Long-Term Outcomes of Paraplegics in a Resource-Limited Society: Are We Doing Enough?

Humam N. Tanki[1] Nayil Khursheed[1] Abdul Q. Khan[1] Majid A. Ganie[2] Altaf U. Ramzan[1] Farah N. Tanki[3] Abrar A. Wani[1]

[1] Department of Neurosurgery, Sheri-Kashmir Institute of Medical Sciences, Jammu and Kashmir, India
[2] Department of Psychiatry, Sheri-Kashmir Institute of Medical Sciences, Jammu and Kashmir, India
[3] Department of Clinical Psychology, University of Kashmir, Srinagar, Jammu and Kashmir, India

Address for correspondence Nayil Khursheed, MS, MCh, Additional Professor, Department of Neurosurgery, Sheri-Kashmir- Institute of Medical Sciences, Srinagar 190011, Jammu and Kashmir, India (e-mail: nayilkhursh@gmail.com).

Indian J Neurotrauma 2015;12:117–121.

Abstract

Cases of paraplegia form a considerable proportion of patient population visiting neurosurgical and neurologic units. Paraplegia not only alters the physical condition of the patient but also his/her mental, psychological, and social well-being. We collected data of 30 patients with paraplegia admitted during a period of 4 years who were followed then for a minimum period of 1 year. Those patients were evaluated for their neurologic improvement and complications usually associated with paraplegia. We found that patients with preserved sensations have better outcome and should be aggressively treated by surgery; whereas in patients who have no motor and sensory function at the time of injury, the decision regarding surgery should be guarded. We also derived that most common complications on follow-up include pressure sores, bladder dysfunction, and deep venous thrombosis, and evaluating them for depression and anxiety is mostly overlooked. We stress that the need of the hour in a resource-limited society such as ours is an intensely committed psychological rehabilitation in this group of patients.

Keywords
- spinal cord injury
- paraplegia
- complications
- psychological complications

Paraplegia is a well-defined state of complete motor deficit in the lower limbs, regardless of sensory involvement, with muscular strength grading zero. Occurrence of sudden paraplegia is definitely a catastrophic event not only in an individual's life, but it equally affects the family as a whole. It alters not only the patient's physical condition but also his/her mental, psychological, and social well-being. The most common cause is trauma. It may also be secondary to neoplastic, vascular, degenerative, inflammatory, or traumatic diseases.[1,2] Impairments in bowel and bladder function, mobility, and autonomic functions along with secondary conditions (viz., pressure ulcers, pain, and impaired sexual functions) are some of the complications that directly impact the patient's health.[3]

Neurosurgeons throughout the globe are getting increasing number of patients of paraplegia day by day. Patients often need intensive rehabilitation in hospitals and rehabilitation centers, to maximize their functions in daily activities.[4]

Patients and Methods

We conducted a study at our institute in the Departments of Neurosurgery and Psychiatry (SKIMS) and Department of Psychology (University of Kashmir). In this study, patients with paraplegia were followed up for a minimum period of 1 year postinjury, and neurologic improvements along with complications and difficulties faced by paraplegics were

received
August 27, 2015
accepted
October 15, 2015
published online
December 17, 2015

DOI http://dx.doi.org/10.1055/s-0035-1569469.
ISSN 0973-0508.

evaluated. Inclusion criteria included all the patients who were newly injured, had power in the limbs of not more than 3/5, had no head injuries or any preexisting neuropsychiatric disorder, and were at least 18 years of age. We defined paraplegia as motor power ranging from 0/5 to 3/5 at the time of presentation to us. The 5-year study period extended from April 2010 till March 2014. We included 37 patients in the study; however, complete 1-year follow-up was available in 30 patients only. We divided the patients into two groups as per the American Spine Injury Association (ASIA) classification. ASIA[2] classifies traumatic paraplegia into two groups: complete injuries (known as ASIA-A), without any motor and sensory function below the level; and those with preserved sensory function without any motor function (paraplegic) (known as ASIA-B).[2] Motor power was assessed before surgery (on arrival), after surgery, and on 1-year follow-up, and graded as per Medical Research Council Score from grades 0 to 5.[5] Hospital Anxiety and Depression Scale was used to assess the occurrence of anxiety and depression disorders in patients with paraplegia.[6] Increase in motor power by at least grade 1 or nondependency on indwelling urinary catheter was considered as improvement. We also evaluated associated complications, such as, bladder dysfunction, bowel dysfunction, deep vein thrombosis (DVT), and pressure sores.

