DIABETIC CARDIOMYOPATHY

V. MOHAN* G. BHARANI**, A. RAMACHANDRAN***, M. VISWANATHAN****, R. ALAGESAN*****, S. THANIKACHALAM******.

SUMMARY

Diabetic Cardiomyopathy is a condition characterized by congestive cardiac failure or cardiomegaly in a diabetic in the absence of hypertensive, ischemic or other heart disease. Two cases of this condition are presented with some interesting clinical, radiological and Echo-cardiographic findings.

While ischemic heart disease and hypertension contribute to the major causes. of heart disease in diabetics, evidence is now fairly strong that there may be yet another form of heart disease in diabetic patients. Analysing the results of the Framingham study, Kannel et al (1) showed that the frequency of congestive cardiac failure after myocardial infarction was twice as high in diabetics compared to their non-diabetic counterparts. The work of Hamby et al (2) suggested an increased frequency of diabetes in patients with idiopathic cardiomyopathy.

Autopsies done in four diabetics with cardiomyopathy showed patent large coronary arteries but changes in the small vessels with cardiomegaly and congestive cardiac failure of unknown cause. There was absence of major coronary artery disease. However the small intramural coronary arterioles demonstrated thickening of the wall and occlusion of the lumen. From India, Tripathy (4), in 1973, presented data on 14 diabetics who presented with symptoms of congestive cardiac failure but no clinical evidence of hypertension, ischemic or other heart disease. He postulated that there probably exists a primary myocardial disease of diabetic origin. The concept of diabetic microangiopathy in the myocardium is not new. Ledet (5) found concentric rings of periodic acid Schiff-positive material in the smallest intramural coronary arteries of diabetics in a necropsy series. Studies by our own group (6) and others (7, 8) using non-invasive techniques have pointed to the occurance of sub-clinical diabetic cardiomypathy in diabetic patients. In this report we present two interesting cases of diabetic cardiomyopathy.

---

* Asst. Director,
** Fellow in Diabetes,
*** Asst. Director,
**** Director,
***** Asst. Prof. of Cardiology,
****** Prof. of Cardiology.

* Diabetes Research Centre and M. V. Hospital for Diabetes, 5, Main Road, Ropapuram, Madras-600 013.

** Institute of Cardiology, Madras Medical College and General Hospital, Madras-600 003.

Received for Publication on 29-8-1983.

Case Reports :

Patient 1 was a 52 year old male with diabetes of 14 years duration. He was admitted to the Diabetes Research Centre and M. V. Hospital for Diabetes, Madras, with history of breathlessness on exertion. He had no history of effort angina, previous myocardial infarction hypertension or any other etiology of heart disease. On examination he was normotensive. He had bilateral pitting pedal oedema, raised jugular venous pressure and a palpable tender liver. On examination of the cardiovascular system a third heart sound was heard.

The X-ray chest showed evidence of cardiomegaly and the cardio thoracic ratio was 0.6. The resting ECG and Exercise ECG were normal. Echo-cardiography was performed which showed evidence of gross left ventricular dysfunction as shown by a markedly reduced ejection fraction (EF) and decreased percentage of shortening of the minor diameter (Vcf).

Biochemical work up revealed severe uncontrolled diabetes with a post prandial blood sugar of 400 mgs%. The diabetes was controlled with calorie restricted diet and insulin initially. Later he was treated with digoxin, diuretics and vasodilators. There was marked improvement in the cardiac condition, and clinically the patient became asymptomatic. The X-ray chest was repeated periodically and over a period of months the heart size came back to normal (Fig I and II). Serial echo-cardiography showed that the left ventricular function also became almost normal. (Table I and Fig. III and IV). The patient has been followed up for 2 years and continues to remain normal clinically, radiologically and echo-cardiographically even after completely withdrawing all cardiac drugs.

