

Morbidity and Mortality Associated with Conservative Management of Spinal Cord Injury in Makurdi, North Central Nigeria.

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ABSTRACT

Background: Spinal cord injury is commonly associated with morbidity and mortality. This is further worsened by inadequate rehabilitation because of dearth of infrastructure, equipment and personnel.

Objectives: To identify the complications and causes of death in traumatic spinal cord injury patients.

Methodology: A 4-year retrospective review of all traumatic spinal cord injured patients treated at Benue State University Teaching Hospital Makurdi was conducted. The information on age, sex, occupation, cause, associated injuries, level of injury, neurological deficit, American spinal cord injury association (ASIA) score at presentation, complications and outcome were obtained from medical records department. Data were analyzed using Statistical Package for Social Sciences (SPSS) 17.0 (SPSS Inc. Chicago, IL, USA).

Results: There were 62 patients with a mean age of 36.02 ± 1.67 years (range 8-77 years) consisting of 54 males and 8 females giving a male to female ratio of 6.8:1. They included students 13(21%) and farmers 10(16.1%). Road traffic crash accounted for 35(56.5%). Majority had cervical spine injury 22(62.8%) and accounted for complications in 20(36.4%). Bed sores occurred in 22(35.5%). ASIA A had the highest frequency of complications 22(35.5%). Eleven patients died giving a case fatality of 31.4%. The patients died from respiratory failure 4(36.4%) and sepsis 2(18.2%).

Conclusion: Many complications including bed sores and orthostatic pneumonia result from spinal cord injury leading to high morbidity and death from sepsis and respiratory failure.

KEYWORDS: Spinal cord, complications, mortality, Nigeria.

Introduction

Spinal cord injury (SCI) is commonly associated with morbidity and mortality especially if there is neurological deficit. This is further worsened by conservative treatment because of challenges of inadequate rehabilitation in centers which lack appropriate infrastructure, equipment and

personnel. SCI a medically complex and life-disrupting condition which has costly consequences, both for individuals and society¹. The patients are left dependent, are excluded from school, and are less likely to be employed. They are also at risk of premature death from the myriad of complications they live with. The global incidence of SCI, both traumatic and non-traumatic, is likely to be between 40 and 80 cases per million population. Based on the 2012 world population estimates, this means that every year between 250 000 and 500 000 people suffer a spinal cord injury. The incidence of traumatic SCI (TSCI) reported in country-level studies ranges from 13 per million to 53 per million.

We conducted this retrospective study to

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provide data on the complication and mortality profile of TSCI in our environment in order to advocate for the establishment of spinal injury rehabilitation centres in Nigeria. This will also provide information for government, non governmental agencies and other key stakeholders for purpose of planning, training of specialist in this subspecialty and funding of research in order to improve outcome of these patients.

Materials and Methods

A four year retrospective (June 2012 to May 2016) review was conducted at Benue State University Teaching Hospital Makurdi (BSUTH). It is one of the two tertiary institutions in the state and has four orthopaedic surgeons who manage musculoskeletal trauma as well as orthopaedic cases. It is the main referral centre for trauma and other critically injured patients in the state and the neighbouring states. The information on age, sex, occupation, cause, associated injuries, time interval to presentation, level of injury, neurological deficit, American spinal cord injury association (ASIA) score at presentation, radiological findings, complications at presentation and during the course of treatment as well as outcome were obtained from case notes in the medical records department and documented in a proforma designed for the purpose. Patients' outcome were categorized as 'improved' if they increased by at least one class on their ASIA classification at time of discharge. 'Same' are those whose ASIA score did not change throughout the period of treatment. 'Survived' are those whose condition improved or remained the same at time of discharge. 'Referred' were patients who were referred to other hospitals for proximity reasons or for further care. 'Deteriorated' are those patients whose condition worsened. In-hospital fatalities and those who were discharged against medical advice (DAMA) were also noted.

Inclusion criteria was patients who sustained TSCI and presented to our centre. Patients who had neurological deficit from non-traumatic aetiologies were excluded from the study. All Patients were managed conservatively with cervical collar or skull traction, thoracolumbar brace or jacket and lumbar brace when indicated. Drugs like non steroidal anti inflammatory drugs, paracetamol, antibiotics and oxygen were given when indicated.

Data were analyzed using Statistical Package for Social Sciences (SPSS) 17.0 (SPSS Inc. Chicago, IL, USA); continuous variables are presented as means \pm S.D., whereas categorical variables are presented as frequencies.

