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QUANTITATIVE EVALUATION OF CARDIOPULMONARY FUNCTIONAL RESERVE IN PULMONARY EMBOLISM PATIENTS AFTER TREATMENT

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Background There is no research focusing on assessing cardiopulmonary functional reserve and exercise tolerance in patients with pulmonary embolism (PE) both at home and abroad, but the benefits of early exercise are well recognised. The goal of this study was to assess cardiopulmonary functional reserve in patients with PE by using the inert gas rebreathing method of cardiopulmonary exercise test (CPET), and compare with the traditional methods.

Methods CPET on the bicycle ergometer were performed in 40 patients with age, gender, body mass index (BMI), systolic blood pressure, and pulmonary function matched. The first group was PE group composed of 16 PE patients (5 male, 11 female) who were given the standard antithrombotic therapy for 2 weeks. The other group was composed of 24 normal individuals (10 male, 14 female). Both the two groups were evaluated by cardiac ultrasound examination, 6 min walking test (6MWT), and CPET.

Results (1) Right ventricular systolic pressure (RVSP) of PE group increased significantly than the control group ((34.81±8.15) mm Hg to (19.75±3.47) mm Hg, $p<0.01$). But neither right atrial end-systolic diameter (RASD) nor right ventricular end-diastolic diameter (RVDD) of PE patients had changed compared with controls (RASD: (38.19±3.70) mm to (36.69±3.20) mm, $p>0.05$; RVDD: (32.75±4.19) mm to (31.06±4.12) mm, $p>0.05$). 6 min walk distance was significantly reduced in patients with PE compared with normal subjects ((447.81±79.20) m to (513.75±31.45) m, $p<0.01$). Both VO_2 AT and VO_2 peak were significantly decreased in patients with PE compared with controls (VO_2 AT: (9.44±3.82) ml/kg/min to (14.62±2.93) ml/kg/min, $p<0.01$; VO_2 peak: (12.26±4.06) ml/kg/min to (23.46±6.15) ml/kg/min, $p<0.01$). VE/ VCO_2 slope was increased in patients with PE ((35.47±6.66) to (26.94±3.16), $p<0.01$). There was no significant descend in resting cardiac output (CO) between PE and normal group ((4.03±1.80) l/min to (4.59±1.34) l/min, $p>0.05$), while peak cardiac output (peak CO) and the difference between exercise and resting cardiac output (CO) were both significantly reduced in patients with PE (peak CO: (5.97±2.25) l/min to (8.50±3.13) l/min, $p<0.01$; CO: (1.29±1.59) l/min to (3.97±2.02) l/min, $p<0.01$). (2) 6 min walk distance didn't correlated with CPET except VO_2 peak ($r=0.675$, $p<0.01$).

Conclusions Cardiopulmonary functional reserve was reduced in patients with PE in our study. CPET is an accurate,