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Peripheral vascular disease

Physical treatments may help

Intermittent claudication is usually caused by an arteriosclerotic stenosis that limits blood flow to the legs so that the increased demand during muscular work cannot be met. In the more advanced stages of occlusive peripheral vascular disease perfusion may no longer be adequate even at rest, and rest pain and eventually gangrene may result. Ideally the affected arteries should be reopened by surgery or fibrinolytic treatment. These methods are not, however, indicated in patients with the less severe forms of peripheral vascular disease; they are not possible in some patients and are unsuccessful in others.¹ In such cases the alternative treatments include drugs and haemodilution, both of which may alleviate symptoms.² A third possibility is physical treatment, which has the advantage of having fewer side effects.

Exercise is undoubtedly the most effective conservative treatment for patients with intermittent claudication. Controlled trials have shown that it doubles or even triples the distance that can be walked before pain occurs.^{3,4} Supervised long term treatment has a response rate of around 80%.⁵ Specific forms of exercise are sometimes helpful. They offer the advantage of "individualising" the treatment: depending on the site of the stenosis, the patient may (selectively) train those muscles that suffer the worst hypoxia.⁶

Most vascular surgeons advocate exercise only for patients with intermittent claudication, yet at least two studies have shown benefit for patients with rest pain.^{7,8} Various mechanisms seem to play a part in improving symptoms: haemodynamic changes help to redistribute the blood flow, metabolic alterations within the muscle cell optimise oxygen utilisation, and structural changes in the musculature affect both microvessels and muscle fibres. Other factors may be changes in walking technique, psychological responses, and improved rheological features in the blood.⁹

Various electrical treatments have been tried to extend the walking distance in patients with claudication.¹⁰ One trial of transcutaneous electrical nerve stimulation reported a 125% prolongation of the walking distance with stimulation compared with only 41% in the control group.¹¹ The mechanism of this effect could be either an analgesic effect or changes in blood flow. Transcutaneous electrical nerve stimulation has been shown to enhance perfusion of the skin, as shown by the laser Doppler technique,¹² but whether this also holds true for the musculature is less clear. The analgesic effects are thought to work by the gate control mechanisms and could well contribute to the effectiveness of this treatment in peripheral vascular disease.¹³ Epidural electrostimulation has also been reported to be helpful in patients with vascular disease, but the technique has the disadvantage of being invasive.¹⁴ At present the verdict must be that the place of electrical treatments in peripheral vascular disease needs further clinical assessment.

Yet another treatment is immersion of the patients in a bath

enriched with carbon dioxide.¹⁵ This causes hyperaemia of the skin, but this by no means indicates hyperaemia in the musculature beneath. There is also some evidence, however, that carbon dioxide might restore the flow characteristics of the blood towards normal.¹⁶ Recently we concluded a controlled clinical trial of 800 patients with cardiovascular disease showing that regular carbon dioxide baths lowered blood viscosity (unpublished results). External carbon dioxide also improves blood flow in the microcirculation of the skin.¹⁷ This treatment has, therefore, a rational basis, but clinical proof of effectiveness is still lacking.

Clearly, physical medicine has a place in treating peripheral vascular disease. Exercise is the most successful and cost effective treatment in patients with intermittent claudication. Other approaches such as electrotherapy and external carbon dioxide may seem worth trying when all else has failed, but they need to be investigated more thoroughly. There are some even more bizarre options—ultrasound, ultraviolet radiation, massage, and intermittent compression; but at present these lack both a rationale and proof of effectiveness.¹⁸⁻²⁰

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