Results

Most patients 73.3% ($n = 22$) were between 20 and 40 years of age. Mean age was 31.9 years. Males were 80% ($n = 24$). The mechanism of injury was fall from height (mostly trees) in 73.3% ($n = 22$) cases and road traffic accident in 16.6% ($n = 5$) cases. Other modes of injury to the spinal cord included machine injury 3.3% ($n = 1$), Pott's spine 3.3% ($n = 1$), and multiple myeloma 3.3% ($n = 1$). The most common site of injury was at D11 to L1 in 53.3% ($n = 16$) cases (►**Figs. 1** and **2**). Power at presentation was grade 0 in 56.6% (17/30), grade 3 in 23.3% (7/30), grade 2 in 16.6% (5/30), and grade 1 in 3.3% (1/30) of cases. Out of the 30 patients, 83.3% ($n = 25$) were operated and 16.7% ($n = 5$) were managed conservatively. Among those treated conservatively, 60% (3/5) showed improvement and 40% (2/5) did not improve. Out of those treated surgically, 64%(16/25) improved and 36% (9/25) did not improve (►**Table 1**). Decompression and long-segment transpedicular fixation with bony fusion was the most common procedure performed in 72% (18/25) cases. In our study, we had 13 patients (43.3%) in ASIA-A group and 17 (56.6%) in ASIA-B group. We noted that within ASIA-A group, no improvement was seen in 61.5% (8 out of 13), whereas in ASIA-B group no improvement was seen in only 11.7% (2 out of 17) ($p = 0.0069$) statistically significant (►**Table 2**). After admission, 46.6% ($n = 14$) patients received injection methylprednisolone (MPS). Among those receiving MPS, 64.2% (9/14) improved. Sixteen patients did not receive MPS injection, and among those not infused by MPS, 56.2% (9/16) improved ($p > 0.05$, insignificant). On 1-year follow-up,

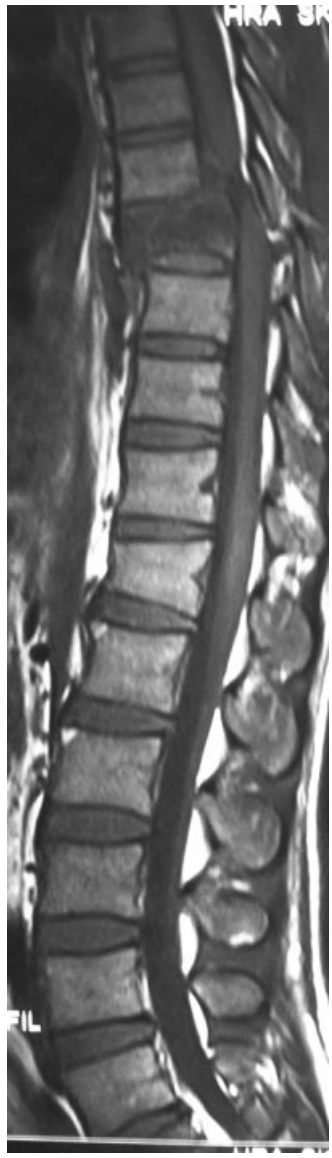

Fig. 1 MRI of the spine sagittal section shows fracture-subluxation of middorsal vertebra.

