KLEIN AND CO-WORKERS demonstrate the technical feasibility of cryosurgical ablation of the atrioventricular (AV) node-His bundle with minimal morbidity in 17 of 22 patients in whom this procedure was attempted. This ablation of part of the AV junction is clearly curative in patients with recurrent or chronic supraventricular tachyarrhythmia in whom antegrade conduction is via normal AV pathway or in whom the AV node-His bundle serves as one of the limbs of a circus movement. This production of cryosurgical AV block results in a junctional escape rhythm with a mean rate of 48 beats/min (range 40–72 beats/min) in the early postoperative period. The resultant AV junctional escape rhythm appears to arise from the His bundle and is characterized by a slight increase in rate with isoproterenol infusion and exercise, and lack of increase in rate with atropine administration. Klein and co-workers conclude that the technique for cryosurgical ablation of the AV node-His bundle is safe and effective. The use of the term safe presumably refers to the surgical procedure itself and the history over a follow-up period of approximately 14 months.

The clinical significance of the cryosurgical lesion can be partially characterized by comparison to some varieties of congenital or acquired conduction disease when data concerning clinical significance are available. The lesion (site of block) produced by the cryosurgical probe has some resemblance to that seen in both congenital AV block and in acquired His bundle block. The usual pathologic lesion of congenital AV block is a lack of atrial connection to the AV node, often associated with total absence of the AV node. Less often, congenital AV block is characterized by discontinuity within the His bundle. In acquired His bundle block, serial section of the conduction system reveals discontinuity in the His bundle usually caused by acquired fibrotic or calcific lesions, with relatively healthy-appearing His bundle tissue both proximal and distal to the acquired lesion.

Although the life history of congenital AV block is relatively benign, decrease in automaticity with advancing age can be expected. This may result in Stokes-Adams attacks in adults with congenital AV block. In regard to acquired His bundle block, there are relatively few data concerning prospective life history from the time of diagnosis. However, most patients with His bundle block are symptomatic when first seen (dizziness, syncope or congestive heart failure). Most patients with chronic His bundle block need permanent pacing.

In the patients with cryosurgical AV block, escape pacemakers seemed reliable at the time of electrophysiologic study. Junctional recovery times, measured at a paced rate of 70 beats/min, were less than 2 seconds in all but one patient, suggesting that the patients were not pacemaker dependent soon after production of cryosurgical AV block. However, the AV junctional escape rates significantly decreased over a mean follow-up period of 14.8 months. Although this rate decrease was relatively slight (approximately 6 beats/min), if continued slowing were observed over a relatively long period, these patients might well eventually develop escape rhythms with very slow ventricular rates. We would expect that at least some of these patients would eventually become pacemaker dependent.

It is therefore clear that production of cryosurgical AV block necessitates subsequent life-long electrical pacing with permanent loss of AV synchrony, and an inability to increase rates with stress (unless more elaborate pacing systems are utilized). These patients will need periodic replacement of energy sources, replacement of leads and generators if failure is noted (two pacemaker failures were noted in 17 patients with a mean follow-up of 14.8 months), and the patients will be subject to the potential risk of syncpe and possibly sudden death in the event of late pacemaker failure.

Surgical ablation of anomalous pathways in the Wolff-Parkinson-White syndrome is preferable to production of cryosurgical AV block. In the Wolff-Parkinson-White syndrome, successful surgery cures arrhythmia due to correction of pathological anatomy (ablation of anomalous pathways), with preservation of the normal conduction system. Cryosurgical AV block, in contrast, replaces one disease (intractable supraventricular tachyarrhythmia) with another (supraventricular AV block).

What is the role of cryosurgical AV block in the management of supraventricular tachyarrhythmia? Cryosurgical AV block would generally be attempted in patients with paroxysmal supraventricular tachycardia or in patients with paroxysmal atrial fibrillation of flutter, with rapid ventricular rates not responsive to AV nodal depressant drugs. At the University of Illinois we have had considerable experience with patients referred because of drug-resistant recurrent paroxysmal supraventricular
tachycardia. In most of these patients, we have achieved cure (or at least satisfactory control) of arrhythmia with chronic electrophysiologic study. In patients in whom a suitable antiarrhythmic drug cannot be delineated, we have successfully used patient-initiated atrial pacing systems for self-termination of paroxysmal supraventricular tachycardia. We have had to resort to surgical AV block in only one patient with paroxysmal supraventricular tachycardia in the past 8 years. This patient had a concealed extranodal pathway and incessant paroxysmal tachycardia. In another patient with recurrent paroxysmal tachycardia, we successfully excised an atrial ectopic focus (with preservation of the AV conduction system).

The management of paroxysmal atrial fibrillation or flutter with rapid ventricular rates poses a more difficult problem. The role of chronic electrophysiologic study in these patients has not been established. However, in our experience, most patients with paroxysmal atrial fibrillation or flutter can be managed using a combination of drugs with atrial antifibrillatory properties or drugs that increase AV nodal refractoriness so that ventricular rates are controlled. We have not yet attempted production of surgical AV block for permanent control of paroxysmal atrial fibrillation or flutter.

In summary, production of surgical AV block (by the cryoprobe or other means) appears to be indicated for recurrent incapacitating or life threatening drug-resistant supraventricular tachyarrhythmia when surgical ablation of anomalous pathways is either inappropriate or impossible. When comparing surgical AV block for control of supraventricular dysrhythmia, the difference in the utilization of this technique at the University of Illinois (one patient in 8 years) and at Duke University (22 attempts over a period that is presumably relatively similar) is in marked contrast. The arrhythmic patients referred to Duke University may have been sicker than those referred to us. Also, our definition of "incapacitating," "life threatening," and "drug resistant" may differ from that of Klein and co-workers. In regard to definition of "drug resistant," we believe that the extensive use of chronic electrophysiologic testing has allowed us to treat medically patients who might be referred for surgery at Duke University. We feel that further delineation of the electrophysiologic substrate of paroxysmal supraventricular dysrhythmia will decrease the number of candidates for production of surgical AV block. If surgical AV block were indicated, the cryosurgical technique seems ideal.

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