Sick Sinus Syndrome Requiring Permanent Pacemaker Implantation in a Patient with Mirror-Image Dextrocardia*

Shiv L. Goyal, M.D.;** Edgar Lichtstein, M.D.;† Prem K. Gupta, M.D.‡; Kul D. Chaddha, M.D.§ and Fouad Lajam, M.D.||

A patient with the sick sinus syndrome accompanying mirror-image dextrocardia which was associated with double superior vena cavae and an absent inferior vena cava is presented. A permanent transvenous demand pacemaker was inserted because of repeated episodes of dizziness and a documented 3½-second period of asystole. Precise knowledge of the venous system and the location of the apex of the right ventricle was necessary prior to permanent pacemaker implantation.

A group of disorders affecting sinus-nodal function have recently been described which may be manifested by either a slow or fast heart rate and may or may not be associated with symptoms of dizziness and syncope. The term, sick sinus syndrome,1,2 has been used and includes inadequacy of the sinoatrial node manifested by both persistent sinus bradycardia and cessation of sinus rhythm with replacement by an atrial or junctional rhythm. This report presents an adult case of sick sinus syndrome with mirror-image dextrocardia and situs inversus, double superior vena cavae, single spleen, and absent inferior vena cava with ayzygos continuation. The technique of permanent pacemaker insertion in dextrocardia is described.

**CASE REPORT**

This 48-year-old woman first came to this hospital in 1965 with the chief complaint of dizziness. Findings from the physical examination and the x-ray films of the chest and abdomen were consistent with a diagnosis of dextrocardia with situs inversus. The electrocardiogram showed a junctional rhythm with a rate of 34 beats per minute and QRS morphology typical of dextrocardia. The patient was treated with sublingual administration of isoproterenol with good results. The current admission in March 1974 was prompted by several episodes of dizziness and one episode of syncope.

**Physical Examination on Admission**

Physical examination on admission revealed blood pressure of 110/70 mm Hg in both arms. Carotid pulses were equal and of good quality. The point of maximal impulse was...

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*From the Department of Medicine, Division of Cardiology, and Department of Thoracic Surgery, Mount Sinai Hospital Services, City Hospital Center, Elmhurst, NY, and Mount Sinai School of Medicine of the City University of New York, New York.

**Clinical Assistant.
†Associate Professor of Medicine.
‡Assistant Professor of Clinical Medicine.
§Assistant Professor of Medicine.
||Assistant Professor of Surgery.

Reprint requests: Dr. Lichtstein, City Hospital Center at Elmhurst, 79-01 Broadway, Elmhurst, New York 11373
in the right fifth intercostal space in the midclavicular line, and there was a grade 2/6 systolic ejection murmur heard along the right sternal border between the second and fourth intercostal space. The ECG showed a slow wandering atrial rhythm with junctional escape beats and QRS changes typical of dextrocardia (Fig 1).

During a period of monitoring, the patient developed an episode of multifocal atrial tachycardia followed by spontaneous cessation of the tachycardia and then a 3½-second period of asystole. The period of asystole was terminated by a slow, irregular junctional escape rhythm (Fig 2). The patient was aware of palpitations during the tachycardia and noted dizziness during the episode of asystole but did not lose consciousness. Because of the evidence of the sick sinus syndrome with significant symptoms, a temporary transvenous pacemaker was inserted. Angiographic studies indicated double superior vena cavae with the left-sided vein entering the right atrium and the right-sided vein connecting with the coronary sinus (Fig 3). The inferior vena cava was absent, and a continuation of the azygos vein was noted. A permanent endocardial bipolar demand pacemaker (Medtronic 5942) was inserted during the second week of hospitalization. The incision was made 3 cm below the left clavicle and the cephalic vein was exposed in the deltopectoral groove. The electrode catheter was guided to the right ventricular cavity through the left superior vena cava. The patient was immediately placed in the lateral position, and the catheter was guided to the apex of the right ventricle using the lateral projection of the angiogram as a reference.

The patient had an uneventful recovery and was discharged without symptoms one week later.

**DISCUSSION**

This patient had evidence of the sick sinus syndrome manifested by absence of a normal sinus-nodal stimulus, a slow atrial pacemaker, and episodes of atrial tachycardia followed by a 3½-second period of asystole. The
patient also had mirror-image dextrocardia, double superior venae cavae, an absent inferior vena cava with anazygos continuation, and situs inversus.

