척수재활

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OP3-2-6

A single-center retrospective analysis of incidence of tracheostomy and ventilator weaning for C-SCI

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Purpose

There are many trauma centers for team approach for patients from trauma and now it is important to minimize complications of survivors. Cervical spinal cord injury (C-SCI) is one of them who survived from tragic accident and it is important to overcome their physiologic dysfunction after C-SCI such as respiratory dysfunction. It is widely accepted that early rehabilitation including chest physiotherapy and early tracheostomy lead to reduced length of stay and improved mortality of patients with C-SCI. In this study, we estimated results of early rehabilitation through multidisciplinary team approach for C-SCI at a regional trauma center retrospectively via incidence of tracheostomy and decannulation and rates of ventilator-free at discharge.

Methods

The study period is September 1st, 2016 to June 30th, 2019. 49 patients were included for C-SCI patients who admitted through the trauma center with neurologic level of injury (NLI) of C1 to C7 and American Spinal Injury Association Impairment Scale (AIS) A or B were enrolled. All of them received early rehabilitation including chest physiotherapy from intensive care unit (ICU) or general ward. Chest physiotherapy includes sputum toileting by mechanical insufflation-exsufflation with abdomen thrust maneuver, high-frequency of chest wall oscillation and education of breathing exercise such as incentive spirometer or air stacking with deep breathing and coughing training.

Results

Total 49 patients were enrolled. Patient demographics are seen in Table 1. Mean time from injury to initiation of pulmonary rehabilitation (PR) were 8.25 days with standard deviation 3.04. Incidence of tracheostomy according to NLI and/or impairment scale is seen in Table 2. Rates of ventilator-free outcome at discharge is seen in Table 3. Comparison with previous studies for rates of successful ventilator weaning according to NLI with AIS A or B is seen in Table 4. Successful ventilator weaning means 24 hours free of invasive ventilation including non-invasive ventilation (NIV).

Discussion

This study showed incidence of tracheostomy (Table 2) and rates of successful ventilator weaning rates at NLI level of our center compared to previous study (Table 3 & 4). Incidence of tracheostomy was higher on higher NLI and rates of decannulation was higher on lower NLI. Patients with NLI of C1 was failed to ventilator-wean in all study. One patient with NLI C2 with AIS A became AIS B after operation and he was extubated and applied NIV at discharge (Table 3).

Conclusion

Reduced tracheostomy rates or increased ventilator-free rate improve life quality of patients with C-SCI and reduce psychological problem. Thus, it is important to collect multi-center based prospective database to establish standardization of early rehabilitation and chest physiotherapy for traumatic SCI patients in Korea.

Table 1. Patient demographics

Sex	M	39	79.59%
	F	10	20.41%
Age	<60	31	63.27%
	≥60	18	36.73%
BMI			23.54%
Mechanism of Injury	fall	24	48.98%
	TA	24	48.98%
	other	5	10.20%
ISS			32.51
ISS greater than 15*			100%
Chest injury	yes	7	14.29%
	no	45	91.84%
Mean Days from onset to initial PR			8.25 ± 3.04
Level of Injury	C1	1	2.04%
	C2	1	2.04%
	C3	8	16.33%
	C4	23	46.94%
	C5	14	28.57%
	C6	1	2.04%
	C7	0	0.00%
	C8	1	2.04%
Impairment Scale	A	34	69.39%
	B	15	30.61%

BMI, body mass index; ISS, Injury Severity Score; PR, pulmonary rehabilitation

*, ISS score ≥ 16 is considered as major trauma

Table 2. Incidence of Tracheostomy & Rates of Ventilator-Free Outcome

Level of Injury	Impairment Scale (#)	# of tracheostomy	Incidence of tracheostomy	# of decannulation	Incidence of decannulation
C1-C4	A (25)	13	50%	6	46%
	B (8)	4	50%	3	75%
C5-C7	A (9)	4	44%	2	50%
	B (7)	0	NR	0	NR
	#	# of tracheostomy	Incidence of tracheostomy	# of decannulation	Incidence of decannulation
C1-C4	33	17	52%	7	41%
C5-C7	16	4	25%	4	100%

NR, not reported; #, number of patients

Table 3. Rates Ventilator-Free Outcome

NLI (#)	16h-VFB*	Percentage	24h-VFB*	Percentage
C1 (1)	0	0%	0	0%
C2 (1)	1	100%	1	100%
C3 (8)	7	88%	5	63%
C4 (23)	23	100%	14	61%
C5 (14)	14	100%	12	86%
C6 (1)	1	100%	1	100%
C7 (0)	0	NR	0	NR
C8 (1)	1	100%	1	100%

NLI, Neurologic level of injury; VFB, Ventilator-free breathing; h, hour; NR, not reported; #, number of patients

*16h-VFB, number of patients to be weaned at daytime; 24h-VFB, number of patients free of ventilator all day.

Table 4. Comparison with previous study of successful ventilator weaning rates

Study (#)	Successful ventilator weaning rates for given level of SCI with AIS A or B (%)							
	C1	C2	C3	C4	C5	C6	C7	C8
Choido et el. (26)	NR	0	25	77	50	NR	NR	NR
Wong et al. (24)	0	0	75	91	NR	NR	NR	NR
Zakrasek et al. (36)	0	40	91	100	100	NR	NR	NR
Current Data (49)	0	100	75	96	100	100	0	100

NR, not reported; #, Sample size of the study