

The Bone & Joint Journal



Supplementary Material

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Table i. Inclusion and exclusion criteria.

Inclusion criteria	
1	Age \geq 18 years.
2	Diagnosis of blunt spinal column injury and SCI, including conus medullaris and/or cauda equina injuries.
3	Pre-surgery American Spinal Injury Association Impairment Scale grade A, B, C, or D.
4	< 14 days between the injury and decompression.
5	Willingness to participate and ability to comply with the study procedures.
6	Ability to understand patient information sheet and provide written informed consent.
Exclusion criteria	
1	Traumatic brain injury with Glasgow Coma Scale \leq 13.
2	Diagnosis of subclinical or clinical polyneuropathy, e.g., presence of bilateral impairment of strength, sensation, and/or deep tendon reflexes with symmetrical and distal distribution and/or neurophysiological abnormalities.
3	SCI caused by a penetrating injury, non-traumatic or pathological fractures or cord compression, e.g. tumour or infection.
4	Unable to cooperate with preoperative physical examination because of cognitive impairment, as assessed by the examiner.
5	Previous spinal column or SCI.
6	Diagnosis of inflammatory spondyloarthropathy.
7	BMI > 35 kg/m ² .
8	Any severe systemic disease that may have an influence on motor function.
9	American Society of Anesthesiologists classification grade \geq 4.
10	Recent history of substance abuse that would preclude reliable assessments.
11	Pregnancy at the time of inclusion.
12	Prisoner.
13	Participation in any other medical device or medicinal product study in the previous month that could influence the results of the present study.

SCI, spinal cord injury.

Table ii. Patient characteristics at baseline by treatment group with comparisons between those who completed and those who did not complete the 12-month follow-up.

Characteristic	Early decompression			Late decompression		Between groups	
	Complete 12-mth FU (n = 119)	Dropout/ death (n = 40)	p-value*	Complete 12-mth FU (n = 93)	Dropout/ death (n = 42)	p-value*	p-value†
Median age, yrs (IQR)	42.0 (31.0 to 58.0)	44.0 (27.5 to 63.0)	0.595‡	50.0 (37.0 to 64.0)	48.5 (30.0 to 67.0)	0.805‡	0.676‡
Sex, n (%)			0.892§			0.744§	0.913§
Male	25 (21.0)	8 (2.0)		20 (21.5)	8 (19.0)		
Female	94 (79.0)	32 (80.0)		73 (78.5)	34 (81.0)		
Prior admission to other hospital after injury, n (%)			0.765§			0.615§	< 0.001§
No	92 (77.3)	30 (75.0)		27 (29.0)	14 (33.3)		
Yes	27 (22.7)	10 (25.0)		66 (71.0)	28 (66.7)		
CCI, n (%)			0.653¶			0.928§	0.366¶
0	111 (93.3)	36 (90.0)		74 (81.3)	33 (78.6)		
1	4 (3.4)	2 (5.0)		11 (12.1)	6 (14.3)		
≥ 2	4 (3.4)	2 (5.0)		6 (6.6)	3 (7.1)		
Median Injury Severity Score (IQR)	16.0 (14.0 to 25.0)	17.5 (16.0 to 25.0)	0.183‡	16.0 (9.0 to 20.0)	15.0 (9.0 to 19.5)	0.427‡	0.014‡
ASIA neurological examinations							
Time between injury and ASIA examination at baseline, hrs			0.388‡			0.968‡	< 0.001‡
Mean (SD)	3.1 (2.2)	3.5 (2.6)		18.2 (25.4)	28.7 (56.9)		
AIS grade, n (%)			0.400§			0.057§	0.279§
A	51 (44.0)	21 (56.8)		21 (22.8)	17 (44.7)		

