심폐재활

게시일시 및 장소 : 10 월 18 일(금) 08:30-12:20 Room G(3F)

질의응답 일시 및 장소 : 10 월 18 일(금) 10:00-10:45 Room G(3F)

P 1-76

Relationship between respiratory exchange ratio and respiratory function in pulmonary diseases

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Objective

Cardiopulmonary exercise test (CPET) is a gold standard to evaluate exercise capacity in patients with cardiopulmonary diseases. CPET provides oxygen consumption (VO2) representing the power of the aerobic energy system as the best indicator of aerobic fitness. Peak VO2 (VO2peak) is individual's capacity to aerobically resynthesize ATP and important prognostic parameter in the patients as well as healthy population. However, VO2peak can be underestimated when patient's effort is insufficient in the test. The respiratory exchange ratio (RER), calculated as expired carbon dioxide divided by inspired oxygen is measured via respiratory gas analyzer. In strenuous exercise, breathing increased to disproportionately high levels compared with the intrinsic metabolic demands to eliminate carbon dioxide produced during anaerobic metabolism generating lactate. RER is an objective indicator representing patient's level of exhaustion. And it is considered sufficient effortful CPET when the RER reaches at or above 1.10. However, in patients with pulmonary disease, limitation of ventilation can prevent RER from reaching sufficient value. This study is to investigate relationship between RER and respiratory function in patients with pulmonary disease.

Materials and Methods

Symptom limited CPET was performed on patients with pulmonary disease. Patients were evaluated for respiratory function with the following parameters: forced vital capacity (FVC), forced expiratory volume (FEV1), FEV1 / FVC and maximum voluntary ventilation (MVV). FVC, FEV1 and MVV were converted to the proportion of normal predictive value. We analyzed the correlation between RER and respiratory function. Patients who have chest wall deformity or comorbid cardiac diseases, and could not complete symptom limited CPET due to early termination, resulting in submaximal test were excluded. And CPETs fulfilled by bicycle ergometer because of neurologic or musculoskeletal conditions of patients were also excluded from the analysis.

Results

Overall, 19 patients were enrolled for the analysis. Of these, 12 patients were diagnosed with obstructive lung disease (10 for COPD, 2 for asthma), and 7 patients underwent operation on lung cancer. The mean age of the patients was 66.2 (± 8.3) years, VO2peak was 19.0 (± 4.1) mL/min/kg, and RER was 0.89 (± 0.08). According to the Spearman correlation analysis, RER had no statistical relationship with proportion of normal predictive value of FVC ($r = 0.142$, $P = 0.562$), but had significant correlation with that of FEV1, FEV1/FVC, and MVV ($r = 0.560$, 0.627 and 0.539 respectively, $P = 0.013$, 0.004 and 0.017 respectively).

Conclusion

In this study, RER was associated with parameters of respiratory function in CPET performed in patients with pulmonary diseases. There was no association with FVC but has correlation with FEV1, FEV1/FVC, and MVV.