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Incomplete Spinal Cord Injury in Enugu, Nigeria: Epidemeology and Outcome

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Abstract

Background: Spinal cord injury represents one of the most physically and psychologically devastating trauma. Before modern medicine, it was considered an ailment not to be treated. In incomplete spinal cord injury (SCI), there is residual sensory and/or motor function. **Method:** This was to determine the epidemiology, treatment options and outcome of incomplete SCI at National Orthopedic Hospital Enugu, Nigeria, over a 5 year period. This was a descriptive retrospective study of patients managed for incomplete spinal cord injury between January 2011 and December 2015. This was to determine the epidemiology, various treatment options and their outcome in patients with incomplete SCI managed in our center. The patients' biodata, mechanism of injury, time of presentation, pattern of injury, level of injury, type of treatment, associated injuries, complications, duration of treatment and American Spinal Injury Association (ASIA) assessment at presentation and at discharge were collected. Data analysis was done using statistical package for social sciences (SPSS) version 20.0. All tests were regarded as significant at P-values < 0.05. **Results:** A total of 57 patients (49 males and 8 females) were included and analyzed showing a male to female ratio of 6.3:1. Incomplete traumatic SCI forms about 44.2% of all traumatic SCI in Enugu. This represents 0.09% of all patients and 0.9% of all trauma patients seen. The cervical spine (59.6%) is the most commonly affected isolated anatomic region. Road traffic accident (52.6%) was the most common aeteology. Compression fracture was the commonest injury (33.3%). Majority of the patients (57.9%) had ASIA C at presentation while 47.4% and 33.3% of the patients had ASIA D and E respectively at discharge. Most of the patients (91.2%) had conservative treatments. **Conclusion:** The significant ASIA grade improvement of majority of the patients suggests good functional outcome of incomplete SCI treated conservatively at our hospital.

Keywords

Incomplete Spinal Cord Injury, Epidemeology, Outcome

1. Introduction

Spinal cord injury (SCI) represents one of the most physically and psychologically devastating trauma. Before the advent of modern medicine, it was considered as an ailment not to be treated [1]. It often results in life-long functional disability [2] being a medically complex and life disrupting condition [3]. SCI results from disruption of neural elements of spinal cord [4] which is situated within the spinal column and extends from the brain to L1 - L2 vertebral level where it terminates as conus medullaris [3].

Road traffic crashes remain the major cause of the injury worldwide [3]. Violent crimes, sports related falls and penetrating injuries [4] [5] are known to cause SCI. Whatever the aetiology is, there is primary mechanical compression, distraction, laceration and shear forces or secondary extension of ischaemic damage to neural and axonal tissues [6].

In incomplete SCI, there is residual sensory and/or motor function below the level of the injury. The general outcome depends on a number of factors including level and extent of injury, time to presentation and the initial management given to the patient [7] [8]. The incidence of incomplete SCI is increasing because of improved motor vehicular safety and better early care [9] [10] [11]. This was to determine the epidemiology, various treatment options and their outcome in patients with incomplete SCI managed at National Orthopedic Hospital Enugu, South East Nigeria.

2. Methodology

This is a descriptive retrospective study of patients managed for incomplete spinal cord injury at National Orthopaedic Hospital Enugu (NOHE) between January 2011 and December 2016. Ethical clearance was obtained from the hospital ethical committee. The accident and emergency admissions and theatre registers were used to identify the folder numbers of patients with incomplete SCI for the period under review. The identified case notes were retrieved from the medical records departments and names matched with the folder numbers to avoid double recruitments. The patients' biodata, mechanism of injury, time of presentation, pattern of injury, level of injury, type of treatment, associated injuries, complications, duration of treatment and American Spinal Injury Association (ASIA) assessment at presentation and at discharge were collected.

The collated data were stored in hard as well as electronic forms. Data analysis was done using statistical package for social sciences (SPSS) version 20.0. Graph pad prism was additionally used as necessary. Descriptive statistics which includes frequency, percent, mean, median, and standard deviation were used to summarize categorical and continuous variables. Associations between categorical variables were analysed using Student-t test and chi-square tests for significance. All tests were regarded as significant at P-values < 0.05. Results of the analysis were presented in texts, tables and figures as indicated.

