

Functional Outcome in Paraplegic Patients from Spinal Cord Injury

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Abstract

Background: Patients with Spinal Cord Injuries (SCI) are confronted with motor and sensory deficits as well as bladder, bowel and sexual dysfunction, which lead to a fundamental change of life. Because of the extensive medical, emotional and social consequences of the SCI, multidisciplinary management is essential. This study focuses on the functional outcome after a spinal cord injury. **Methods:** This was an observational study done during a period of 6 months from July 2007 to December 2007 among paraplegic spinal cord injured patients, admitted in the Neurosurgery Department and attended in the Department Physical Medicine and Rehabilitation, Chittagong Medical College, Chittagong. A total of 50 patients were selected for the study. Sampling technique was purposive and different scores and followup findings were collected and analyzed by Statistical Package for Social Science (SPSS-15) P value < 0.05 was considered as significant. **Results:** Mean age of study population was 32.7 years with all patients were between 18 to 55 years age range. Male and female ratio was 9:1. Maximum respondents were day labourer 36.0%, followed by 34.0% other different types of occupation, 10.0% business man, 8.0% service holder, 8.0% housewife and 4.0% student. Fall from height was the major cause of spinal cord injury of the present study group followed by Road Traffic Accident (RTA). Out of all patients 50.0% had urinary incontinence, 44.0% had bowel incontinence, 46.0% had spasticity, 34.0% had hypotension and 4.0% had bed sore. At pretreatment stage mean (\pm SD) FIM score of the patients was 92.5 and discharge 107.32. ($p < 0.05$). Spasticity of the patients was 2.6 ± 1.55 at pretreatment stage and after six weeks of treatment mean (\pm SD) spasticity was reached at 1.96 ± 1.07 ($p < 0.05$). Visual analog scale was used to measure the severity of the pain. At pretreatment stage mean (\pm SD) pain score of the patients was 5.7 ± 1.07 after six weeks of treatment mean (\pm SD) pain score was reached at 2.2 ± 0.88 ($p < 0.05$). At pretreatment stage mean (\pm SD) ASIA score of the patients was 3.0 ± 0.81 . After one week of treatment mean (\pm SD) ASIA score was reached at 3.12 ± 0.72 and after six weeks at 3.38 ± 0.69 . ANOVA test was revealed statistical significant difference among groups in term of ASIA score of different treatment stages (F value=3.42, p value =0.035). **Conclusion:** For SCI rehabilitation program like physical therapy, occupational therapy, orthosis, gait retraining and management of complications make significant improvement in the term of FIM score, ASIA score, muscle weakness pain and spasticity which is proved by current study. So rehabilitation program is the only hope of spinal cord injury patients and physiatrist have important role to achieve the goals of functional outcome in paraplegic patient from spinal cord injury.

Key words : Paraplegic patient, Spinal cord injury; RTA.

INTRODUCTION

Spinal Cord Injury (SCI) is injury that occurs to spinal cord from foramen magnum distal to the conus medullaries & cauda equinae¹. Acute injury of spinal cord are among the most common cause of sever disability & death². Spinal Cord Injury (SCI) which results in disruption of the nervous transmission can have considerable physical and emotion consequences to an individual's life^{3,4}.

The incidence of traumatic SCI is significant. The consequences of a spinal cord injury are often devastating, and any possibility of mitigating neurologic loss is attractive⁵. Spinal cord injury occurs most frequently in groups. 80% are under the age 45 years. The majority of persons with SCI are male. The common cause of SCI can varies in different geographical regions. Vehicles Crashes are the most common causes (45.4%) followed by fall (16.8%), sports injury (16.3%) and violence. Quadriplegia results from injury to the cervical cord. There is a loss of motor, sensory or both in arms trunk & legs as well as loss of bladder, bowel & sexual function. Paraplegia results from injury to thoracolumber or sacral segment. This include injury to the conus medullaris and cauda equine. These can be involvement of the trunk bowel, bladder and sexual dysfunction to some degree¹.

Life expectancy of person with SCI has increased in recent decades. Evidence of the benefits of medical rehabilitation is documented by the reduction in disability of person receiving in patient rehabilitation. Functional outcome or gain in functional ability during rehabilitation reflects the effectiveness of supervised rehabilitation. Many patients with spinal cord injuries are able to go home after the rehabilitation period and a significant number achieve a reasonable degree of independence in the performance of daily living skills⁶.

