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LONG TERM FOLLOW UP AFTER SPINAL CORD INJURY: CASE SERIES FROM A TERTIARY CARE CENTRE OF NORTH INDIA

Orthopaedics

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ABSTRACT

Study design: Prospective observational case series study.
Objectives: To find out the outcomes in long term follow-up after Spinal Cord Injury
Setting: Sawai Man Singh Medical College and Hospital, Jaipur, India.
Methods: Consecutive Long term follow up (more than one year) of SCI cases from 2000 to 2006 were evaluated on a preformed proforma for outcomes.
Results: Out of 1819 cases of SCI, 198 (11.1%) [97 cervical (10%) and 101 DL (12%)] cases reported for follow-up of 1 year or beyond, with male to woman ratio of 6.9:1 and 86% in the age group of 20–59 years. The mean follow up period was 27 months with a range 12 to 78 months. There is no change in AIS grading in most of the cases (116 out of 198). Most of the cases (73 cervical and 84 DL) were independent in bed mobility, where as more cervical cases were independent for transfers and community ambulators in comparison to DL SCI. DL SCI improves better in aspect of ADL. For bladder management, cervical SCI patients should avoid reflex emptying and Foley's catheterisation and DL SCI cases should do timely self intermittent clean catheterisation technique and follow adequate fluid restriction. For bowel management, they should be counselled to avoid constipation to prevent other complications such as piles etc. For better sexual experience in SCI cases, it is advised to counsel the patients to attempt conversion of active partner to be the spouse. For psychological management, efforts should be made to counsel patients and caregivers to avoid depression. The role of vocational training and initial financial support needs to be emphasized
Conclusion: Since there is a paucity of studies on the long term follow-up after SCI from India as well as around the world, it is emphasized that such multiple studies on long term follow-up after SCI should be carried out at multi-centric level across various countries and continents all over the world. The results of these studies can be compared with each other to give a different perspective on the management of SCI. It will lead to better outcomes in long term follow-up in SCI cases. All these efforts will help in successfully reintegrating SCI patients into the community

KEYWORDS

Spinal cord injury (SCI), Long term follow-up, Community ambulators

INTRODUCTION

Spinal cord injury (SCI) is a life threatening situation that carries a high risk of morbidity and mortality.[1] The patients of SCI are poorly motivated, poorly compliant and pose several challenges for the treating physiatrists and other specialists. There are lots of challenges in their long term rehabilitation and these affects the outcomes. India is the 2nd most populous nation in the world, still there is a paucity of studies on the long term follow-up after SCI from India as well as around the world. Therefore, a study was performed to find out the outcomes in long term follow-up after SCI at a tertiary care spinal unit in North India.

MATERIALS AND METHODS

This prospective observational case series study was conducted for a period of six years from 2000 to 2006 in the Spinal Unit of the Department of Physical Medicine and Rehabilitation, in our tertiary care hospital. All consecutive cases of SCI admitted in the department have been evaluated for neurological status according to the International Standards for Neurological Classification of Spinal Cord Injury, which include the American Spinal Injury Association Impairment Scale (AIS).[2] All the cases of SCI who reported for follow-up after one year or more were included in this study A prestructured proforma was used for evaluation which included their AIS and following criteria:

1. Ambulation-Bed mobility,Transfers & Locomotion
2. Activites of daily living (ADL)
3. Bladder management
4. Bowel management
5. Sexual behaviour
6. Mental status
7. Vocational status
8. Complications-Neuropathic Pain, Spasticity, Pressure sore & others

The analysis was done by descriptive methods. Data are presented as numbers or percentage.

RESULTS

Out of 1819 cases of SCI admitted in the department during the course of the study period, 970 cases (53%) were of cervical and 849 cases (47%) were of dorsolumbar (DL) SCI. A total of **198 cases (11%)** [97 cervical (10%) and 101 DL (12%)] presented for follow up after 12 months or more. The mean follow up period was 27 months with a range 12 to 78 months. It was 27 (upto 62) and 28 (upto 78) in cervical and DL respectively. The age and sex distribution of these cases is described in Table 1

NO. OF CASES (%)							
TYPE	CERVICAL			DORSOLUMBAR			TOTAL
Age Group (yrs)	F	M	Total	F	M	Total	
0-19	2 (2%)	11 (11%)	13 (13%)	2 (2%)	7 (7%)	9 (9%)	22 (11%)
20-39	7 (7%)	48 (49%)	55 (57%)	6 (6%)	66 (65%)	72 (71%)	127 (64%)
40-59	4 (4%)	20 (21%)	24 (25%)	2 (2%)	17 (17%)	19 (19%)	43 (22%)

60+	2 (2%)	3 (3%)	5 (5%)	0	1 (1%)	1 (1%)	6 (3%)
TOTAL	15 (15%)	82 (85%)	97	10 (10%)	91 (90%)	101	198

The initial ASIA Impairment Scale (AIS) and followup AIS of these patients is described in Table 2.

