CLINICOPATHOLOGIC CORRELATIONS

Surface Thrombosis and Fibrous Encapsulation of Intravenous Pacemaker Catheter Electrode

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An indwelling catheter placed in the right side of the heart has the potential for causing untoward reactions. One such reaction is erosion of the lining of the superior vena cava and the right atrium. Bland mural thrombosis is a common response. Infection, of which samples were presented in an earlier communication, is a more serious complication. Other complications include thrombosis on the surface of the catheter and fibrous encapsulation of the catheter electrode placed into the right ventricle for the purpose of pacing. This report illustrates the latter phenomena, and implies that there are inherent dangers in the attempt at removal of a catheter electrode that has been in place for a considerable period of time.

Case 1. Thrombotic Encapsulation of Recently Inserted Pacemaker Electrode

A 72-year-old man with clinical coronary heart disease for over 20 years was admitted to the hospital because of progressive heart failure of 2-weeks' duration.

After two episodes of sinus node arrest, one of which was followed by ventricular fibrillation, a pacemaker was inserted into the right ventricle through the venous route. The patient died suddenly 1 day later.

At necropsy, extensive coronary atherosclerosis and healed anteroseptal transmural myocardial infarction of the left ventricle were found.

In the right side of the heart the end of the catheter electrode lay in the apical part of the right ventricle. Within the right ventricle, the catheter was encased in a sleeve-like formation of thrombotic material about 2 mm thick. At the superior vena caval-right atrial junction, a superficial mural thrombus was present (fig. 1).

The case portrays two points: (1) an intravascular catheter may traumatize the lining of the vessel and cause erosion and thrombosis and (2) thrombotic material may develop upon the surface of a catheter left within the vascular system.

Each of the two foregoing processes serves to set the stage, through organization of the thrombus, for fibrous encapsulation of a catheter left in place over a protracted period of time. Two examples of the latter process follow as cases 2 and 3.

Case 2. Fibrous Encapsulation of Catheter Electrode Eight Months after Insertion

An intracardiac pacemaker was inserted in a 79-year-old man for complete heart block and congestive heart failure. Six months after implantation, signs of failure of the pacemaker and first-degree heart block were apparent. Two months later, the patient was readmitted with pneumonia from which he died.

Necropsy revealed extensive coronary atherosclerosis and a minor degree of mitral...
Case 1. (a) Interior of superior vena cava (S.V.C) and right atrium (R.A.) and ventricle (R.V.). The end of the catheter electrode lies in the right ventricular apex. From the level of the tricuspid valve to the ventricular apex, the catheter is encased by thrombotic material. At the junction of the superior vena cava and right atrium is a focus of erosion and secondary mural thrombosis (between arrows). (b) Details of catheter electrode in right ventricle.

Case 3. Fibrous Encapsulation of Catheter Electrode Two Years after Insertion

A 77-year-old male patient with known coronary heart disease experienced episodes of syncope associated with heart block. Death from carcinoma of the thyroid gland occurred 2 years after intravenous insertion of a pacemaker.

The case is of particular interest in showing an unusual point of encapsulation of the catheter electrode near the inferior vena cava and coronary sinus. In addition, two common stenosis. The latter was associated with calcification of the anterior mitral leaflet, which process had extended to involve the membranous septum.

In the right side of the heart, the end of the catheter electrode lay in the apical region of the right ventricle. To enter the right ventricle, the catheter had passed through a space between chordae that inserted into the posterior tricuspid leaflet.

Two foci of fibrous encapsulation of the catheter electrode were apparent. One lay at the junction of the superior vena cava and right atrium. The other involved the terminal end of the catheter from the tricuspid level downward. Chordae of the tricuspid valve and a related papillary muscle were fused with the connective tissue encapsulating the catheter (fig. 2).
Figure 2

Case 2. (a) Interior of superior vena cava (S.V.C.) and right atrium (R.A.) and ventricle (R.V.). One focus of encapsulation of the catheter electrode lies at the caval-atrial junction (between arrows). The catheter has entered the right ventricle by passing through an interchordal space. More inferiorly, the catheter lies beside a papillary muscle. There is fibrous encapsulation of the catheter in this region. (b) Photomicrograph of cross section through fibrous encapsulation at caval-atrial junction (section prepared after the catheter was removed). The encapsulation is represented by a fibrous sleeve. Elastic tissue stain (× 8). (c) and (d) Photomicrographs of sections through right ventricular wall and fibrous sheath around the catheter. (c) Near apex of papillary muscle shown in (a). (d) Near base of papillary muscle. Elastic tissue stain (× 8).

points of encapsulation, namely at the superior vena caval-right atrial junction and at the apex of the right ventricle, were encountered (fig. 3).
Figure 3

Case 3. Interior of superior vena cava (S.V.C.) and right atrium (R.A.) and ventricle (R.V.). In addition to fibrous encapsulation of the catheter electrode at two common points for such a process, the superior vena caval-right atrial junction (between upper arrows) and the apex of the right ventricle, there is an uncommon location for encapsulation. The latter (between lower arrows) lies in the right atrium between the ostia of the inferior vena cava (I.V.C.—opened) and the coronary sinus (C.S.).

References
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