척수재활

게시일시 및 장소 : 10 월 19 일(토) 08:30-12:30 Room G(3F)

질의응답 일시 및 장소 : 10 월 19 일(토) 11:00-11:30 Room G(3F)

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Subjective Percentage of Remnant Sharp Pain Sensory Predicts Functionality in Spinal Cord Injury

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Background

Motor recovery and restoration of functionality after spinal cord injury depends on the extent and severity of the initial injury. Sparing of the spinothalamic sensory, which is assessed through sharp pain discrimination and referred to as pin prick, seems to be most closely correlated with motor recovery, possibly due to the anatomical proximity of the spinothalamic tract and the corticospinal tract.

Objective

Our aim was to determine the prognostic significance of remnant sharp pain sensation below the neurological level of injury (NLI) on functional outcome of spinal cord injury patients. Predictability of motor recovery and functionality based on initial physical examination may help physicians provide personalized rehabilitation programs even in the earliest phases of recovery.

Subjects & Method

Sixty-two patients with incomplete injury to the spinal cord were evaluated in this study. The American Spinal Injury Association (ASIA) scoring system was used for evaluation, and patients with ASIA C or D were enrolled. Patients were evaluated before and after in-patient rehabilitation. Spinothalamic sensory starting 3 levels below the neurological level of injury was checked at each dermatome and marked as a subjective numerical percentage compared to uninjured dermatomes. The average of sensory percentage below the NLI was used for analysis. According to a study conducted by Godi, M., et al, the best minimal important change is known as 7 points for BBS in patients with balance deficits. Subjects were divided into 2 groups based on whether their change in BBS exceeded 7 points or not (Table 1).

Result

The initial remnant pin-prick sensory between group A (△BBS≤7) and group B (△BBS>7) was examined, and there was statistically significant difference between the 2 groups (group A 54.58%, group B 73.42%, p=0.004) (Table 1).
 Spearman correlation analysis showed significant correlation between the change in BBS, change in MBI and initial sharp pain sensory (Table 2). The change in BBS was more closely correlated to initial sensory showing a correlation coefficient of 0.520 (p=0.000), compared to the change in MBI which had a correlation coefficient of 0.345 (p=0.006). nitial pin-prick sensory, age, and rehabilitation duration were considered as possible variables in regression analysis, but the analysis excluded age (p=0.912) and rehabilitation duration (p=0.269) as variables that explain this model. Initial pin-prick sensory, however, was shown to be a significant variable (R2=0.257, p=0.000) (Table 3).

Conclusion

More sparing of spinothalamic sensory below the neurological level of injury was observed in patients with more change in functionality. It may be useful to check subjective percentage of remnant pin-prick sensory when evaluating spinal cord injury patients, contrast to marking sensory score as numbers (normal 2, impaired 1, absent 0) as it is currently the standard according to ASIA scoring system.

Table 1. Demographic data of patients

Variables	Group A (ΔBBS≤7)	Group B (ΔBBS>7)	Total
Number of subjects	24	38	62
Age (years)	62.29±16.42	63.11±10.72	62.79±13.10
Sex (Male/Female)	16/8	22/16	38/24
Paraplegic/Tetraplegic	17/7	25/13	42/20
Trauma/Non-trauma	11/13	22/16	33/29
Mean time since surgical intervention (days)	13.88±11.62	11.29±6.77	12.29±11.62
Mean length of rehabilitation stay (days)	29.2±13.7	25.0±8.0	26.6±10.6
Average initial remnant sharp pain (%) **	54.58±28.13	73.42±21.22	66.13±25.63
AIS grade (C/D)	12/12	6/32	18/44
ΔBBS	2.92±2.28	24.11±12.26	15.90±14.19
ΔMBI	8.29±9.82	20.16±12.43	15.56±12.81

** p-value 0.004

ΔBBS, change in BBS before and after in-patient rehabilitation (average 27 days)

Table 2. Spearman correlation analysis showed significant correlation between initial sharp pain sensory and both ΔBBS, ΔMBI

		△BBS	△MBI
Initial pin-prick sensory in NLI (%)	Correlation coefficient	0.520	0.345
	p-value	0.000	0.006
	n	62	62

Table 3. Regression analysis model predicting the change in BBS

Model		Unstandardized Coefficients		p-value
		B	Standard error	
1	(constant)	2.987	10.221	0.771
	age	-0.015	0.122	0.901
	Initial pin-prick sense	0.277	0.063	0.000
	Rehabilitation duration	-0.166	0.150	0.272
2	(constant)	1.957	6.015	0.746
	Initial pin-prick sense	0.277	0.062	0.000
	Rehabilitation duration	-0.166	0.148	0.269
3	(constant)	-2.674	4.365	0.542
	Initial pin-prick sense	0.281	0.062	0.000

R^2 0.257