

prevent infection and Femshield, the new female condom, seems a promising development. All barrier methods should be used with a spermicide containing nonoxinol 9 as this chemical inactivates HIV—at least in vitro.⁴

In choosing a reliable method of contraception sterilisation seems the obvious solution. But for some this is unacceptable as the implication is that there is no hope of a cure for HIV infection. Intrauterine devices should probably be avoided because they carry an appreciable risk of pelvic infection. The usual choice is a combined contraceptive pill, but, given the irregular lifestyle of many intravenous drug users, compliance may be difficult and a long acting progestogen may be a better alternative.

The risk of an infected mother having an infected child is difficult to estimate: there are no simple markers for infection in the child, and the mother's infectivity may vary. Recent studies have suggested that between a quarter and just less than a half of babies born to infected mothers are themselves infected.^{5,6} Most of these seem to be infected in utero.⁷

Thus, though the risk of pregnancy to the mother is still uncertain, the main indication for termination in an infected woman is the risk to the child. Although some evidence suggests that breast feeding increases the risk of neonatal infection, this is probably small. Transmission through breast milk has been described in babies whose mothers became infected after delivery, but this may have occurred because of a short peak of infectivity just after infection.⁸ In Third World countries the benefits of breast feeding outweigh the risks of HIV transmission, but in Western society we cannot be so sure.⁹

HIV infection predisposes to the development of some

cancers, especially those thought to be caused by viruses. In women with HIV infection human papillomavirus infection and cervical dysplasia are frequent,^{10,11} and as both of these are strongly linked with carcinoma of the cervix cervical dysplasia may be another tumour related to HIV. Women need to be aware of this hazard so that they can consider attending screening clinics.

AIDS has extended the debate on the patient's "right to know," and these issues challenge many aspects of the conventional doctor-patient relationship. As with other young people with long term illnesses, those with HIV infection usually want to know as much as possible about this and to be in control. The added dimension of pregnancy and childbirth means that a woman has an even greater need of information so that she can make informed choices.

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A century of cardiac pacing

Suggested from Aberdeen in the "BMJ" 100 years ago

Exactly 100 years ago this week John McWilliam, a professor from Aberdeen, suggested in the *BMJ* that repeated electrical stimulation might be used to maintain the heart rhythm in patients with bradycardia.¹ Some 70 years later Elmqvist and Senning first implanted a permanent pacemaker in man.² McWilliam's paper is a masterpiece.

Stimulating the heart had been tried by various methods in McWilliam's era, and he was aware of the dangers: "The application of strong galvanic and faradic currents to the ventricles is attended with disastrous results: an immediate abolition of the normal beat, and the occurrence of a wildly incoordinated, arrhythmic contraction of the ventricular muscle (fibrillar contraction or heart-delerium), attended by a great and rapid fall in blood pressure, and, in the higher mammals (the dog at least) by speedy death." He recognised as well, however, that "in certain forms of cardiac arrest there appears to be a possibility of restoring by artificial means the rhythmic beat and tiding



John McWilliam. Reproduced by permission of Medtronic Incorporated



Mr Geoffrey Davies, inventor of one of the first permanent pacemakers (see p 349)

over a sudden and temporary danger."

McWilliam thus described a potential method of electrically stimulating the arrested heart: "We want a much more effective and speedy mode of exciting rhythmic contraction, and one that will have a direct and powerful influence in calling forth a series of beats in the depressed or inhibited heart, while at the same time free from the danger of throwing the ventricles into delerium. Such a mode of excitation seems to be available in the form of a periodic series of single induction shocks sent through

the heart at approximately the normal rate of cardiac action. A single induction shock readily causes a beat in an inhibited heart, and a regular series of induction shocks (for example, sixty or seventy per minute) gives a regular series of heart beats at the same rate."

In his paper McWilliam described studies in anaesthetised cats in whom bradycardia and hypotension had been induced by direct vagal stimulation. The ventricle was paced by "a

periodic series of induction shocks (regulated by a metronome) applied to the apex of the ventricles.” This process partially restored the blood pressure: “The mean pressure is raised from the low point to which it had fallen in consequence of the cardiac standstill: it does not, however, attain the normal height, even though a long series of beats is elicited by the stimulating shocks. This fact is due to the feebleness of the auricular contraction under inhibitory influence. For the auricles beat so feebly (in response to the stimulation) that they are unable to pump their contents into the ventricles in the normal vigorous fashion. The ventricles fill very slowly, and, at the moment of contraction, contain much less blood than in the normal state; hence the amount of blood thrown into the aorta in a given space of time is much diminished, and the arterial pressure fails to attain its ordinary height.”

