Editorial

The After-Care of Patients with Implanted Cardiac Pacemakers

Implanted pacemaker systems, now widely accepted as the long-term treatment of choice of symptomatic heart block, have yielded palliation as well as prolongation of survival. On the other hand, increasing clinical experience has revealed shortcomings in the performance of the electrode and the pulse generator and the longevity of earlier implanted systems has not been measured up to initial estimates. Systems of current manufacture are much improved, but occasional failures still occur. For this reason and because pacing is a form of continuous therapy of a chronic illness, close supervision of patients with implanted pacemakers remains an important responsibility of the cardiologist and the surgeon who carried out the initial installation of the system.

The after-care of patients with implanted pacemakers entails careful selection and regulation of drug therapy, based upon recognition of the combined effects on the heart of pharmacological agents and electrical stimuli. Multifocal ectopic arrhythmias, while more often a complication of the early postoperative period, may also be encountered later in the course and require aggressive therapy by antiarrhythmic agents and in some cases a temporary increase of the driving rate as well. Diuretics and digitalis may be needed for long periods of time, and dosage of the glycosides is critical because of the danger of competition between a drug-induced arrhythmia and the electrical stimuli. For the same reason, use of sympathicomimetic agents in such patients requires utmost caution.

Instruction of the patient is an important aspect of the after-care. Patients with implanted pacemakers must be taught to check their pulse rate at least daily. Any change of more than four beats in either direction of the set rate of the pulse generator must be immediately reported and investigated. Episodes of loss of consciousness or dizziness, or intermittent or irregular pacing must be considered as presumptive evidence of failure of the pacemaking system requiring an immediate check.

The various approaches to long-term pacing have their own characteristic complications. Displacement of the electrode with consequent loss of pacing occurs in about 10% of patients with endocardial electrodes. Although typically an early postoperative complication, it has been seen in some cases after months or years of continued pacing. Usually, it can be corrected by repositioning of the electrode under local anesthesia. Displacement of myocardial electrodes is rare, but because they are exposed to greater flexing stresses, they carry a higher incidence of wire fracture.

An obvious objective for an implanted pacemaker system is a degree of reliability and simplicity such that installation and replacement can be performed by simple techniques and without complicated electronic instrumentation. It has taken longer than expected to approach this objective, chiefly because of the technical difficulties of operating an electromechanical system exposed to constant motion in the fluid environment of the body. However, pulse generator performance is now such that, based upon experience with large numbers of units, it is possible to recommend a specific period of service for a given type of pacemaker and to program elective replace-

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ments in order to hold the incidence of unexpected failures to an acceptable percentage. For instance, with the pulse generator that the author has used,* replacement after 30 months of service (of pulse generators manufactured between 1964 and 1967) should yield a 90% probability for a failure-free performance.2 Such a program of elective replacement has been well accepted by the patients. Based upon analysis of actual past performance of a given system, this approach should be more effective in minimizing premature failures than efforts to diagnose impending failure by x-ray examination of the batteries, threshold analysis, or oscillographic evaluation of the pacemaker stimulus on the electrocardiogram.3-5

The degree of depletion of the batteries can only be approximated by radiography, and at the present time pulse generator failures are mostly related to random component failure. The presently recommended service life is therefore substantially below ultimate battery capacity, and an assessment of the latter, at least at the present time, would be of limited value.

With some implanted systems, the margin of the stimulus output or threshold requirement can be determined without exteriorization of the pulse generator.4 This would permit detection of a rising myocardial threshold and correction by appropriate drug treatment. Groups working with this equipment have reported a high incidence of rising myocardial thresholds and "exit block," perhaps related to the use of stainless steel electrodes in a bipolar configuration with corrosion and tissue reaction at the electrode site. In the absence of infection a rising threshold has not been a problem with electrodes made of, or tipped by, platinum.

Even if tests of impending failure were completely valid and applicable to all pacemaker systems, performance of such investigations at intervals of several months or even weeks would scarcely be of value. To be of real assistance, assessment of pacemaker performance would have to be made almost on a daily basis and this is obviously not practical.

In our view, close follow-up of the patient with an implanted pacemaker is important. The interval between examinations must be tailored to the needs of the specific patient. Emphasis should be on close supervision of drug therapy and detection of symptoms or changes in the rate which may have been overlooked by the patient.

At the present time, the care of patients with pacemakers is in the hands of a relatively small number of individuals and groups in larger centers who have developed a special interest in these problems. This may impose some limitations on the availability of specialized care for such patients in certain areas. However, the techniques for monitoring and electrical control of cardiac activity are expanding rapidly, particularly in relation to temporary pacemaking in a number of conditions other than chronic heart block. Since the problems of permanent pacing are similar to those of temporary electrical stimulation of the heart, it seems reasonable to expect that in the near future every coronary care unit will be able to handle cardiac pacing and pacemaker problems.

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References

*Chardack-Greatbatch implantable pacemakers manufactured by Medtronic, Inc., Minneapolis, Minnesota.

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