3. Results

A total of 57 patients (49 males and 8 females) with complete records were included and analyzed showing a male to female ratio of 6.3:1 (Figure 1). Incomplete traumatic SCI forms about 44.2% of all traumatic SCI in Enugu. This represents 0.09% of all patients and 0.9% of all trauma patients seen within the study period. The most common age bracket at presentation was found to be 31 - 50 years (49.2%) (Figure 2). Most of the patients (66.7% and 24%) presented

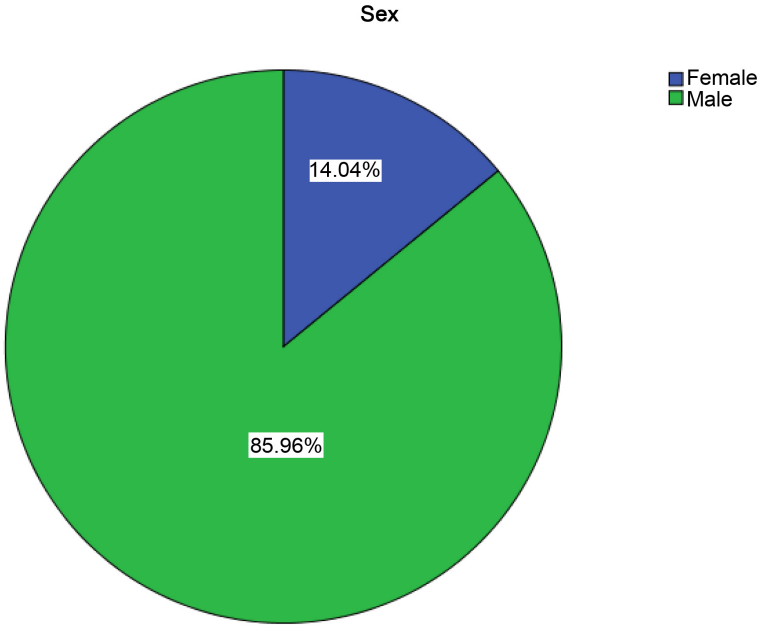

Figure 1. Pie chart of sex distribution of the patients.

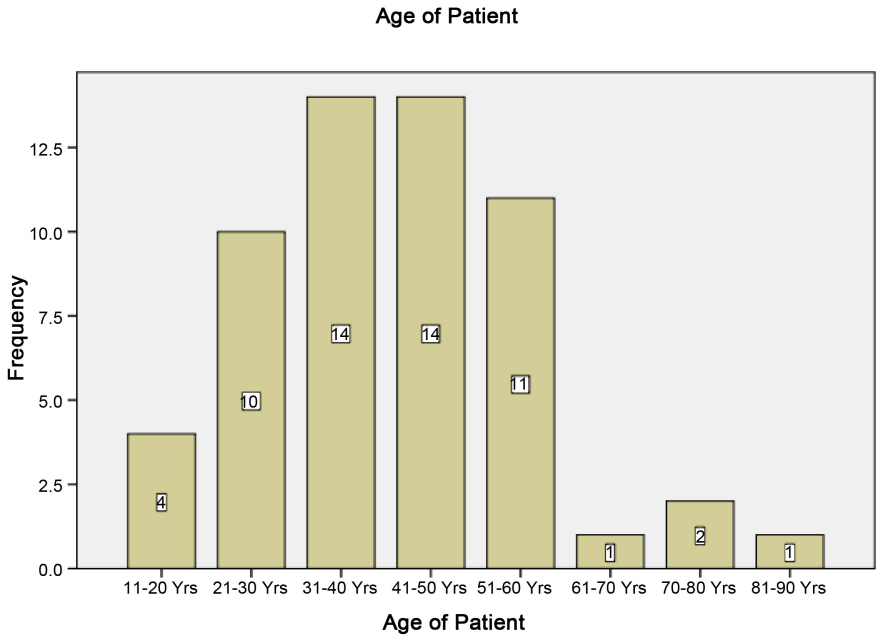

Figure 2. Bar chart of age distribution of patients wih incomplee SCI.