Cardiologists will recognise in this passage a description of some of the underlying physiology of the pacemaker syndrome.³ The patient may be aware of dizziness, precordial distress, or jugular pulsations. Symptoms are probably caused both by loss of the normal sequence of atrial and ventricular contraction and by activation of atrial stretch receptors causing further reflex changes. The syndrome is most likely to occur if the patient has retrograde ventriculoatrial conduction reversing the normal sequence of contraction.

McWilliam, whose experiments were performed long before electrocardiography appeared, noted this change in the sequence of contraction: “The ventricular contraction precedes the auricular contraction when the exciting shocks are applied to the ventricles.”

McWilliam may even have anticipated the haemodynamic benefit of dual chamber pacing⁴: “In order that such excitation should be as effective as possible it is probably best to send the stimulating shocks through the whole heart, so that the auricles come directly under their influence as well as the ventricles.” McWilliam truly showed outstanding insight into the subtleties of using pacemakers.

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Wide variations in surgical mortality

Standard definition needed for postoperative mortality

Surgeons used to be able to bury their mistakes, but not any longer. With the increasing scrutiny of surgical results within hospitals and regions,¹ and in some cases nationally,² surgical mortality becomes one of several definable points at which quality may be assessed. It may, however, be a crude index of surgical skill and clinical judgment because many other factors—such as the general condition of the patient, anaesthetic skill, and the quality of postoperative care—will contribute to death after an operation. In an ideal world surgical staff in every hospital should be able to carry out the full repertoire of procedures with similarly low mortality and complication rates, but this is clearly not the case.

Studies in several surgical specialties have shown wide variations in surgical mortality. Specialist urologists achieve a lower mortality and better results than non-specialists,^{3,4} and similar data have been presented for operations on abdominal aortic aneurysms.^{2,5} Surgical experience has a crucial effect on the results of operations for oesophageal cancer⁶: in a survey of oesophageal resections reported to the West Midlands Cancer Registry patients operated on by surgeons carrying out three or fewer resections a year had twice the postoperative mortality of the patients of surgeons performing six or more resections a year.⁷ Among the 84 surgeons contributing to the large bowel cancer project there was a sixfold variation in the rate of breakdown of the anastomosis with a consequent threefold variation in mortality.⁸ West *et al* studied two adjacent counties in the United States and found that patients in one county, who were taken to the nearest hospital offering an emergency service, had a considerably worse outcome than those in the adjacent county, which had a smaller number of defined trauma centres.⁹ In England and Wales, where patients are usually taken to the nearest hospital, two thirds of deaths caused by trauma to systems other than the central nervous system were judged preventable.¹⁰ There are many

other examples of differences in surgical mortality, but comparisons are not as easy as they seem: careful case selection and massaging of figures may improve the results of a surgical series.

The first problem is one of definition. There are currently four definitions of postoperative mortality: death within 30, 60, or 90 days of operation and death while still undergoing treatment as an inpatient. In a recent series of patients with colorectal cancer Brown *et al* applied these different definitions and found that the postoperative mortality varied from 7% to 12%.¹¹ Death within 30 days of the last operation seemed the best definition, including most of the cardio-respiratory deaths related to the operation and excluding most of the deaths from advanced malignancy. The adoption of the 30 day definition in publications and local audit would help allow fair comparisons of quality and excellence.

Other factors also influence mortality. In the confidential inquiry into perioperative deaths more than a fifth of deaths followed operations done as an emergency, and more than 10% of these fatal procedures were judged unnecessary or unjustified—often because the patient had advanced disease or was elderly and frail.² In a quarter the inexperience of the surgeon was thought to be important in the patient's death.

An ideal definition of surgical mortality would include only those deaths occurring from the procedure being performed and not those resulting from advanced malignancy. There should be some method of scoring the general condition of the patient taking into account age and cardiorespiratory function, and one such method is the APACHE (acute physiology and chronic health evaluation) score.¹² There are, however, a multiplicity of scoring systems, and Schein has argued for a uniform system for general use.¹³ The procedure should be classified as emergency, urgent, scheduled, or elective, and the experience and status of the surgeon should