Supernormal Resting Skin Sympathetic Nerve Activities Trigger Arrhythmia Initiation: Comparisons Between AF Patients and Healthy Individuals

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Introduction: Skin sympathetic nerve activity (SKNA) can be used to estimate sympathetic tone noninvasively in humans. Autonomic dysregulation is considered to be an underlying pathophysiology of AF. Objective: The study aimed to evaluate the differences of SKNA activations between AF patients (Group 1) and control (Group 2).

Methods: Of consecutive 32 subjects, 13 were drug-refractory symptomatic paroxysmal AF and 19 were healthy volunteers, all received patch electrodes to record SKNA continuously. The SKNA was recorded from ECG lead I configuration (ECG-SKNA) and bipolar electrodes on the right arm (EMG-SKNA). Those signals were bandpass filtered between 500 to 1000 Hz to detect SKNA. The ECG was displayed with bandpass filtered the signals between 0.5 and 150 Hz.

Result: All subjects received a 10 min of SKNA recording continuously. Average ECG-SKNA (0.73±0.49 vs. 0.54±0.18 μV, p=0.03) and EMG-SKNA (0.60±0.32 vs. 0.42±0.017μV, p=0.015) were higher in Group 1 than those of Group 2, respectively. Intermittent surge of SKNA (sSKNA) was noted in both groups, there was a higher trend of surge frequency in Group 1 than that of Group 2 (2.54±1.73 vs. 1.89±1.13 times/10min, p=0.08). In Group 1, 1.38±2.25 times/10min sSKNA were associated with the onset of APCs. The amplitude of sSKNA was higher in that with, when compare to that without APC (Table). The amplitudes of sSKNA were significantly higher in Group 1 than that of Group 2 (Table). Figure shows examples of sSKNA with and without APC development from Group 1 and 2 patients.

Conclusion: Both transient surge and average SKNA were higher in patients with AF than healthy individuals. AF patients tended to have a higher frequency of sSKNA during resting status, indicating that AF had an augmented sympathetic activity and those activations were associated with the onset of AF.