type of operation required for retrieval. Most commonly the knots are removed from the subclavian, axillary or antecubital veins. In previous reports dealing with these procedures, most patients had to receive general anesthesia to relieve pain and vascular spasm as the knot is withdrawn to the most peripheral site possible for surgical intervention.\(^5\) Occasionally, thoracotomy will be required to remove an entangled catheter in the intrathoracic portion of the subclavian and jugular veins,\(^4,5\) and very rarely cardiectomy is necessary to remove a knotted catheter trapped in the chordae tendineae of the right ventricle.\(^6\) Newly introduced catheters such as the flow directed balloon-tipped (Swan-Ganz) and the semifloating bipolar pacemaker catheters have formed knots which were surgically removed.\(^1,6\)

Our case is of interest because it is the first reported case of a complete knotting of a nonhollow catheter which did not require surgical removal. Subsequently, we have reproduced the same phenomenon with different types of cardiac catheters, hollow and solid, and in all instances we were able to disentangle the catheters with the technique described above. This method could also be used in cases where catheters are inserted through cutdown. An introducer of sufficient diameter could be advanced over the external end of the catheter until its proximal end is positioned well inside the vein. The maneuvering would then be identical to the one described in this communication. Whether this technique could be used for catheters positioned in the veins of the arms can only be speculated. One would anticipate more difficulty due to the smaller size of the veins but this would depend largely on the size of the knot.

The importance and the necessity of using constant fluoroscopy when manipulating catheters if complications such as this are to be prevented should be stressed. In our case the knot was formed in the very beginning of the insertion of the catheter, at the time fluoroscopy was not being used because of the close proximity of the site of insertion. The resistance offered to the advancement of the catheter was in all likelihood caused by the movement of its tip against the wall of the femoral vein during the formation of the knot. The Swan-Ganz catheter technique is of great help in obtaining pulmonary arterial and “wedge” pressures without fluoroscopic control; the catheters used are very thin and soft, which facilitates looping and knotting formation. Therefore, their use should be limited to situations in intensive and coronary care units where knowledge of those pressures is imperative in order to make definitive diagnostic and therapeutic decisions.

ACKNOWLEDGMENTS: We acknowledge the technical assistance of Nancy Copeland, RN, Larry Kuriger, Sydney Peebles and Sharon Squire.

REFERENCES


Complete Heart Block Occurring during Cardiac Catheterization in Patients with Preexisting Bundle Branch Block*

Demetrios Kimbiris, M.D., Leonard S. Dreifus, M.D., F.C.C.P. and Joseph W. Linhart, M.D., F.C.C.P.

A case of catheter-induced complete heart block in a patient with preexistent left bundle branch block is documented by His bundle recordings. It is recommended that a temporary pacemaker catheter on demand should be placed in the right ventricular apex in all patients with complete bundle branch block undergoing cardiac catheterization. In the coronary care units catheters should never be passed blindly to the right heart chambers in patients with left bundle branch block.

The site of block in complete atrioventricular heart block may be at the level of the A-V node, His bundle or in both left and right bundle branches.\(^1\) Complete block below the His bundle is usually associated with wide QRS complexes, a slow heart rate, and may be accompanied by symptoms of heart failure or syncope.\(^2\) This is usually due to organic heart disease involving degenerative changes of the A-V conduction system, or severe diffuse coronary disease. It has been reported to occur occasionally during the course of cardiac catheterization when either left or right bundle branch block was preexistent\(^3\) and the other bundle was inadvertently injured.

For editorial comment, see page 2

A case of complete heart block occurring during the course of cardiac catheterization in a patient with preexistent left bundle branch block in which the site of block was documented by His bundle electrogram is reported.

*From the Division of Cardiology, Department of Medicine, Hahnemann Medical College and Hospital, Philadelphia.

Reprint requests: Dr. Dreifus, 1320 Race Street, Philadelphia 19107
Case Report

A 67-year-old woman was admitted to the Hahnemann Medical College and Hospital for evaluation because of palpitations and two episodes of syncope. She had no history of chest pain, dyspnea or peripheral edema. On physical examination the blood pressure was 130/80; the carotid pulses were normal. There was a left ventricular heave and a grade 2/6 ejection systolic murmur at the aortic area. The electrocardiogram showed sinus rhythm with left bundle branch block (LBBB) and mean QRS axis of -50 degree. She initially underwent left heart catheterization, left ventriculography and coronary arteriography through the right brachial artery. The hemodynamics were compatible with systemic systolic and diastolic hypertension. The end-diastolic pressure of the left ventricle was also moderately elevated (19 mm Hg). On left ventriculography the contractions were diffusely poor. There was no evidence of intracardiac calcifications. Coronary arteriography disclosed normally patent coronary arteries.

