

Research Article

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The patterns and management outcomes of traumatic thoracic and lumbar spinal cord injuries among patients admitted at Kilimanjaro christian medical centre from 2017 to 2018

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Keywords: thoracic and lumbar spinal cord injury; management outcome; spine stabilization.

Abstract

Background: Traumatic thoracic and lumbar spinal cord injury (TTLSCI) is one of the common musculoskeletal injuries which predisposes someone to a devastating disability, also associated with several life threatening complications and also pauses a huge financial burden to the society and the healthcare system. Early diagnosis, treatment and stabilization of the TTLSCI patients have led to reduction of complications, early discharges and early engagement into compatible and adaptive physical and occupational activities and also reduction of huge burden to the already crippled health care system of most developing world.

Methods: This was a retrospective and descriptive cohort study design which was conducted at KCMC Orthopaedics and Trauma Department. Non-probability; convenient sampling technique was used. Patients' files were traced, and the needed information was extracted by the use of pre-designed data collection sheet.

Objective: This study aimed to assess the patterns of injuries and management outcome of traumatic thoracic and lumbar spinal cord injuries among patients admitted at Kilimanjaro Christian Medical Centre from January 2017 to December 2018.

Results: We were able to include 97 participants in this study where by 75 (77.3%) were males. The male to female ratio was 3.4:1. More than half of study participants, 50 (51.6%) had stable vertebral injuries. Compression fracture endplate type (47.4%) was the commonest pattern of injury. Fall from height being the leading cause of these patterns by 57.7%. From the road traffic crash injuries 57.6% was due to car crashes. Lower thoracic spine (T10-T12) injuries were the commonest (44.3%). Long bone fractures 22 (22.7%) was the commonest associated injury. Majority of study population 43 (44.3%) had ASIA A classification on admission. Pressure ulcers (15.8%) were the leading complication. Deaths was reported in 5 (5.2%) of the study population. Few patients 8 (8.3%) who were surgically stabilized had no complications and had few numbers of days in the hospital.

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Conclusion: Mainly males aged 20-40 yrs of the study population were the most affected group. Fall from height and motor traffic crash injuries were the leading causes. Surgical stabilization was the effective mode of management with better outcome where by majority of patients who were stabilized surgically had no complications and had few numbers of days in the hospital. Pressure ulcers, which are preventable, were the most commonly observed complication associated with unfortunate management outcome.

Introduction

Spinal injury is defined as an insult to the spinal column leading to a change, either temporary or permanent, in its normal neural and supportive function [1].

Fractures of the thoracic and lumbar spine region constitute a spectrum of injuries ranging from simple undisplaced fractures to complex fracture dislocations with or without cord compromise [2]. Of recent years surgical stabilization to TTLSCI patients have been taking place to our centre and there is no recent study on the patterns and management outcome of traumatic thoracic and lumbar spinal cord injuries among patients treated at KCMC has been carried out and in addition there is scanty literature available on the management outcome of spinal injured patients who underwent surgical stabilization to our centre, thus this study aims to increase the body of knowledge in this area.

Materials and methods

A hospital-based retrospective descriptive study was conducted at KCMC, a tertiary hospital in the northern part of Tanzania, in the department of Orthopedics and recruited patients presenting with traumatic TLSCIs who were needing admission to the orthopaedics and trauma wards from January 2017 to December 2018.

For two years of this study, only 2263 patients with musculoskeletal injuries were admitted in the department. Of these only 140 (6.19%) had spine injuries, and out of these only 97 (69.29%) had TTLSCI with eligible criteria to be included in this study.

We recruited all patients who had at least one of the radiological investigations of the study regions of our interest, i.e. plain x-ray, CT-scan, MRI or combined radiological investigations. We started enrolling patients from the Emergency department admission registry and then followed them in the wards. Patients were again identified from orthopaedic ward register books, then the files were retrieved from medical records and radiological images from radiology database system by using hospital numbers and the patients' records were assessed to determine the availability of all necessary and required patients' data. The patients records from admission notes; daily ward round notes; physiotherapy and occupational therapy notes; nursing procedure charts; temperature charts; drugs sheets; radiographic and laboratory results were thoroughly crosschecked. The required details were then extracted and filled in the predesigned checklist.

The checklist contained demographic data; medical history; circumstances of injury; as well as the time of arrival to KCMC after the injury with an initial medical and neurological examination; vital signs; temperature charts; radiological findings; the medical and surgical treatment received; if there were any complications, and the final mortality event were captured in the files were picked. Then the data was collected by using a designed structured questionnaire.

All patients' radiological images were reviewed with an assistance of a consultant radiologist and orthopaedic surgeon. All information relevant for the study was entered on to a designed structured questionnaire.