within one and two weeks of their injury respectively. The cervical spine (59.6%) is the most commonly affected isolated anatomic region. Affectation of two spinal segments occurred in about 5 patients accounting for only 8.8% (Table 1). Road traffic accident was found to be the most common cause of injury accounting for up to 52.6% while gunshot injury was the least common aetiology (Table 2). Compression fracture was the most common injury (33.3%). Other common pathologies include traumatic spondylolisthesis 28.07%, and burst fracture 15.79% (Figure 3). Isolated traumatic disc prolapse accounted for only 5.26%. Majority of the patients (57.9%) had ASIA C at presentation while 47.4% and 33.3% of the patients had ASIA D and E respectively at discharge, showing statistically significant improvement of the patients at discharge, (P value < 0.0001 (Table 3). This represents 80.7% of the patients having at least improvement of one grade of ASIA assessment at discharge. Most of the patients (91.2%) had conservative treatment in the form of cervical traction with Minerva jacket (54.4%) and thoracolumbar jacket (31.6%) while 8.8% had spinal decompression (Table 4). Majority of the patients (75.5%) had hospital stay of 1 - 8 weeks. Thirty patients (52.6%) managed had no complication. The commonest complications seen were urinary tract infection and pressure sores (Figure 4).

4. Discussion

Within the study period, 0.2% of all the patients that presented in the hospital were cases of traumatic SCI and 44.2% of the traumatic SCI were incomplete

Table 1. Level of injury.

	Frequency	Percent
Only Cervical Spine	31	54.4
Only Thoracic Spine	5	8.8
Only Lumbar Spine	16	28.1
Cervical with Thoracic	3	5.3
Thoracic with Lumbar	2	3.5
Total	57	100.0
Mean: 1.95 ± 0.155, Std. Deviation: 1.171		

Table 2. Aetiology of incomplete SCI.

	Frequency	Percent
RTA	30	52.6
Gun Shot	1	1.8
Fall from Height	19	33.3
Assault	3	5.3
Others: Hit by Object, Dive into Shallow Water	4	7.0
Total	57	100.0
Mean: 2.12 ± 0.174, Std. Deviation: 1.310		

Table 3. ASIA scoring at presentation and discharge.

	ASIA at Presentation		ASIA at Discharge		
Score	Freq.	Percent	Freq.	Percent	P value (two-tailed)
A	0	0.0	0	0.0	
B	7	12.3	0	0.0	<0.0001
C	33	57.9	7	12.3	
D	9	15.8	27	47.4	
E	8	14.0	23	40.4	
Total	57	100.0	57	100.0	

Approximate P value (<0.0001) is significant at (alpha = 0.05).

Table 4. Type of treatment.

Type of treatment given	Frequency	
CONS. = Cervical + Minerva Jacket	6	10.5
CONS. = C. Collar, Skull Traction, Minerva Jacket	25	43.9
CONS. = Cervical Collar	3	5.3
CONS. = Thoracolumbar Jacket	18	31.6
Surgical (Spinal Decompression)	5	8.8
Total	57	100.0
Mean: 2.84 ± 0.164, Std. Deviation: 1.236		

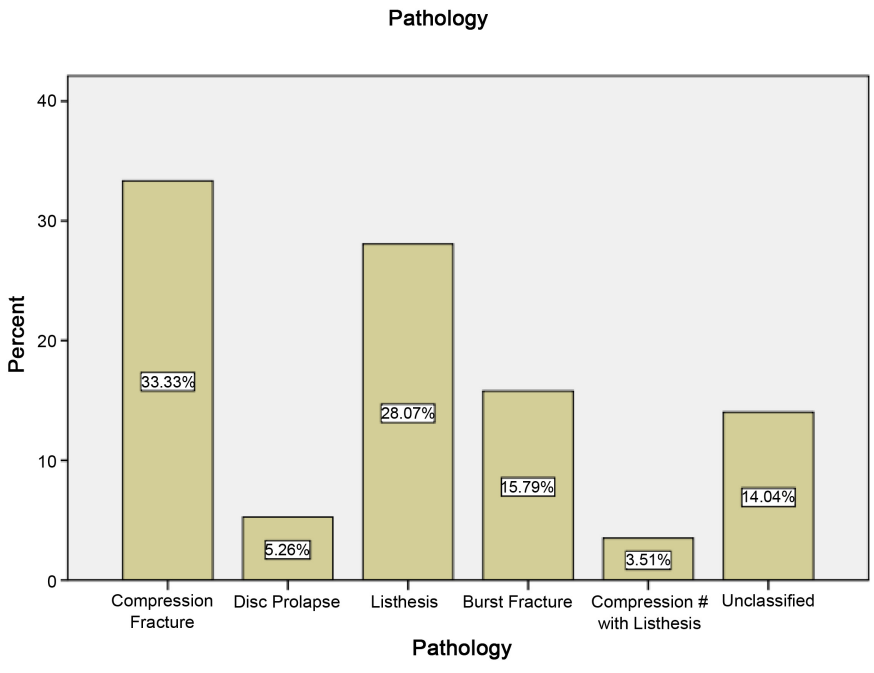

Figure 3. Pathology of incomplete SCI.

