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Endomyocardial fibrosis in Caucasians previously resident in tropical Africa[1]

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Two cases of endomyocardial fibrosis in Caucasian patients previously resident in tropical Africa are described. It is argued that the circumstantial evidence suggests that it is a distinctive disease of specific aetiology related to the tropical environment.

Endomyocardial fibrosis is a form of cardiomyopathy endemic in East, Central, and West Africa (Davies, 1948; Connor *et al.*, 1967, 1968). A similar disease has occasionally been described in other tropical regions, e.g. South America (Andrade and Guimaraes, 1964), India (Gopi, 1968), and Ceylon (Nagaratnam and Dissanayake, 1959).

Authenticated cases have been reported in Caucasian patients who have previously resided in the tropics (Brockington, Olsen, and Goodwin, 1967). Very occasionally cases with a disease resembling endomyocardial fibrosis have been reported in patients who have never lived in the tropics (Connor *et al.*, 1967, 1968), and (Bishop *et al.*, 1968).

This report concerns the only two patients with undoubted endomyocardial fibrosis seen in this Clinic during the past 15 years. Both of these had lived for a time in tropical Africa. We believe this to be of interest in view of the uncertainty that still exists about the exact interrelations of the various forms of cardiomyopathy.

Case histories

Case 1 The first patient, a White woman of 45, had lived in Lusaka (Zambia) for 27 years. Symptoms of dyspnoea on exertion first began in July 1960, followed shortly afterwards by oedema of the legs. There was no previous history of rheumatic fever and she had four normal pregnancies without any mention of a cardiac lesion. A diagnosis of valvular heart disease was made by her doctor and treatment with digoxin and diuretics was started. She denied having had malaria or other tropical diseases while in Zambia. In 1962 she moved to the Cape Province of South Africa where she was noted to have severe oedema, hepatomegaly, and ascites, with conspicuous peripheral cyanosis and pigmentation, the symptoms of pulmonary congestion being less obvious. Loud systolic and diastolic murmurs were noted over the whole praecordium. Later repeated paracenteses had to be performed for recurrent ascites, and she was eventually referred to the Cardiac Clinic of this Hospital for assessment for cardiac surgery. The physical signs noted in 1965 were an irregular pulse due to atrial fibrillation with a normal blood pressure of 120/80 mmHg, signs of severe right-sided heart failure with gross tricuspid insufficiency. The apical impulse was unimpressive but well displaced beyond the mid-clavicular line. Most of the praecordial activity was due to the enlarged right ventricle. The electrocardiogram showed atrial fibrillation with a normal QRS axis, conspicuous clockwise rotation, and digitalis effect. The chest *x*-ray showed generalized but moderate cardiomegaly with obvious left atrial enlargement and signs of pulmonary venous congestion. A clinical diagnosis was made of severe congestive cardiac failure due to silent mitral stenosis with severe pulmonary hypertension and functional tricuspid incompetence. Her blood examination revealed a normal eosinophil count of 1 per cent out of 5,900. At catheterization the right atrial pressure was raised to a mean of 15 mmHg and the wave form showed a large 'cv' wave peaking to 20 mmHg. The right ventricular pressure was 70/7–15 mmHg and the pulmonary artery 70/38 mmHg. The wedged pulmonary artery pressure was a mean of 22 with a 'cv' wave peaking to 30 mmHg. No diastolic gradient was detected across the mitral valve and the left ventricular pressure was 110/12–25 mmHg. Cardiac output was reduced (index 1·7 l./min^2). Left ventricular angiography showed the typical appearance of endomyocardial fibrosis with obliteration of the cardiac apex, a vigorously contracting basal myocardium, and

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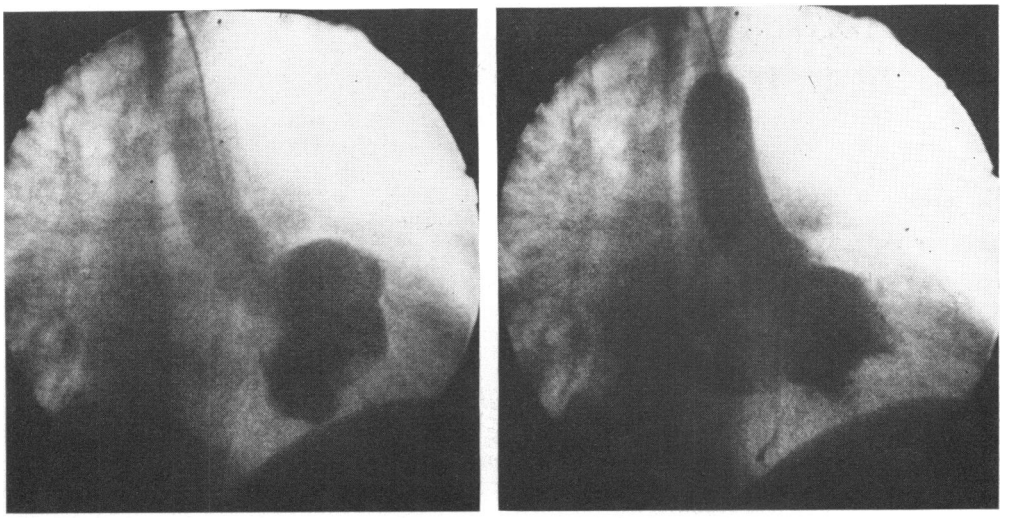


