was T11-L2.

The conservative treatment for CSI involved keeping patients supine in bed with alignment maintained by longitudinal traction with skull traction using Gardner-Wells, Crutchfield calliper or Cone's traction for 6 weeks and then Philadelphia collar applied for additional

3-6 months. For thoracic and lumbar fractures, the patients were managed with thoracolumbar brace in bed for six weeks and then discharged on the brace for another 3 month irrespective of the neurologic status.

Statistical Analysis

Complications recorded within the first six months of injury were designated as dependent variables to identify potential risk associations. Parametric data were analyzed using an unpaired "t" test and categorical data using² analysis or Fisher's Exact Test. The measures of risk were determined by crude odds ratios (ORs) and adjusted odds ratios (adjusted ORs). The ORs were adjusted using multi-variate logistic regression; 95% confidence intervals (CI) were used and p-value of <0.05 considered significant. Statistical Package for Social Sciences (SPSS) 17.0 was employed for this analysis.

RESULTS

Four hundred and twenty-two patients were included in this study, 346

(81.9%) were male. The mean age of the patients was 37.2 ± 14.2 years, min-max 14-78 years. Cervical Spinal Injury occurred in 329 (77.9%) patients, 64 (15.0%) patients had TSI and the other 30 (7.1%) patients had TLI.

The commonest cause of SCI was road traffic injury (RTI) (88.2%), while the other causes were fall (7.6%), assault (1.8%), penetrating injury (0.9%) and others (1.5%). Muscle spasms (98.8%) and neurogenic pain (90.5%) were the main complications noted (Table 1).

Data concerning severity of injury and mortality are presented in Table 2. Of the 422 patients, 144 (34.1%) died.

The commonest cause of death was respiratory failure (44.4%), while the other causes were septicemia (26.4%), brain injury (11.8%), venous thrombosis and embolism (8.4%) and undetermined (9.0%). The risk of complications was increased for patients with CSI ($p=0.001$) and complete (Frankel A) SCI ($p=0.001$) on admission. Table 3 shows the association between mortality and predictors of death at admission.

Table 1: Complications associated with Spinal Cord Injury

Complications	Numbers (%)
Muscle Spasm	417 (98.8)
Neurogenic pain	382 (90.5)
Bladder distension	378 (89.6)
Paralytic Ileus	312 (73.9)
Constipation/Faecal impaction	154 (36.5)
Urinary tract infection (Para-catheter discharge)	324 (76.7)
Hypostatic pneumonia	155 (36.7)
Hypotension	244 (57.8)
Bed Sores	302 (71.6) [Grade I-141, II-98, III-60, IV-43]
Hyperpyrexia	121 (28.7)
Depression	162 (38.4)
Bladder stone	39 (9.2)
Catheter retention	33 (7.8)
Deep vein thrombosis	21 (4.9)

Table 2: Relationship between severity of Injury and Mortality

Severity	n	Survived	Died	Mortality rate (%)
Frankel A	58	26	32	22.2
Frankel B	280	180	100	64.9
Frankel C	45	36	9	6.3
Frankel D	39	36	3	2.1

Table 3: Predictors of Mortality at Admission

Predictor	Death	Survivor	Relative Risk (95% CI)	p-Value
Number	144 (34.1%)	278 (65.9%)	–	–
Age	40.3± 14.6	36.7± 12.8	–	0.001*
Cervical Injury	112	214	–	0.001†
Frankel A	32	26	4.32(1.46–13.9)	0.001†
GCS<9	38	3	14.6(1.3–130.2)	0.001†

*t-test; †Exact Fisher's test/ χ^2

DISCUSSION

As it has been noted in many reports^{1–8} from Nigeria and other developing countries,²¹ our study has shown that the majority of SCI patients are young male adults and that RTI remains the most common cause of SCI in Nigeria.

Complications following SCI in Nigeria are high. In this study the figure was 94.8%. This is similar to the findings of a study among SCI patients in the Netherlands in the report by Haisma *et al.*²⁴ Solagberu² reported a high complication rate among SCI patients in Ilorin but did not quote a figure. Muscle spasm and neurogenic pain were the commonest complications noted in our study which corroborated that reported by Haisma *et al.*²⁴ in their study. Most of the complications noted have been previously reported in the literature, the difference in the range of complication rates noted may be attributed to the variation in the study population and study design.^{2,24}

Mortality is an obvious indicator of quality of care.²¹ In a resource-replete centre, mortality rates of 5–10% in patients with spinal trauma²⁷ have been reported. In our study the mortality was 34.1% within the first six months of injury; but when patients with significant brain injury, multiple trauma and haemodynamic instability were excluded the corrected mortality was 19.9%. This corrected figure is still high probably because of death from respiratory failure and sepsis. Respiratory insufficiency and related complications are the most common causes of morbidity and mortality in acute SCI with an incidence of 36% to 83%.²⁹ Ventilatory failure may last up to an average of five weeks.³⁰ Efforts to improve respiratory function and minimize respiratory complications in SCI reduce mortality.^{22,28–29} To reduce or prevent respiratory failure in SCI, the

patient may have to be managed in a specialized spine unit,³¹ have aggressive pulmonary secretion management (pulmonary toileting), and the use of mechanical ventilation.^{22,29–31} We conjecture that the high mortality rate in our study was due to our resource poor environment with respect lack specialised spine centers to treat SCI patients, mechanical ventilators are non-existent and no well define protocol on pulmonary secretion management.

Sepsis may result from focus in the bladder due to catheterisation, intravenous line, respiratory tract from aspiration, hypostatic pneumonia from respiratory insufficiency and the skin from bed sores. Adequate attention and preventive measures like intermittent catheterisation, aseptic procedures in setting up intravenous line, chest physiotherapy and pulmonary toileting and frequent turning of patients to prevent bed sores would help to reduce mortality from sepsis.

Age, cervical spine injury, GCS<9 and complete neurologic deficit²² at presentation have been shown as predictors for adverse prognosis.^{21,22,28} Mortality increases with advanced age due to associated comorbid factors like obesity, diabetes mellitus and cardiac disease which are increasingly being seen in young people due to lifestyle change.³² Cervical spine injury may be associated with respiratory insufficiency leading to ventilatory failure and this may require mechanical ventilator which do not exist in our centres. Lower GCS showed that there were more complications represented by respiratory complication leading to increase mortality. In complete neurologic deficit, there is lack of motor function and the patient may need treatment in a specialised centre and where this is not available mortality may be high.

Conclusion

Our study has shown that the commonest complications noted in SCI patients are muscle spasms and neurogenic pain but the commonest causes of death are respiratory failure and septicemia. The mortality rate six months post injury is quite high. Predictors of complications are CSI and Frankel type A injury. Age, CSI, Frankel type A injury and GCS<9 at presentation all lead to an adverse outcome.

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