A non-probability convenient sampling technique was used in this study. All patients with TTLSCI admitted in the Orthopedics and Trauma Department between January 2017 and December 2018 who was conscious at the time of admission were included. Unconscious patients were excluded because we were not able to identify the level of injury and whether they had spinal injury problems prior to this incident. Either all patients with pre-existing neurological impairment and peripheral nerve lesions above the level of injury were also excluded to minimise bias.

The data was entered, processed and analyzed by using SPSS version 22 package. Descriptive statistics were summarized by using frequency and proportion for categorical variables and measures of central tendency with respective measures of dispersion for numerical variables were used.

Results

This study included a total of 97 study participants. The mean (SD) age of the study participants was 34.4 (15.3) years. Most of the study participants 57 (58.8%) were aged 20 – 40 years, 75 (77.3%) were males, 50 (51.6%) were rural residence, and peasants were 42 (43.3%), those who had primary education were 51 (52.5%). The median (range) time between injury and presentation at KCMC was 14 (2-1440) hours as shown in Table 1.

More than half of the study participants 50 (51.6%) had a stable vertebral fracture. Majority of the study participants 46 (47.4%) had a compression fracture of end plate type injury according to Denis classification of spine injury, and 43 (44.3%) had T10 – T12 anatomical level of injury. However, 40 (41.2%) had an injury at the thoracolumbar junction as shown in Figure 1 and Figure 2.

A large proportion of the study participants 56 (57.7%) were involved in falls, followed by road traffic crush 33 (34.0%). Most

of those who were involved in a road traffic crashes, were due to car crush 19 (57.6%). This is shown in Figure 3 and Figure 4.

On admission 43 (44.3%) were ASIA A followed by ASIA D 31 (31.9%) and at discharge 40 (41.2%) were ASIA A, and 26 (26.8%) were ASIA D. This is shown in Table 2 and Figure 5. Among those operated, on admission there was 5 ASIA "A", 0 ASIA "B", 1 ASIA "C", 2 ASIA "D" and 0 ASIA "E". At discharge there was 3 ASIA "A", 2 ASIA "B", 0 ASIA "C", 2 ASIA "D" AND 1 ASIA "E" as shown in Table 2.

Table 2: ASIA at admission and discharge (n=97)

	ASIA DISCHARGE					Total
	ASIA A	ASIA B	ASIA C	ASIA D	ASIA E	
	n=40	n=8	n=8	n=26	n=15	n=97
ASIA ADMISSION						
ASIA A	37	6	0	0	0	43
ASIA B	0	2	0	1	0	3
ASIA C	1	0	8	8	2	19
ASIA D	2	0	0	17	12	31
ASIA E	0	0	0	0	1	1

Table 1: Socio demographic characteristics of the study participants (n=97)

Characteristics	n (%)
Age (years) (mean (SD))	34.4 (15.3)
Age (years)	
< 20	13 (13.4)
20–40	57 (58.8)
41– 60	18 (18.6)
> 60	9 (9.2)
Sex	
Male	75 (77.3)
Female	22 (22.7)
Residence	
Rural	50 (51.6)
Urban	47 (48.4)
Occupation	
Peasant	42 (43.3)
Civil servant	11 (11.3)
Domestic worker	10 (10.3)
Business	19 (19.6)
Student	15 (15.5)
Education	
None	1 (1.1)
Primary	51 (52.5)
Secondary	29 (29.9)
Tertiary	16 (16.5)
Time interval between injury and presentation at KCMC -median- (range) hrs	14 (2 - 1440)

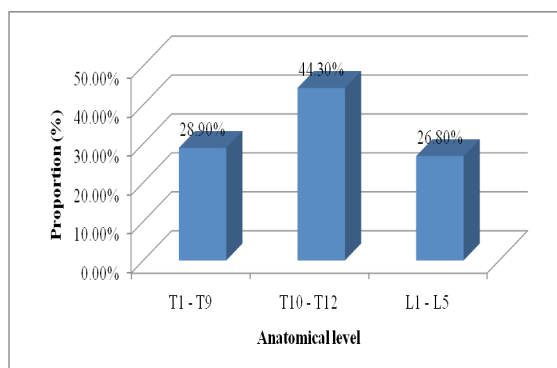


Figure 2: The patterns of injury among patients with TLSCI according to anatomical level (n=97).

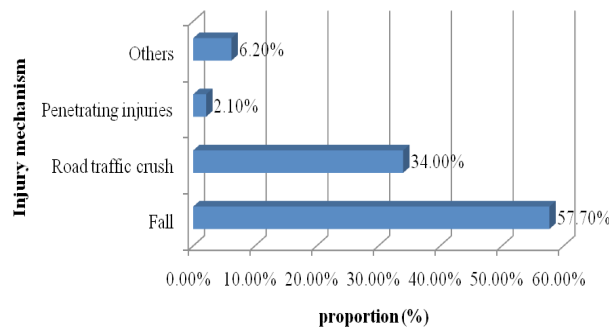


Figure 3: Mechanism of injury in patients with TLSCI (n=97).

