Activity after myocardial infarction

For most patients a myocardial infarction is a devastating blow. The devastation is sometimes rendered complete and occasionally permanent by inadequate or incorrect medical advice. Many patients can get back to normal activity and return to their previous jobs within a few weeks; some can reach a level of physical fitness far greater than before their heart attacks.

Rehabilitation after a myocardial infarction should start early. For patients admitted to hospital the vital requirements are good nurses, a pleasant and optimistic atmosphere, and immediate detection and treatment of ventricular fibrillation. Early mobilisation should now be routine, and most patients can be out of hospital in about a week. Elaborate investigations are seldom necessary; they tend to cause dependency and sometimes terror rather than reassurance.

Before leaving hospital patients need advice about how they should spend the next few weeks, and many units give out an information booklet. Gentle walking can be started within a week after uncomplicated myocardial infarction. Experience in the past two decades has shown that many patients can undergo progressive exercise courses safely and that these lead to a striking improvement in morale and in physical fitness. At the recent conference on "Exercise, Health, and Medicine" at the Sports Council centre at Lilleshall, Nanette Wenger described the methods which she and her colleagues have developed at Atlanta, Georgia.^{1,2} Beneficial exercise rehabilitation courses have been reported from several countries including England.³ Roy Shephard, another speaker at the conference, recently reviewed three controlled trials of exercise training after myocardial infarction.⁴ None of these trials, or any others, has produced convincing evidence that mortality or further infarction is reduced by a course of exercise. Shephard pooled the data from the three trials, and, with a method of life table analysis, suggested that patients who were allocated to the exercise courses had a 25-30% reduction in mortality compared with control patients. He readily admitted that such statistical juggling had its limitations and that the ideal would be a single investigation by one team; such a trial, however, is most unlikely to be undertaken and one of the several difficulties would be to find financial support, which would probably require \$10-15 million. The same problems apply to the unconvincing results of the trials of beta blockers, aspirin, anticoagulants, and antiplatelet drugs. Since the aetiology of coronary disease is almost certainly multifactorial it is very unlikely that any organisation would pay for

an investigation where only one factor was to be assessed.

Nevertheless, the evidence does show very clearly that progressive exercise is safe, good for morale, and makes people fitter. Such results cannot be claimed for beta blockers, which often make many patients feel generally unwell and a few extremely ill, or for the other drug treatments that are widely advocated. Indeed, the evidence in favour of exercise is now so strong that we should no longer be defining the indications but the contraindications. The two main cardiac contraindications to exercise training are heart failure and limiting angina; their detection requires only taking a clinical history, a physical examination, and a chest radiograph. Patients with either of these complications can often be helped by drug treatment; when it does not help, further investigations with coronary artery bypass grafting operation in mind are indicated for those with angina, and a possible resectable ventricular aneurysm should be sought in those with chronic heart failure. Patients who do not have either of these two complications or any other obvious reason for not taking increasing exercise should be advised to do so.

There is no "right" programme. Most patients prefer the security of a medically supervised exercise course and find the company of others in the gymnasium stimulating and reassuring. Such courses are usually preceded by electrocardiographically monitored exercise testing. This provides an indication of the level of fitness so that the supervising instructors (physiotherapists, physical educationalists, or others) can adjust and slowly build the level of exercise for each person. The test also provides information about possible exercise induced arrhythmias and about the presence and severity of angina. There is no merit in performing an exercise test a few days after myocardial infarction while the patient is still in hospital, and it is kinder and more practicable to leave this until just before the start of the exercise course.

Whether patients with appreciable ST segment depression should then have coronary arteriography and subsequent venous graft surgery if they have more than single vessel disease remains controversial.⁵ Most physicians and cardiologists who look after large numbers of patients who have had infarctions will agree with the recent cautious comments of Petch⁶; early surgery for asymptomatic patients after recovery from myocardial infarction must continue to be considered as an aggressive and impractical policy unless future research shows it to be justified. Exercise testing which is followed by

reassurance to those without ST segment changes is fatuous; it is action and not words which is needed to show a patient that he or she can walk, bicycle, swim, or even tie shoe laces without danger. ST segment behaviour and drop in morale are not related to each other.

Some patients do not want to join formal exercise courses. Most wish to get back to active life, however, and need proper advice about how to do so, whether they have been in hospital or looked after at home. Many hospitals do not provide any exercise rehabilitation facilities for patients with coronary disease, and the doctor in charge of such patients has to give them sensible advice about how to get fitter on their own. This takes time, but it is time well spent. The simplest start is with a walking campaign, and patients need to be told that in the absence of angina, uncomfortable breathlessness, or profound fatigue they are not doing too much. Some patients prefer a routine based on how far they get in their daily walk in a certain time and improve their fitness by going a bit further each day, or by walking a set distance and reducing the time. Once they can achieve four miles an hour with comfort most prefer to proceed to other things such as slow running, swimming, or bicycling. Patients need to be told that exercise should be enjoyable and that sprinting and marathon running are not an essential part of any programme; they often also appreciate knowing that both these activities have been safely performed by patients who have had an infarction. The important feature is to increase the exercise gradually. Symptoms are a reason to cut back on the intensity, and they should be reported if they continue.

