Cardiac Rehabilitation 1992

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Abstract. The goal of cardiac rehabilitation is to optimize function through attention to the patient’s medical needs, risk factors for recurrent events, physical reconditioning, and psycho-social needs. Medical needs include beta-adrenergic blocking agents and aspirin unless contraindicated, angiotensin converting inhibitors for left ventricular dysfunction, and relief of residual ischemia. Smoking, lipid abnormalities, physical inactivity, and hypertension remain important predictors of reinfarction and death and must be controlled. Obesity must be addressed because it exacerbates these problems. Therefore, the principles of behavior change should be applied to help patients control their risk factors and adopt healthy lifestyles. Smoking cessation and appropriate dietary behaviors can be adopted by the patient while in the hospital. Physical reconditioning can also begin with twice-daily exercises. After discharge from hospital and after an initial submaximal exercise evaluation, the patient will benefit from three sessions per week of outpatient cardiac rehabilitation for six to eight weeks. These sessions should last about an hour and raise the patient’s heart rate as much as 30 beats per minute. Along with physical reconditioning, the cardiac rehabilitation program provides an opportunity to address risk factor modification, return to work, return to sexual activity, management of depression and anxiety, and the presence of risk factors in the patient’s family. The patient should attend reinforcing sessions every three months for the first year and as necessary after that to control risk factors and reinforce the necessity for physical fitness. (Keio J Med 41 (3): 123–127, September 1992)

Key words: secondary prevention, risk factors, exercise training

Introduction

Fortunately for the modern patient with heart disease, the treatment of the patient with coronary heart disease has changed markedly over the past 60 years. In 1929, it was advised: “The nurse should be carefully instructed to do everything in her power to aid the patient in any physical activity so that all possible movements such as feeding himself or lifting himself are spared. . . . Finally, the patient should be urged to spend at least six weeks, and preferably eight weeks or more, absolutely in bed.”1

Ten years later, an autopsy study was interpreted to: “. . . support the more or less empirical custom of those who advise for patients with small- to moderate-size myocardial infarcts, without complications, one month of rest in bed (the first two weeks absolutely complete), and one month of very carefully graded convalescence, with a third month to consolidate recovery and to re-establish good health both of body and mind. To advise less than three weeks in bed is unwise, even for patients with the smallest myocardial infarcts.”2

The forty years that followed were characterized by cautions probing of the boundaries of exercise to determine exactly how much activity could be performed with safety.

Today, cardiac rehabilitation has been shown not only to be safe, but also to increase the survival of post-myocardial infarction patients who receive the intervention.3,4 The goal of cardiac rehabilitation is to optimize function through 1) identification and management of medical needs, 2) risk factor control, 3) physical reconditioning, and 4) management of the patient’s psycho-social needs.

Identification and Management of Medical Needs

On the basis of 25 trials of beta-blockers, ten trials of anti-platelet agents and four trials of calcium channel blockers involving 23,000, 18,500 and 9,000 patients, respectively, it has been concluded that long-term appli-
cation of beta-blockers results in a 22% (95% confidence interval = -16 to -30) reduction in mortality and a 27% (-17 to -37) reduction in myocardial infarction. Anti-platelet agents result in an 11% (-2 to -20) reduction in death and a 31% (-21 to -41) reduction in myocardial infarction. Long-term treatment with calcium channel blockers result in a net increase (mean = 6%, 95% confidence interval = +28 to -13) in death.

Treatment of left ventricular dysfunction with angiotensin converting enzyme (ACE) inhibitors, whether the dysfunction is symptomatic as congestive heart failure or asymptomatic, improves survival. If a patient has a large area of myocardium that becomes ischemic with exercise, or if the patient has moderate left ventricular dysfunction and significant disease in three coronary arteries, revascularization is indicated even if symptoms are absent. Because of the potential of anti-arrhythmic medications increasing mortality in patients after myocardial infarction, electrophysiologic testing should be used to guide anti-arrhythmic therapy. In general, only sustained ventricular tachycardia or symptomatic non-sustained ventricular tachycardia are treated.