a b

FIG. 1 *The left ventricular angiogram of Case 1 in the right anterior oblique view. In diastole (a), the apical half of the left ventricular cavity is obliterated producing a 'bat's wing' deformity. During systole (b), the basal portion contracts normally and mitral insufficiency occurs.*

obvious mitral insufficiency (Fig. 1). A biopsy specimen obtained with the Konno intracardiac biotome from the cavity of the left ventricle revealed dense collagenous tissue only. The significance of the finding escaped us at the time. After her discharge from hospital the patient survived 2 more years, dying fairly suddenly after a fall during which she fractured her femur.

The heart was sent to us for study. It weighed 450 g, and its external appearance was unremarkable. On section the left ventricle was hypertrophied up to 3 cm thick with the cavity much reduced in size in part by the massive concentric hypertrophy but mostly by obvious fibrous thickening of the endocardium (Fig. 2). This process involved only the lower half of the left ventricle leading to obliteration of the apex. Proximally the fibrosis extended to involve the papillary muscles causing the mitral valve to be disorganized and incompetent. The endomyocardium on the right side of the heart was not involved.

Histological examination showed diffuse fine fibrosis with scattered areas of focal fibrosis throughout the myocardium. The myocardial fibres showed some variation in size and some interstitial oedema was present. No necrosis or inflammatory response was seen. The endocardium was thickened by mature fibrous tissue without an excess of elastic elements. Tongues of fibrous tissue extended into the myocardium and at the deepest part of the scar some elastic tissue was being formed.

Case 2 The second patient, a White woman aged 55, first developed symptoms of heart failure in 1969; a year later, heart failure recurred with the onset of atrial fibrillation and she was admitted for cardioversion. In 1971, a third admission for relentless cardiac failure was required. The past history was negative for rheumatic fever but during the second world war she had lived in the Belgian Congo and had contracted loa-loa, the filarial worm eventually being extracted from her left eye. The findings on examination initially revealed evidence of moderate right-sided heart failure with atrial fibrillation. There was striking right ventricular overactivity, with a quiet impalpable cardiac apex. Murmurs of mitral and tricuspid incompetence and a loud apical gallop were present. The electrocardiogram showed atrial fibrillation, a normal QRS axis, and a non-specific left ventricular damage pattern with widened QRS complexes; the chest *x*-ray showed generalized cardiomegaly with grade 1 left atrial enlargement and pulmonary venous congestion. The blood picture was normal with an eosinophil count of 2 per cent out of 7,400. The clinical picture suggested some form of cardiomyopathy, and cardiac catheterization was performed, to exclude primary mitral valve disease. The catheterization data revealed a mean right atrial pressure of 6 mmHg and right ventricular systolic pressure of 45 mmHg, pulmonary artery pressure of 45/20 mmHg. The pulmonary arterial wedge pressure was a mean of 24 mmHg with a large 'cv' wave peaking to 40 mmHg. The left ventricular end-diastolic pressure was 20. No mitral or aortic valve gradients were present. The cardiac output was reduced to an index of 1·06. Left ventricular angiography revealed a moderately enlarged ventricular cavity, the apical half of which was completely obliterated (Fig. 3). The basal portions of the ventricle contracted vigorously and free mitral insufficiency was present. An endocardial biopsy taken with the Konno biotome from the apex of the right ventricle

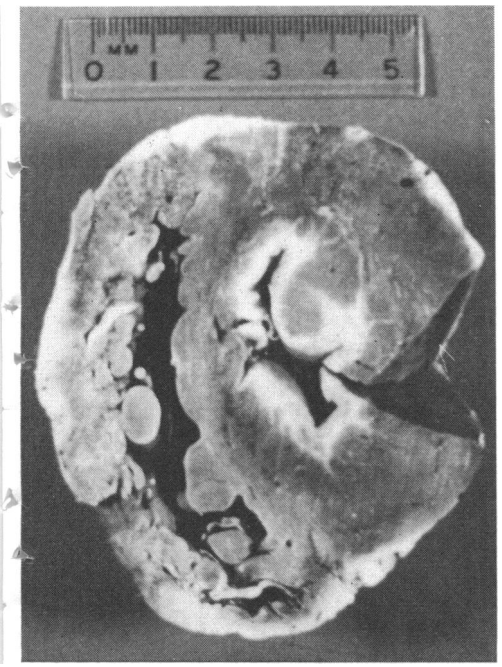


FIG. 2 *A cross-section of the heart half way between the apex and the base, shows the dense fibrous thickening of the endocardium which envelops the papillary muscle, and extends as fibrous strands into the myocardium.*

