Transvenous pacemaking—a bedside technique

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A technique, termed 'pacing' method, is described for the blind insertion of temporary transvenous pacemakers. Advantage may be taken of cardiac pacing with minimal risk in situations where fluoroscopic control is not available.

The introduction of endocardial electrode catheters for cardiac pacing has significantly altered the management of cardiac arrhythmias. Temporary transvenous pacemaking is frequently indicated in patients with AV block and uncontrolled tachyarrhythmias. In the acutely ill patients, where fluoroscopy is not available, flexible unipolar pacemaker catheters have been inserted blindly by recording the intracavitary electrocardiogram from the tip of the catheter electrode (Kimball and Killip, 1965). However, knotted catheters, difficulty with interpretation of the intracavitary electrocardiogram, and inconsistent pacing have been problems with this unipolar catheter technique. Therefore, a blind technique (Siddons and Sowton, 1967) using stiff bipolar electrode catheters¹ without intracavitary electrocardiography was employed in 31 patients.

Method

The transvenous bipolar pacemaker catheter is introduced under sterile conditions into the median basilic, external jugular, or saphenous venous systems (Fig.) while the patient is undergoing continuous electrocardiographic monitoring. The catheter is advanced until the right heart is entered or an obstruction is met. At this time the two terminals of the catheter electrode are attached to the external pulse generator², and 1-3 MA impulses at a slow rate are initiated. The position of the catheter if lodged outside the heart is recognized by skeletal muscle contractions induced by pacemaker stimuli. Appropriate repositioning of the catheter allows for further advancement toward the right atrium. As the catheter approaches the right heart the pacemaker stimuli

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¹ Bipolar Pacemaker Catheter, Electro-Catheter Corporation, 932 East Elizabeth Avenue, Linden, N. J.

² Medtronic Model 5840 External Pacemaker, Medtronic, Inc., 3055 Old Highway Eight, Minneapolis, Minnesota.

become visible on the oscilloscope. Successful entrance of the catheter into the right atrium is manifested by atrial pacing, i.e. an artificial stimulus or 'spike' preceding each P wave at a rate determined by the external pulse generator. The catheter may then be passed into the right ventricle where ventricular pacing is recognized by the stimuli preceding the widened QRS complexes. 'Overdrive' of the atrial or ventricular rhythm is easily accomplished by adjustment of the rate and milliamperage control.

Discussion

The 'pacing' method of blind insertion of transvenous pacemaker catheters was successfully employed in 28 of 33 instances (31 patients). Complications such as vessel perforation, pacemaker-induced arrhythmias, or patient intolerance to the skeletal muscle stimulation were not observed during the insertion. Prolonged or unsuccessful catheter insertion was attributed to soft or floppy catheters as well as extensive manipulation required by the indirect approaches of the median basilic or external jugular venous systems. However, recent experience with the newly introduced Elecath 'semi-floating' bipolar pacemaker catheter has resulted in a high percentage of successful insertions from the median basilic venous system. It must be added that one patient in this group developed cardiac perforation manifested by diaphragmatic twitching. The intracavitary electro-

cardiogram confirmed the extrusion of the pacemaker catheter tip by recording an epicardial lead pattern before withdrawal back into the right ventricular chamber. The patient tolerated this complication, as in most cases of catheter perforation, without pericardial tamponade. It is entirely possible that a greater incidence of cardiac perforation during temporary pacing may be detected by the use of intracavitary electrocardiography.

The blind techniques using an intracavitary electrocardiogram and the 'pacing' method described in this paper will eventually become obsolete with the wider use of portable fluoroscopy and intensive care units equipped with image intensification. However, the distinct advantages of cardiac pacing in the control of arrhythmias by fixed rate, demand, or coupled stimulation warrant continued use of the blind insertion technique in situations where fluoroscopy is not available.

References

- Kimball, J. T., and Killip, T. (1965). A simple bedside method for transvenous intracardiac pacing. *American Heart Journal*, 70, 35.
- Siddons, H., and Sowton, E. (1967). *Cardiac Pacemakers*. Charles C. Thomas, Springfield, Illinois.

Addendum

Approximately 100 additional patients have had successful semifloating bipolar pacemaker insertion with the method described.