66.6% ($n = 20$) were found to have shown improvement in motor power. Power improvement to grade 4 was seen in 33.3% ($n = 10$) patients, grade 3 in 26.6% ($n = 8$), and grade 1 in 6.66% ($n = 2$) patients. The most common complications experienced were bladder dysfunction in 66.6% ($n = 20$), pressure sores were seen in 33.3% ($n = 10$), and DVT in 16.6% ($n = 5$). Hospital Anxiety and Depression Scale showed psychological problems ranging from mild depression and behavioral changes, as irritability and mood swings anxiety were observed in 83.33%, to severe depression with suicidal tendency, which was observed seen in four (13.35%) patients. Complaint of fatigue was seen in 70% (21/30) patients (►**Table 3**).

Discussion

Traumatic spinal cord injury (SCI) is a life-altering experience not only for the person with injury but for

Fig. 2 CT scan of the spine sagittal section shows fractures of L1 and D8 vertebra.

spouses, parents, siblings, and children of the person. It leads to physical, functional, and psychosocial challenges for individuals. A high incidence of SCI among younger populations has been reported,[4,7] resulting in significant physical, mental, and financial burden for individuals and their caregivers.[3,4,8,9]

ASIA[2] classifies traumatic paraplegia into two groups: first, complete injuries (known as ASIA-A), without any motor and sensory function; second, those with preserved sensory function without any motor function (paraplegic) (known as ASIA-B). Harrop et al[10] evaluated the neurologic outcome of 282 patients who sustained trauma in regions of the thoracic and lumbar spine and found that both groups have distinct neurologic recovery prognosis. These authors observed that only 7.7% of patients, classified as ASIA-A, showed some degree of neurologic improvement compared with 66.7% of neurologic improvements seen in patients classified as ASIA-B after 1-year follow-up.[11] In our study, we had 13 patients (43.3%) in ASIA-A group and 17 (46.6%) in ASIA-B group. We experienced that within ASIA-A group, no improvement was seen in 61.5% (8 out of 13) patients, whereas in ASIA-B group no improvement was seen in only 11.7% patients. Such data suggest that preserved sensory function, despite no motor activity in the lower limbs, is an important prognostic factor in patients with spinal trauma.[10] For patients with traumatic SCI ASIA-B group, we believe that sensation preservation in any degree (partial or total) is a prognostic factor that should be considered when deciding on the type of treatment.[11]

Apart from loss of sensation and motor function, there may also be obnoxious additional effects, including impaired sexual function, incontinence, and pain. These symptoms often result in vocational and social losses, and place great demands on family and relationships. In our study, consideration was given to bladder dysfunction, however evaluation of sexual functions was lacking. We found that although all the patients had bladder involvement at time of injury, on 6-month follow-up, 10 (33.4%) patients had improved and 66.6% ($n = 20$) had bladder dysfunction. Hence, bladder problems are significantly high in paraplegics.

SCI occurs most frequently in young males because they are physically more active than females and elderly population.[12] In our study, 86% ($n = 26$) patients were

Table 1 Table depicting number of patients improved after surgery or conservative management

	Improved		Not improved	
	Number	%	Number	%
Operated ($n = 25$)	16	64	9	36
Conservative ($n = 5$)	4	80	1	20

Table 2 Comparison of improvement in ASIA-A and ASIA-B groups

	Improved		Not improved	
	Number	%	Number	%
ASAI-A ($n = 13$)	5	38.5	8	61.5
ASAI-B ($n = 17$)	15	88.3	2	11.7

Abbreviations: ASIA-A/-B, American Spine Injury Association group A/B.
$p = 0.0069$ (significant).

Table 3 Complications on follow-up

Complications	No. of patients (%)
Bladder dysfunction	20 (66.6)
Pressure sores	10 (33.3)
Deep vein thrombosis	5 (16.6)
Anxiety disorders	25 (83.3)
Depressive disorders	17 (57)
Fatigue	21 (70)
Severe psychological disorders with suicidal tendency	4 (13.35)

males and 50% ($n = 15$) were below 30 years of age. In literature, approximately 82% of all SCIs occur in males, and 55% are younger than 30 years.[13]

In our study, dorsolumbar junction was the most common site of injury, which was in accordance with most of the studies.[14] It was followed by injuries to the cervicodorsal junction area, as they are junctional areas between the mobile and rigid (thoracic) segments of spine and hence are considered are most prone to trauma.

