Relation between VE/VCO2 slope and maximum phonation time in chronic heart failure patients

Izawa Kazuhiro1, Satoshi Watanabe2, Tochimoto Shinobu3, Hirano Yasuyuki4, Matsushima Shinya5, Suzuki Tomhiro6, Oka Koichiro7, Saito Takashi8, Ono Yutaka9, Suzuki Kenzo10, Osada Nachiko11, Omiya Kazuto12, Shimizu Hiroyuki13, Akashi Yoshihiro14

1) Kobe University.  2) St. Marianna University School of Medicine.  3) Tokushima Bunri University. 4) Waseda University.

5) Visiting Nursing and Rehabilitation Network

key words  maximum phonation time · VE/VCO2 slope · chronic heart failure

[Purpose] This study aimed to determine the relation between the regression slope relating minute ventilation to carbon dioxide output (VE/VCO2 slope) and maximum phonation time (MPT), and the MPT required to attain a threshold value for VE/VCO2 slope of ≤34 in chronic heart failure (CHF) patients. [Methods] This cross-sectional study enrolled 115 CHF patients (mean age, 54.5 years; men, 84.9%). VE/VCO2 slope was assessed during cardiopulmonary exercise testing (CPX). Thereafter, patients were divided into two groups according to exercise capacity: VE/VCO2 slope ≤34 (VE/VCO2 ≤34 group, n = 81) and VE/VCO2 slope >34 (VE/VCO2 >34 group, n = 34). For MPT measurements, all patients produced a sustained vowel/a:/ for as long as possible during respiratory effort from a seated position. [Results] All subjects showed significant negative correlation between VE/VCO2 slope and MPT (r = -0.51, P < 0.001). After adjustment for clinical characteristics, MPT was significantly higher in the VE/VCO2 ≤34 group versus VE/VCO2 >34 group (21.4 ± 6.4 vs. 17.4 ± 4.3 sec, F = 7.4, P = .007). The appropriate MPT cut-off value for identifying a VE/VCO2 slope ≤34 was 18.12 sec. [Discussion] An MPT value of 18.12 sec may be a useful target value for identifying CHF patients with a VE/VCO2 slope ≤34 and for risk management in these patients.