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A case showing that cardiac rehabilitation is necessary to improve the exercise tolerance of patients with severely impaired cardiac function

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Background & Aim: Left ventricular assist device (LVAD) is well known to improve cardiac function of patients with severe heart failure. It is applied to patients whose peak oxygen uptake is extremely decreased. However, we sometimes experience patients whose exercise tolerance does not improve sufficiently although LVAD is successfully implanted. We hypothesized that this is because LVAD can improve only cardiac output, and exercise tolerance is regulated not only by cardiac function but also by skeletal muscle function. Hereby, we examined which parameter of cardiopulmonary exercise test (CPX) is improved by LVAD activation.

Methodology: A forty-three year-old man with dilated cardiomyopathy who was implanted extracorporeal LVAD performed CPX three times with 3 months interval. Between each CPX, patient performed exercise training. Each times, CPX was repeated twice. At first, it was performed under a condition of effective LVAD assist (LVAD-on). Next, it was performed without effective assist (LVAD-off). We compared peak VO₂ and nadir VE/VCO₂.

Results: From the 1st CPX to the 3rd CPX, both peak VO₂ and VE/VCO₂ improved gradually. As for the effect of LVAD assist, VE/VCO₂ was lower when LVAD is effective, while peak VO₂ showed no difference between LVAD-on and off.

Conclusions: Exercise training improved peak VO₂ in DCM (Dilated Cardiomyopathies) patient, however, increase of cardiac output by LVAD failed to improve peak VO₂. Cardiac rehabilitation was revealed necessary to improve the exercise tolerance.

Biography

Hitoshi Adachi pursued his MD Degree from Gunma University (Japan). He worked as an Exchange Resercher at Harbor-UCLA Medical Center, California (USA). He is the Director of Cardiac Rehabilitation Division of the Gunma Prefectural Cardiovascular Center. He has published more than 25 papers in the field of cardiac rehabilitation and has been serving as one of the directors of Japanese Association of Cardiac Rehabilitation.