Morbidity Aspects in Spinal Cord Injury Patients: Experience of the Spinal Unit at King Hussein Medical Center

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ABSTRACT

Objectives: To investigate the frequency of medical complications in spinal cord injury patients, their demographic characteristics, extent and causes of their injury.

Methods: The medical records of 190 patients with spinal cord injury patients who were admitted during 2008-2012 were enrolled in this study. Their demographic data, causes and extent of injury were analyzed. The American Spinal Injury Association impairment scale was used to categorize injury level and severity. The causes of morbidities surveyed were cardiovascular, respiratory, renal complications, pressure sores, spasticity and neurogenic pain.

Results: A total of 190 cases were reviewed. The majority were predominantly males 152 (80%). The male/female ratio was 4:1, the mean age at the time of injury was 32 years. Their age ranged from (13-70 years). The vast majority was traumatic causes (n=167,88%) of which road traffic accidents were the main cause of their injury. Non-traumatic causes were recorded in 23 (12%) patients. Among the morbidities studied, pain was the dominant cause (45%) followed by urinary tract infection (30%), pressure sores (25%), spasticity (23%), thromboembolic complications (18%) and respiratory complications (10%).

Conclusions: The most common causes of morbidity were pain followed by urinary tract infection and pressure sores. Effective prevention strategies should be applied as early as possible to reduce their occurrence in spinal cord injury patients. This study showed that traumatic causes and particularly road traffic accidents are the leading cause of spinal cord injury.

Key words: American Spinal Injury Association, Complications, Morbidities, Spinal Cord Injury

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Introduction

Spinal Cord Injury (SCI) is one of the most devastating injuries that afflict young people at the height of their social and working life. SCI has a worldwide incidence between 10.4 and 83 cases per million per year.[1] It is a multi system injury which leads to significant morbidity and mortality. There is no reported literature on the incidence of SCI and its morbidities from our country. Systematic epidemiological studies in developing countries are relatively less compared to European countries.[2] The first published epidemiological study was from Jordan which showed an

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incidence of 18 per million per year.[3] Despite increased awareness and advances in the management of SCI, complications continue to occur and negatively affect the neurological injury and rehabilitation outcome.[4] In addition, these complications have a considerable impact on SCI patients interfere with the start of active rehabilitation and can lead to increased mortality.[5] Many factors are preventable and need patient education and public health measures. The British Association of SCI Specialist recommends early transfer to specialized units designated for the care of SCI patients in order to reduce the incidence of complications.[6] The management during acute phase and in-patient rehabilitation should focus on prevention and treatment of such complications. This study aims to investigate the frequency of medical complications in SCI patients, their demographic characteristics, extent and causes of their injury in a specialized unit at King Hussein Medical Center which is the only referral unit in Jordan.

Methods

We retrospectively reviewed the medical records of patients who were admitted between March, 2008 and December, 2012 to the Spinal Unit at King Hussein Medical Center for management and rehabilitation after SCI. Ethical approval was granted by the Royal Medical Services Ethics Committee. The following data were collected: age, sex, etiology, level and extent of injury as well as details of medical complications. The clinical features of Spinal Cord dysfunction were classified according to the International Standards of Neurological and Functional Classification of Spinal Cord Injury proposed by the American Spinal Injury Association (ASIA).[7] The initial degree of impairment was measured by the ASIA impairment scale. The neurological level was defined by the most caudal segment of the Spinal Cord with normal sensory and motor functions on both sides. We included patients who had SCI presenting class A, B, C and D as defined by ASIA Classification System with different levels of injuries (cervical, thoracic and lumbar) due to traumatic and non-traumatic causes. Their demographic data and causes of injury were analyzed. The causes of morbidities surveyed were cardiovascular, respiratory, renal complications, pressure sores, spasticity and neurogenic pain.

Simple descriptive statistics (mean, frequency and percentages) were used in describing the study variables.

Results

There were a total of 190 cases with SCI admitted during the period of the study (Fig. 1). The majority were males 152 (80%). The male/female ratio was 4:1. The mean age at the time of injury was 32 years. Their age ranged from (13 - 70 years). The vast majority were traumatic causes (n=167, 87%) and the leading cause of their injury were road traffic accidents followed by falls, while 23 (13%) patients were of non-traumatic causes (Table I).

