Fatal involvement of the heart with multiple myeloma

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Involvement of the heart by metastases is a well-recognized pathological and clinical feature of malignant disease. While extra-osseous infiltration by plasma cells is a common feature of multiple myeloma[1] there are few reports of cardiac involvement. The majority of these lesions have been of little clinical significance and were discovered only at autopsy.[2-4] In the following case recurrent pericardial effusions, congestive heart failure and death resulted from myelomatous infiltration of the heart.

Case report

The patient, a 50-year-old Caucasian female, was found to have IgG multiple myeloma. The initial response to therapy with cyclophosphamide and prednisone was satisfactory, in that symptoms resolved and the serum proteins were reduced from an initial value of 12.5 to 6.7 g./100 ml. This was accompanied by disappearance of the monoclonal spike in the serum protein electrophoretic pattern. She was maintained in remission for 15 months with cyclophosphamide therapy when she developed a small tumour on the left upper eyelid. An excisional biopsy was performed and the lesion proved to be a plasmacytoma. There was no other evidence of progression of her disease. The chest x-ray was normal.

She continued to do well until three months later when she presented with a 10-day history of productive cough, orthopnea, dyspnea and vague substernal chest pain aggravated by respiration and to a lesser extent by exertion. On admission she was dyspneic, the heart rate was 96 beats/min. and the blood pressure was 140/75 mm. Hg with no pulsus paradoxus. The remainder of the physical examination disclosed findings within normal limits with the exception of occasional expiratory rhonchi and coarse rales which were considered to be due to bronchitis. A chest x-ray showed an enlarged cardiac silhouette with clear lung fields. The electrocardiogram showed non-specific ST changes and was unchanged from previous tracings. Laboratory data were normal except for a slightly increased serum IgG of 1650 mg./100 ml. A right pleural effusion was observed on a chest x-ray taken on the second hospital day and a lung scan was consistent with pulmonary embolization. Anticoagulant therapy was initiated with intravenous heparin but by day 4 there had been no clinical improvement, with persistence of dyspnea, orthopnea and an enlarged cardiac silhouette. The patient was digitalized and given diuretics, with no response. On day 8 her dyspnea worsened, with the development of jugular venous distension, distant heart sounds and 40 mm. of pulsus paradoxus. Cardiac catheterization was performed and confirmed the diagnosis of pericardial effusion with tamponade. Eight hundred ml. of serosanguinous fluid was removed by transthoracic pericardiocentesis. Cultures of the pericardial aspirate for bacteria and fungi were sterile but pleomorphic malignant cells were seen. Anticoagulant therapy was stopped but digoxin and diuretics were continued. The patient's condition improved initially following the pericardial tap but despite the absence of signs of cardiac tamponade the congestive heart failure did not clear and the cardiac shadow remained enlarged. On day 13 she again developed signs of tamponade and another 600 ml. of fluid was aspirated. Cultures were again sterile but on this occasion the cytologic examination revealed clearly identifiable plasma cells. Electrophoresis performed on the fluid revealed a monoclonal gamma peak similar to that present in the serum. Again, despite the relief of the tamponade, signs and symptoms of heart failure persisted.

The pericardial effusion re-accumulated slowly after the second aspiration and therefore a thoracotomy was performed on day 33 to establish pericardial drainage through a window into the left pleural space. At operation the pericardium contained 300 ml. of serosanguinous fluid. There were numerous deposits of tumour on the pericardial surfaces of the heart and biopsy revealed these to be plasma cell infiltrates. Postoperatively the signs of heart failure increased despite vigorous treatment with digoxin and diuretics and the patient died on day 37.

At autopsy the great vessels and pericardium were encased in dense tumour infiltrates. The heart itself was greatly enlarged with gross invasion of the myocardium (Fig. 1). The coronary vessels and cardiac valves were normal. Histological examination revealed the pericardium and myocardium to be extensively involved in infiltrating plasma cells (Figs. 2, 3), but there was no demonstrable amyloid in the myocardium.

Focal myelomata were present in the lumbar vertebrae, pancreas, parametrium, and mediastinal and mesenteric lymph nodes. In addition, microscopic deposits of plasma cells were found in the liver, kidney and adrenal medulla. Multiple recent small emboli were found in the pulmonary vasculature and marked congestion of the lungs was noted.

Discussion

In a patient with multiple myeloma, treated for prolonged periods with cytotoxic agents, an infectious origin

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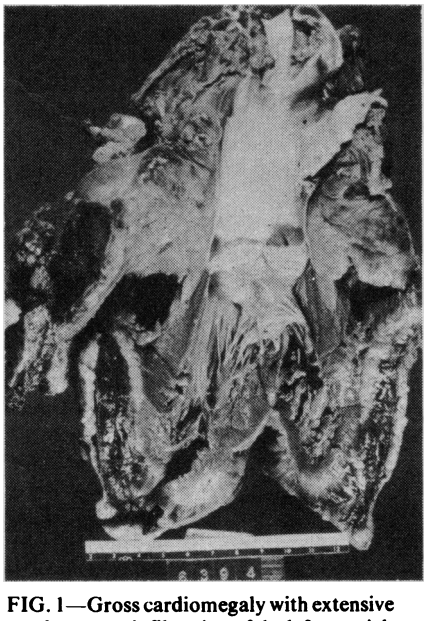

FIG. 1—Gross cardiomegaly with extensive myelomatous infiltration of the left ventricle.