Our study shows that fall was the most common mode of injury seen in 73.3% cases, whereas most of the studies show that road accident (40–60%)[15] was the most common mode of spinal injury. The reason is that agriculture and horticulture are the main occupations of our state, and a large proportion of population is associated with fruit-growing industry. Hence we get a lot of cases of fall from trees, especially walnut trees during harvesting season.

Some studies implied that four areas of function emerged as particularly important among individuals with SCI: bowel, bladder, sexual, and motor (ambulation). Restoring mobility, sexual function, and bowel/bladder function emerged as priorities for almost all the individuals with paraplegia, but no consensus was formed to determine which one should be the top most priority. The two functions that have received the greatest attention in the literature to date are motor function and complications associated with bladder function.[16,17] In our study, patients evaluated on follow-up were more concerned regarding recovery of bowel and bladder functions. We believe that more research on bowel management and sexual function of patients with spinal injury is required as nowadays quality-of-life issues and patient preferences are given importance.[17] We also observed that secondary conditions such as pain, pressure sores, and spasms were rarely evaluated in the surveys. In studies in which pain was included, it was identified as an essential condition (25% in some studies) but less important than motor and bladder/bowel function.[18] Because occurrence of pain was very infrequent in our outpatients, this variable was excluded. One reason for that may be inclusion mostly of completely paraplegics without any sensory and motor function in our study.

In all the patients included in our study, we always found features of psychiatric dysfunction. It ranged from mild depression and anxiety disorders to severe depression leading to suicidal tendency. Some authors concluded that there may be differences between subjective and objective feeling, which is suggested by studies investigating differences between staff ratings and patient ratings of depressed mood.[19–21] Furthermore, health professionals differ between themselves on their assessment of patients with SCI. Research by Dijkers and Cushman[22] found that mental health professionals and physicians reported the lowest, occupational and physiotherapists occupied an intermediary position, and nurses judged the highest percentage of patients as being depressed.[23] Suicide and divorce rates among patients with SCI are on the increase.[24] Some variables that have been found to be associated with an unfavorable adjustment to SCI include older age, low education, low social support, being male, and having a complete lesion.[25,26] We noticed that significantly higher proportion of persons with SCI is depressed and anxious in comparison to able-bodied persons of a similar background. These responses may be considered normal responses to an abnormal situation,[26] and not reflective of psychological problems usually associated with psychiatric disorders. However, some people experience more serious psychological difficulties than others. Research into psychological adjustment following SCI indicates that psychological morbidity decreases over time.[25–27] Dryden et al observed that 28.9% of the patients with SCI required treatment for depression,[28] which is quite high. Patients with complete lesions tend to be more depressed than those with incomplete lesions,[29] which is in accordance with our study. This may be due to the hope that the person with an incomplete lesion will walk again.[23]

Interestingly, the importance of fatigue was not investigated in any of the studies. Fatigue is a common consequence of SCI (as in other chronic conditions) and has been shown to have a negative impact on quality of life.[30] We in our study found persistent complaint of fatigue in 70% (21/30) patients on 1-year follow-up.

Another aspect evaluated in some studies is that, in the SCI population, association between essential hypotension and cognitive impairment has been reported.[31–34] Specifically, prolonged reaction times and decreased accuracy in sustained attention and working memory are reported in hypotensive compared with normotensive subjects.[32,33,35] There is speculation that the diminished cognitive performance reported in hypotensive compared with normotensive individuals is the result of long-standing cerebral hypoperfusion due to the chronically low blood pressure.[36]

We found that postinjury sexual dysfunctions are equally distressing as other symptoms for younger population. Orgasm and ejaculation are more vulnerable than erection. Studies suggest that loss of erections after the injury should not discourage the patient. Talbot[37] found that half the men who eventually recovered potency had had no erections in the first 3 months, whereas Phelps et al[38] showed that improvement may continue for up to 2 years (with a mean of 9 months).