The supervised rehabilitation is most important component of rehabilitation patients with SCI. Spinal cord injury is a devastating condition that require such study on rehabilitation. To study research on this aspect of spinal cord injury will enrich our knowledge in patients management in the area of rehabilitation.

MATERIALS & METHODS

This was an observational type of study done in the Department of Physical Medicine and Rehabilitation, Chittagong Medical College Hospital, Chittagong from July 2007 to March 2008. Study population were paraplegic spinal cord injured patients, admitted in the Neurosurgery Department and attended in the Department Physical Medicine and Rehabilitation, Chittagong Medical College, Chittagong. A total of 50 patients were selected for the study. All patients aged more than 16 years, subjects on their initial admissions in the hospital with SCI of traumatic origin were included and subjects whose SCI was of nontraumatic origin and patients who did not give their consent were excluded. Sampling technique was Purposive. FIM score, Muscle power, Spasticity, Pain and ASIA score were calculated from all patients.

Statistical analyses of the results were obtained by using window based computer software devised with Statistical Packages for Social Sciences (SPSS-15) (SPSS Inc, Chicago, IL, USA). The results were presented in tables, figures, diagrams. Statistical tests for significance of difference were done using t test, chi square test. A 'p' value < 0.05 was considered as significant.

RESULTS

Total 50 paraplegic spinal cord injured patients admitted in the Department of Neurosurgery & attending in the Physical Medicine and Rehabilitation were included in the study. Among all patients maximum patients, 22 (44.0%), of the study group were within 15 to 25 years age group. All patients were between 18 to 55 years age range (Table 1). Out of all patients 45 (90.0%) were male and 5 (10.0%) were female. Male and female ratio was 9:1 (Table 2). Maximum respondents, 18 (36.0%), of the study group were day labourer (Table 3). Fall was the major cause of spinal cord injury of the present study group (Table 4). Out of all patients 25 (50.0%) had urinary incontinence, 22 (44.0%) had bowel incontinence, 23 (46.0%) had spasticity, 17 (34.0%) had hypotension and 2 (4.0) had bed sore (Table 5). At pretreatment stage mean (\pm SD) FIM score of the patients was 92.5 (\pm 21.66). After one week of treatment it reached 99.24 (\pm 16.85) and after six weeks of treatment it was 107.32 (\pm 18.37) (F=9.034, p value =0.001) (Table 6). At pretreatment stage mean (\pm SD) spasticity of the patients was 2.6 \pm 1.55. After one week of treatment it was 2.56 \pm 1.47 and after six weeks of treatment it reached 1.96 \pm 1.07 (F=3.770, p value =0.025) (Table 7). At pretreatment stage mean (\pm SD) pain score of the patients was 5.7 \pm 1.07. After one week it reached 4.74 \pm 0.75 and after six weeks it reached 2.2 \pm 0.88 (F=199.326, p value =0.001) (Table 8). At pretreatment stage mean (\pm SD) ASIA score of the patients was 3.0 \pm 0.81. After one week of treatment it reached 3.12 \pm 0.72 and after six weeks it was 3.38 \pm 0.69 (F=3.42, p value =0.035) (Table 9).

Table 1 : Age distribution of the patient (n=50)

| Age (year) | Frequency | Percent | Mean \pm SD (range) |
|--------------|-----------|--------------|--------------------------|
| 15-25 | 22 | 44.0 | |
| 26-35 | 8 | 16 | |
| 36-45 | 16.0 | 32.0 | 32.7 \pm 10.51 (18-55) |
| 46-55 | 4 | 8.0 | |
| Total | 50 | 100.0 | |

Table 2 : Sex distribution of the patients

| Sex | Frequency | Percent |
|--------------|-----------|--------------|
| Male | 45 | 90.0 |
| Female | 5 | 10.0 |
| Total | 50 | 100.0 |

Table 3 : Occupation of the patients (n=50)

| Occupation | Frequency | Percent |
|--------------|-----------|--------------|
| Student | 2 | 4.0 |
| Service | 4 | 8.0 |
| Business | 5 | 10.0 |
| Housewife | 4 | 8.0 |
| Day Laborer | 18 | 36.0 |
| Others | 17 | 34.0 |
| Total | 50 | 100.0 |

Table 4 : Distribution of the patients by mode of injury

| Mode of injury | Frequency | Percent |
|----------------|-----------|--------------|
| RTA | 6 | 12.0 |
| Fall | 36 | 72.0 |
| Others | 8 | 16.0 |
| Total | 50 | 100.0 |