Results

There were 62 patients with a mean age of 36.02 ± 1.67 years (range 8-77 years) (Table 1). They consisted of 54 males and 8 females giving a male to female ratio of 6.8:1. They included students 13(21%), farmers 10(16.1%), Drivers 4(6.5%), Business/traders 7(11.3%), Retirees 5(8.1%), Civil servant 6(9.7%), Carpenters 3(4.8%), Teachers 1(1.6%), Pupil 1(1.6%) and others 12(19.4%). Road traffic crash accounted for 35(56.5%) followed by fall from height 15(24.2%), falling mass object 5(8.1%), gunshot injury 4(6.5%) and diving into shallow waters 3(4.8%). The levels of injury were Cervical spine injury 35(56.5%), Thoracic spine 16 (25.8%) and lumbar 11(17.7%). There were 12 documented complications occurring a total of 51 times in 33 patients. Most of the complications 20(36.4%) occurred in cervical spine injured patients. Twenty nine patients did not have complications before discharge or referral. Of the 62 patients, bed sores occurred in 22(35.5%), orthostatic pneumonia 8(12.9%) and depression 8(12.9%)



Table 1: Distribution of patients by age

Age	Frequency	Percentage (%)
≤10	1	1.6
11-20	12	19.4
21-30	16	25.8
31-40	11	17.7
41-50	8	12.9
51-60	7	11.3
61-70	6	9.7
71-80	1	1.6
Total	62	100%

Table 2: Distribution by Complications

Complications	Frequency (N=62)	Percentage%
Bed sore	22	35.5
Orthostatic pneumonia	8	12.9
Depression	8	12.9
Urinary tract infection	2	3.2
Spasms	2	3.2
Hyperpyrexia	2	3.2
Fournier's gangrene	1	1.6
Peri-catheter bleeding	1	1.6
Constipation	1	1.6
Neurogenic shock	1	1.6
Joint Contracture	1	1.6
Insomnia	1	1.6
Anaemia	1	1.6
Total	51	82.3

Key:

N= number of patients Total = total number of occurrence of complications
 %= percentage of patients that had the particular complication.

Some patients had more than one complication. The ASIA Scores were ASIA A 32(51.6%), ASIA B 13(21.0%), ASIA C 11(17.7%), ASIA D 5(8.1%), ASIA E 1(1.6%). ASIA A had the highest frequency of complications 22(35.5%). This is followed by ASIA B 7(11.3%), ASIA C 3(4.8%), ASIA D 1(1.6%), ASIA E1 (1.6%).

The associated injuries were, head injury 25(40.3%), loss of teeth 2(3.2%), blunt chest trauma 2(3.2%), left tibia fracture 2(3.2%), urethral injury 2(3.2%). Other injuries included nasal bridge fracture, fibula fracture, ulna fracture, open patella fracture, tongue laceration, flame burns from traditional bone setters intervention, rib fractures, haemothorax and friction burns occurring in



one patient each (1.6%). Some patients had more than one associated injury.

Twenty two patients discharged themselves against medical advice and 4 were referred hence they are not included in the analysis of outcome. Out of the 36 patients who were treated for at least six weeks, the outcome was improved 15(41.6%), deteriorated 11(17.7%)

and same 10(27.7%). All the eleven patients who deteriorated died eventually giving a case fatality of 17.7%. The patients died from respiratory failure 4(36.4%), sepsis 2(18.2%), head injury 2(18.2%), orthostatic pneumonia 2(18.2%) and malignant hyperpyrexia 1(9.1%). Nine (81.8%) of those who died had cervical spine injury and ASIA A type of injury.

Table 3: Distribution of outcome of patients treated conservatively by ASIA score

ASIA scores	n	Survived	Died	Mortality rate(%)
A	17	8	9	52.9
B	9	7	2	22.2
C	6	6	0	0
D	6	4	0	0

The others 2(18.2%) had thoracic injury and ASIA B injuries. Six of the dead patients(54.5%) had bed sores while two others had neurogenic shock and depression each (9%).

Discussion

Most of the patients with spinal cord injury in our study are young people. This has been reported in many Nigeria studies⁴⁻⁸, The commonest cause of the injury is road traffic crash in our study as in many others studies except countries like south Africa where assault is the leading cause accounting for 59.3%⁹. Spinal cord injuries with neurological deficit are at higher risk of complications because the impaired sensory, motor and/or autonomic dysfunction. This predisposes them to complications involving the respiratory system, skin, urinary tract, bowel, muscles, joints and the brain. The commonest complication observed in our study was bed sore which occurred in 35.5% of the patients. Some of the complications were already present at presentation while others were developed in the course of the treatment. Other studies in resource constrained centres have similar observations^{1,3,10}. This may be due to the high

prevalence of cervical spine injury which makes nursing care for these patients challenging both for the hospital staff and the relations when they are eventually discharged. Cervical spine injury accounted for 68.6% in our study and was responsible for most of the complications (36.4%). Most of our patients were also ASIA A (56.1%) at presentation. A one year prospective study conducted in cape town South Africa showed that most of their injuries occurred in the cervical spine (53.1%), and ASIA A (39.3%) was observed in the cohort⁹.