Patient 2 was a 50 year old male who had diabetes of 8 years duration. He

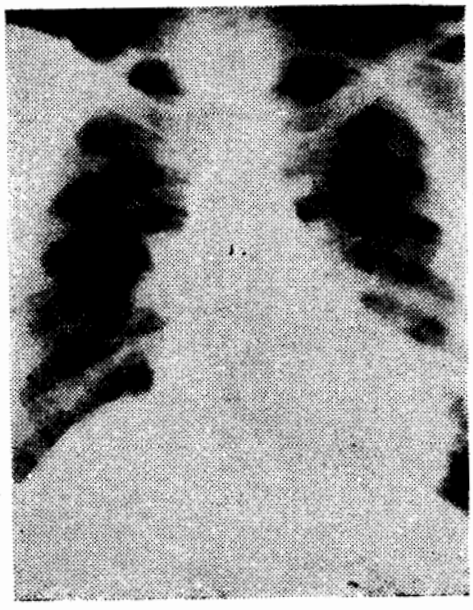

Figure : I

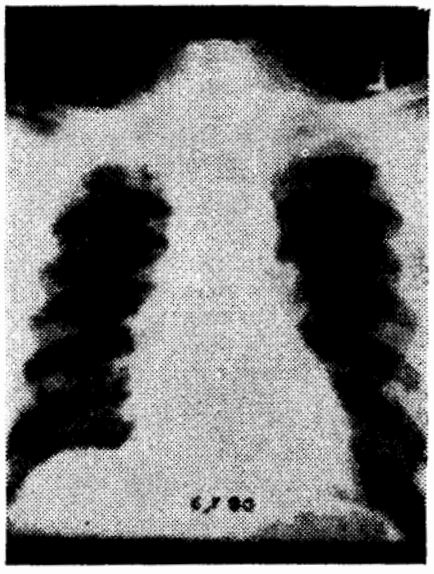

Figure : II

TABLE — 1 :

Echo-Cardiographic Findings of Patient — 1

Echo-cardiographic	Dates			Normal Range
Parameters	31.7.79	2.3.80	9.7.80	
LVIDd cms	4.8	4.5	4.3	38.56
LVIDs cms	4.0	3.5	3.2	2.24
Ejection Fraction (E.F. %)	34.9	46.4	58.8	52.7
% of M.D.	16.7	22.2	25.7	24.46
E. P. S. S. (mm)	12	8	5.5	5.5
L. V. wall motion & septal motion	Abnormal	Normal	Normal	—

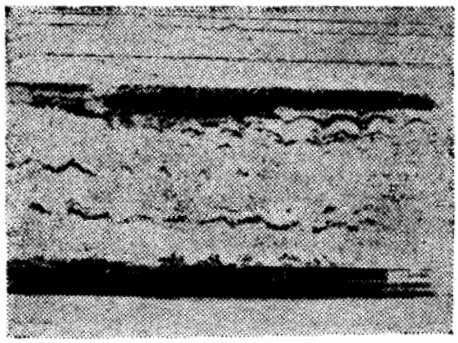

Figure : III

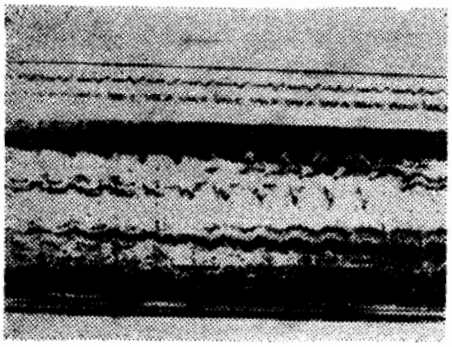

Figure : V

had mild cough for which he had been seen at a medical college hospital. An X-ray chest had been taken and he was diagnosed to have pulmonary tuberculosis and started on streptomycin along with other first line drugs. He developed severe vertigo within a week of treatment. He was seen at that point of time at the Diabetes Research Centre, Madras.