Risk Factor Control

Risk factor levels are determined by both genetic and environmental factors. Although the genetic component implies that behavior change will not be sufficient in many cases, behavior change is always the foundation of risk factor treatment. Behavior is determined by personal and environmental factors, and behavior, in turn, changes both the individual and the environment. Long-term behavior change requires long-term reinforcement of the new behaviors. It is for this reason that education and intervention programs in cardiac rehabilitation are several weeks in length and must be reinforced intermittently for a much longer period of time.

In an analysis of smoking trials, for example, no single intervention was particularly more effective than all others. However, increasing the number of interventions offered to the patient, the number of types of health care professionals who interacted with the patient, the number of therapy sessions with the patient, and the time (weeks or months) over which the intervention took place, all increased the probability of success. In short, it was reinforcement of the desired new behaviors through multiple interventions, intervenors and contacts that produced success. We would expect to see this same pattern with interventions directed at other risk factors.

Smoking

Smoking is a risk factor for recurrent myocardial infarction and recurrent sudden death, and smoking reduces the effectiveness of drugs used to control angina pectoris. Smoking cessation requires both the ability to quit and the desire to quit. While devices such as patches for the trans-dermal delivery of nicotine reduce symptoms of withdrawal, the smoker needs to develop strategies to deal with urges and other stimuli to smoke. As described above, the long-term success of a smoking cessation intervention requires repeated contact over the longest possible time period to help the smoker overcome urges to smoke and develop a sense that smoking is a major impediment to his or her long-term goals. Programs have been developed that are both effective and compatible with a busy medical practice.

Hypertension

Poorly controlled hypertension is associated with poor outcome after myocardial infarction, and treatment of hypertension, even in patients with known coronary heart disease, is associated with an improved outcome. Beta-blockers with low dose diuretics, if necessary, are the drug of choice in patients with normal left ventricular function and appear to also be of benefit in patients with decreased left ventricular function who tolerate the medications. While an ACE inhibitor will be the drug of choice for patients with decreased left ventricular function, calcium channel blockers are to be avoided in these patients.

Lipid abnormalities

Lipid abnormalities (particularly elevated low density lipoprotein levels and decreased high density lipoprotein levels) predict recurrent events, and more importantly, aggressive treatment of lipid abnormalities has been shown to slow, and in some cases reverse, the progression of coronary artery atherosclerosis. An LDL level of 2.6 mmol/L (100 mg/dl) or lower should be the target in the patient with coronary heart disease. The target for HDL should be 1.0 mmol/L or greater. All patients should be on a diet high in fruits, vegetables and whole grains and low in animal fats, the foundation of treatment. A program of regular physical activity will help to increase HDL levels. If goal lipid levels cannot be reached with diet alone, medications should be started.

Niacin is preferred in patients with isolated low HDL or with modest elevations of LDL. An HMG Co-A enzyme inhibitor (lovastatin, pravastatin, simvastatin) is the drug of choice in patients with marked elevations of LDL. A fibric acid derivative (eg, gemfibrozil) is the drug of choice for diabetics or individuals with elevated VLDL and low HDL. Cholesterol binding resins can be very helpful in combination with HMG Co-A inhibitors, but are to be avoided in patients with elevated VLDL levels.
Physical Reconditioning

Inpatient (phase I) programs

Contrary to the advice of 60 years ago,1,2 bed rest is no longer a therapy for coronary heart disease. The patient who is experiencing myocardial ischemia needs to have revascularization with thrombolytic agents, angioplasty, or surgery, and the patient who is free of ischemia can begin a reconditioning program as soon as they are able to cooperate.23,24 In the first day or two this means light arm and leg exercises along with sitting in a chair.24 Ambulation can begin on the second or third day with the fifth or sixth day set as the target for dismissal from hospital for uncomplicated cases. Rise in heart rate should be limited to about 20 beats per minute for patients who have suffered an acute myocardial infarction and 30 beats per minute for patients who are recovering from surgery. Patients who experience angina or a fall in blood pressure at these work loads need further evaluation for ischemia or other abnormalities. A sub-maximal exercise test can be performed before discharge from hospital to assure that the patient doesn’t have significant residual ischemia.25 This exercise test also provides the basis for the outpatient exercise prescription.

