신경근육재활 및 전기진단

발표일시 및 장소: 10 월 19 일(토) 14:30-14:40 Room C(5F)

OP3-3-4

Correlation between Autonomic Dysfunction and Functional Status in Patients with ALS

Myung Hoon Moon[1*], Ju Hyun Son[1], Soo-Yeon Kim[1†]

Pusan National University Yangsan Hospital, Department of Rehabilitation Medicine[1]

Objective

Amyotrophic lateral sclerosis (ALS) has traditionally been considered as a pure motor disease, but it is not uncommon to have non-motor manifestations in advanced cases. Autonomic dysfunction is one of the non-motor manifestations including orthostatic hypotension, heart rate variability, dyshidrosis, neurogenic bladder or bowel. These symptoms have a major impact on patients' quality of life, but unlike motor function, it is difficult to evaluate quantitatively and to predict the onset of symptoms. The aim of this study was to determine the relationship between functional status and autonomic dysfunction in patients with ALS.

Methods

We collected data from the prospective study conducted in 29 ALS patients (26 males and 3 female). The collected data were divided into 2 categories; The Medical Research Council (MRC) sum score, Amyotrophic Lateral Sclerosis Functional Rating Scale-Revised (ALSFRS-R), Korean version of Modified Barthel Index (K-MBI), Berg Balance Scale (BBS), Forced Vital Capacity (FVC), Peak Cough Flow (PCF), Body Mass Index (BMI), estimated skeletal muscle mass on bioimpedance analysis and Penetration Aspiration Scale (PAS) on videofluoroscopic swallow study were categorized as physical function test; blood pressure (BP) response to postural change, heart rate (HR) response to postural change and deep breathing, Sympathetic Skin Response (SSR) and Quantitative Sudomotor Axon Reflex Test (QSART) are categorized as autonomic function test. The MRC sum scores were measured as a score of 0 to 5 at bilateral elbow flexors, finger flexors, hip flexors, and ankle dorsiflexors, and all were added. Among autonomic function tests, BP response to postural change, SSR and QSART are known to represent sympathetic function, and HR response to postural change and deep breathing represent parasympathetic function. The correlations between physical function tests and autonomic function tests were statistically analyzed.

Result

Demographics and descriptive data of the subjects are shown in Table 1. There was no statistically significant correlation between physical function tests and autonomic function tests (Table 2). Although there is no statistical significance, SSR was abnormal in almost all subjects.

Conclusion

This is a pilot study to develop a model for early prediction of autonomic dysfunctions in ALS patients. Result of this study showed that there is no direct correlation between patients' physical and autonomic function tests. We will conduct a further study to find out which tests can represent the onset of perceptive symptom most sensitively over time in patients with ALS.

Table 1. Demographics and descriptive data of the subjects

Variables	Value
Age (years)	**59.66±7.68**
Sex	
Male	**26 (89.7%)**
Female	**3 (10.3%)**
Type	
Bulbar-onset	**17 (58.6%)**
Spinal-onset	**12 (41.4%)**
Duration from onset (months)	**43.90±37.80**
BMI	**24.73±3.42**

Table 2. Comparison between autonomic function tests and physical function tests

				MRC sum score (out of 40)		ALSFRS-R (out of 48)		K-MBI (out of 100)	
				Mean±SD	*p-value*	Mean±SD	*p-value*	Mean±SD	*p-value*
Autonomic function tests	Sympathetic function	BP response to postural change	Normal (n=19)	21.84±7.86	0.824	26.33±9.55	0.729	50.37±26.51	0.766
			Abnormal (n=10)	21.10±9.56		27.90±14.13		53.80±33.91	
		SSR	Normal (n=3)	25.00±5.57	0.463	26.67±6.66	0.110	76.67±25.79	0.111
			Abnormal (n=26)	21.19±8.57		25.72±11.09		48.65±28.03	
		QSART	Normal (n=11)	23.27±8.05	0.433	28.64±9.89	0.640	59.55±24.51	0.306
			Abnormal (n=17)	20.65±8.79		26.56±11.99		47.94±31.07	
	Parasympathetic function	HR response to postural change	Normal (n=10)	24.20±7.99	0.240	30.20±11.40	0.231	56.70±32.60	0.508
			Abnormal (n=18)	20.22±8.60		24.71±11.14		48.89±27.77	
		HR response to deep breathing	Normal (n=18)	25.22±6.21	0.234	30.53±9.83	0.651	60.44±29.63	0.583
			Abnormal (n=5)	21.20±7.56		28.20±10.47		52.60±18.49	

