Results of endomyocardial biopsy—histological, histochemical and ultrastructural analysis

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ALTHOUGH this technique of investigation has been practised for many years in Japan and reported by Konno, Sekiguchi and Sakakibara in 1971, it has only recently become more widely used in Europe. So far, biopsy material from fifty-six patients*, thirty-nine of whom were suspected of suffering from a type of cardiomyopathy, have been examined. This paper concentrates on the diagnostic value which can be derived from the material obtained by Konno's biptome (Sakakibara and Konno, 1962) or by the King's College Hospital instrument (Richardson, 1973).

Up to three biopsies, each measuring approximately 2-3 mm in diameter, have been received. In all but three patients the tissue was obtained from the right ventricle. The material was received from five centres, three in London, which were investigated histologically, histochemically and ultrastructurally wherever possible, and two in West Germany, which were processed for histological and electronmicroscopic examination only. The tissue for histological and histochemical examination was carried out on frozen sections. Cryostat cut sections were stained with haematoxylin and eosin, Weigert's elastic Van Gieson and histochemical analysis included that of glycogen (McManus, 1946), succinic dehydrogenase (Pearse, 1960) and acid phosphatase (Barka, 1960). Preparation for electronmicroscopic examination included 3% glutaraldehyde fixation and post-fixation in 1% osmium tetroxide. The material was subsequently Epon embedded. The tissue was examined without knowledge of clinical details, which included the suspected diagnosis, but was subsequently discussed with the physician and grouped as follows.

Suspected diagnosis confirmed

The criteria described in the previous paper (Olsen, 1975) were applied. Thus, if attenuation of regularly arranged hypertrophied myocardial fibres was evident, together with an increase of the smooth muscle component of the thickened endocardium,

congestive cardiomyopathy was confirmed. If the HHI (Histological HOCM index; Van Noorden, Olsen and Pearse, 1971) was greater than 50% in cases of hypertrophic obstructive cardiomyopathy, the suspected diagnosis was grouped under the above heading (Fig. 1). The suspected diagnosis of one patient who suffered from eosinophilia and cardiac symptoms suggestive of Löffler's endocarditis was also confirmed (Fig. 2).

Suspected clinical diagnosis excluded

In cases where an alternative possible clinical diagnosis was entertained, for example myocarditis as a possible cause for the patient's congestive heart failure, and where no evidence of present or past myocarditis was found on pathological examination, the result was grouped under this heading.

Unhelpful pathological result

This included those cases where equivocal changes were observed, for example, if the HHI fell below a value of 50%, which did not permit confirmation or definite exclusion of the suspected clinical diagnosis.

Failed biopsy

This included patients from whom insufficient tissue was recovered, but also those cases where the diagnostic component was not included in the biopsy, for example, in a case of suspected endomyocardial fibrosis which lacked endocardium in the prepared material.

Seventeen other patients have also been included in the tables, who suffered from suspected conditions such as cardiac tumour, myocarditis or sarcoidosis.

The results obtained, grouped in the manner described above, are tabulated (see Table 1).

The results indicate that in the fifty-six patients, 25% of suspected diagnoses were confirmed and 34% were excluded, which resulted in a diagnosis helpful to the physician in 59% of cases (the results for the thirty-nine patients with possible cardiomyopathy was 55%). This figure is promising but a value of 29% of unhelpful results is high.

It appears likely that in some patients an

* At the time of going to press the number of patients examined has increased to 121. (Presented at the VII World Congress of Cardiology, Buenos Aires, September 1974.)

FIG. 1. Right ventricular endomyocardial biopsy from a patient suspected of suffering from hypertrophic obstructive cardiomyopathy. The severely hypertrophied myocardial fibres are arranged in a whorl. Some nuclei are surrounded by a 'halo'. HE $\times 160$.

FIG. 2. Biopsy specimen from a patient with eosinophilia and suspected of suffering from Löffler's endocarditis parietalis fibroplastica. An inflammatory infiltrate which is present in the myocardium includes eosinophils. On the right of the photomicrograph is recent thrombus, rich in eosinophils. HE $\times 200$.

TABLE 1. Results of pathological investigation of endomyocardial biopsy

Suspected diagnosis	Confirmed	Excluded	Unhelpful	Failed	Total no.
Hypertrophic obstructive cardiomyopathy	4	2	4	0	10
Congestive cardiomyopathy	8	7	8	4	27
Obliterative cardiomyopathy	1	0	0	1	2
Other groups	1	10	4	2	17
Total	14	19	16	7	56
	25%	34%	29%	12%	

unrepresentative area may have been sampled, although patients dying subsequently (not as a result of the biopsy) have shown confirmatory evidence of the biopsy diagnosis at autopsy (Sekiguchi and Konno, 1969). Very occasionally patients have also been biopsied in whom a helpful pathological result could not have been expected, for example, mitral insufficiency due to ruptured chordae, possibly congestive cardiomyopathy. Even if the criteria of dilatation were established, the result could not be distinguished, on biopsy, from congestive cardiomyopathy.

The value of 12% for failed biopsies is also unacceptable, but included in the seven patients in this category were four from whom a successful biopsy had been obtained, but division of the material for other investigations had resulted in insufficient material, or clot only, for histological and electron-microscopic evaluation.

The evidence presented here suggests that much valuable information can be obtained from this biopsy procedure. Provided that the patients are carefully selected, a better result can be expected in the future.

This relatively new technique permits analysis of fresh endomyocardial tissue, not only from a diagnostic point of view, on which this paper has concentrated, but also virological and biochemical analyses, which hopefully will help to elucidate the suspected, but so far not proved, aetiologies of cardiomyopathy.

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