Ventricular Late Potentials Measured by Signal-Averaged Electrocardiogram in Young Korean Professional Soccer Players

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Introduction: Athlete's heart is well recognized and characterized by structural cardiac changes including enlargement and hypertrophy. However, exercise-induced cardiac remodeling is not well known in Asian athletes. We sought to evaluate the association between vigorous exercise and development of abnormal late potential on signal-averaged electrocardiogram (SAECG).

Methods: We enrolled 56 of Korean professional soccer players who underwent SAECG and transthoracic echocardiography in Kyung Hee University Hospital. To determine the incidence of abnormal SAECG in young athletes and compare with healthy control subjects, 72 controls with similar ages were analyzed. An SAECG was considered abnormal when any one of the three following criteria was met: filtered QRS duration of more than 114 msec, root-mean-square voltage in the terminal 40 msec of less than 20 uV, or a voltage of less than 40 uV for more than 38 msec.

Result: Mean age of control group was older than athletes (30.0 ± 2.2 years vs. 21.1 ± 3.8 years, p<0.01). Athletes showed significantly lower resting heart rate (67.9 ± 9.6 bpm vs. 55.4 ± 6.9, p<0.001), longer QRS duration (91.3 ± 9.2 ms vs. 96.9 ± 15.0 ms, p=0.014), and corrected QT interval (413.2 ± 23.4 ms vs. 438.1 ± 30.1 ms, p=0.001). Fragmented QRS was more commonly found in athletes (1.4% vs. 12.3%, p=0.021). Athletes demonstrated significantly higher proportion of long filtered QRS duration more than 114 ms (8.3% vs. 26.3%, p=0.006), and lower terminal QRS room mean square voltage less than 20 uV (6.9% vs. 21.1%, p=0.019). Any one of abnormal SAECG finding was significantly more frequent in athletes (40.4% vs. 16.7%, p=0.003).

Conclusion: Abnormal SAECG findings and ventricular late potentials were significantly more commonly found in athletes than controls. Clinical impact of these abnormal SAECG in athletes is still unknown. Further study is needed to determine the SAECG abnormality in athlete's heart and adverse cardiac outcome in long-term.