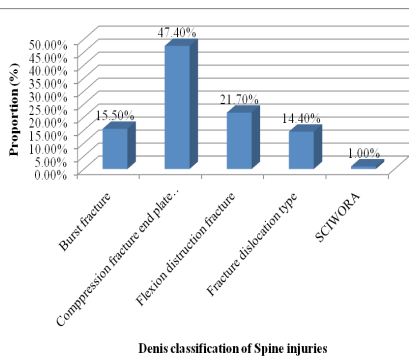


Figure 1: The patterns of injury among patients with TLSCI according to Denis classification of spine injuries (n=97).

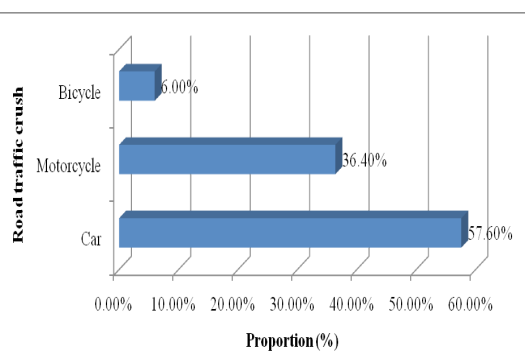


Figure 4: Mechanism of injury in patients with TLSCI (n=97).

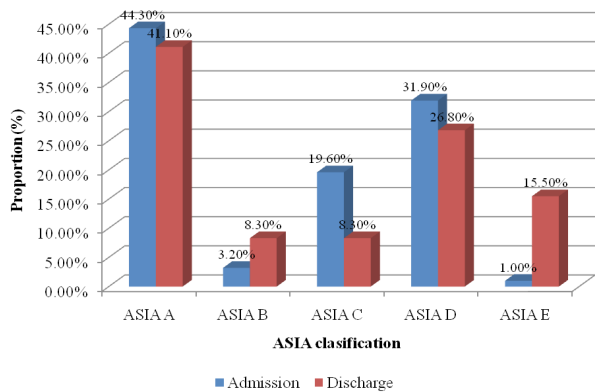


Figure 5: The injury severity score at admission and discharge in patients with TTLSCI treated at KCMC by using ASIA classification (n=97).

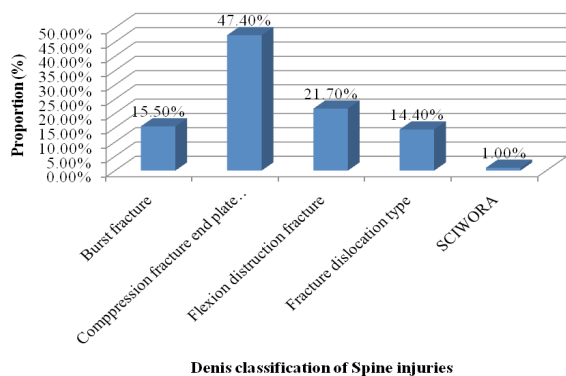


Figure 6: Complications in patients with SCI treated at KCMC (n=97)

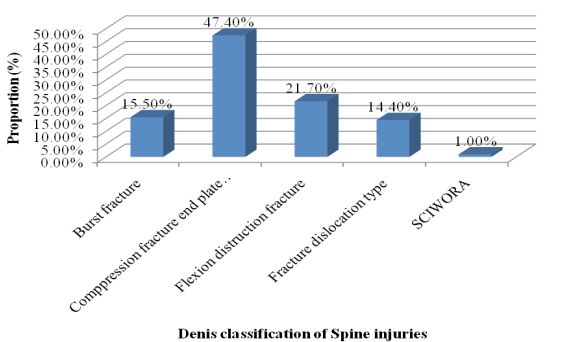


Figure 7: Management outcomes in patients with TTLSCI treated at KCMC (n=97).

Majority of the study participants had pressure sores 18 (15.8%), followed by, spasticity 16 (14.0%) and urinary tract infection 14 (12.3%) as shown on Figure 6. Death was found to be 5(5.2%) of the study population.

Of the treatment offered in this study, 89 (91.8%) were managed conservatively and 8 (8.2%) were operated. The range (median) of hospital stay was 98 (9 – 394) days. Those managed conservatively 30 (33.7%) walked unaided on discharge, and 41 (46.1%) had 91 – 180 days of hospital stay. Those managed operatively 4 (50.0%) were wheelchair dependent on discharge, and 6 (75.0%) had < 91 days of hospital stay as shown on Figure 7.

Discussion

The most affected population in this study was male of a young age group ranging from 20-40 years. These are the most active age group in the society as well as in the social-economic well being of the community. This agrees with other studies in developed and developing countries respectively [3,4].