AIS grade	Cervical		Dorsolumbar	
	Initial	Followup	Initial	Followup
A	47	19	89	73
B	14	4	5	3
C	12	9	2	8
D	21	54	4	16
E	5	14	0	0

The Change in AIS grade over the follow up period is described below in Table 3:

FOLLOW UP AIS GRADES						
INITIAL AIS	No.	A	B	C	D	E
A	136	91	5	11	28	1
B	19	-	2	5	11	1
C	14	-	-	1	12	1
D	24	1	-	-	17	6
E	5	-	-	-		5

CHANGE	CERVICAL	DL	TOTAL
SAME	37 (38%)	79 (78%)	116
1 GRADE	23 (24%)	5 (5%)	28
2 GRADE	13 (13%)	10 (10%)	23
3 GRADE	22 (23%)	7 (7%)	29
4 GRADE	1 (1%)	0	1
DETERIORATION (3 GRADES)	1 (1%)	0	1

Out of 97 cases of cervical SCI, 73 were independent, 10 and 14 cases were partially dependent and totally dependent respectively for bed mobility. Out of 101 cases of DL SCI, 84 were independent, 9 and 8 cases were partially dependent and totally dependent respectively for bed mobility. In cervical SCI, 62 cases were independent, 9 and 26 cases were partially dependent and totally dependent respectively for transfers, while in DL SCI; 56 cases were independent, 21 and 24 cases of DL SCI were partially dependent and totally dependent respectively. For ambulation, out of 97 cases of Cervical SCI, 9 cases were bed-ridden, 8 standing bedside only, 14 therapeutic ambulation (around bed only), 17 were doing functional/indoor ambulation (at home only) and 51 cases were community ambulators. In DL SCI, 3 cases were bed-ridden, 11 standing bedside only, 36 therapeutic ambulation, 22 were doing functional/indoor ambulation and 29 cases were community ambulators. For activities of daily living (ADL), 46 cases were independent, 28 and 23 cases were partially dependent and totally dependent respectively, while in DL SCI; 54 cases were independent and 47 cases of DL SCI were partially dependent. Surprisingly, there were zero totally dependent cases in DL SCI.

The bladder management of these patients is described in Table 4:-

TYPE	CERVICAL	DORSO-LUMBAR	TOTAL
Clean intermittent catheterization	12	6	18
Compression method	2	9	11
Condom catheter	1	2	3
Foley's catheter	5	7	12
Normal	48	17	65
Bed Pot	1	3	4
Reflex emptying	20	15	35
Self intermittent clean catheterization	8	42	50

In cervical SCI cases, maximum 48 (49%) cases were passing urine normally, while in DL SCI, 42 (42%) cases were passing urine using self intermittent clean catheterization technique.

When we observed the complications in Cervical SCI, we found that of 12 patients doing clean intermittent catheterization; 6 were incontinent, 1 patient using condom catheter technique found to have nephrolithiasis, of 2 patients using compression technique; 1 was incontinent, all 15 patients doing reflex emptying were incontinent, only 1 patient was using bedpot technique and was incontinent, only 1 patient using condom catheterisation technique and was incontinent, of 2 of 8 cases doing self intermittent clean catheterization technique; 2 were incontinent, of 5 cases using Foley's catheter; 2 were having autonomic dysfunction and of 48 cases passing normally; 1 was having burning micturition and oliguria and another was having urgency. So, total 30 cases had complications in cervical SCI; 25 were incontinent, 2 were having autonomic dysfunction, 1 each was found to have burning micturition and oliguria, nephrolithiasis and urgency. Out of the 25 incontinent cases; 6 were using clean intermittent catheterization technique (1 each was having overflow, reflex and urge, stress and urge, stress and 2 were having urge incontinence types), 1 case was using compression technique (overflow type), 1 was using bedpot technique (overflow type), 15 were using reflex emptying (1 each was having reflex and urge, reflex; 2 were having stress and urge and 11 were having urge incontinence types) and 2 were using self intermittent clean catheterization technique (urge incontinence).

