

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)

## **P 3-62**

### **Correlation of Heart Rate Variability with Impaired Autonomic Nervous System in Patients with SCI**

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#### **Introduction**

The autonomic nervous system (ANS) is supraspinally controlled, has many functions including heart rate control. The sympathetic innervation of the heart is from T1 to T5 spinal cord segments and the parasympathetic innervation of the heart from the vagus nerve. Therefore, spinal cord injury (SCI) above the T6 level can cause ANS dysfunction and interfere with supraspinal cardiac control. Our hypothesis is a disturbance of sympathetic control of the heart that causes uninhibited parasympathetic stimulation. The aim of the study is to investigate the association of heart rate variability (HRV) and impaired sympathetic nervous system in patients with SCI.

#### **Methods**

The retrospective study was performed on medical records of 20 patients (16 males and 4 females) with SCI. It is known that the HRV strongly represents the parasympathetic tone during the Valsalva maneuver. It is believed that the accurate Valsalva maneuver causes forced exhalation for 15 seconds with an expiratory pressure of over 40 mmHg. During the Valsalva maneuver, real-time electrocardiography monitoring was performed on all subjects. Distance between two consecutive R-waves of the QRS complex in milliseconds is defined as the R-R interval. The R-R interval ratio is calculated as the maximum value divided by the minimum value. We calculated the R-R interval ratio for each patient during the 15 seconds of Valsalva maneuver. The correlations between the neurologic level of injury (NLI), lesion completeness and HRV were statistically analyzed.

#### **Results**

Demographic data and descriptive data are listed in Table 1. Fifteen patients had NLI of above T1 and five patients had NLI of T1 or below. The number of patients with American Spinal Injury Association Impairment Scale A, B, C, and D was 3, 0, 2 and 15, respectively. Eight patients (40.0%) showed normal R-R interval ratio (average  $1.6 \pm 0.18$  ms), while 12 patients showed an abnormal finding (average  $1.15 \pm 0.11$  ms) (Table 1). HRV during the

Valsalva maneuver did not correlate statistically with NLI ( $p = 0.29$ ) nor with the completeness of the SCI ( $p = 0.125$ ).

### Conclusion

According to the literature, it is known that the sympathetic and parasympathetic tone after a lesion, which can lead to an ANS dysfunction, recover their mutual equilibrium after a certain period of time. In our study, the period from the onset of SCI to the ANS function test was not considered. To know the changes in the ANS function after SCI requires a larger study with more variables.

Table 1. Demographics and clinical characteristics of the subjects

Variables	Number
Age (years)	54.5±12.06
Gender	
Male	16 (80.0%)
Female	4 (20.0%)
Neurologic level of injury(NLI)	
Above T1	15 (75.0%)
T1 or below	5 (25.0%)
AIS	
A	3 (15.0%)
B	0 (0.0%)
C	2 (10.0%)
D	15(75.0%)

Table 2. Correlations among the NLI or completeness of lesion and HRV

NLI	Abnormal RR interval ratio	Normal RR interval ratio	<i>p</i> -value
Above T1	8(66%)	7(87.5%)	0.29
T1 or below	4(33%)	1(12.5%)	
Completeness of SCI			
Complete injury	3(25.0%)	0(0.0%)	0.12
Incomplete injury	9(75.0%)	8(100.0%)	

Statistical significance was  $p < 0.05$