Males were dominating with male to female sex ratio of 3.4:1, this is similar to other studies which have reported male to female sex ratio of 2.74:1 in France [5], 4.6:1 in Nigeria [6] and 7.55:1 in Pakistan [7] as well as in Kenya 15.3:11. In this study males were the most affected gender, although the gender ratio varies considerably in other studies. Since men are bread winners in most societies they are more prone to TTLSCI.

Half of the study participants (51.6%) had stable vertebral fractures, these agree with findings by other authors [6,11] who also had majority with stable fractures. Also majority of the study population had compression fractures (47.4%) with end-plate type this is contrary to [8] who had 33.6% compression type among his study participants, however, this is explained well by the mechanism of injury in which most of his study population had a motor vehicle crush as a leading cause of injury. Similar findings were also reported by Katsuura, Osborn and Cason. More than half of the study participants (51.6%) had stable injuries [9]. Also majority of the study population had compression fractures (47.4%) with end plate type this is contrary to [2,8] who had 33.6% compression type among his study participants however this is explained well by the mechanism of injury in which most of his study population had a motor vehicle crashes as a leading cause of injury while in this study the leading mechanism of injury was fall from height.

Majority (44.3%) of study participants had lower thoracic (T10-T12) level of injury followed by thoracolumbar junction (T11-L1) by (41.2%). Similar findings were reported by [5,8]. This is explained well by the relative weakness of the junction as it is the most flexible part of the spine. Different from other studies, the second leading part of vertebrae injured was the upper thoracic spine (28.8%) with almost equal proportional with Lumbar injuries L1-L5 in which most of the studies were the second leading fracture patterns among the study participant; a study done in the USA reported to have 37.6% of the study population contrary from this study however also the mechanism of injury was different [8].

Majority of participants in this study 89 (91.8%) were managed non-operatively, this is contrary to a study done by Ghobrial [10] also these findings agrees with the findings found in Italy [4] and 8 (8.2%) were operated. Majority of those who were operated had a minimum range of hospital stay of less than 90 days, these findings agree with the study done in 2012 ('What do we currently know about thoracic spinal cord injury recovery and outcomes? A systematic review', 2012). None of the operated patients encountered any complications. There was no deterioration of ASIA classification among of the operated patients. The median (range) of hospital stay among the study population who was not operated were 98 (9-394) days. Those managed conservatively 30 (33.7%) walked unaided on discharge and 41 (46.1%) had 91 - 180 days of hospital stay. Surgical management was undertaken in 8 of the patients. Out of those managed surgically, 50.0% were wheelchair dependent on discharge and 6 (75.0%) had <91 days of hospital stay. Those

who were operated and was able to walk though aided were 25.0% and 12.5% were able to walk unaided. However 12.5% remained bed ridden patients until their discharges. The average time between presentation and surgery was 36.4 days (10 – 84), and there were two main factors for the delay, the first one being the expertise and second was the availability of implants.

Majority of the study participants 15.8% had pressure sores as a leading complication, this tally with the study done in Kenya in which by three months 44.8% developed bed sores¹. Also spasticity 14.0% was the second observed complication followed by urinary tract infections 12.3%, other complications were contracture 9.6%, pneumonias as well as neurogenic pain with 7.9% among study participants respectively. Musculoskeletal complications in general were the commonest among all; such findings were also reported by many authors.

Conclusion

For two years of this study, only 2263 patients with musculoskeletal injuries were admitted in orthopaedic department. Of these only 140 (6.19%) had spine injuries, and out of these only 97 (69.29%) had criteria's to be included in this study.

Male patients aged 20-40 years were the most affected group and falls from height together with motor traffic crash injuries were the leading causes of the injury patterns.

The management outcomes were associated with the mode of treatment and also affected the hospital stay.

Majority of the study participants were treated non-operatively; however those who were operated had shorter days of hospital stay. ASIA A being the leading injury severity classification during admission and there was a substantial increase of ASIA E during discharge, showing that most of the patients were improving during the course of treatment.

Pressure ulcers along the course of management were the leading complication, and those patients who acquired pressure ulcers had a significant number of days in the hospital.

Recommendations

Stable injuries without neurological deficit with indications for stabilization, should be earlier surgically stabilized to minimize their hospital stay and other complications

Health education to indoor animal keepers and avocado fruits harvesters on the safe method of their activities should be conducted to minimize the injuries.

Further studies are needed to address the progress of spine surgery program and how best the unconscious patients with traumatic spinal cord injuries can be included on the initial muscle assessment charts and be graded their ASIA scores.

Primary care of admitted patients with TTLSCI should be more addressed on preventing the pressure sores to minimize

the number of hospital stay and other related complications to most of patients.

Declarations

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