Table 5 : Distribution of the patients by Presenting feature (n=50)

| | Frequency | Percent |
|----------------------|-----------|---------|
| Urinary incontinence | 25 | 50.0 |
| Spasticity | 23 | 46.0 |
| Bowel incontinence | 22 | 44.0 |
| Hypotension | 17 | 34.0 |
| Bed sore | 2 | 4.0 |

Table 6 : FIM score

| FIM score | Mean \pm SD | P value* |
|--------------------|--------------------|----------|
| Pretreatment stage | 92.5 \pm 21.66 | |
| Week 1 | 99.24 \pm 16.85 | 0.001 |
| Week 6 | 107.32 \pm 18.37 | |

*ANOVA test was done to measure the level of significance, F=9.034

Table 7 : Spasticity on different treatment stage

| | Spasticity Mean \pm SD (range) |
|--------------------|-------------------------------------|
| Pretreatment stage | 2.6 \pm 1.55 (0-5) |
| Week 1 | 2.56 \pm 1.47 (0-5) |
| Week 6 | 1.96 \pm 1.07 (0-4) |

ANOVA test was done to measure the level of significance
F value=3.770, p value =0.025

Table 8 : Pain score on different treatment stage

| | Pain score Mean \pm SD (range) |
|--------------------|-------------------------------------|
| Pretreatment stage | 5.7 \pm 1.07 (4.0-8.0) |
| Week 1 | 4.74 \pm 0.75 (3.0-6.0) |
| Week 6 | 2.2 \pm 0.88 (0-3.0) |

ANOVA test was done to measure the level of significance
F value =199.326, p value =0.001

Table 9 : ASIA score on different treatment stage

| | ASIA score Mean \pm SD (range) |
|--------------------|-------------------------------------|
| Pretreatment stage | 3.0 \pm 0.81 (2.0-4.0) |
| Week 1 | 3.12 \pm 0.72 (2.0-4.0) |
| Week 6 | 3.38 \pm 0.69 (2.0-5.0) |

ANOVA test was done to measure the level of significance
F value=3.42, p value =0.035

DISCUSSION

Patients with Spinal Cord Injuries (SCI) are confronted with motor and sensory deficits as well as bladder and bowel dysfunction of which the consequences for daily living are uncertain. Early prediction of neurological recovery and functional abilities after rehabilitation is essential to inform the patient and to make plans for treatment. Present study focused on neurological and functional outcome after spinal cord lesions.

Total 50 paraplegic spinal cord injured patients admitted in the Department of Neurosurgery and attended in the Department of Physical Medicine and Rehabilitation, Chittagong Medical College Hospital during the period of July 2007 to March 2008 for the hope of better treatment were enrolled in the present study.

Mean age of study population of present series was 32.7 years with a standard deviation of \pm 10.51 years. All patients were between 18 to 55 years age range. Most of the patients of the study group were younger and was in the third decade. Several studies have reported that the mean age of Spinal Cord Injured (SCI) patients are in the third decade^{7,8}. Some other studies however report a range from the second to fourth decades¹². In our study the mean age of the group was in the third decade.

Maximum patients, 22 (44.0%), of the study group were within 15 to 25 years age group followed by 16 (32.0%) within the range of 36 to 45 years age, 8 (16.0%) within 26 to 35 years and 4 (8.0%) within 46 to 55 years age group. Mean (\pm SD) current age of Ullrich et al series was 47.3 \pm 13.1 years and mean age of their spinal cord injury was 36.1 \pm 14.3 years¹⁵.

In our study regarding gender distribution, male and female ratio was 9:1. SCI is more common in the male sex and epidemiological studies report a percentage of 80%^{7,8,11,14}.

Maximum respondents, 18 (36.0%), of the study group were day labourer followed by 17 (34.0%) 'Others' different types of occupation, 5 (10.0%) business man, 4 (8.0%) service holder, 4 (8.0%) housewife and 2 (4.0%) student. In Ullrich et al series 22% patients were full-time, 10% part-time worked, 12% retired, 3% homemaker and 48% unemployed¹³.

In our study a falls from high place etiology was noted in 72.0% of the cases, road traffic accidents in 12.0%, and 8% from other causes. Most common etiological factor in SCI is trauma^{7,8}. In the USA the most common factors responsible for SCI are motor vehicle accidents in 45%, falls in 22%, flights in 16% and sports accidents in 13%^{7,8}.

