Effects of Renal Denervation to Cardiac Autonemics During Sleep in Rats with Myocardial Infarction

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Introduction: Sympathetic hyperactivity and poor sleep quality are reported in MI patients. Sleep is an important modulator of cardiovascular function, both in physiological conditions and in disease states. Objective: We aimed to evaluate the effects of renal denervation (RDN) on cardiac autonomic activity and disordered sleep pattern.

Methods: Wireless transmission of polysomnographic recording was performed in sham (n=6) and left coronary artery (LCA) ligation (n=7) male rats during normal daytime sleep before and after RDN treatment. Spectral analyses of the electroencephalogram (EEG) and electromyogram (EMG) were evaluated to define active waking (AW), quiet and paradoxical sleeps (QS, PS). Cardiac autonomic activities were measured by analyzing the power spectrum of heart rate variability (HRV).

Result: In LCA ligation group, there was a higher LF/HF ratio during sleep, and LF/HF ratio was reduced significantly after RDN treatment in all sleep stages, when compared to that before RDN treatment (Fig A). The frequency of sleep interruption was increased before RDN treatment in LCA ligation rats compared to sham, and that change was ameliorated and restored to baseline after RDN treatment in LCA ligation group (Fig E). Percentages of LVEF and FS were significant decreased in LCA ligation rats compared to sham (Fig F).

Conclusion: Our results demonstrate a significant sleep fragmentation with sympathetic hyperactivity after MI, and RDN restores the autonomic dysfunction and sleep disorder. The findings suggest that RDN improve sleep-related arrhythmia and sudden cardiac death after MI by restoring autonomic homeostasis.