The exercise capacity and chronotropic incompetence in the patients with mitral valve surgery

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Background: Chronotropic incompetence (CI) is sometimes observed during exercise training of cardiac rehabilitation in patients with cardiac surgery, however, little is known concerning the differences between patients with mitral valve (MV) and aortic valve (AV) surgery. Because the possibility exists that cardiac sympathetic nerves might be impaired by left atrium incision, we hypothesized that the incidence of CI was higher in patients with MV surgery (Mitral Valve Replacement and Mitral Valvuloplasty) compared with patients with AV surgery (Aortic Valve Replacement).

Purpose: In this study, we thus aimed to elucidate whether patients with MV surgery cause CI with cardiopulmonary exercise testing (CPX).

Methods: We performed CPX by ramp loading with ergometer exercise in total 45 patients who had undergone elective cardiac valve operation (12 patients with MV surgery, age 56.6 ± 8.3 years old; 33 patients with AV surgery, age 63.4 ± 12.8 years old). We analyzed chronotropic response index (CRI), peak oxygen uptake (peak VO2/W), anaerobic threshold (AT), and peak oxygen pulse (peak VO2/HR).

Results: The value of CRI was significantly decreased in the patients with MV surgery compared with the patients with AV surgery (MV; 0.20±0.11 vs. AV; 0.39±0.18, P<0.005). Peak VO2/W, AT and peak VO2/HR were not significantly different between patients with MV and AV surgery. Patients with MV surgery showed a strong correlation between peak VO2/W and peak VO2/HR (r=0.71, P<0.005), but not in patients with AV surgery.

Conclusions: The present study demonstrated that higher incidence of CI was shown in patients with MV surgery. The exercise capacity of the patients with MV surgery was determined by peak VO2/HR. These results suggest that the oxygen pulse would be a critical indicator for exercise capacity in patients with MV surgery. The cardiac rehabilitation can provide an increase of arteriovenous oxygen difference, with resulting higher oxygen pulse, and increase exercise capacity in patients with MV surgery.
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