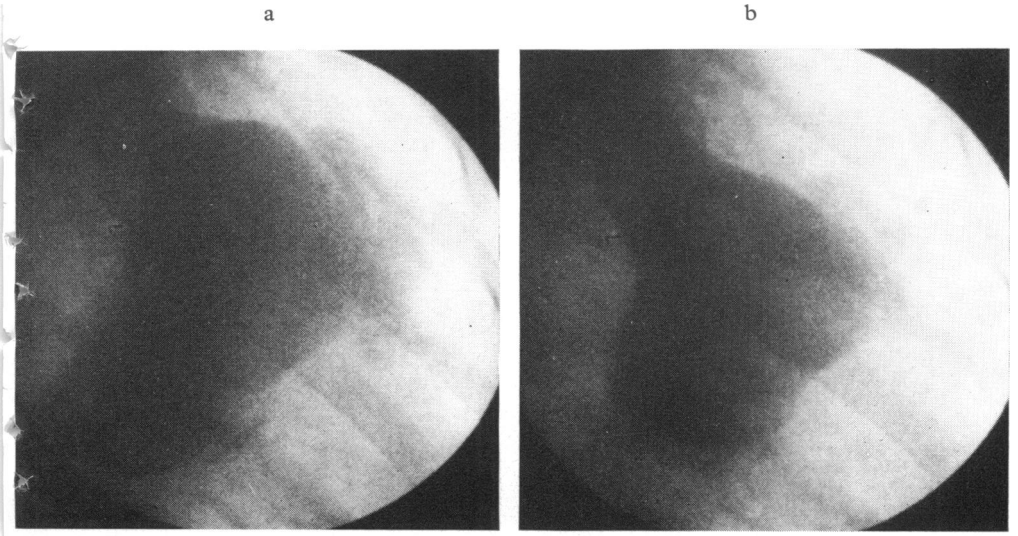
revealed muscle fibres showing some hypertrophy. No other abnormality was present.

On the basis of the characteristic angiographic appearances a diagnosis of endomyocardial fibrosis was made.

Discussion

Congestive cardiomyopathy of unknown aetiology is a fairly common form of heart disease among our non-White population, accounting for approximately 30 per cent of all heart disease in this group (Bradlow, Zion, and Fleishman, 1964). It is thus of great interest that we have in the course of 15 years' experience only encountered 2 cases of endomyocardial fibrosis and these have both been patients who have at some time lived in parts of tropical Africa where the disease is endemic. Only one other authenticated case of endomyocardial fibrosis has been reported from South Africa, also in a White patient who had previously lived in the Congo (Brink and Weber, 1966). While the morbid anatomical and angiographic features are distinctive and suggest that the disease is a different entity from other forms of cardiomyopathy (Connor *et al.*, 1967), the histological findings are not distinctive, and both McKinney (1970) and Thompson (1961) have concluded that the differentiation between endomyocardial fibrosis and congestive cardiomyopathy is purely arbitrary. The fact that the only 3 recorded cases in South Africa had previously lived in tropical Africa is strong circumstantial evi-

FIG. 3 *The left ventricular angiogram in Case 2 in the right oblique view. In diastole (a) the entire apical half of the cavity is obliterated. The basal portion is enlarged. During systole (b) a vigorous contraction of the basal segment occurs and some mitral insufficiency is seen.*



dence that the disease is a separate entity with a specific aetiology as yet undiscovered.

With regard to the angiographic differentiation between congestive cardiomyopathy and endomyocardial fibrosis we agree that the features previously mentioned (Cockshott, 1965), viz. the obliteration of the cardiac apex with reduction in cavity size and severe mitral insufficiency, are present, but an equally striking difference noted in our 2 cases with endomyocardial fibrosis was the apparent vigour of the contraction of the unaffected basal portion of the myocardium compared with the generalized hypokinesis of cases with congestive cardiomyopathy (Chambers, Beck, and Schrire, 1969).

The value of endomyocardial biopsy with the Konno biotome in the diagnosis of this disease is difficult to assess. In the second case with a biopsy specimen from the right ventricle no diagnosis could be made. In the first case the biopsy was taken from the left ventricle and a specimen of fibrous tissue obtained. Obviously in cases with isolated left ventricular disease biopsy specimens from the right ventricle will not be diagnostic; on the other hand, we no longer carry out left ventricular biopsies because of the occurrence of transitory ophthalmoplegia in a case with congestive cardiomyopathy, presumably the result of dislodging a mural thrombus.

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Addendum

Since submitting this paper Case 2 has died. At necropsy the characteristic features of endomyofibrosis affecting the left ventricle only were present.