Studies conducted in developed countries show that respiratory complications are the most life threatening. The extent of these respiratory complications depends on the level of the spinal cord injury and the degree of motor impairment according ASIA classification¹¹. The effect on lung function is usually due to the paralysis of inspiratory and expiratory muscle groups with secondary respiratory failure, weakened cough strength and secretion stagnation⁹. Lung function, measured in terms of forced vital capacity (FVC), is reduced depending on the level of the injury¹². In patients with high quadriplegia (C1-C4) who have complete motor injury, Forced vital capacity is on average 44% of the expected capacity, and increases by 16% in



cases of incomplete injury¹³. In the acute phase, 36-83 % of patients with Spinal cord injury are affected by respiratory complications¹⁴⁻¹⁶. With cervical injury, 80 % of all deaths are secondary to respiratory complications¹⁴. Our study shows that 81.8% of our patients who died had complete spinal cord injury and majority of them (36.4%) died of respiratory failure. This is due to frequent involvement of the phrenic nerve roots leading to diaphragmatic paralysis, atelectasis, orthostatic pneumonia, lung abscess and eventual respiratory compromise in these patients.

A similar retrospective study conducted in Hamburg Germany reviewed the records of 3114 patients with traumatic spinal cord and found out that 268 died giving a case fatality of 8.6%. This is much lower compared to 31.4% in our study. This clearly shows that with commitment from staff and the availability of the right equipment including functional ventilators, as seen in standard spinal rehabilitation centres, the morbidity and mortality may be reduced.

The prevention of complications including those of the respiratory system must start immediately irrespective of the level of the spinal cord injury⁹. Secretion stagnation due to weakness of the expiratory musculature is treated with lung physiotherapy¹⁷ postural drainage, suction, manual cough support and mechanical insufflation and exsufflation¹⁸. Mechanical insufflation-exsufflation employs a technical respiratory method (cough-assist device) whereby air is blown into the lungs and then suctioned out, rapidly and with great force. This high expiration flow causes secretions to be forced up into the upper airways. This cough device can be applied via a face mask or a tracheostomy tube¹⁹

Manual cough assist can also be done by a helper pressing the lower portion of the ribcage on both sides or pressing their hand flat against the epigastrium while the patient tries to cough. This is known to enhance the flow of air and produces a more effective cough⁹. Another technique is 'frog-breathing' also called glossopharyngeal breathing. In this case the patient uses gulping swallowing movements to press small volumes of air (40-200

ml) down into the lungs and after 6-9 cycles breathes out, or coughs²⁰. In air stacking, a ventilator or bag with mouthpiece or mask is used to 'stack' a number of inspirations, preferably 3-6, before the patient coughs^{19,20}. Other factors that may reduce the risk of infection in the acute phase are elevated bed head (45°), closed suction system, weekly replacement of circuit and good oral hygiene⁹.

Bed sores are better prevented than treated because of the enormity of the challenge they pose to patients, their caregivers and managing physicians. Relief of pressure is the standard conservative strategy for preventing and healing of bedsores²¹. Patients on admission should have regular assessment of pressure areas and pressure relief implemented with specialty beds and mattresses. Complying with turning orders, use of heel protectors, bed sheet cradles, removal of any extrinsic pressure sources such as strapping, pillows, restraints and catheters also go a long way in reducing this complication²¹. Those seen in the clinic on follow up should be interviewed about their compliance with pressure relief protocols. This includes where they sit, the number of hours they sit per day and wheelchair or cushion problems. Other areas of concern are transfer habits or protocols, turning or repositioning habits while sleeping and the type of mattress used. Even changes in care givers may contribute to development of complications because the new caregiver may have to learn some things on the job. These strategies usually reveal risk factors for bed sore development²¹. Further research will need to be conducted in our locality to identify peculiar risk factors for ulceration in order to reduce the occurrence of this major complication.

The study is hospital based and so may not capture the whole details of the morbidity and mortality of spinal cord injuries in the general population. The sample size is also small for inferential statistics.

Conclusion

Many complications including bed sores and orthostatic pneumonia result from spinal cord injury leading to high morbidity and death from sepsis and respiratory failure.



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