On examination the patient was normotensive. He had minimal pedal oedema and bilateral basal crepitations. X-ray chest showed cardiomegaly and an interlober effusion which had been mistaken for tuberculosis (Fig-V). Resting ECG and Exercise ECG were done which did not reveal any evidence of ischemic heart disease. Echo-cardiography was done which showed gross left ventricular dysfunction with abnormal left ventricular

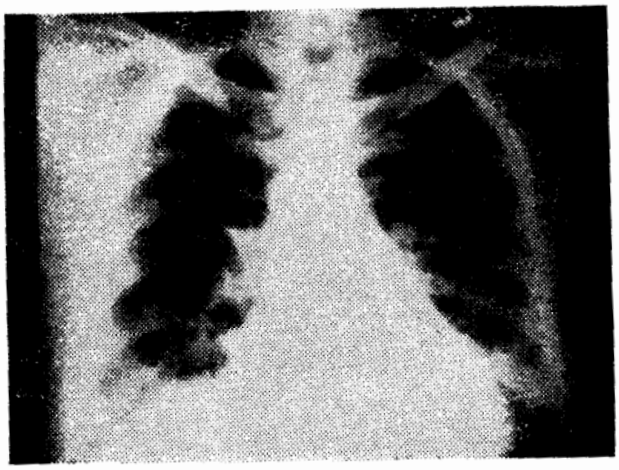

Figure : IV

wall and septal motion. He was treated on the same lines as patient-1. There was considerable improvement clinically. Serial X-rays of the chest showed a reduction in the heart size (Fig-VI). Echo-cardiographically also there was good improvement in L. V. Performance. However after a period of time, he discontinued all treatment. He came back with severe breathlessness and this time the

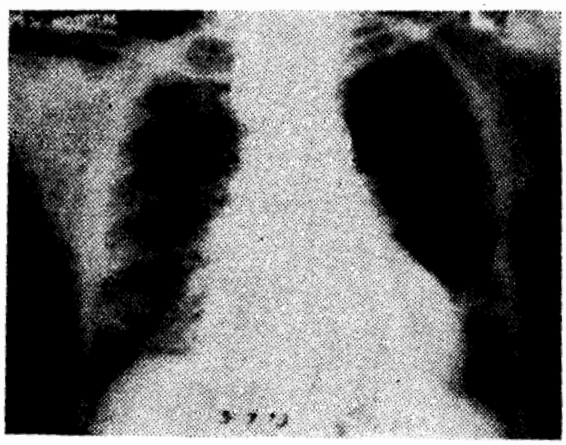

Figure : VII

X-ray chest revealed gross cardiomegaly and a right sided hydrothorax (Fig VII). With intensive treatment of the congestive heart failure, the hydrothorax disappeared and once again the heart size was reduced.

Discussion :

Diabetic cardiomyopathy can be clinically diagnosed by the presence of symptoms of cardiac failure and/or cardiomegaly in a diabetic of fairly long duration in the absence of hypertension, ischemic heart disease and other causes

It has been demonstrated by autopsy by Ledet (5) and by ventricular septal biopsy, in living patients by Pearce et al (7). It may also be diagnosed by using sensitive methods such as echo-cardiography or systemic time intervals (6, 8, 9).

In this paper we have presented two cases of diabetic cardiomyopathy. While there is no histological proof of the diabsence of hypertension, the normal ECG and exercise ECG and absence of other causes of heart disease, strongly suggest the possibility of diabetic cardiomyopathy. Moreover the clinical condition of the two patients did not warrant intensive methods such as endomyocardial biopsy which have hazards of their own.

The first case illustrates the fact that despite having cardiac failure and gross cardiomegaly, these could be reversed with proper treatment. Both the cardiac size and function were brought back to almost normal by simultaneous treatment of the diabetic and cardiac condition. It is known that changes in systolic time intervals could be reversed after diabetes control in early stages of diabetic cardiomyopathy (8). The first case illustrates the prognosis can be quite good if the condition is treated properly.