Outpatient (phase II and III) program

Phase II cardiac rehabilitation programs monitor the patient’s heart rate and rhythm with telemetry during exercise; patients monitor their own responses to exercise in phase III programs. While phase II programs are generally conducted in hospitals, phase III programs are frequently sponsored by a YMCA or another community institution.

The acronym “FITT” (Frequency, Intensity, Type, and Time) can be used as a format for prescribing exercise: The frequency of exercise should be at least three, and preferably five, times per week. The intensity should be up to 60% of maximal capacity. This means the target heart rate should be about 60% of the rise in heart rate experienced on the exercise test. The type of exercise should include large muscle groups, particularly the legs with the possibility of adding arm exercises to leg exercises. The time of exercise should be about 30 minutes per session – 5 minutes of warm-up, 20 minutes at a training heart rate, and 5 minutes of cool-down.26

The patient without significant left ventricular function or orthopedic problems should, at a minimum, be walking 2 miles five times per week for a weekly total of 10 miles. It is not unrealistic to expect that, with time, some patients can walk at four miles per hour (6.5 KPH) or more.

Obligatory physical tasks

Patients will occasionally face tasks that potentially exceed their physical work capacity. For example, a patient may have to shovel his car out of the snow or walk up a steep hill. Or patients may wish to mow their lawn or do other yard work and home repairs. A patient can limit the rise in heart rate yet accomplish the same amount of work by breaking the task into very short work-rest cycles.27 Cycles of 30 seconds each are even superior to cycles as short as two minutes.

Management of Psycho-social Needs

Return to work

It is estimated that 70% to 75% of all patients with myocardial infarction in the United States return to work.28 Return to work depends more on the patient’s pre-illness employment status, age, and physician’s attitude than on severity of disease. Although patients may originally view disability as attractive, occupational disability leads to depression and feelings of inadequacy, and not infrequently to divorce. Because of these problems, along with economic hardship, it is important that the physician not unnecessarily disable the cardiac patient. A patient can be tested to determine whether he will tolerate the physical demands of his job.29

Management of depression and anxiety

Severe myocardial damage tends to be associated with depression while relative mild myocardial infarctions tend to be associated with anxiety.30 All patients are at risk for anxiety and depression, and early intervention to reassure them that they can expect to return to active function will decrease these problems. Exercise has also been shown to decrease the negative psychological impact of myocardial infarction. Patients who are significantly disabled by anxiety or depression should be seen by a psychiatrist.

Sexual counseling

A brief sexual history should be taken for all patients.24 The very act of taking the sexual history tells the patient that it is appropriate to address these concerns. The brief sexual history should establish the baseline frequency and type of sexual activity before the coronary event, the patient’s expectations about return to sexual activity, the patient’s cardiovascular status, the health and attitudes of the spouse about sexual activities, and the psychological status of the patient (eg, fear, anxiety, and depression).

Many couples fear that even cuddling will result in sudden death or a myocardial infarction; they should be
reassured that this is not the case. Couples can hold hands and cuddle at any time and can resume intercourse when the patient tolerates physical activities at the 5 MET level. Patients should be encouraged to engage in foreplay because it requires very little cardiac work and serves to relax both partners.31 If the patient experiences significant sexual dysfunction should be referred for further intervention.

Family and social support

It is essential that family members understand the goals of the cardiac rehabilitation program and participate where appropriate.24 The spouse should witness the inpatient exercises and exercise testing. The spouse should also periodically attend the phase II and phase III sessions and participate in the patient’s walking program.

All family members should stop smoking, and the house and family car should be smoke-free. All ash trays and other smoking paraphernalia should be discarded. All nutrition education must include the family food purchaser and preparer, and the family should eat the same meals as the patient. Because heart disease tends to cluster in families, the cardiac rehabilitation period presents an excellent opportunity to assess the risk factor levels of the patient’s family.

Conclusions

Before the 1970s and 1980s, the treatment of the coronary patient centered around bed rest and retirement from active life. Outcomes were poor. Today, treatment is based on aggressive intervention to relieve residual ischemia, modification of risk factors for reinfarction and vigorous reconditioning. This strategy not only extends the life of the patient, it reduces the number of non-fatal recurrent events and significantly improves the psychosocial functioning of both the patient and the patient’s family.

References

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