In DL SCI, we found that of 6 patients doing clean intermittent catheterization; 2 were incontinent, of 9 patients using compression technique; 7 were incontinent, of 15 patients doing reflex emptying; 8 were incontinent and 1 was having vesical calculus, of the 3 patients using bedpot technique; one was found to be tying glans leading to circumcision, of 42 cases doing self intermittent clean catheterization technique; 17 were incontinent and 1 each was found to have scrotal swelling and vesical calculus and of 17 cases passing normally; 1 was having burning micturition. None of the 2 patients using condom catheterisation technique and the 7 cases using Foley's catheter were having any complications. So, total 41 cases had complications in cervical SCI; 36 were incontinent, 2 were having vesical calculus and 1 each was found to have burning micturition, scrotal swelling and tying glans leading to circumcision. Out of the 36 incontinent cases; 2 were using clean intermittent catheterization technique (both were having overflow type incontinence), 7 cases were using compression technique (2 each were having overflow and stress type and 1 each was having overflow and stress, stress and reflex, stress and urge types of incontinence), 2 were using bedpot technique (overflow type), 8 were using reflex emptying (3 were having urge, 2 each were having overflow and reflex and 1 having stress incontinence types) and 17 were using self intermittent clean catheterization technique (6 were having overflow, 4 were having overflow and stress, 3 each were having stress and urge and 1 was having reflex incontinence types).

For bowel management, of the total 198 cases, 61 (31%) were passing normally (Cervical: 46 and DL: 15) and remaining 137 (69%) were doing reflex evacuation (Cervical: 51 and DL: 86). Among the complications in bladder management; 6 were having constipation - all cervical (4 passing normally and 2 were doing reflex evacuation). A total of 11 cases were having piles; 5 cervical (1 was passing normally and 4 cases were doing reflex evacuation) and 6 DL (All using reflex evacuation) cases.

In sexual behaviour of these cases, a total of 79 cases (40%) - 38 cervical and 41 DL were doing sexual intercourse. The frequency of those cases doing intercourse is described in Table 5 as per AIS grading:

Frequency	Cervical						Dorsolumbar					
	A	B	C	D	E	Total	A	B	C	D	E	Total
Twice Or More/Wk	6	3	4	5	1	19	5	1	1	0	0	7
Once/Wk	4	1	3	2	0	10	9	2	1	0	0	12
Once/15 Days	2	0	0	1	0	3	5	1	0	0	0	6
Once/Month	2	2	2	0	0	6	13	1	1	1	0	16

Regarding intercourse satisfaction, 23 in cervical and 12 in DL were satisfied, 7 in cervical and 19 in DL were moderately satisfied, 7 in cervical and 9 in DL were not satisfied at all.

Regarding mental status, 11 each in cervical and DL were anxious, 2 each in cervical and DL were apprehensive, 19 in cervical and 7 in DL were cheerful, 39 in cervical and 48 in DL were depressed, 1 in DL was having psychiatric issues, 1 in cervical was well adjusted, 20 in cervical and 23 in DL were normal in mental behaviour. Regarding complications, 21 cases were having insomnia, other complications were frequent recall of trauma, suicidal intent, helplessness, hopelessness and worthlessness in some of the cases.

Regarding vocational status, 19% in cervical and 5% in DL were in same profession with same activity, 16% in cervical and 10% in DL were in same profession with reduced activity, 13% in cervical and 7% in DL were in same profession with passive activity under supervision, 7% in cervical and 13% in DL changed profession with actively involved, 6% in cervical and 8% in DL were in changed profession with passive activity under supervision, 41% in cervical and 53% in DL were unemployed.

Among the complications, 42 in cervical and 64 in DL were having neuropathic pain and 69 in cervical and 30 in DL were having spasticity, Grade III Modified Ashworth Scale being most common. Pressure sore were found in 8 in cervical and 40 in DL; sacral site being most common. Other complications were stiff shoulder in cervical and tight tendoachilles leading to equinuus deformity in DL cases.

DISCUSSION

The study on long term follow-up after SCI is important for planning and developing assets to furnish adequate treatment and rehabilitation, as it has massive personal, bio-psychological impact and socio-economic consequences.16. Unfortunately, the authors could not find any study in literature on this from India as well as other countries. So, the authors did not have much data for comparison.

The incidence of cervical (53%) and DL (47%) SCI was found in study which was comparable to the incidence as stated via Martin et al.[3] in the ratio of 51.2:48.8.The male to female ratio various from 1.6:1 to 13.5:1 in different studies.[3-18] We observed that adult males had been four times (4.2:1) extra prone for SCI when compared with females. This should be due to the fact that in most families, adult males are main income generating member of the family and for this reason, their follow-up is more common. 64% (71% DL and 57% cervical) were in the age group of 20–39 years, followed by 22% (19% DL and 25% cervical) in 40-59 years age group which is in accordance with previous studies.1–5,8–11,14,16,17,19. However the DL cases are slightly more in 20-39 age group, while cervical more in 40-59 year age group. This is an alarming circumstance where mostly the breadwinner of family is turning into severely disabled ensuing in loss of household incomes in families. This affects their day-to-day life, consisting including management due to monetary constraints and non-availability of care taker. However, joint families overcome this trouble to some extent where other participants of the household are probably to support the patients and their family.