injury. This is similar to reports for other developing countries [12]. The study found a male preponderance of the injury which is similar to that reported by

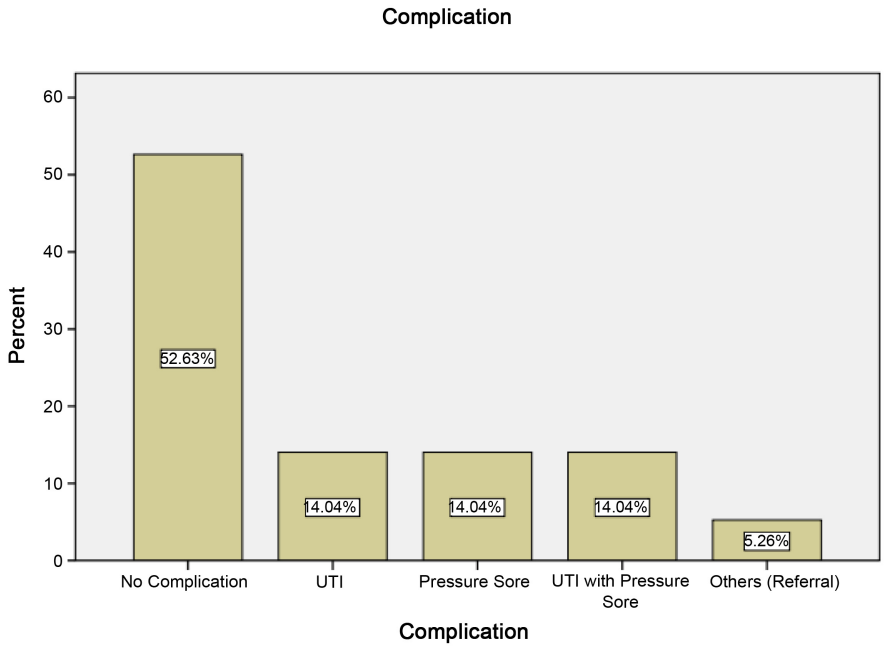

Figure 4. Complications of incomplete.

Ahmad *et al.* in their study at Yazd city [13]. The mean age of the patients is 41.35 ± 1.938 years. The most common affected age bracket of 31 - 50 years found in the study was also similar to that reported by Shrestha *et al.* Shrestha *et al.* in their study showed age range of between 26 - 56 years as the most commonly affected [14]. This is within the most productive, mobile and exploratory age group. The cervical spine (54.4%) was the commonest anatomic region of affectation. This is similar to that reported by Kumar *et al.* (44.1%) but differed from that of Ahmad *et al.* that reported thoracic spine as the commonest (44.2%) [13] [15]. Road traffic accident is the most common cause (52.6%), followed by a fall from a height (19%). These were similar to those reported by Ahmad *et al.* in their study showing motor vehiclar accident and fall from a height as 66.7% and 15.5% respectively [13]. However, Conran *et al.* in their study reported assault as the most common etiology in South Africa (60%) and fall from a height (58%) in Sweden [16]. On discharge, 47.4% of the patients had ASIA D, 33.3% had ASIA E and 12.3% had ASIA C. However, Bartel *et al.* reported good outcome in conservative management of central cord syndrome patients and that surgery has been found to give a better outcome if done within 24 hours of injury [17]. Study by Hwa *et al.* showed that 58% of patient that had laminoplasty for incomplete injury improved by one or more ASIA grade in 6 months [18]. Although, most of the patients in our study (91.2%) were managed conservatively but at discharge 47.4% and 33.3% had ASIA D and E respectively. This was similar to the good outcome reported by Bartel *et al.* with their conservative management of central cord syndrome. Similarly in our study, even though only 8.8% had surgical decompression, they also showed good outcome similar to that reported by Hwa *et al.* in their study [18]. In our work, both the patients managed conserva-

tively and those who had surgical decompression demonstrated good outcome of neurologic improvement.

5. Conclusion

The significant ASIA grade improvement of majority of the patients suggests good functional outcome of incomplete SCI treated conservatively as at National Orthopedic Hospital Enugu.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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