evaluation of the mass was consistent with a large organized hematoma. Postoperatively, the patient improved, and the abnormalities evidenced by Doppler echocardiography resolved. The patient was later able to recall an episode occurring 3 years before the onset of ascites in which he had sustained blunt chest trauma to the anterior thorax after a fall.

**DISCUSSION**

This case demonstrates an unusual example of intrapericardial hematoma manifesting as constrictive pericarditis and supports the notion that traumatic hemopericardium may be unrecognized for prolonged periods of time. In one case, the patient presented 17 years after the suspected initial trauma; this same report discussed the association of a hematoma with fibrous pseudomembranes. Several modalities have been used to characterize intrapericardial masses, including CT and two-dimensional echocardiography. However, the clinical experience of using gated MRI to assess cardiac and pericardial masses is limited. Although the capability of MRI to assess intracardiac thrombus is well documented, to our knowledge this is the first case that demonstrates MRI of an intrapericardial hematoma causing hemodynamically significant cardiac compression. A large organized hematoma was suspected before surgical exploration, which aided in planning the operative approach. Finally, this case illustrates the complimentary use of Doppler echocardiography to define the hemodynamic effects of a pericardial mass. Respiratory variation of transvalvular flows and expiratory flow reversals in the hepatic vein suggested constrictive physiology, which was confirmed at catheterization.

In conclusion, we believe that echocardiography (imaging and Doppler) should be the initial diagnostic modality for assessing suspected pericardial pathologic abnormalities owing to its ability to characterize structural and hemodynamic abnormalities in a cost-effective manner. In certain instances, transesophageal approaches may be necessary. CT or gated MRI are used to further assess pericardial thickness and pericardial masses; tissue boundaries are better characterized, and in some cases, the attenuation coefficients and signal intensities are diagnostic. We recommend a formal catheterization study if definitive surgical therapy is dependent upon hemodynamic findings.

**REFERENCES**


**Complete Heart Block and Severe Tricuspid Regurgitation After Radiotherapy**

**Case Report and Review of the Literature**

C. J. Knight, MA; and G. C. Sutton, MD

Cardiac complications can occur long after chest radiotherapy. We describe a patient who developed both valve disease and complete heart block at different intervals following radiotherapy for Hodgkin's disease. The combined presentation of these two very rare cardiac complications and surgery for radiation-induced tricuspid valve disease have not been described before.  

(CHEST 1995; 108:1748-51)

Key words: heart block; radiotherapy; valve disease

Treatment with radiotherapy to the chest, particularly for Hodgkin’s disease, has resulted in increased survival of patients, some of whom may develop complications of this treatment many years after presentation. The heart has long been considered relatively resistant to the effects of radiation although an increasing variety of cardiac complications has been described. The most common cardiac complication is involvement of the pericardium. Radiation damage to the valves and conducting system of the heart is rare and although both have been described in isolation, the case we describe is unique in that both complications have occurred in the same patient. The valvular involvement followed the heart block by a number of years, suggesting that after irradiation a sequence of cardiac complications may occur since different cardiac structures degenerate at different speeds. The case also is the first description of surgery for isolated, radiation-induced tricuspid valve disease.

**Case Report**

The patient developed a carcinoma of the right breast in 1974 at the age of 24 years. She was treated with a right mastectomy and postoperative radiotherapy to the chest wall, right axilla, and supravacuicular fossa with an incident dose of 5,500 rad. On regular yearly review, there had been no evidence of recurrence. In 1983, a diagnosis of hypothyroidism was made, and she was treated with thyroxine. 100 pg/dL. An ECG performed in 1994 was normal.

In October 1986, 12 years after radiotherapy, she was admitted to the hospital with episodes of syncope. She was found to be in complete heart block (Fig 1). Cardiovascular examination was within normal limits, as was an echocardiogram (but without Doppler). On September 10, 1986, a single chamber (ventricular) permanent pacemaker was implanted. Atrial pacing was attempted but could not be obtained. No further investigations were carried out to determine the cause of heart block. Following this procedure, she remained well. She did not present for cardiologic follow-up until December 1990.

During the early months of 1990, she developed dyspnea and was

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admitted 4 times to another hospital with heart failure. Her chest x-ray film showed cardiomegaly. A CT scan of her thorax showed evidence of pericardial thickening. Echocardiography (July 1990) showed good left ventricular systolic function with trivial aortic and mitral regurgitation.

In December 1990, she presented to this hospital, for the first occasion after pacemaker implantation, with abdominal distension. Examination revealed a grossly elevated jugular venous pressure with a dominant systolic wave and steep “y” descent (Fig 2). There also was a midystolic murmur at the left sternal edge, hepatomegaly, and ascites. Doppler echocardiography was performed. There was Doppler evidence of severe tricuspid regurgitation with a very active right ventricle and reversed septal movement. Apart from trivial mitral regurgitation, no left-sided abnormality could be demonstrated. It was concluded that the hemodynamic picture was dominated by severe tricuspid regurgitation rather than by pericardial constriction or restrictive cardiomyopathy.

An attempt was made to manage her medically, awaiting an operation on the tricuspid valve. The patient remained stable on a regimen of large doses of diuretics until July 1991 when she developed worsening fluid retention. She was therefore referred for surgical correction of her tricuspid valve lesion. In February 1992, she had a De Vega tricuspid annuloplasty and limited pericardiectomy. At the time of operation, thickened, nonrheumatic tricuspid valve leaflets were observed. The valve cusps were white and shrunken. A biopsy of the right atrial wall showed no evidence of radiation damage to the endomyocardium. There was some epicardial thinning, possibly related to radiation.

