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Editorial

Is cardiac rehabilitation necessary?

Eight to 38% of patients do not return to work after myocardial infarction though many of them seem physically capable of resuming employment.¹ The cost of myocardial infarction is high and is mainly the result of vocational disability. In the 1970s and 1980s many studies were designed to test the premise that rehabilitation after infarction improves the patient's psychological state and exercise capacity and reduces mortality. Cardiac rehabilitation is defined as a process by which patients with cardiac disease are restored to their optimal physical, medical, psychological, social, emotional, vocational, and economic status.²

Exercise capacity

Exercise capacity after myocardial infarction is impaired by the reduced response of cardiac output to exercise and the deconditioning effect of bed rest and physical inactivity. Some randomised and controlled studies have examined whether rehabilitation improves physical work capacity more than would be expected to occur spontaneously.³⁻⁷ The contradictory results probably relate to differences in exercise training programmes, the role of non-exercise treatment such as counselling, time of enrolment after infarction, and differences in the patient populations studied. Overall analysis of available data suggests that supervised physical exercise can be expected to increase a patient's maximal exercise capacity after infarction by an average of 15-25% over that which would occur spontaneously.⁸

Many, predominantly sedentary patients, without complications whose recreational and occupational activities are of low intensity resume their former activities without participating in a formal cardiac rehabilitation programme. It is unclear, however, which patients are most likely to benefit. Hammond *et al* reported that the best predictor of improvement in exercise performance at one year was a low initial exercise capacity.⁹ But their results did not accord with those of Van Dixhoorn *et al*¹⁰—perhaps because in the latter study¹⁰ exercise capacity was not expressed as a percentage that predicted for age. A small improvement in exercise capacity might enable people with a poor exercise capacity after myocardial infarction to return to a reasonable level of activity. Cardiac rehabilitation may also benefit those with an initially good exercise capacity, though the improvement will be of less clinical importance.

The study by Goble *et al* reported in the March issue of the *British Heart Journal* showed that the physical benefits of aerobic exercise training can be as easily achieved with light exercise as with heavy exercise.¹¹ The mechanism of the improvement in exercise capacity after cardiac re-

habilitation is not clear. There is no totally objective method of assessing exercise capacity and hence increased patient motivation may result in an apparent improvement in physical state. Goble *et al*'s study found that only 41% of patients who enrolled in the light exercise programme attended more than three quarters of their classes. Is the "improvement" in exercise capacity with both exercise regimes related to the type of exercise protocol or to reassurance of the patient by close, regular contact with a paramedical worker or doctor?

Most cardiac rehabilitation programmes have not evaluated the effects on patients with cardiac failure. Contrary to previously held belief, patients with severe left ventricular dysfunction who participated in an organised rehabilitation programme improved their exercise capacity.^{12,13} But those who have suffered a large anterior myocardial infarction (who might eventually develop overt heart failure) may deteriorate if enrolled in a rehabilitation programme soon after infarction.¹⁴

Psychosocial function

As expected, the results of the studies of the effects of cardiac rehabilitation and psychosocial function have been inconsistent. Psychosocial data are difficult to quantify. Reports in uncontrolled studies frequently describe a substantial improvement in psychological wellbeing related to cardiac exercise programmes. Data from the few randomised control studies suggest less impressive effects of exercise on psychological wellbeing and question whether the improvement documented relates to close review of the patient rather than participation in a formal exercise programme.¹⁵⁻¹⁸

No significant improvement was reported in occupational state in well designed assessments of cardiac rehabilitation. The conclusion of an extensive review on the subject was that special programmes of cardiac education, teaching, or psychological support and counselling over and above usual supportive care should not be recommended as routine measures after myocardial infarction.⁸ This is not to say, however, that selected patients might not require special teaching and counselling in addition to routine care because of psychological distress or a lack of knowledge.

Mortality

Once again, difficulties in study design have precluded definitive conclusions on mortality. Unfortunately, most studies have predominantly focused interventional effort on low risk patients. Consequently, because of a type II statistical error, studies of small groups of patients might

“erroneously” conclude that rehabilitation fails to reduce mortality. Only one of the major randomised trials of exercise in cardiac rehabilitation after infarction reported a significant reduction in cardiac mortality.¹⁹ There were slightly more than 700 in the largest study.²⁰

This issue was reviewed by meta-analyses three times in the 1980s. May *et al* reviewed various interventions after myocardial infarction and reported a significant 19% decrease in cardiovascular mortality with an exercise programme.²¹ Oldridge *et al* and O'Connor *et al* combined the randomised exercise trials of the 1970s and 1980s (including over 2000 patients).^{22,23} Significantly lower pooled odds ratios—0.75 and 0.78 respectively—were reported. However, pooling of data in these studies might be inappropriate. There were differences in patient populations, mortality, and exercise programmes between studies. Given the presumed pathogenetic mechanisms involved in altering the atherosclerotic process it is unlikely that relatively short term programmes of exercise, for example less than four or five years, would substantially alter mortality and morbidity in patients with coronary artery disease. Perhaps a longer habitual increase in physical activity after infarction could reduce morbidity and mortality, as has been shown in certain long term studies of healthy people or in men originally at high risk from coronary disease as predicted by high concentrations of cholesterol, high blood pressure, or cigarette smoking. Such an assertion, however, currently cannot be supported by the existing data and must remain hypothetical.

Risk factor modification

When Kallio *et al* used a multifactorial intervention they found substantial changes in risk factors in their special intervention group.¹⁹ Other studies (not multifactorial but typically exercise only) showed less impressive or no changes in risk factors. On the basis of these studies an exercise programme alone seems unlikely to produce better risk factor outcomes when applied to unselected patients after myocardial infarction.

Conclusions

The analysis of the effects of cardiac rehabilitation is hampered by the heterogeneity of the patients studied. Formal exercise programmes are probably not justified for all patients. Certain patient subgroups may benefit, for example those with a low exercise capacity or chronic exercise limitation caused by severely depressed left ventricular function. The major beneficial effect of rehabilitation programmes may be associated with the reassurance provided by close contact with paramedical staff. Further

trials are required to evaluate which components of the rehabilitation programme benefit the individual patient.

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