Effectiveness of Closed-Loop Stimulation (CLS) Function in Circulating Blood Volume Variation during Dialysis in Bradycardiac Dialysis Patients

Rieko Nakagami1, Takao Suzuki2, Tetsu Akimoto1, Tomonori Watanabe1, Takahiro Komori1, Tomoyuki Kabutoya1, Yoshihito Hata1, Takeshi Mitsuhashi1, Kazuomi Kario1, Norio Ishikawa2, Mitsuru Yasui3

1Division of Cardiovascular Medicine, Department of Medicine, Jichi Medical University School of Medicine, Tochigi, Japan, 2Department of Clinical Engineering, Jichi Medical University Hospital, Tochigi, 3NIHON KOHDEN CORPORATION

Background: Recently we measured beat-to-beat heart rate (HR), systolic blood pressure (SBP), cardiac output (CO) and total peripheral resistance (TPR) using a cardiac function measurement device (Task Force Monitor (NIHON KOHDEN)) and reported the effectiveness of CLS function in recovering blood pressure drop during dialysis with little body motion. We reported that when SBP dropped 20 mmHg, PR increased 30 ppm responsively within about 18 seconds (29 beats).

Purpose: We measured changes in HR, SBP, CO and TPR when changing the water removal rate during dialysis and evaluated the effectiveness of CLS function.

Methods: We measured these variables on a beat-to-beat basis with the device for a 70-year-old female with complete atrioventricular block. The programmed pacing mode was DDD-CLS.

Results: Pacemaker events during dialysis were As-Vp 3% and Ap-Vp 97%. When water removal rate was increased from 500 ml/h to 600 ml/h during dialysis, PR increased 20 ppm.

Discussion: These beat-to-beat measurement results suggest that PR increased with the physiological load increase caused by circulating blood volume reduction during dialysis with little motion.

Conclusion: CLS function may work effectively to control circulating blood volume variation during dialysis.

Keywords: closed loop stimulation (CLS), dialysis, water removal rate