



Target pathology: *Cardiorespiratory*

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Case Description

A 67 year old man initially presented to the emergency department with shortness of breath and anxiety. Approximately 10 years previously he was diagnosed with asthma and hypertension. On further evaluation by a cardiologist the man was diagnosed with chronic heart failure without any myocardial infarction or valvular heart disease. His clinical notes also indicated left atrial enlargement and left ventricular hypertrophy. The man is obese with a poor exercise history. After the man was stabilised with drug therapy and further stress tests were conducted, he was referred to the exercise physiology department in the Canberra Hospital for 12 weeks of supervised exercise therapy.

Patient Assessment

The patient underwent clinical exercise testing prior to entering the exercise therapy program. The exercise testing included a cycle ergometer, where he cycled at a speed of 60rpm with no load for 3 minutes. After 3 minutes, the workload was increased by 10W per minute until the patient could no longer tolerate the workload. Gas exchanges as well as blood pressure were monitored during the test. The patient exercised for 9 minutes reaching 60W before he stopped because of generalised fatigue. The results indicated that the patient had a reduced peak V_{O2} and anaerobic threshold, as well as a low vital capacity, signifying left ventricular failure¹. The exercise physiology department conducted the following tests prior to commencing the exercise program: resting heart rate, body weight, blood pressure and a 6 minute walk test. The results recorded are indicated on the right:

Test	Result - Initial
Resting Heart Rate	67bpm
Body Weight (kg)	89kg
BMI	30.79
Waist Circumference	105cm
Blood Pressure	109/69
6 minute walk test	220m – HR 101

Exercise Therapy

The exercise therapy for this patient consisted of 2 exercise sessions a week for twelve weeks. The exercise therapy was conducted in a group format, with up to 25 patients exercising at the one time. The group warm-up consisted of range of movement exercises including walking, various arm movements and leg movements. The warm-up lasted approximately 10minutes after which each patient would follow their own exercise routine as recorded on a program card. The following exercises (below) were prescribed for the patient². The volume and intensity was increased over time. After the completion of each exercise the patient recorded his heart rate and rate of perceived exertion (RPE). If his heart rate was above 120bpm he was instructed to rest until his heart rate stabilised at 85bpm. If his RPE was more than 4/10 then he was once again instructed to rest.

Weeks 1-4	Weeks 5-8	Weeks 9-12
Group warm-up 10min	Group warm-up 10min	Group warm-up 10min
Bike 2min 0 resistance	Bike 4min 1 resistance	Bike 4min 2 resistance
Sit to stand 2x10	Sit to stand 2x10	Sit to stand 3x10
Treadmill 3min 3.5km/hr	Treadmill 5min 4km/hr	2 x Treadmill 5min 5km/hr
Bicep/Tricep exercise 2x10 @ 2kg	Bicep/Tricep exercise 3x10 @ 2kg	Bicep/Tricep exercise 3x10 @ 4kg
Arm Crank 2min @ 5watts	Arm Crank 4min @ 5watts	2 x Arm Crank 4min @ 10watts
Step up 2x10 (low step)	Step up 2x10 (med step)	Step up 3x10 (med step)
Group warm down/stretch 10min	Leg Press 2x10 @ 10kg	Leg Press 2x10 @ 10kg
	Group warm down/stretch 10min	Leg extension 3x10 @ 10 resistance
		Leg Curl 3x10 @ 7 resistance
		Group warm down/stretch 10min

Patient Outcome

At the end of the 12 week exercise therapy intervention the patient had reduced his body weight by 4kg, reducing his BMI to 29.4. He decreased his waist circumference by 2cm to 103cm. His blood pressure remained relatively low at 111/72. He increased his 6min walk test distance to 350m, which is an increase of 62% from his initial distance of 220m. His HR at the end of the walk was also higher with a reading of 115bpm. The patient also undertook another cycle ergometer exercise test. His clinical notes indicated an increase in his maximum work rate, peak V_{O2} and anaerobic threshold.

Reflection

Chronic heart failure is a complex syndrome in which the ability of the left ventricle to fill with or eject blood is impaired. Patients with CHF have a low exercise tolerance and raised mortality and morbidity³. Fortunately for this patient, regular exercise participation with moderate supervision has been effective in partially reversing some of the maladaptations evident in his myocardial and skeletal function. This has hopefully improved his physical fitness and quality of life. For a patient with more severe CHF, additional supervision would be required with the inclusion of ECG monitoring in the first 4 weeks.

References

1. Wasserman, K., Hansen, J., Sue, D., Stringer, W., & Whipp, B. (2005). Principles of Exercise Testing and Interpretation. 4th Ed, LWW: Philadelphia.
2. Durstine, J., Moore, G., Painter, P., & Roberts, S. (2009). Obesity. In J.L. Durstine and G.E. Moore (Eds). *Exercise management for persons with chronic diseases and disabilities* Champaign, Ill: Human Kinetics.(pp. 192-200).
3. Dubach, P., Myers, J., Dziekan, G., Goebbels, U., Reinhart, W., Muller, P., et al. (1997). Effect of high intensity exercise training on central hemodynamic responses to exercise in men with reduced left ventricular function. *J Am Coll Cardiol*, 29(7), 1591-1598.