Conclusion

These results have implications for the treatment of patients with SCI. First, patients in ASIA-A and ASIA-B groups have significantly differing outcome, and these results imply that patients with preserved sensations have better outcome and should be aggressively treated by surgery, whereas in ASIA-B group decision regarding surgery should be guarded. Second, the most common complications on follow-up include pressure sore, bladder dysfunction, and DVT. These are preventable if patients and attendants are properly educated. While this study shows that many people with SCI are not severely depressed or anxious, they still have elevated levels of anxiety and depression over the first

year of injury. It is necessary to follow patients with SCI for a longer period to determine whether this pattern remains. Second, it is clear that up to a third of patients with SCI will have levels of depression and anxiety typical of clinical depression. This would justify the provision of psychological services to assist those in need.

References

1 Bohlman HH, Freehafer A, Dejak J. The results of treatment of acute injuries of the upper thoracic spine with paralysis. J Bone Joint Surg Am 1985;67(3):360–369
2 Marino RJ, Barros T, Biering-Sorensen F, et al; ASIA Neurological Standards Committee 2002. International standards for neurological classification of spinal cord injury. J Spinal Cord Med 2003;26(26, Suppl 1):S50–S56
3 McKinley WO, Jackson AB, Cardenas DD, DeVivo MJ. Long-term medical complications after traumatic spinal cord injury: a regional model systems analysis. Arch Phys Med Rehabil 1999; 80(11):1402–1410
4 Ackery A, Tator C, Krassioukov A. A global perspective on spinal cord injury epidemiology. J Neurotrauma 2004;21(10): 1355–1370
5 Reff. Medical Research Council. Aids to the examination of the peripheral nervous system, Memorandum no. 45, Her Majesty's Stationery Office, London, 1981.
6 Zigmond AS, Snaith RP. The hospital anxiety and depression scale. Acta Psychiatr Scand 1983;67(6):361–370
7 O'Connor PJ. Trends in spinal cord injury. Accid Anal Prev 2006; 38(1):71–77
8 Fiedler IG, Laud PW, Maiman DJ, Apple DF. Economics of managed care in spinal cord injury. Arch Phys Med Rehabil 1999;80(11):1441–1449
9 Ramer MS, Harper GP, Bradbury EJ. Progress in spinal cord research—a refined strategy for the International Spinal Research Trust. Spinal Cord 2000;38(8):449–472
10 Harrop JS, Naroji S, Maltenfort MG, et al. Neurologic improvement after thoracic, thoracolumbar, and lumbar spinal cord (conus medullaris) injuries. Spine 2011;36(1):21–25
11 Giacomini L, Mathias RN, Joaquim AF, Fabbro MD, Ghizoni E, Tedeschi H. Is there a right time for surgery in paraplegic patients secondary to non traumatic spinal cord compression? Einstein (São Paulo) 2012;10(4):508–11
12 Go BK, DeVivo MJ, Richards JS. The epidemiology of spinal cord injury. In: Stover SL, DeLisa JA, Whiteneck GG, eds. Spinal Cord Injury: Clinical Outcomes from the Model Systems. Gaithersburg, MD: Aspen; 1995:21–55
13 National Spinal Cord Injury Statistical Center (NSCISC). Annual Report for the Model Spinal Cord Injury Systems of Care. Birmingham, England: Univ Alabama; 1999
14 Siddhartha SS, Deepak G, Mahapatra AK. Traumatic paraplegia outcome study at an apex trauma centre. Indian J Neurotrauma 2011;8(1):33–36
15 McAfee PC, Yuan HA, Lasda NA. The unstable burst fracture. Spine 1982;7(4):365–373
