Editorial

Lasers, burns, cuts, tingles and pumps: a consideration of alternative treatments for intractable angina

In every cardiology clinic there are a small but increasing number of patients whose angina has survived all attempts to treat it. Such patients get little if any relief from conventional treatment. Their daily activities are severely restricted and they often require repeated hospital admissions.

What more can we do for such patients? When we consider alternative therapies we must strike a careful balance between denying a patient useful palliation because of a lack of appropriate scientific rigour and exposing a patient to poorly evaluated and potentially harmful treatments.

Many treatments have been regarded as useful in treating angina. Medical therapy with heart muscle extract, radiotherapy, anticoagulants, vitamin E, choline, meprobamate, and cobra venom and surgical procedures such as thyroidectomy, pericardial abrasion, internal mammary ligation, and the Vineberg operation have all had their enthusiastic supporters though all have now been largely discounted. Currently several no less ingenious methods are used to treat angina in patients in whom conventional treatment has failed. These can be loosely divided into those that aim to increase blood flow to ischaemic myocardium, and those that influence the pain pathways of the heart.

Chelation therapy
In chelation therapy, the patient is given repeated intravenous infusions of edetate disodium in an attempt to dissolve atheromatous deposits. It has been reported to relieve angina; however, its antianginal effect has not been evaluated in double blind trials. In addition chelation has important side effects such as renal tubular necrosis, hypertensive tetany, bone marrow depression, hypertension, and allergic reactions. Chelation is still being given in some clinics, especially in the United States.

Enhanced external counterpulsation
Another recent approach is that of enhanced external counterpulsation, in which three sets of balloons are wrapped around the muscles of the legs and thighs, and inflation is controlled by the patient’s electrocardiogram such that the balloons expand during diastole and collapse during systole. The principle is that increased coronary diastolic flow will stimulate the opening of collaterals in ischaemic areas of the myocardium. Lawson et al showed that this treatment, when performed for an hour each day for 7 weeks, resulted in symptomatic improvement in 16 out of 18 severely restricted patients and thallium scintigraphy showed resolution of ischaemic defects in 12 patients. Controlled trials (using sham inflation) have yet to be performed.

Neural methods
Various methods have been described for the palliation of angina by interruption or modification of the afferent neural signals through which the pain is perceived. Various surgical methods have been used to interrupt the innervation of the heart, including autotransplantation, sympathectomy, and plexectomy. Autotransplantation (complete excision and reanastomosis of both atria and great vessels) is the most radical form of denervation and carries the greatest risk to life. It has been reported to be effective in a few patients although there seems little justification for such an aggressive approach. A recent report suggests that complete cardiac denervation could be achieved by a cryoablation technique in which liquid nitrogen is pumped through polyvinyl tubes that are inserted around the great vessels at thoracotomy.

Sympathectomy is performed by bilateral excision of the upper three or four dorsal ganglia of the sympathetic chain (or by unilateral or occasionally bilateral paravertebral injection of alcohol). Sympathectomy was reported to be effective in reducing angina in 28 out of 52 patients and to increase effort tolerance on treadmill testing in most. There is also evidence that sympathectomy can reduce exercise induced ischaemia.

Sympathetic fibres from the lower cervical and upper thoracic ganglia merge with vagal fibres to form the cardic plexuses, which are located at the base of the heart and within the adventitia of the great vessels. Stripping the aorta and pulmonary arteries of their adventitia (plexectomy) therefore partially denervates the heart. Although not used in isolation this technique has been reported to improve the results of coronary bypass grafting, particularly in Prinzmetal’s angina.

The development of the gate theory of pain by Melzack and Wall in 1965 suggested that stimulation of those nerve fibres that do not transmit pain (large afferent A fibres) could reduce the input to the brain from the fibres that do (small C fibres) and hence reduce the
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Sensation of pain. This theory led to spinal cord stimulation and transcutaneous electrical nerve stimulation (TENS). The precise mechanism of action for both treatments is not fully understood but both have been reported to relieve angina. Sanderson, in his review of these treatments concluded that not only were they useful for pain relief but also that they could also modify ischaemic activity. For spinal cord stimulation a flexible electrode is passed percutaneously (and under local anaesthetic) into the epidural space at the mid-thoracic level and positioned so as to produce a prickling sensation in the area of pain. This method has been shown to reduce ischaemic activity as well as to relieve pain. Mannheimer et al studied 10 severely restricted patients for 2 weeks. They reported a significant increase in time to angina and maximal exercise capacity on bicycle testing. Most of the alternative treatments should be used and which avoided?

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