8

Recommendations for Prescribing Exercise to Patients with Heart Disease

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Introduction

Participation in regular exercise by patients with known heart disease poses a number of clinical and ethical questions, including the most appropriate physical activities and sport in which patients may safely be engaged. In fact, identification of a heart disease, or incidence of a cardiac event, is usually associated with prudent advice for patients to reduce (or leave) intensive exercise training and competitive sport, justified by clinical concern for the increased cardiac risk associated with exercise and sport. Therefore, primary care practitioners are often faced with the dilemma of whether to prescribe exercise to their patients or not, knowing that for some medical conditions, exercise is not advisable.

This chapter aims to provide useful references for primary care practitioners who wish to prescribe exercise to adult patients who suffer from certain types of heart disease, including ischaemic heart disease (IHD), chronic heart failure (CHF), arrhythmia and valvular heart disease (VHD). Rarer conditions such as congenital heart disease and cardiomyopathies are not within the scope of this chapter.

It should be emphasised at this point that in any case, patients with heart disease should be referred to a cardiologist or similar specialist for consultation and/or assessment before the exercise programme starts, especially where doubt exists. Exercise prescription for heart disease patients should be individualised according to risk.

Risk of Exercise in Patients with Heart Disease

Physical activity and exercise training may pose risks to individuals with certain heart conditions. While the commonest risk of physical activity among adults is musculoskeletal injury, IHD accounts for most exercise-related sudden deaths among those aged 35 years or above (1). The incidence of major cardiovascular complications during outpatient cardiac exercise programmes, among a mixed group of patients after percutaneous coronary intervention (PCI) or cardiac surgery, or those with other coronary and non-coronary conditions, has been estimated to be one in 50,000 participant-hours (2). In fact, sudden cardiac death (SCD) is often the initial coronary event in patients with either silent or symptomatic IHD (3). Pathology findings suggested that a considerable number of fatal myocardial infarctions (MIs) were not due to significant stenosis of the coronary arteries but rupture of unstable coronary atherosclerotic plaque possibly during exercise (3). Another cause of SCD in patients with heart disease is exercise-induced ventricular arrhythmias which are commonly detected during exercise testing (4).

Benefits of Exercise

Increasing physical activity is universally recognised as a desirable lifestyle modification for improving cardiovascular health, as exercise has been shown to be an important adjunct to reduce atherosclerotic risk factors such as hypertension, hyperlipidaemia, hyperglycaemia, obesity and tobacco use (5-9). In addition, regular physical activity has potential benefits on the autonomic nervous system, ischaemia threshold, endothelial function and blood coagulation. One randomised controlled trial also demonstrated slower disease progression and significantly fewer ischaemic events in patients with stable IHD who regularly exercised (10).

Cardiac rehabilitation (CR) is an important element of a comprehensive plan for secondary prevention of acute cardiac events in patients with IHD. CR was initially defined by the U.S. Public Health Service as a comprehensive long-term programme involving medical evaluation, prescribed exercise, cardiac risk factor modification, education, and counselling (11). Several meta-analyses have concluded that cardiac rehabilitation reduced mortality rates in patients after MI (12-14). Of these, one (a meta-analysis of 51 randomised controlled trials of CR in patients who have had MI, coronary artery bypass graft (CABG) or percutaneous transluminal coronary angioplasty, or who have angina pectoris or coronary artery disease defined by angiography) also concluded that exercise-only CR, when compared to a comprehensive CR, could also reduce total cardiac mortality and all-cause mortality by 31% and 27% respectively (14). These results suggest that exercise is a crucial component of the rehabilitation process (15).

Benefits of physical activity for CHF patients have also been well documented. These include improved physical capacity (an increase of 10 to 30% of the maximum physical capacity) (16-17), quality of life (18), endothelial function (19), serum catecholamine levels

(20), morbidity and hospital re-admission rates (21). Other potential benefits of exercise, with limited scientific evidence to support at this point, include the reduction of all-cause mortality (22) and improving resting cardiac function (23).

Pre-participation Evaluation

In any case, all patients with heart disease should have their clinical status carefully reviewed by relevant specialists before heading for an exercise programme. In addition to history taking and physical examination to identify cardiac and non-cardiac problems that might limit exercise participation and other factors possibly contributing to exercise intolerance, a blood test for basic biochemistries and electrolytes may be indicated (24). A physical exercise testing is also necessary to identify any potentially dangerous electrocardiographic abnormalities and to stratify risks in patients with heart disease (25). Any recommendation for exercise training should be based on the pathology of the patient's condition, the individual's response to exercise (including heart rate, blood pressure, symptoms, and perceived exertion) as well as measurements obtained during exercise testing (24).

The following evaluation methods may be considered in assessing cardiac patients' risk of exercise participation (26).