16 Furlan JC, Fehlings MG. A Web-based systematic review on traumatic spinal cord injury comparing the "citation classics" with the consumers' perspectives. J Neurotrauma 2006;23(2): 156–169
17 Tate DG, Boninger ML, Jackson AB. Future directions for spinal cord injury research: recent developments and model systems contributions. Arch Phys Med Rehabil 2011;92(3):509–515
18 Simpson LA, Eng JJ, Hsieh JT, Wolfe DL. Spinal Cord Injury Rehabilitation Evidence Scire Research Team. The health and life priorities of individuals with spinal cord injury: a systematic review. J Neurotrauma 2012;29(8):1548–1555
19 Bodenhamer E, Achterberg-Lawlis J, Kevorkian G, Belanus A, Cofer J. Staff and patient perceptions of the psychosocial concerns of spinal cord injured persons. Am J Phys Med 1983;62(4): 182–193
20 Ernst FA. Contrasting perceptions of distress by research personnel and their spinal cord injured subjects. Am J Phys Med 1987;66(1):12–15
21 Cushman LA, Dijkers MP. Depressed mood in spinal cord injured patients: staff perceptions and patient realities. Arch Phys Med Rehabil 1990;71(3):191–196
22 Dijkers M, Cushman LA. Differences between rehabilitation disciplines in views of depression in spinal cord injury patients. Paraplegia 1990;28(6):380–391
23 Hancock KM, Craig AR, Dickson HG, Chang E, Martin J. Anxiety and depression over the first year of spinal cord injury: a longitudinal study. Paraplegia 1993;31(6):349–357
24 Chan SC, Chan AP. One-year follow-up of Chinese people with spinal cord injury: a preliminary study. J Spinal Cord Med 2013; 36(1):12–23
25 Kerr WG, Thompson MA. Acceptance of disability of sudden onset in paraplegia. Paraplegia 1972;10(1):94–102
26 Woodrich F, Patterson JB. Variables related to acceptance of disability in persons with spinal cord injuries. J Rehabil 1983; 49(3):26–30
27 Richards JS. Psychologic adjustment to spinal cord injury during first postdischarge year. Arch Phys Med Rehabil 1986;67(6): 362–365
28 Dryden DM, Saunders LD, Rowe BH, et al. Depression following traumatic spinal cord injury. Neuroepidemiology 2005;25(2): 55–61
29 Hasan SA, Alam Z, Hakim M, et al. Rehabilitation of patients with paraplegia from spinal cord injury: a review. JCMCTA 2009;20(1): 53–57
30 Suzuki R, Krahn GL, McCarthy MJ, Adams EJ. Understanding health outcomes: Physical secondary conditions in people with spinal cord injury. Rehabil Psychol 2007;52:338
31 Costa M, Stegagno L, Schandry R, Bitti PE. Contingent negative variation and cognitive performance in hypotension. Psychophysiology 1998;35(6):737–744
32 Duschek S, Matthias E, Schandry R. Essential hypotension is accompanied by deficits in attention and working memory. Behav Med 2005;30(4):149–158
33 Duschek S, Weisz N, Schandry R. Reduced cognitive performance and prolonged reaction time accompany moderate hypotension. Clin Auton Res 2003;13(6):427–432
34 Weisz N, Schandry R, Jacobs AM, Mialet JP, Duschek S. Early contingent negative variation of the EEG and attentional flexibility are reduced in hypotension. Int J Psychophysiol 2002; 45(3):253–260
35 Duschek S, Schandry R. Cognitive performance and cerebral blood flow in essential hypotension. Psychophysiology 2004; 41(6):905–913
36 Duschek S, Schandry R. Reduced brain perfusion and cognitive performance due to constitutional hypotension. Clin Auton Res 2007;17(2):69–76
37 Talbot HS. The sexual function in paraplegia. J Urol 1955;73(1): 91–100
38 Phelps G, Brown M, Chen J, et al. Sexual experience and plasma testosterone levels in male veterans after spinal cord injury. Arch Phys Med Rehabil 1983;64(2):47–52