The incidence of complete tetraplegia and paraplegia (AIS A) in specific research varies from 4.8 to 50.6% and sixteen to 85.1%, respectively.[4,7,9,11-20] We found 47 cases (48%) of cervical and 89 cases (88%) of DL SCI belonging to AIS A initially. More than half (118) cases remain in same AIS grading over the follow-up period. However, there were more in DL:79 compared to cervical:37 cases. While only 28 cases changed by grade 1; more cases were in cervical (23) compared to DL (5). 23 (cervical:13 and DL:10) and 29 (cervical:22 and DL:7) cases respectively changed by 2 and 3 grades respectively. However, more cases were in cervical, but the difference in both groups was much higher in those changing by 3 grades. Only 1 case (cervical) changed by 4 grades and surprisingly 1 case (cervical again) deteriorated by 3 grades. So, we can say that most of the cases remain in same AIS grade, but this is more common in DL group compared to cervical SCI cases. Some cases improved by one to three grades, more common in cervical cases. This can be explained by the fact that more cases in DL (89) compared to cervical (47) were initially in AIS grade A. Hence, prognosis was poor in these cases. While there were more cases in AIS B, C and D grades in cervical than DL. This explains the change of AIS grades by 1, 2 and 3 more in cervical SCI cases.

With regards to bed mobility, more DL (83%) in comparison to cervical (76%) SCI cases were independent, while cervical (14%) SCI cases were totally dependent compared to DL (8%) SCI. In contrast for transfers, more cervical (65%) SCI cases in comparison to DL (55%) were independent, while more DL (21%) SCI cases were totally dependent compared to cervical (9%) SCI.

With regards to ambulation, more cervical in comparison to DL SCI cases were community ambulators (51 vs. 9) and bedridden (9 vs. 3). This finding was very surprising as cervical SCI cases were more in both community ambulators and bedridden category. Whereas there were more DL in comparison to cervical SCI cases were standing bedside only (11 vs. 8), doing therapeutic ambulation (36 vs. 14) and functional/indoor ambulation (22 vs. 17). From this, it is clear that cervical SCI cases either improves a lot or remain bed-ridden more in comparison to DL SCI. For ADL, more DL SCI cases: 53% and 48 % were independent and partially dependent respectively in comparison to cervical: 47% and 27%. Totally dependent in ADL (23%) were found only in cervical SCI. This is a surprising finding in our study that in DL SCI there were no cases which were totally dependent in ADL. So, we can convincingly deduce that DL SCI improves better in ADL.

For bladder management, majority of cervical (49%) SCI cases were passing normally, while 42% of DL cases were using self intermittent clean catheterisation technique. Incontinence was the most common complications in cervical (25) as well as DL (36) cases, overflow incontinence being the most common type. For bowel management, again more cervical (46) cases were passing normally in comparison to DL (15), while more DL cases (86 vs. 51)were doing reflex evacuation. For sexual behaviour, 40% cases were doing intercourse; almost similar in both 38 cervical and 41 DL SCI type. In cervical, 19 were doing twice or more per week followed by 10 once per week, while in DL, 16 were doing only once per month followed by 12 once per week. 23 cervical SCI cases were satisfied, while 19 DL SCI cases were moderately satisfied. So, we can conclude here that cervical SCI cases were better in terms of frequency and satisfaction.

For psychological assessment, majority of the patients were depressed followed by normal behaviour and anxiety in that order. Insomnia is the most common complication. Regarding vocational status, more cases in cervical SCI were in same profession, while more DL cases changed their profession or were unemployed.

To summarize, adult males in age group of 20-59 years are more prone to SCI and they are mostly the breadwinner for their family. There is no change in AIS grading in most of the cases. Most of the cases were independent in bed mobility, where as more cervical cases were independent for transfers and community ambulators in comparison to DL SCI. DL SCI improves better in aspect of ADL. Cervical SCI patients should avoid reflex emptying and Foley's catheterisation and DL SCI cases should do timely self intermittent clean catheterisation technique and follow adequate fluid restriction. For bowel management, they should be counselled to avoid constipation to prevent other complications such as piles etc. For better sexual experience in SCI cases, it is advised to counsel the patients to attempt conversion of active partner to be the spouse. For psychological management, efforts should be made to counsel patients and caregivers to avoid depression. The role of vocational training and initial financial support needs to be emphasized. All these efforts will help in successfully reintegrating SCI patients into the community.

LIMITATIONS OF THE STUDY

The limitation of this prospective case series observational study is that we could not get any data to compare, as there is no available literature from India as well as any other country on this subject. Hence, it is emphasized that such multiple studies on long term follow-up after SCI should be carried out at multi-centric level across various countries and continents all over the world. The results of these studies can be compared with each other to give a different perspective on the management of SCI. It will lead to better outcomes in long term follow-up in SCI cases.

DATA ARCHIVING

There was no data to deposit.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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