Thoracic spine injuries were the most common accounting for 56% followed by cervical injuries 26% and lumbar spine injuries 18%. The neurological impairment according to ASIA classification showed that the majority had a complete injury 58% (ASIA grade A), while 42% had incomplete injuries (ASIA grade B-D) as demonstrated in Table II.

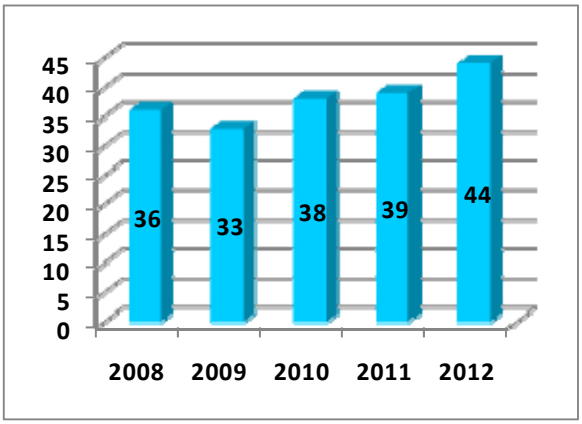

Fig.1: Number of cases admitted to spinal unit

Table I: Etiology of traumatic causes among the study group

Traumatic cause of SCI	Cases	%
Traffic accidents	90	54
Accidental falls	63	38
Gunshot wounds	14	8

Table II: Extent of injury (ASIA class)

ASIA class	Cases	%
A	110	58
B	10	5
C	47	25
D	23	12

Table III: Morbidity aspects among the study group

Morbidity Aspect	Cases	%
Pain	86	45
UTI	57	30
Pressure Sores	48	25
Spasticity	44	23
Thrombembolic	34	18
Respiratory	19	10

Among the morbidities studied, neuropathic pain was the dominant cause 45% followed by urinary tract infection (UTI) 30%, pressure sores 25%, spasticity 23%, thromboembolic complications 18% and respiratory complications 10%. The various causes for morbidities studied are shown in Table III. Pain was found to be the leading cause of morbidity in this study and it was more common in patients who had sustained a thoracic level of injury. UTI was the second most common complication.

Pressure sores were found in a quarter of the study sample and we noticed that most of those pressure ulcers occurred during in-patient admissions and before transfer to spinal unit. Spasticity of various degrees occurred mainly in cervical and thoracic spine injuries. Thrombembolic complications accounted for 18% of this group in spite of prophylactic treatment, while respiratory complications were noticed in 10% and mostly occurred in tetraplegic patients following cervical spine injury.

Discussion

The current study was retrospective, examining complications in a cohort of individuals with SCI who were admitted to the spinal unit at King Hussein Medical Center and it showed that neurogenic pain was the leading cause followed by UTI, pressures sores, thrombembolic and respiratory complications. Individuals with SCI are highly susceptible to secondary complications and nearly 95% are reported to have at least one complication.[8] SCI related pain can be classified into nociceptive or neuropathic pain. Despite extensive research in this domain the literature is rather confusing in this regard.[9] In our study we focused on neurogenic pain to avoid such confusion. Forty five percent of our patients reported neurogenic pain of various degrees during their hospitalisation. Neuropathic pain after SCI occurs in a range of 20 -75% and it is more refractory to treatment as it was shown by Barrera *et al*.[10] We noticed that patients who sustained gunshot injuries were more prone to neuropathic pain compared to other causes of injuries.

A recent study about patterns of pain across the acute SCI rehabilitation stage found that pain intensity might change and it is not consistent over time.[11]

UTI was the second most common cause of morbidity, probably because most of our patients were on indwelling catheter for variable periods before being admitted to spinal unit and commenced on proper bladder training program. It is reported that persons managed with indwelling catheter are more prone to develop UTI, which accounts for up to 40% of nosocomial infections.[12] The method of urinary drainage is an essential risk factor for UTI. The use of indwelling catheter is the main cause as it was found that the prevalence of bacteruria is 100% by day four after the use of indwelling catheter, while the use of intermittent catheterization reduces the incidence of UTI.[12]