The patient experienced only minimal improvement in her symptoms in the months following the operation and still required considerable diuretic support. Although she still had tricuspid regurgitation, it was thought that a physiologic pacing mode might make a significant difference to her hemodynamic state. In June 1992, she was successfully changed from the single to a dual chamber pacemaker mode. There was a marked clinical improvement following this, with clearance of peripheral edema and a marked reduction in heart size seen on the chest x-ray film (Fig 3).

A second echocardiogram showed normal left ventricular function, a normal-sized right ventricle, and no evidence of tricuspid regurgitation. The patient is currently well and able to lead an active life, taking only 80 mg of furosemide a day.

Figure 1. ECG showing complete heart block.

Figure 2. Recording of jugular venous pulse showing dominant systolic wave and steep “y” descent.

Figure 3. Chest x-ray film before (top) and after (bottom) dual chamber pacing showing reduction in heart size.

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DISCUSSION

Radiation in significant doses can affect any part of the heart, probably as a result of microcirculatory injury causing ischemia and progressive fibrosis.\(^1\) Pericardial effusion, acute pericarditis, and constrictive pericarditis are the most common manifestations of radiation-induced heart disease, although cardiomyopathy and coronary artery stenoses are well recognized. Radiation-associated valve disease and conducting-tissue disease are both much rarer.

There seems to be a spectrum of valve involvement from asymptomatic valvular thickening to symptomatic valvular dysfunction. In one necropsy series of 16 patients, 4 to 5 years after radiotherapy,\(^2\) 80% had valvular endothelial thickening, but none had had clinical evidence of valve dysfunction. In a review of radiation-associated valve disease, Carlson et al\(^2\) identified 38 patients described in the world medical literature. Of these, 66% were asymptomatic. These patients were first seen on an average of 11.5 years after their radiotherapy, as compared with 13 symptomatic patients who were seen on an average of 16.5 years after radiotherapy. It was postulated that valvular thickening is the early manifestation of a radiation-induced degenerative process which results in valve dysfunction in some patients after a number of years. In this review, 93% of valve lesions were left-sided and predominantly regurgitant. There was one case of tricuspid regurgitation in a symptomatic patient with coexisting aortic and mitral disease. There was no patient with a predominantly right-sided abnormality.

An echocardiographic review of 25 patients 10 to 20 years after radiotherapy for Hodgkin’s disease\(^1\) showed Doppler evidence of tricuspid regurgitation in 88%. This was mild in all but one case when moderate tricuspid regurgitation and enlargement of the right ventricle were demonstrated. None of the patients was symptomatic. The presence of Doppler evidence of mild tricuspid regurgitation may be of little pathologic significance as a regurgitant flow pattern may be found across the tricuspid valve in normal subjects. An incidence of 78% has been reported.\(^5\)

Ten patients in the literature have required surgery for valve defects associated with radiation.\(^4\) All these operations involved the aortic or mitral valves or both. In one case, a tricuspid valve repair was performed together with mitral valve replacement.\(^6\) No case has been reported before involving surgery for an isolated right-sided lesion.

Transient complete heart block following radiation treatment for thyrotoxicosis was first described by Kremer and Laplaëc\(^2\) in 1936, but atrioventricular block requiring pacemaker implantation following radiotherapy remains rare. Pathologic studies have shown marked fibrosis of the atrioventricular node and arteriolar narrowing.\(^8\)

A review of the literature provides details of 30 cases (including the current one) in which symptomatic atrioventricular block has occurred at an interval after thoracic radiotherapy.\(^9,10,18\) Details of age of the patient and interval after radiotherapy are available in 27: the patients were aged between 25 and 73 years at the onset of atrioventricular block with a mean age of 42 years. The interval between treatment and the development of atrioventricular block varied from 1 month to 23 years with a mean of 12 years. Most cases are clustered between 10 and 14 years. Hodgkin’s disease was the original pathologic finding in 15 patients (56%). In only one other case was heart block associated with the treatment of carcinoma of the right breast.\(^1\) There was associated pericardial disease in ten patients, and right ventricular outflow tract stenosis was seen in 2.\(^2\)\(^,19\)\(^,24\) None of these papers reported coexistent valvular dysfunction.

In summary, we have presented a patient in whom two extremely rare complications of thoracic radiotherapy have occurred together. The latency between treatment and complication appears typical from review of the limited number of reported cases. In patients that have survived for long periods after radiotherapy to the chest, it is important to remember that cardiac complications can occur.

ACKNOWLEDGMENTS: We would like to thank Dr. D. Gibson for his help with the diagnostic studies and management of this patient and Professor Sir M. Yacoub who carried out the surgery.

REFERENCES

Digital Clubbing Associated With Polymyositis and Interstitial Lung Disease*

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Clubbing of the fingers is commonly associated with interstitial lung diseases (ILDs). Although ILD occurs in as many as 40% of patients with polymyositis/dermatomyositis (PM/DM), clubbing of the digits has never been reported to occur in patients with PM/DM and ILD. We report the first case of clubbing associated with PM/DM and ILD.

(CHEST 1995; 108:1751-52)

ILD=interstitial lung disease; PM/DM=polymyositis/dermatomyositis

Key words: bronchoalveolar lavage; clubbing; dermatomyositis; interstitial lung disease; polymyositis

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