Sinus-nodal dysfunction may be due to an ischemic, sclerotic, rheumatic, or inflammatory condition. It also occurs with pericarditis or cardiomyopathy, acute or chronic coronary occlusion, Friedreich’s ataxia, progressive muscular dystrophy, collagen disease, surgical injury to tissue, metastatic disease, infiltration of atria in amyloidosis and hemochromatosis, and local fibrosis of the sinus node. Diphtheria has been incriminated in some cases but the link has not been proven. Familial sinus-nodal disease has been reported. In our patient, none of these causes appeared to be responsible for sinus-nodal dysfunction.

The characteristic electrocardiographic findings in mirror-image dextrocardia include negative P waves with inverted QRS complex and T wave in lead 1 and the interchanging of lead aVL for aVR, of lead 2 for lead 3, and of right precordial leads for the corresponding left precordial leads. The absence of a negative P wave in lead 1 as in our case, is unusual with mirror-image dextrocardia and should lead to suspicion of associated abnormalities. In their study of cardiac rhythms in dextrocardia, Momma and Linde found that an upright P wave in lead 1 was frequently associated with either bilateral superior venae cavae or absent inferior vena cava. With bilateral superior venae cavae the P-wave vector was thought to arise from a left atrial rhythm, while with absent inferior vena cava, there was thought to be a coronary sinus rhythm. Mirowski et al described eight patients with mirror-image dextrocardia with intermittent or permanent abnormality in the direction of the P wave in lead 1. These patients had complex congenital cardiac lesions which included bilateral superior venae cavae in three and an absent inferior vena cava in two. Mirowski et al noted that these patients had a tendency to develop spontaneous or induced arrhythmias which were, in most instances, episodes of supraventricular or atrial tachycardia, and in one instance, syncope was noted.

Mirror-image dextrocardia with situs inversus is compatible with a normal life span. The development of all forms of cardiovascular disease, including arteriosclerotic heart disease, would be anticipated and may occur with similar frequency and manifestations as in the general population. Although arteriosclerotic heart disease is a common cause of the sick sinus syndrome, we could find no evidence of this entity in our patient.

Treatment

Symptomatic sinoatrial rhythmic disturbances have been effectively treated with permanent pacemakers. We are not aware of any previous experiences with the insertion of a permanent pacemaker in patients with mirror-image dextrocardia. We found the information gained from the venous angiograms to be essential and feel that angiographic studies should be done in all similar cases. Since there is a high prevalence of venous abnormalities when mirror-image dextrocardia is seen without a negative P wave in lead 1, the angiogram is helpful in determining the route of the endocardial catheter.

ACKNOWLEDGMENT: We thank Ulrich Vieux, M.D., Department of Radiology, City Hospital Center, Elmhurst, NY, for performing the venous angiogram and Mrs. Edith Erick and Mrs. Frances Schlesinger for their secretarial assistance.

REFERENCES

2 Schulman CL, Rubenstein JJ, Yurchak PM, et al: The
Aspergilloma within a Malignant Pulmonary Cavity*

J. O. Torpoco, M.D.;** Mohammed Youssufuddin, M.D.;** and James W. Pate, M.D., F.C.C.P.†

The simultaneous appearance of both bronchogenic carcinoma and aspergilloma with the typical radiographic appearance of a mycetoma emphasizes the importance of consistent suspicion for malignancy in any pulmonary lesion. This is apparently the first reported case in which allergic phenomena (asthma-like symptoms and eosinophilia) are associated with an aspergilloma occurring within a cavitary bronchogenic carcinoma.

Mycetomas due to aspergillosis characteristically occur in pulmonary cavities which have resulted from infectious processes, frequently superimposed upon emphysematous or metabolic pulmonary diseases. There have been a few cases in which aspergillosis was believed to have been invasive, evolving from a pneumonic process to the classic fungal ball.4-6 The purpose of this paper is to report the second case in the English literature of aspergilloma occurring in a malignant pulmonary cavity and the first such case to be associated with asthmatic “attacks.” Since cavitating bronchogenic carcinomas are not rare, the possible association of aspergilloma with malignant cavities deserves emphasis.

*From the Department of Surgery, College of Medicine, University of Tennessee, Memphis.
**Resident in Thoracic Surgery.
†Professor of Surgery.

Figure 1. Cavitating lesion located in superior segment of right lower lobe.

Case Report

A 68-year-old black man was referred because of an abnormal chest x-ray film. Three months prior to admission, the patient had “flu-like” symptoms which he treated with home remedies while the symptoms became worse. He complained of dyspnea on exertion and tightness and discomfort in the chest. The patient had felt “feverish,” lost about 4.5 kg (10 lb) of weight, and had one episode of a small hemoptysis. The patient had smoked one pack of cigarettes per day for over 30 years but had stopped smoking for no obvious reason about a year prior to this illness; he had a past history of hypertensive cardiovascular disease and peptic ulcer.

Figure 2. Bronchogram demonstrating patent bronchus into cavity.