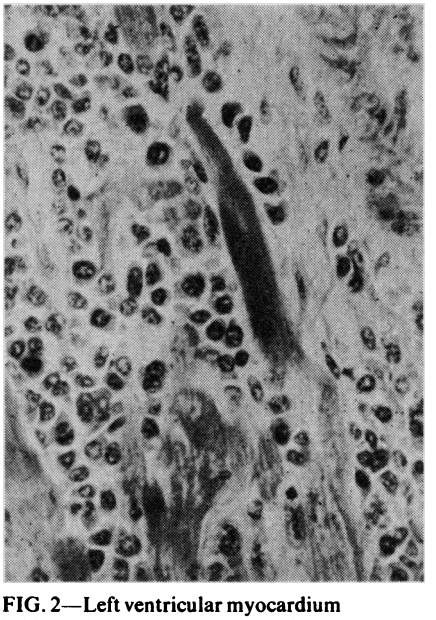

FIG. 2—Left ventricular myocardium infiltrated with plasma cells (X 600).

for the pericardial effusion was a major consideration. However, extensive studies failed to identify any organisms in numerous samples of pericardial fluid. Other causes of pericardial or myocardial disease were not suggested by the clinical or pathological evidence. Therefore the patient's death was directly attributable to her plasma cell disorder, primarily to the extensive myocardial destruction.

With improved methods of palliative therapy for malignant disease the recognition of potentially treatable complications of the primary process has taken on new importance. This has been shown specifically for pericardial effusions secondary to a variety of malignant diseases by Hill and Cohen.[5] It is possible that earlier diagnosis in this case could have allowed appropriate therapy to be carried out with an alteration in the clinical course. The delay in reaching the correct diagnosis was partly due to uncertainty concerning the significance of the cytological findings in the aspirated fluid. The discovery of pleomorphic malignant cells in the first sample raised the possibility of a second primary neoplasm existing in this patient. The presence of plasma cells in the specimen from the second aspiration immediately suggested a myelomatous etiology for the cardiovascular problems. However, lack of specificity of this finding[6] combined with the absence of previous reports of symptomatic cardiac involvement made us reluctant to subject the patient to thoracotomy at that point.

Multiple myeloma may be added to the list of rare causes of pericardial effusion and heart failure. Early surgical intervention would seem indicated to permit diagnosis and effective management of this complication.

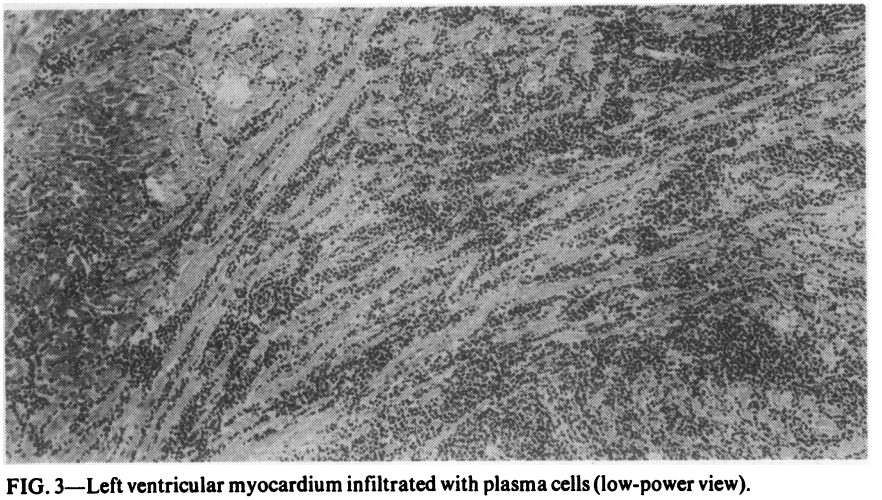

FIG. 3—Left ventricular myocardium infiltrated with plasma cells (low-power view).

Résumé

Issue cardiaque fatale chez une malade souffrant de myélome multiple

Une femme de 50 ans souffrant de plasmocytome présenta une insuffisance cardiaque et une tamponade récidivante du péricarde. Malgré le soulagement de la tamponade, la malade mourut d'insuffisance cardiaque terminale. L'autopsie révéla qu'il s'agissait d'une infiltration myélomateuse du myocarde. Les auteurs soulignent l'importance de diagnostiquer précocement ces pathologies qui peuvent théoriquement être traitées.

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