The impact of Metabolic Syndrome and Obesity on Fragmented QRS in Twelve Lead ECG in East Asian Population

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Introduction: Several papers have found that both patients with obesity and with metabolic abnormalities have increased insulin resistance. Fragmented QRS (fQRS) in 12 lead ECG can predict poor prognosis in patients with variable cardiac diseases or systemic diseases. We aimed to establish the relationship of patients with obesity and metabolic abnormalities to predict the fQRS ECG.

Methods: This retrospective, observational study was based on the “Registry of health examination at Chang-Hua Christian Hospital” database. The study group included 3,136 consecutive patients with age more than 18 years old who received health examination between January 1, 2010 and December 31, 2014 in Chang-Hua Christian Hospital in middle Taiwan. Metabolic syndrome was defined as ATP III definition. Obesity were defined as BMI ≥27.5 kg/m² in WHO Asian BMI cut points. Based on ATP III definition and Asian BMI cutoff level, the patients were divided into 4 groups, including healthy subjects, obese subjects, non-obese patients with metabolic abnormalities, and obese patients with metabolic abnormality. The baseline data and risk factor of patients were compared among groups. The percentage of fQRS in 12 lead ECG in each patient group were compared among groups. Conditional logistic regression analysis was used to examine the association between obesity and metabolic abnormalities and fQRS in ECG. The effects of obesity and metabolic abnormalities on the risk of fQRS in ECG are presented as aORs and 95% CIs.

Result: Among 1,940 healthy subjects, 197 obese subjects, 580 non-obese patients with metabolic abnormality, and 419 obese patients with metabolic abnormality in the study, the baseline characteristics of each groups is listed and compared in table 1. The percentage of fQRS in 12 lead ECG in each group was shown in Figure1, and there are 31.89%, 39.34%, 62.71% and 56% of fQRS observed in 12 lead ECG, respectively. The table 2 demonstrated the multivariate logistic regression analysis of obese or metabolic syndrome of our population in prediction of fQRS. While the age and gender matching data are used, non-obese or obese patients with metabolic syndrome were susceptible to fQRS (P<0.001, odd ratio [OR]: 3.00, 95% confidence interval [CI]: 1.70-5.31; P<0.001, odd ratio [OR]: 2.28, 95% confidence interval [CI]: 1.65-3.15). The table 3 demonstrated the multivariate logistic regression analysis of number of diagnosis criteria for metabolic content or obesity in prediction of fQRS. While the age and gender matching data are used, patients with components of diagnosis criteria for metabolic syndrome were susceptible to fQRS. The risk of fQRS increased when the patients had increased components of diagnosis criteria for metabolic syndrome.

Conclusion: The study revealed that both patients with metabolic abnormality and obesity are associated with increased fQRS ECG than healthy subjects in East Asians.