B	30 (25.9)	5 (13.5)		11 (12.0)	2 (5.3)		
C	14 (12.1)	5 (13.5)		15 (16.3)	7 (18.4)		
D	21 (18.1)	6 (16.2)		45 (48.9)	12 (31.6)		
Median total motor score (IQR)	50.0 (32.0 to 59.0)	50.0 (24.0 to 58.0)	0.353‡	56.0 (46.5 to 87.0)	50.0 (18.0 to 68.0)	0.016‡	0.723‡
Median LEMS (IQR)	0.0 (0.0 to 19.0)	0.0 (0.0 to 10.0)	0.478‡	26.0 (0.0 to 49.0)	3.5 (0.0 to 37.0)	0.100‡	0.045‡
Median light touch score (IQR)	76.0 (52.0 to 94.0)	64.5 (36.0 to 82.0)	0.082‡	97.0 (72.0 to 108.0)	75.0 (48.0 to 97.0)	0.004‡	0.346‡
Median pin prick score (IQR)	76.0 (50.0 to 94.0)	64.5 (30.0 to 84.0)	0.073‡	96.0 (76.0 to 108.0)	75.5 (40.0 to 98.5)	0.005‡	0.355‡
Type of paralysis, n (%)			0.873§			0.565§	0.166§
Tetraplegic	50 (45.9)	18 (47.4)		49 (57.6)	24 (63.2)		
Paraplegic	59 (54.1)	20 (52.6)		36 (42.4)	14 (36.8)		
UEMS (tetraplegic patients only)			0.474‡			0.008‡	0.562‡
Median UEMS (tetraplegic patients only) (IQR)	18.0 (8.0 to 38.0)	19.0 (10.0 to 28.0)		28.0 (12.0 to 43.0)	18.0 (6.0 to 22.0)		
Traumatic lesion in spine**, n (%)							
Cervical spine	49 (41.2)	20 (50.0)	0.330§	54 (58.1)	27 (64.3)	0.495§	0.191§
Thoracic spine	56 (47.1)	17 (42.5)	0.617§	23 (24.7)	13 (31.0)	0.449§	0.278§
Lumbar spine	27 (22.7)	13 (32.5)	0.216§	26 (28.0)	5 (11.9)	0.040§	0.024§
Sacral spine	1 (0.8)	0 (0.0)	1.000¶	1 (1.1)	1 (2.4)	0.527¶	1.000¶
Time between injury and the first decompression, hrst††			0.263‡			0.470‡	N/A
Mean (SD)	6.9 (2.5)	7.5 (2.8)		42.7 (43.0)	42.2 (55.2)		
Approach used for			0.850¶			0.931¶	0.731¶

decompression, n (%)							
Anterior only	24 (21.4)	10 (25.6)		28 (31.5)	14 (33.3)		
Posterior only	82 (73.2)	28 (71.8)		54 (60.7)	26 (61.9)		
Circumferential only	3 (2.7)	0 (0.0)		5 (5.6)	1 (2.4)		
Combination of the above approaches	3 (2.7)	1 (2.6)		2 (2.2)	1 (2.4)		
Laminectomy, n (%)			0.472§			0.508§	0.296§
No	36 (32.1)	15 (38.5)		39 (43.8)	21 (50.0)		
Yes	76 (67.9)	24 (61.5)		50 (56.2)	21 (50.0)		

Results are presented using patients with data available for individual variables; no imputation was performed to impute missing data.

*p-values comparing, within early/late decompression group, patients who completed and those who did not complete the one-year follow-up.

†p-values comparing patients who dropped out or died during the one-year follow-up in the early versus in the late decompression group.

‡Mann-Whitney U test.

§Chi-squared test.

¶Fisher's exact test.

**Patients could have traumatic lesions in multiple spine regions. Percentages do not add up to 100%.

†† If exact time of the first decompression was not reported and instead the quarter during surgery when decompression happened was available, the midpoint of the respective time interval was imputed. This variable is missing in one patient in whom the time of depression was unknown, and the patient was assigned to the late group based on the date of the decompression.

AIS, ASIA Impairment Scale; ASIA, American Spinal Injury Association; FU, follow-up; IQR, interquartile range; LEMS, Lower Extremity Motor Score; N/A, not applicable (as the two groups were defined by the time elapsed between injury and the first decompression); SD, standard deviation; UEMS, Upper Extremity Motor Score.

Table iii. Analyses of subgroup effect (interaction) of baseline American Spinal Injury Association Impairment Scale grade and type of paralysis on the difference in change in Lower Extremity Motor Scale (between baseline and 12 months) between the early and late group (complete-case analyses, two-way analysis of variance without adjustment for covariates).

Subgroups	Early decompression (n = 159)		Late decompression (n = 135)		Between-group difference in change from baseline, mean (95% CI)	p-value*
	n	Change from baseline, mean (95% CI)	n	Change from baseline, mean (95% CI)		
Baseline AIS grade						0.996
A	47	8.0 (4.0 to 12.0)	21	5.2 (-0.7 to 11.2)	2.8 (-4.4 to 9.9)	
B	29	26.7 (21.7 to 31.8)	10	23.5 (14.9 to 32.1)	3.2 (-6.7 to 13.2)	
C	14	28.5 (21.2 to 35.8)	15	26.9 (19.9 to 33.9)	1.6 (-8.5 to 11.7)	
D	19	7.8 (1.6 to 14.0)	40	5.6 (1.3 to 9.9)	2.2 (-5.4 to 9.8)	
Type of paralysis						0.070
Tetraplegic	48	19.7 (15.0 to 24.3)	49	10.9 (6.3 to 15.5)	8.8 (2.2 to 15.3)	
Paraplegic	57	12.0 (7.7 to 16.2)	33	12.1 (6.5 to 17.7)	-0.1 (-7.1 to 6.9)	

Complete-case analysis comprised patients with all relevant variables available. Between-group differences were calculated as the early group minus the late group. Results from a two-way analysis of variance with 1) change in LEMS as the dependent variable, 2) treatment group and baseline AIS grade/type of paralysis as the two independent (categorical) variables, and 3) an interaction term between baseline AIS grade/type of paralysis and treatment group.

