척수재활

발표일시 및 장소: 10 월 18 일(금) 14:25-14:35 Room C(5F)

OP3-2-2

How to Define Baseline Blood Pressure in Patients with Spinal Cord Injury

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Introduction

There are several possible factors that affect blood pressure (BP) fluctuation in patients with spinal cord injury (SCI). These factors include position, orthostatic and postprandial hypotension, diurnal hormonal change, neurologic level of injury (NLI), circadian rhythm and autonomic dysreflexia (AD). It is questionable when to measure baseline BP in SCI patients, but there are only a few reports. The purpose of the study is to determine the optimal condition or timing for measuring the baseline BP of SCI patients.

Method

Fourteen SCI patients (12 males and 2 females) with NLI above C8 showing AD symptoms were included. Real-time changes in BP during filling and emptying the bladder using the urethral catheterization were monitored using FinometerTM (Fig. 1A). To exclude the effects of orthostatic and postprandial hypotension, all patients were examined in the supine position 2 hours after meals. Because BP in tetraplegics dropped at night and increased at dawn, the baseline BP was measured during the daytime. The saline infusion rate was set strictly as 24 mL/hr to avoid overactivity by rapid filling the bladder. We defined the duration of BP to be completely normalized from the peak BP point as Resolution Time (RT) (Fig. 1B). We measured RT in all the subjects and analyzed using descriptive statistics.

Results

The demographic and descriptive data are listed in Table 1. As the patient's bladder filled with normal saline, BP gradually increased to peak and stabilized over time by emptying the bladders. Regardless of the clinical severity of AD or bladder type, all patients reached baseline BP after a certain period of time. RTs in the SCI patients with AD vary from 1 to 14 minutes with an average of 5.9 ± 4.1 minutes (Table 2).

Conclusion

In the literature, BP measurement in patients with SCI is recommended in a supine position, in the daytime, more than 2 hours after the meal, and when the patient is free from AD symptoms. As AD symptoms are frequently mostly caused by bladder filling, we designed the study to determine when to measure BP after the onset of bladder emptying. Based on the results of the study, we suggest measuring the baseline BP after at least 14 minutes from the starting of emptying the bladder. In the study, RT appeared to last up to 14 minutes but may increase depending on AD severity. To determine the mean and maximum RT, according to the factors that may influence the value, including AD severity or detrusor type, further studies with a larger sample size are needed.

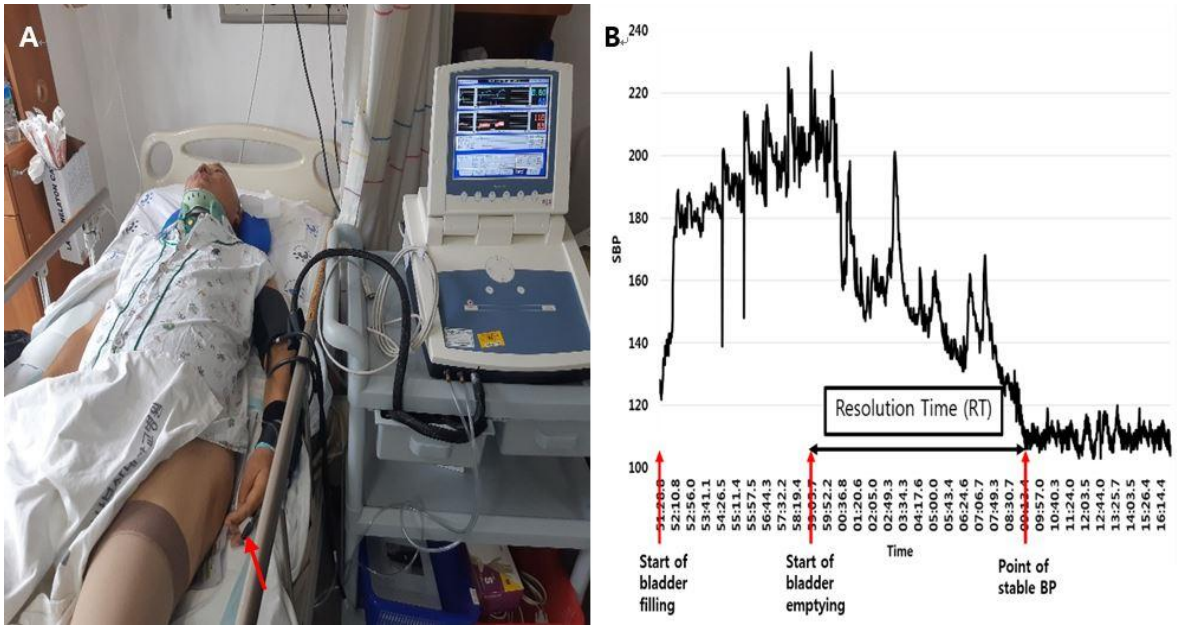

Figure 1. A) Finometer B) RT means time from bladder emptying point to stable BP point.

Table 1. Demographics and clinical characteristics of the subjects

Variables	Number
Age (years)	49.0 ± 17.0
Gender	
Male	12 (85.7%)
Female	2 (14.3%)
Neurologic level of injury	
C2	1 (7.1%)
C3	4 (28.6%)
C4	4 (28.6%)
C5	2 (14.3%)
C6	1 (7.1%)
C7	0 (0.0%)
C8	2 (14.3%)
AIS	
A	6 (42.9%)
B	3 (21.4%)
C	2 (14.3%)
D	3 (21.4%)
Type of bladder detrusor	
Overactive	4 (28.6%)
No overactivity	10 (71.4%)

Table 2. Resolution time of AD

Subject	Base BP (mmHg)	Peak BP (mmHg)	BP change (mmHg)	Resolution time (min)
Case 1	122	233	111	9.65
Case 2	148	195	47	6.95
Case 3	100	176	76	2.47
Case 4	116	163	47	3.83
Case 5	120	163	43	3.6
Case 6	123	156	33	4.68
Case 7	109	223	114	6.95
Case 8	110	152	42	2.88
Case 9	102	213	111	6.65
Case 10	121	205	84	4.57
Case 11	89	182	93	14.85*
Case 12	121	170	49	1.95
Case 13	108	166	58	1.07
Case 14	97	193	96	12.68
Total (Mean±SD)	113.3±14.6	185±25.8	71.7±29.4	5.9±4.1

Asterisk, the longest resolution time among the participants