Effects of Nesiritide and Dobutamine on Heart Rate Variability in Patients With Decompensated Heart Failure

Doron Aronson, Darlene P. Horton, Andrew J. Burger, Barnabas Medical Center, Hamilton, Israel. Both listed Department of Medicine, Boston, Massachusetts.

INTRODUCTION: Congestive heart failure (CHF) is characterized by sympathetic overactivity and parasympathetic withdrawal. Clinical trials in patients (pts) with decompensated CHF have shown that nesiritide (brain natriuretic peptide) is associated with beneficial hemodynamic effects and sympathetic improvement. Recent studies suggest that nesiritide exerts a favorable effect on autonomic dysfunctions in CHF. We compared the effect of nesiritide and dobutamine (Dob) on heart rate variability (HRV) in decompensated CHF.

METHODS: We studied 186 pts admitted for decompensated CHF requiring intravenous vasoactive therapy. Baseline 24-h Holters were obtained prior to initiation of therapy. Pts were randomized to receive either nesiritide or Dob and continued for an additional 24 h after initiation of therapy. The study population was divided into 2 groups: highly depressed HRV (SDNN < 50 ms) and moderately depressed HRV (SDNN 50-100 ms). HRV time domain indices were compared from baseline and treatment Holter recordings.

RESULTS: In the Dob group, pts with moderately depressed HRV at baseline (n = 20) displayed a reduction in indices of total variability such as SDNN (82 ± 4 to 71 ± 4 ms, p = 0.01) and SDANN (69 ± 3 to 60 ± 4 ms, p = 0.01). Indices of parasympathetic modulation, rMSSD, pNN50, low frequency (0.04-0.15 Hz, LF) and high frequency (0.15-0.40 Hz, HF) were also decreased. With severely depressed HRV (n = 83), no significant changes occurred. In the nesiritide group, pts with severely depressed HRV (n = 75) displayed a significant increase in SDNN (100 ± 3 to 120 ± 3 ms, p = 0.002), LF (1.0 ± 1.7 to 1.6 ± 1.8 ms, p = 0.02), and RMSSD (15 ± 1.8 to 13 ± 1.5 ms, p = 0.01). No significant changes occurred in HRV indices with moderately depressed HRV at baseline (n = 53).

CONCLUSION: In pts with severely preserved HRV, Dob reduces overall variability and parasympathetic modulation. With severely depressed HRV, the effect of Dob on HRV is minor, presumably due to β-adrenergic receptor down-regulation or saturation. In contrast, nesiritide improves indices of overall HRV and parasympathetic modulation in pts with severely depressed HRV and has no adverse effect on pts with relatively preserved HRV.

Altered Fractal Behavior and Heart Rate Variability in Daily Life in Neurally Mediated Syncope

Bongei Takase, Yutaka Horioka, Yoshito Matsushita, Takashi Asami, Syuuchi Katashima, Yoshiko Nishikawa, Fumitaka Ohsuzu, Akira Kurita, National Defense Medical College, Tokorozawa, Japan, Self Defense Forces Central Hospital, Tokyo, Japan.

Background: The fractal dimension is an index to the complexity of cardiovascular control system and autonomic function is important in the pathogenesis of neuromediately mediated syncope (NMS). However, it is still not fully understood if the derangement of the autonomic nervous system exists in NMS in daily life. Methods: Thus, we performed 24-hour ECG monitoring (AECG) and measured traditional heart rate variability indices (HRV) along with long fractal scaling exponent (α) in 36 pts (NMS, 24.9 ± 7y) with NMS diagnosed by head-up tilt testing (HUT, >30°) and 11 age-matched normal controls (NC). AECG was performed within 48 hours before HUT procedure. For HR, SDANN, SD1, SD2, RMSSD (0.5 ± 1.0; 2.2 ms, p = 0.002), LF and HF (frequency 0.15-0.40 Hz, HF) were measured. All measurements were analyzed in three different periods such as total 24-hour, awake (00:00-08:00) and sleep (00:00-06:00) phases. The ratio of each measurement in awake over sleep phase (A/S ratio) was also calculated. Results: Several 24-hour HRV showed significantly higher value in NMS than those in NC (SDANN: 116 ± 51 vs 85 ± 11 ms; SD1: 80±13 vs 38±11 ms; pNN50: 30±17 vs 14±7 ms, p = 0.05). The awake and sleep values of 0.015 ms were also significantly different from those in NC. Conclusion: Overall autonomic activity in daily life is exaggerated in NMS. Since in most of the time pts are upright during awake and are supine during sleep phase, the significant differences between awake and sleep values of β, and abnormal A/S ratio of β is suggested that deranged fractal behavior exists in NMS. These findings may be associated with the mechanisms of orthostatic intolerance in NMS.