That this syndrome can often be mistaken for other conditions such as

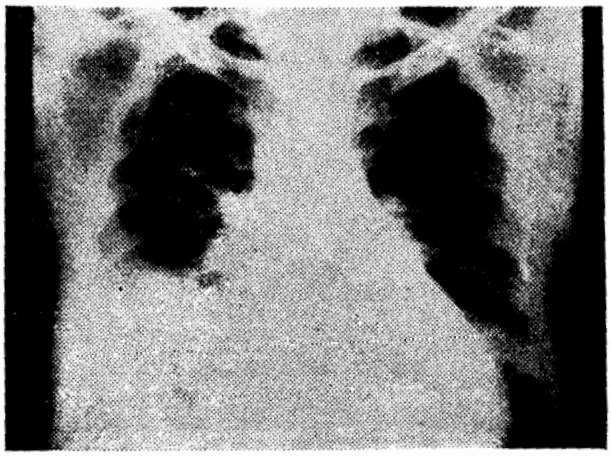

Figure : VI

pulmonary tuberculosis, pleural effusion etc is shown by the second case. Carefully looking for symptoms and signs of congestive cardiac failure will often give us the diagnosis especially when there is obvious cardiomegaly. In all long term diabetics, periodic X-rays of the chest and whenever possible echo-cardiography, will help to detect early stages of diabetic cardiomyopathy so that appropriate treatment could be instituted, at an early stage.

REFERENCES

1. Kannel W. B., Gordon, T. and Sehriartz, M. J. Systolic Versus diastolic blood pressure and risk or coronary heart disease. The Framingham study. Am. J. Cardiol. 1971, 27:335.
2. Hamby, R. T. Zongriach, S. and Shorman, L. J. Amer. Med. Assn. 1974, 229:1749.
3. Rubler, S., Dlugash, J.Z.Y., Yuccoglu, Kimura, L., Bramood, S., T.A.W. and Grishmann, A. A new type of cardiomyopathy associated with diabetic glomerulosclerosis, Am. J. Cardiol. 1982 30 : 595.
4. Tripathy, B. B., J. Ind. Med. Assn. 1973, 61 : 45.
5. Ledet, T. Diabetologia. 1968, 4:268.
6. Thanikachalam, S., Mohan, V., Alagesan, R., Elangovan, D. and Lakshmikanthan, C., Ramachandran, A. and Viswanathan, M. J. Assn. Phys. Ind. 1981, 29 : 267.
7. Zoneriach, S., Zoneraich, O., Rheez, O. Left ventricular performance in diabetic patients without clinical heart disease. Evaluation by systolic time intervals and echocardiography. Ches: 1977, 72 : 748.
8. Senevirathe, B.I.E. Diabetic cardiomyopathy. The preclinical phase. Br. Med. J. 1977, 1 : 1441.
9. Pearce, M. B., Bulloch, R. T. and Kizzier, T. C. Circulation 1973, 38 : Abstract. Suppl 1, 38 : 6.
10. Skyes, C. A., Wright, A. D., Malina, J. M. and Pankoose, B. L. Changes in S.T.I during treatment of Diabetes Mellitus. British Heart Journal. 1977, 39 :255.
11. Agarwal, B. L., Rastogi, D. K., and Guptha, O. P. A study of cardio vascular status in long term diabetics. J. Assn. Phy. Ind. 1977, 25 : 480.

Abstract

Sensitisation to human insulin. Garcia-Ortega P., Knobel H. and Mirada A. Brit Med J 288 : 1271, 1984.

This is a report of a diabetic who developed severe clinical allergy to a mixture of porcine and bovine insulins. He had not received human insulin. But he showed antibodies of IgE and IgE classes to human insulin. Sensitisation to animal insulin may result in sensitisation to human insulin. Any change from animal to human insulin in patients allergic to animal insulin, should be made with caution. Authors suggest that treatment with human insulin should be considered in patients with atopy or allergy to drugs.

A.S.G.