Pressure ulcers are generally considered the most common dermatologic complication of SCI. It is considered one of the main causes of morbidity and mortality as it has been estimated that between 7% and 8% of SCI affected patients die because of this complication. Moreover, 25% of total cost is related to pressure ulcers.[13]

The relatively high incidence of pressure ulcers affecting a quarter of our patients indicate the importance of its prevention keeping in mind the high cost in its care and prolonged rehabilitation time. Early transfer to spinal unit is recommended as it was shown that pressure ulcers were approximately threefold less when a patient is admitted in a specialized SCI center.[14]

Pressure sores continue to be a major concern following discharge from spinal unit. Krause found 10% out of more than 1000 community subjects with SCI reported undergoing plastic surgery in previous 2-year period and noticed that individuals with tetraplegia and complete lesions were more likely to have pressure ulcers.[15] We noticed that pressure sores are one of the most common causes of readmission to our hospital with subsequent increase in length of stay and bed occupancy.

A large multicenter survey of tetraplegic patients showed that pressure sores and urinary tract complications were reported more commonly in those with complete lesions while pain was more frequent in persons with incomplete lesions. [16]

Spasticity is one of the most common consequences of SCI. It is reported to affect 65% - 78% of SCI individuals on long terms, particularly those who have more severe and higher level of injuries and it can interfere with their daily living activities and functional achievements.[17] Spasticity was found in 23% of our patients and as expected it occurred in upper motor neuron level of injury, particularly those who sustained cervical and thoracic spinal injury. Venous thromboembolism is an important cause of morbidity and mortality after SCI. The risk of thromboembolism in SCI is very high and the incidence of deep vein thrombosis was reported to be greater than 50%, while the prevalence of deep vein thrombosis in acute SCI is reported in a range of 14% - 100%.[18] In our study, the incidence was 18% although all our patients were receiving prophylactic anticoagulant treatment of low molecular weight heparin, in addition to the use of medical elastic stockings, external pneumatic compression device and daily physiotherapy program.

Pulmonary complications, in particular pneumonia are considered the main cause of mortality in individuals with SCI during the first year of injury and along with cardiovascular diseases constitute the principal cause of death thereafter.[19] Respiratory complications were found in 10% of our patients and were more common in subjects with cervical level of injury and in particular those with complete neurological impairment.

Our findings are in keeping with other studies where it has been shown that persons with high tetraplegia and an incomplete (ASIA B through D) injury, the forced vital capacity will be about 16% higher than those with complete (ASIA A) injuries. Also, persons with low tetraplegia (C6-C8), the Forced Vital Capacity will be about 10% higher compared with those with complete injuries.[20]

Long-term, secondary medical complications play an important role in the continuum of care for people with SCI. They are a frequent cause of morbidity and mortality and lead to increased rates of rehospitalisation, increased cost of care, loss of employability and decreased quality of life.[21]

In developing countries like India 28% - 48% of patients are readmitted due to medical complications.[22] In developed countries like Sweden and Italy the leading medical complication reported in individuals who survived 25 years or more after SCI are pressure ulcers, neuropathic pain, spasticity and respiratory complications.[23]

Complications due to SCI are expected to happen throughout their lives as it interferes with their well-being, social activities and consequently their quality of life. In addition, it can drain health care resources and increase utilisation of hospital services, therefore greater awareness and attention to their causes and early recognition are necessary to reduce their occurrence and target preventative measures.

Limitation of the Study

Some medical records (5%) were incomplete focusing mainly on primary diagnosis and causes of spinal cord deficit while the details of complications and exact timing were not fully recorded. Lack of spinal cord injury registry plays a role in underestimating the incidence of SCI and documenting their associated morbidities. The present study focused on the frequency of major medical complications and in particular aiming to highlight the most common one. Psychological and functional aspects were not evaluated due to inadequate data in medical records.

Conclusions

This study showed the importance of early detection and recognition of certain morbidities that occur during patient hospitalisation and identifying high risk individuals to prevent their occurrence. The most common causes of morbidity were neurogenic pain followed by urinary tract infection and pressure sores. This study showed that traumatic causes and particularly road traffic accidents were the leading cause of spinal cord injury in Jordan. Further analytical studies with extended follow up should be conducted focusing on the associations between different morbid conditions in SCI patients and their correlations with psycho-social conditions.

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