				BBS (out of 56)		FVC (% of predicted normal value)		PCF (mmHg)	
				Mean±SD	*p-value*	Mean±SD	*p-value*	Mean±SD	*p-value*
Autonomic function tests	Sympathetic function	BP response to postural change	Normal (n=19)	23.00±21.93	0.480	66.56±47.11	0.598	240.00±106.39	0.829
			Abnormal (n=10)	29.40±24.61		75.90±38.84		250.00±116.73	
		SSR	Normal (n=3)	35.67±17.16	0.408	91.67±35.77	0.372	286.67±70.24	0.473
			Abnormal (n=26)	24.00±23.17		67.28±44.59		237.73±111.95	
		QSART	Normal (n=11)	34.64±19.94	0.105	84.09±55.56	0.214	293.33±107.94	0.116
			Abnormal (n=17)	20.35±23.15		62.31±33.66		222.00±100.58	
	Parasympathetic function	HR response to postural change	Normal (n=10)	28.10±26.10	0.652	75.90±56.50	0.622	270.00±113.01	0.436
			Abnormal (n=18)	23.89±21.84		66.88±37.55		231.88±110.04	
		HR response to deep breathing	Normal (n=18)	29.72±23.02	0.711	81.24±44.96	0.614	249.38±104.59	0.228
			Abnormal (n=5)	34.00±20.53		69.60±43.31		320.00±82.87	

				BMI		Estimated skeletal muscle mass (Kg)		PAS	
				Mean±SD	*p-value*	Mean±SD	*p-value*	Mean±SD	*p-value*
Autonomic function tests	Sympathetic function	BP response to postural change	Normal (n=19)	22.07±3.21	0.556	22.33±4.69	0.699	3.44±2.68	0.172
			Abnormal (n=10)	21.24±3.87		21.54±5.65		2.00±1.94	
		SSR	Normal (n=3)	22.37±3.72	0.751	21.50±6.26	0.847	1.67±0.58	0.365
			Abnormal (n=26)	21.68±3.46		22.10±4.95		3.09±2.62	
		QSART	Normal (n=11)	22.88±2.48	0.176	24.66±5.13	0.208	2.33±1.87	0.390
			Abnormal (n=17)	20.99±3.96		20.41±4.18		3.25±2.79	
	Parasympathetic function	HR response to postural change	Normal (n=10)	22.55±2.70	0.436	20.88±5.48	0.385	2.75±2.44	0.784
			Abnormal (n=18)	21.44±3.85		22.69±4.84		3.08±2.67	
		HR response to deep breathing	Normal (n=18)	21.84±3.23	0.311	21.83±5.12	0.221	3.00±2.62	0.862
			Abnormal (n=5)	23.42±1.65		25.06±4.48		2.75±2.22	

MRC, Medical Research Council; ALSFRS-R, Amyotrophis Lateral Sclerosis Functional Rating Scale-Revised; K-MBI, Korean version of Modified Barthel Index; BBS, Berg Balance Scale; FVC, forced vital capacity; PCF, peak cough flow; BMI, body mass index; PAS, Penetration Aspiration Scale; BP, blood pressure; SSR, Sympathetic Skin Response; QSART, Quantitative Sudomotor Axon Reflex Test; HR, heart rate