- Resting 12-lead electrocardiogram (ECG) for detection of ischaemia, arrhythmias and cardiac hypertrophy.*
- Physical exercise test (using treadmill or bicycle) for evaluation of symptoms, ST segment changes, arrhythmias, ischaemia and anginal thresholds, exercise capacity and blood pressure/heart-rate responses.
- Echocardiography for evaluation of left ventricular function, structural abnormalities or regional wall motion abnormalities.
- Physical or pharmacological stress test with single photon emission computed tomography, for detection of regional perfusion defects of the myocardium.
- Maximal physical or pharmacological stress with echocardiography or magnetic resonance imaging, for detection of reversible regional wall motion abnormalities, as a sign of reversible ischaemia.
- Coronary angiography for evaluation of luminal coronary stenosis or occlusion in one or more of the main branches or left main stem, coronary flow disturbances or abnormal coronary anatomy.
- Twenty-four-hour or longer (Holter) electrocardiographic monitoring for detection of electrical instability or ST–T changes.

* It should also be noted that some kinds of cardiac arrhythmias can occur in structurally normal hearts or reflect the physiological adaptation to exercise participation itself. Atrial premature beats, first-degree atrioventricular block or second degree Wenckebach-type atrioventricular block (Mobitz type I), for instance, are prevalent in the general population especially among athletes as they may be part of the physiological adaptations to exercise. In those cases with absence of structural heart disease, there is no need to proceed with further investigation or therapy and participation in all types of exercise are allowed (27).

Recommendations for Exercise Prescription

It is recommended that exercise prescribed should be tailored to each individual in accordance with their physical condition, aerobic/anaerobic fitness and local muscular condition. It is also important that exercise should be suited to each individual in terms of its intensity, duration and volume, in relation to his or her intended level of physical activity and their training goals. The activity should be linked to other lifestyle modifications to minimize the cardiac risk. Adequate pre- and post-exercise medical evaluations (follow-up) are also essential (26). Box. 8.1 lists some good practices when heart disease patients undertake physical activity.

Box **8.1** Good Practices for Cardiac Patients Undertaking Physical Activity

- Include three periods in each physical activity session: warm-up, training and cool-down (28). Proper warm-up and cool-down phases (5 mins of light activity at a reduced intensity) may have an anti-anginal and possibly cardioprotective effect (28).
- Advise low-impact aerobic activity to minimise the risk of musculoskeletal injury. Recommend gradual increases in the volume of physical activity over time (28).
- Explore daily schedules to suggest how to incorporate increased activity into usual routine (e.g., parking farther away from entrances, walking 2 flights of stairs, and walking during lunch break) (28).
- Terminate exercise immediately if warning signs or symptoms occur. These include dizziness, dysrhythmias, unusual shortness of breath, angina or chest discomfort.
- No exercise in case of unusual asthenia, fever or viral syndrome (29).
- The level of supervision and monitoring during exercise training depends on the result of risk stratification from patient assessments and clinical evaluations. Medical supervision and monitoring are particularly recommended for patients with multiple risk factors, and with moderate-to-high risk of cardiac events (i.e., recent revascularization, heart failure). The supervision should include physical examination, monitoring of heart rate, blood pressure and rhythm before, during and after exercise training (28). The supervised period should be prolonged in patients with new symptoms, signs, blood pressure abnormalities and increased supraventricular or ventricular ectopy during exercise (30).
- Provide progressive updates to the exercise prescription and modify further if clinical status changes.
- Ensure adequate hydration before, during and after physical activity. Adapt the intensity of physical activity to the environmental conditions, temperature, humidity and altitude (31).
- Avoid smoking at all times (32).
- Hot shower, which may result in an increased heart rate and arrhythmias, should be avoided during the 15 mins after physical activity (33).

Special Precautions

Patients with IHD

- Patients with unstable angina are not eligible for competitive sports or any other regular physical activity. Patients with stable angina, silent ischaemia or post-PCI/CABG and with a high probability for exercise-induced coronary events are also not eligible for competitive sports. Recreational sports are also restricted for post-MI patients with a high risk of cardiovascular events while leisure-time physical activity should always be encouraged (26).

Patients with CHF

- Specific contraindications to exercise in patients with CHF include new onset atrial fibrillation, obstructive valvular disease, especially aortic stenosis or active myocarditis (either viral or autoimmune) (24).

- CHF patients with diastolic and systolic dysfunction should refrain from swimming (24).

Individuals with pacemakers

- Patients with heart disease and a pacemaker can participate only in exercises consistent with the limitations of the underlying heart disease.

- Individuals with a pacemaker should also be restricted from exercises with a risk of bodily impact (e.g. rugby, martial arts), because of the possible damage to the electrodes/pacing unit and risk of skin perforation (which may occur late after trauma). Extreme ipsilateral arm movements should be avoided at least until complete fixation of the leads, namely 6 weeks. Sports with pronounced arm movements (such as volleyball, basketball, tennis and climbing) may also increase the risk of late lead damage as a result of subclavian crush (with insulation or conductor failure) (27).

Patients with valvular heart disease

- Physical check-ups among individuals with valvular heart disease are of significant relevance and exercise testing should be obtained after evaluation of the heart valves by echocardiography.

- Exercise is contraindicated in patients with unexplained syncope, family history of SCD, complex supraventricular or ventricular arrhythmias, long QT interval or severe mitral regurgitation (34).

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Reading Note