Original Article

Spasticity after traumatic spinal cord injury: a cross sectional study

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Objective: To determine frequency and severity of spasticity in spinal cord injury (SCI) patient with reference to type and level of spinal cord injury and different complications.

Methodology: It was a cross sectional study conducted at Armed Forces Institute of Rehabilitation Medicine, Rawalpindi, Pakistan from July 2012 to June 2013. Using Non probability sampling technique, all patients with spinal cord injury for more than 6 months duration were included in the study. Informed consent was taken from all patients. American SCI classification was used to determine level of SCI and to classify it. Modified Ashworth scale was used to measure and grade spasticity. SPSS v 17 was used to analyze data.

Results: The study included 70 patients. Mean age of presentation was 31±1.39 years. Injury was complete in 56 (80%) patients. Spasticity was present in 38.6% patients. In cervical cord injuries, spasticity was present in 77.8% patients and in incomplete injuries, spasticity was seen in 50% patients.

Conclusion: Spasticity was a frequent complication after SCI. It is more frequent in cervical injuries and incomplete injuries. (Rawal Med J 2014;39: 171-173).

Key words: Spinal cord injury, spasticity, Modified Ashworth scale.

INTRODUCTION

Spinal cord injury (SCI) is a devastating lifelong condition with incidence of 11000 new cases per year in USA.[1] In Pakistan, 2005 earthquake affected estimated 650 individuals.[2] Spasticity is a common complication after SCI.[3] Spasticity is a velocity dependent increase in muscle tone.[4] Painful stimuli like pressure ulcers, UTI, constipation, DVT and infections below level of injury aggravate spasticity.[5] It is both good and detrimental in SCI. Beneficial effects of spasticity are increasing blood flow to lower extremity, increasing bone mineral density, ambulation and keeping muscles alive.[6] Harmful effects are delayed healing of pressure ulcers, difficulty in urine and bowel management, difficulty in ambulation, falls from bed or wheelchair, risk of injuries, pain and sleep disturbances.[7] Spasticity control should be included as a prerequisite for any treatment protocol of SCI patients.[8]

The management options depend on the extent of functional failure caused by the spasticity and its location.[5] Spasticity is commonly measured by modified Ashworth scale which has excellent validity and inter-rater reliability.[9] The negative outcomes of SCI need to be considered in an individual's rehabilitation and treatment methods.[10] Purpose of this study was to determine frequency and severity of spasticity in SCI patient with reference to its type and level of SCI and different complications.

METHODOLOGY

It was a cross sectional study conducted at Armed Forces Institute of Rehabilitation Medicine Rawalpindi, Pakistan from July 2012 to June 2013. Non probability sampling technique was used and all patients with SCI for more than 6 months duration, both genders between 15-75 years of age were included in the study. Patient with non-traumatic SCI were excluded from study. Informed consent was taken from all patients before inclusion in the study and ethical issues were considered.

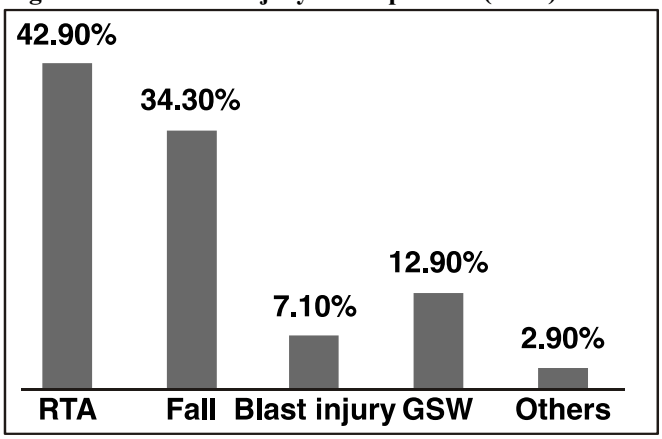
All patients were interviewed and thoroughly examined. American Spinal Cord Injury classification (ASIA classification) was used to determine level of SCI and to classify injuries. Modified Ashworth scale was used to measure and grade spasticity. Complications found at time of examination were also noted. SPSS v 17 was used to

analyze data. Odds ratio was calculated where association of spasticity is done with different variables.