After the completion of the hemodynamic and angiographic studies, a No. 4 bipolar pacemaker catheter was introduced percutaneously through the femoral vein and advanced and positioned across the septal leaflet of the tricuspid valve for His bundle recordings. A No. 5 bipolar pacemaker catheter was introduced through a right antecubital vein and advanced into the upper right atrium (RA). Simultaneous His bundle and atrial electrograms were recorded with standard electrocardiogram leads 1, 2 and 3 (Fig 1). The atrial to His (A-H) interval was normal, but the His to ventricle (H-V) interval was significantly prolonged to 69 msec. Because of the prolonged H-V interval in the presence of LBBB with left axis deviation and the history of syncopal episodes it was felt that a permanent pacemaker placement was indicated. The RA pacemaker catheter was then advanced into the right ventricle for temporary pacing. During the manipulation of the catheter, however, the patient developed complete heart block with ventricular asystole lasting 12 seconds (Fig 2) followed by 2:1 A-V block. The block was located below the His bundle since each atrial complex (A) was followed by a His bundle deflection (H) and no QRS. The pacemaker catheter then was immediately positioned in the right ventricular apex for ventricular pacing. A permanent demand pacemaker then was subsequently implanted.

Discussion

Transient cardiac arrhythmias are a common finding during the course of cardiac catheterization and angiography and they include a spectrum from the most benign atrial premature systoles to the most serious arrhythmias such as ventricular standstill and fibrillation. Right
bundle branch block induced during right heart catheterization was reported to occur in 12 percent of patients when constant electrocardiogram recording was used, while other reported incidences ranged from 0.3 percent to 7 percent. Left bundle branch block is less commonly observed during left heart catheterization. Complete atrioventricular block was reported to occur in 0.1 percent of patients during cardiac catheterization. Patients with preexisting right or left bundle branch block have a greater tendency to develop complete A-V block if catheterization of the contralateral cardiac chamber is performed. This complication is serious and may lead to death if immediate and appropriate action is not taken. Paul Wood, years ago, made the theoretic assumption that since 5 percent of his patients developed transient RBBB during right heart catheterization, complete atrioventricular block would be expected to occur in 5 percent of patients with left bundle branch block. He considered that the presence of LBBB was a contraindication for right heart catheterization, but this statement was made before the widespread use of cardiac pacing. Our case documents the occurrence of this complication and the His bundle electrogram shows that the block is below the His bundle, most likely at the level of free running right bundle fibers. Therefore, this reemphasizes the fact that cardiac catheterization performed in patients with bundle branch block offers a potential hazard and a temporary pacemaker should be placed on demand in the right ventricular apex before any attempt is made to catheterize the ventricle opposite the preexisting bundle branch block in order to avoid a catastrophic ventricular standstill or fibrillation. The problem becomes of extreme importance in the coronary care unit when in acutely ill patients with bundle branch block, catheters are inserted into the pulmonary artery to monitor the pulmonary arterial pressure or recordings of His bundle electrograms are made at the bedside for diagnosis of certain types of cardiac arrhythmias and conduction disorders. In these situations, if portable fluoroscopic apparatus is not available, it is preferable to move the patient to a fluoroscopy room so that catheters can be placed in an appropriate position under fluoroscopic control.

REFERENCES

6 Wennevold A, Christiansen I, Lindeneg O: Complications in 4,413 catheterizations the right side of the heart. Am Heart J 69:173-180, 1965
8 Fowler NO, Westcott RN, Scott RC: Disturbances in cardiac mechanism of several hours duration complicating cardiac venous catheterization. Am Heart J 42:652-660, 1951

Fulminant Lymphoma Mimicking Pneumocystis Carinii Pneumonia*

Richard A. Mintzer, M.D.; John T. Chiles, M.D.; John J. Fennessy, M.B.; and Martin Gross, M.D.

An unusual case of fulminant lymphoma coexisting with and mimicking pentamidine resistant Pneumocystis carinii pneumonia is presented. Bronchial brushings were positive. The lack of response to pentamidine should have suggested another process.

A case report of a patient with rapidly progressing histiocytic lymphoma and Pneumocystis carinii is presented. A rapidly evolving pulmonary disease appeared both clinically and radiographically to be consistent with Pneumocystis carinii pneumonia. This diagnosis was substantiated by bronchial brushings. Appropriate therapy with pentamidine isethionate was instituted. In spite of early and adequate therapy, the disease progressed relentlessly. Within eight days of the

*From the Departments of Radiology and Pathology, The University of Chicago Hospitals and Clinics. Reprint requests: Dr. Mintzer, 950 East 59th Street, Chicago 60637