AIS, American Spinal Injury Association Impairment Scale; CI, confidence interval; LEMS, Lower Extremity Motor Score.

*p-value testing for interaction between treatment group and baseline AIS grade/type of paralysis. A p-value > 0.5 indicates that the difference in the change in LEMS between the early and late group did not differ significantly between baseline AIS grades/type of paralysis.

Table iv. Change in American Spinal Injury Association Impairment Scale grade from baseline to 12 months with six-month observations carried forward.

Baseline AIS grade						AIS grade at 1 yr*				
	A	B	C	D	E	Sub total	ASIA exam not done	ASIA exam incomplete	Dropout /death before 6 mths	Total
Early decompression, n (%)										
A	30 (53.6)	10 (17.9)	7 (12.5)	8 (14.3)	1 (1.8)	56	3	0	13	72
B	5 (15.6)	4 (12.5)	3 (9.4)	17 (53.1)	3 (9.4)	32	0	0	3	35
C	1 (7.1)	1 (7.1)	1 (7.1)	7 (50.0)	4 (28.6)	14	0	0	5	19
D	1 (4.8)	0	0	14 (66.7)	6 (28.6)	21	1	0	5	27
ASIA exam not done	0	0	0	2	0	2	0	0	1	3
ASIA exam incomplete	0	0	0	1	0	1	0	0	2	3
Total, n (%)	37 (30.1) †	15 (12.2) †	11 (8.9) †	46 (37.4) †	14 (11.4) †	123†	4	0	29	159
Late decompression, n (%)										
A	16 (61.5)	1 (3.8)	7 (26.9)	2 (7.7)	0	26	1	0	11	38
B	1 (10.0)	0	2 (20.0)	7 (70.0)	0	10	1	0	2	13
C	0	0	4 (22.2)	14 (77.8)	0	18	0	0	4	22

D	2 (4.3)	0	0	27 (57.4)	18 (38.3)	47	1	0	9	57
ASIA exam not done	0	0	1	0	0	1	0	0	3	4
ASIA exam incomplete	0	0	0	1	0	1	0	0	0	1
Total, n (%)	19 (18.8) †	1 (1.0) †	13 (12.9) †	50 (49.5) †	18 (17.8) †	101†	3	0	29	135

Figures in brackets are percentages. All percentages were calculated by using the column "Subtotal" (sum of columns "A", "B", "C", "D", and "E") as the denominator. Categories "ASIA examination not done", "ASIA examination incomplete", "Dropout/death before 6 months" were not used in calculating the percentages.

AIS, American Spinal Injury Association Impairment Scale; ASIA, American Spinal Injury Association.

*For patients who dropped out or died between 6 months and 1 year, the 6-month AIS grades were carried forward to 12 months.

†The sum of rows "A", "B", "C", "D", disregarding the rows of "ASIA examination not done" and "ASIA examination incomplete".

Table v. Change of ASIA lower extremity motor score between baseline and one year (Patients with baseline LEMS < 45, complete-case analysis).

ASIA LEMS	Early decompression (≤ 12 hrs after injury)			Late decompression (> 12 hrs after injury)			Mean difference in change from baseline (95% CI)	p-value*
	n	Mean (95% CI)	Mean change from baseline (95% CI)	n	Mean (95% CI)	Mean change from baseline (95% CI)		
Preoperative	97	6.6 (4.2 to 9.0)		61	13.7 (10.0 to 17.5)			
1 yr	97	24.1 (19.7 to 28.5)	17.5 (13.8 to 21.2)	61	29.7 (24.5 to 34.9)	15.9 (12.3 to 19.6)	1.6 (-3.5 to 6.7)	0.540

Complete-case analysis comprised patients with both preoperative and 12-month follow-up LEMS assessed. Between-group differences were calculated as the early group minus the late group.

AIS, ASIA Impairment Scale; ASIA, American Spinal Injury Association; CI, confidence interval; LEMS, Lower Extremity Motor Score.

*Independent-samples *t*-test comparing change score between both groups.