RESULTS

A total 70 patients were included in study. Mean age of presentation was 31±1.39 years. There were 54 (77.1%) males and 16 (22.9%) females. Thoracic level of injury was in 35 (50%) patients followed by lumbar level in 16 (22.9%), cervical level in 9 (12.9%) and cauda equine lesion in 10 (14.28%) patients. Injury was complete in 56 (80%) patients.

Fig. 1. Mechanism of injury in SCI patients (n=70).



Most common cause of injury was RTA in 24 (34.3%) followed by fall and GSW (Fig. 1). Spasticity was present in 38.6% of patient. Grades of spasticity are shown in Table 1.

Table 1. Frequency of spasticity in SCI patients using Modified Ashworth Scale.

Spasticity	Number	Percent
No Spasticity	43	61.4
Grade 1	4	5.7
Grade 1+	10	14.3
Grade 2	7	10.0
Grade 3	4	5.7
Grade 4	2	2.9
Total	70	100.0

Table 2. Association of spasticity with gender.

Gender	Number n= 70	Percentage	Frequency of spasticity	Odds ratio
Male	54	77.1	18 (33.3%)	**1.1**
Female	16	22.9	5 (31.3%)	**0.90**

Table 3. Association of spasticity with level of injury.

Level of injury	Frequency n= 70	Percentage	Frequency of spasticity	Odds ratio
Cervical	9	12.9	7 (77.8%)	**9.8**
Thoracic	35	50	11 (31.4)	**0.87**
Lumbar	16	22.9	5 (31.3%)	**0.90**

Table 4. Association of spasticity with severity of injury.

Severity of injury	Frequency n= 70	Percentage	Frequency of spasticity	Odds ratio
Complete	56	80.0	16 (28.6 %)	**0.4**
Incomplete	14	20.0	7 (50%)	**2.5**

There was no association of spasticity with gender (odds ratio of 1.1). Spasticity had strong association with cervical level injuries with odds ratio of 9.8. Association of spasticity with gender, level and severity of SCI are shown in Tables 2, 3 and 4.

DISCUSSION

In this study, we found that spasticity was seen in 38% SCI patients. It was more common in incomplete injuries and cervical injuries. There was no correlation of spasticity with pressure ulcers, age and gender of patients. Mingaila et al. reported that 30.2% of their patients had spasticity.[11] In a US study, 67% patients developed spasticity by discharge and 78% developed spasticity in follow up and 37% received anti spasticity medication.[12] In an Iranian study, frequency of spasticity was 67.5%.[13] McKinley et al. found 20% prevalence with no significant difference in vascular related and traumatic SCI patients.[14]

There are different views about association of spasticity with gender, level of injury, severity and associated complications. Skold et al. found that spasticity was less common in females and presence of problematic spasticity was significantly correlated with cervical incomplete (ASIA B-D) injuries but not with pressure ulcers.[6] In contrast, an Indian study did not find significant difference in development of spasticity in different ASIA impairment scales of injury and but noted that treatment of pressure ulcers, UTI, physiotherapy and medical treatment decreased the incidence and severity of spasticity.[15]

Another from Netherland showed some association of spasticity with gender and weak associations with age, level of injury, completeness of injury, body

mass index and smoking.[16] Treating hip adductor spasticity in SCI patient with phenol neurolysis of obturator nerve had positive effect on buttock-seat interface pressure which has crucial effect in development of pressure ulcers.[17] Dhindsa et al. demonstrated that reduction in lower limb perfusion played a part in spasticity in patients with SCI.[18] In a review of 1152 articles, pregnancy, posture, cold, circadian rhythm, and skin conditions, bowel and bladder-related issues, menstrual cycle, mental stress, and tight clothing increased spasticity.[19] However, heterotopic ossification, hemorrhoids, deep vein thrombosis fever, and sleep patterns did not increase spasticity.[19]

CONCLUSION

We concluded from this study that spasticity is a common complication after SCI and it is more frequent in cervical injuries and incomplete injuries.

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Conception and design: Naveen Mumtaz
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Drafting of the article: Akhtar Waheed
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