Exercise may be beneficial in many chronic illnesses: obesity, diabetes, asthma, coronary disease, hypertension, and probably osteoporosis.¹ This form of treatment is cheap, not accompanied by side effects other than muscle stiffness, which wears off in time, and it actually makes people feel better. It is surprising how reluctant our profession is to accept this. "Whenever I feel the desire to take exercise I lie down until the feeling passes off," allegedly said for the first time by Bernard Shaw, several American presidents, and innumerable doctors is beginning to sound as silly and outdated as "one for the road."

After a myocardial infarction patients feel very vulnerable and most listen to, and often act on, whatever advice is given. Doctors should be wary about blanket advice on things such as early retirement, avoidance of stress, and changes in diet. For some people such advice may be correct since it may make them happier, but there is no good evidence that it improves the prognosis for the majority. As in the primary prevention of coronary disease, we can confidently condemn smoking.⁷ Advice on increasing exercise for those without limiting angina or heart failure may now be added to the condemnation of tobacco, not for a reduction in mortality, which remains uncertain, but for improvement in the sense of wellbeing which is frequently so lacking after a heart attack.

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Treatment of acute stroke

It is naive to expect that a single treatment will be appropriate for the different varieties of stroke, but certain principles of management may be applied. All but the mildest cases and patients who are moribund require admission to hospital, where careful clinical and laboratory assessment should be carried out. Too much emphasis has been placed on the need for computed tomography to differentiate between cerebral haemorrhage and infarction. This differentiation seldom alters management, and so routine scanning is unnecessary.

The core of the infarct or haemorrhage is damaged irreversibly, so that treatment should aim at preserving the cells in the surrounding ischaemic "penumbra," thereby minimising cerebral damage and subsequent handicap. Blood flow is negligible to the core of the stroke and poor to the penumbra,¹ and cells which have vigorous metabolising activity are vulnerable when flow is reduced. It would seem appropriate, therefore, to reduce metabolism and improve cerebral blood flow. Neuronal metabolism may be reduced by sedative drugs or by hypothermia. The dose of sedative drugs needs to be high, however, and patients treated in this way may need ventilatory or circulatory support or both.² Sustained hypothermia is also hazardous, especially in the elderly. The practical disadvantages of both of these techniques thus outweighs their potential advantages. Hypermetabolism during fits is damaging and must be suppressed immediately with parenteral anticonvulsants.³ Similarly if a patient becomes feverish antibiotics and simple techniques to reduce the temperature are indicated.

An increase in cerebral blood flow is difficult to achieve because the blood vessels in the penumbra are damaged and unresponsive to physiological or pharmacological stimuli. Vessels elsewhere in the brain may, however, respond normally. Paradoxically this may have an adverse effect, because when they dilate relatively more blood will be directed away from the area of need (intracerebral steal). Several drugs previously advertised as vasodilators have therefore been redesignated "metabolism improvers," but there is no convincing evidence that any of them are beneficial. Theoretically it would seem more appropriate to use drugs which cause vasoconstriction and those which suppress metabolism, although vasoconstrictor treatment, including low PaCO_2 , has not been shown to be of value.

Blood flow may also be increased by raising blood pressure, lowering intracranial pressure, haemodilution, or removing the arterial obstruction. Hypotension is unusual after a stroke, but relatively low pressures—for example, 120/80 mm Hg in a hypertensive patient—may occur. Raising the blood pressure in such patients may restore flow and reduce cerebral ischaemia.⁴ Hypertension is common after a stroke.⁵ Often this is a temporary reflex phenomenon which helps to maintain flow despite the occluded vessels and raised intracranial pressure. Reducing blood pressure lessens the flow and may thus be counterproductive.⁶ In rare cases the blood pressure remains extremely high and leads to increasing cerebral oedema and raised intracranial pressure. Under these circumstances a cautious reduction in systolic blood pressure to about 180 mm Hg is advisable, combined with an attempt to reduce intracranial pressure. This may be achieved by tilting patients with their heads up and ensuring that they are not overloaded with fluids. Steroid treatment may help in some cases, and glycerol,⁷ which is probably underused, is preferable to mannitol.⁸ The value of non-osmotic diuretics is questionable.

Reducing the packed cell volume lowers the oxygen carrying

¹ Morris JN. Exercise, health, and medicine. *Br Med J* 1983;286:1597-8.

² Smith T. Exercise: cult or cure-all? *Br Med J* 1983;286:1637-9.

³ Carson P, Phillips R, Lloyd M, et al. Exercise after myocardial infarction: a controlled trial. *J R Coll Physicians Lond* 1982;16:147-51.

⁴ Shephard RJ. The value of exercise in ischemic heart disease: a cumulative analysis. *Journal of Cardiac Rehabilitation* 1983;3:294-8.

⁵ Oakley CM. After the infarct. *Br Med J* 1983;287:625-6.

⁶ Petch MC. Coronary bypasses. *Br Med J* 1983;287:514-6.

⁷ Mulcahy R. Influence of cigarette smoking on morbidity and mortality after myocardial infarction. *Br Heart J* 1983;49:410-5.