National spinal cord injury statistical center at the university of Birmingham revealed that motor vehicle accidents were the major cause of spinal cord injury. 44% patients with spinal cord injury had history of motor vehicle injury followed by acts of violence (24%), falls (22%), sports (8%) (2/3 of sports injuries are from diving), other (2%).

Some other statistics give pressure sores as leading complication, but for long-term follow-up UTI keeps the first position. Cuetaneous complications, primarily pressure sores, had an incidence of 15.60%. The patients with pressure sores were transferred to Physical Medicine & Rehabilitation with already constituted pressure sores. None of the patients had newly developed pressure sores while at the Physical Medicine

& Rehabilitation. All pressure sores were healed during the Physical Medicine & Rehabilitating hospitalization period. A few patients required plastic surgery and a few patients were readmitted with pressure sores, which had developed later at home.

Only 4.25% of the cases displayed autonomic dysreflexia episodes. They were connected with urethra! catheter obstruction, suprapubic catheter obstruction or bowel impaction. Deep Venous Thrombosis (DVT) was found in six cases (4.25%) from which one developed DVT while under our care. In our series out of all patients 25 (50.0%) had urinary incontinence, 22 (44.0%) had bowel incontinence, 23 (46.0%) had spasticity, 17 (34.0%) had hypotension and 2 (4.0%) had bed sore.

At pretreatment stage of present series mean (\pm SD) FIM score of the patients was 92.5 (\pm 21.66). After one week of treatment mean FIM score was reached 99.24 (\pm 16.85) and after six weeks of treatment mean FIM score was reached 107.32 (\pm 18.37) (p value =0.001).

The increase in mean total FIM scores (92.5 -107.32) for the patients from admission to discharge is consistent with the gains documented in other studies^{7,8}. For example, Ditunno et al reported that people with traumatic SCI generally have a mean total FIM score of 59.5 on admission and 95.3 on discharge (mean gain of 35.9). Data from the United Data System for Medical Rehabilitation (UDSMR) for SCI admissions during 1995-1997, with corresponding sample sizes of 3444, 4337 and 4652 cases, showed lower discharge FIM total scores (means of 89.8 to 88.8 over the 3 years, respectively) and lower FIM gains (mean of 26 for 1997) than patients showed in the present study⁹. The total FIM gains for patients in this study were 14.82 point. The results of this study confirm that patients with traumatic SCI generally present with high cognitive FIM scores on admission and discharge. The FIM has been previously shown to be relatively nsensitive to changes that may occur in cognitive function in this group of patients¹⁰.

At pretreatment stage mean (\pm SD) spasticity of the patients was 2.6 \pm 1.55. After one week of treatment mean (\pm SD) spasticity was reached at 2.56 \pm 1.47 and after six weeks of treatment mean (\pm SD) Spasticity was reached at 1.96 \pm 1.07. (F value=3.770, p value =0.025). It has been well-documented that pain after SCI is common, tends to be severe in about one-third of those with pain, and has the potential to impact heavily on well-being and functioning. Visual analog scale was used to measure the severity of the pain in our study. At pretreatment stage mean (\pm SD) pain score of the patients was 5.7 \pm 1-.07. After one week of treatment mean (\pm SD) pain score was reached at 4.74 \pm 0.75 and after six weeks of treatment mean (\pm SD) pain score was reached at 2.2 \pm 0.88. (F value=199.326, p value =0.001).

The ASIA protocol describes a standardized clinical examination of motor and sensory functions in cases of traumatic SCL. It has been used for assessment in the cases of ischemic SCL also. ASIA impairment scale was used in this study both at admission and at discharge. While comparing between the group, it was found that the score was 3.0 \pm 0.81in admission and significantly improved at discharged from the hospital. After one week of treatment mean (\pm SD) ASIA score was reached at 3.12 \pm 0.72 and after six weeks at 3.38 \pm 0.69. (F value=3.42, p value =0.035).

CONCLUSION

For SCI rehabilitation program like physical therapy, occupational therapy, orthosis, gait retraining and management of complications make significant improvement in the term of FIM score, ASIA score, muscle weakness pain and spasticity which is proved by current study. So rehabilitation program is the only hope of spinal cord injury patients and physiatrist have important role to achieve the goals of functional outcome in paraplegic patient from spinal cord injury.

DISCLOSURE

All the authors declared no competing interest.

