An Autopsy Case of Idiopathic Myocardial Hypertrophy, the Heart Weight of which indicated 1,000 gr

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SINCE JOSSERAND & GALLAVARDIN¹⁷ described three cases of what they termed "progressive failure of young subjects due to primary subacute myocarditis," the group of diseases of cardiac enlargement which is of unknown cause and frequently leads to cardiac dilatation, congestive heart failure, and finally to death, has been reported by many authors on the synonyms of idiopathic cardiac hypertrophy,³⁰ primary myocardial disease,^{2,3} cardiomyopathy¹¹ and myocardosis³ etc.

By the definition of these diseases, no definite conclusion has been reached to their entity despite that secondary forms of cardiac enlargement complicating with hypertensive heart disease, occlusive coronary disease and valvular heart disease have been excluded.⁸

HUDSON¹⁶ found it was useful to apply 8 criteria; 4 negative and 4 positive, in making naked-eye diagnosis of cardiomyopathy at necropsy. The 4 negative features are: 1. no coronary disease or anomaly; 2. no valve disease or anomaly; 3. no hypertension; 4. no shunt inside or outside the heart. The 4 positive features are: 1. cardiomegaly; 2. endocardial thickening; 3. mural thrombus; 4. scars or other lesion.

NADES²⁴ stated that cardiac enlargement without typical cardiac murmur and electrocardiographic abnormality manifested ST-T changes were most important for clinical diagnosis of primary myocardial disease and that any shunt, pericarditis, paroxysmal supraventricular tachycardia, arterial hypertension, renal disease, neuro-

muscular disorders and any infections should be excluded.

MATTINGLY²⁵ extended the category of primary myocardial disease, which included myocarditis, cardiomegaly complicating with neuro-muscular disorders, primary myocardial neoplasmas etc.

By FOWLER et al⁷, the concept of primary myocardial disease implies familial, non-familial cardiomegaly, endocardial fibroelastosis, endomyocardial fibrosis and postpartum heart disease.

GOODWIN et al¹¹ suggested that cardiomyopathy might arise in three principal ways: that was congestive, obstructive and constructive type.

SEGAL & HARVEY^{15,29} preferred broader classification to primary myocardial disease and divided their patients into two groups, one specific etiology and other idiopathic.

At symposium on idiopathic myocardial fibrosis and allied disease in Japan (1966),³³ it was discussed that primary myocardial disease would be transformed to allied disease, and the concept of primary myocardial disease was too ambiguous to draw distinctions from the border-line or related elements.

Recently co-operative studies of clinicians and pathologists¹² had an effort to definite the entity of idiopathic myocardial hypertrophy, but definite concept was not revealed.

This report will present a case, which had a prominent cardiomegaly, died following an episodes of cardiac failure for long duration, and showed at autopsy the cardiac hypertrophy belonging to idiopathic.

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CASE REPORT

A 62 years old male was admitted to the Fukuoka Red Cross Hospital on March 18, 1968, because of symptoms of congestive heart failure such as dyspnea, palpitation on exertion, cough, sputum and edema on legs.

At the age of 52, his X-ray film showed an abnormal cardiac enlargement.

He had been admitted to Kumamoto National Hospital and Fukuoka Red Cross Hospital in 1964, 1966 and 1967 for the similar complaints, which was relieved every time by internal medical therapy. He had no illness such as rheumatic fever and another infections in the past, and in his family there was no patients with similar symptoms.

A physical examination revealed edema on his legs and face, ascites on the height of his umbilicus on standing position.

Pulse rate was 88 per minute with a irregular rhythm and well tension. The apex beat was forcible and displaced as far as the left anterior axillary line.

On auscultation of heart, a soft systolic murmur in the apex intermittently, a diastolic rumble in aortic area always and pan-systolic murmur in the fifth right intercostal space just beyond the right line of sternum were heard. The second sound was accentuated over the entire precordium but not split.

The friction-rub on the left lung and moist râle on the right lung entirely heard.

The liver edge was palpable 2 fingerbreadth below the right costal margin with moderate tenderness. There was no splenomegaly.

The blood pressure was 140/0 on the lying

position.

Fluoroscopy of the chest revealed generalized cardiac enlargement, left atrium, ventricle and right ventricle especially.

An electrocardiogram showed atrial fibrillation, right axis deviation, incomplete right bundle branch block and myocardial damages with ST-T changes.

Laboratory examination were as summarized in Table I.

Clinical diagnosis was interpreted as combined valvular heart disease with mitral and aortic stenosis insufficiency.

The patient temporarily recovered with digitalis, diuretics and coronary dilatator. At last a week prior to his death, the decompensation of heart gradually developed and he died on February 25, 1969.

AUTOPSY FINDINGS

A) Macroscopic Findings:

Body height 166 cm. Body weight 59 kg.

There was edema on the both legs. The enlarged pericardial cavity was situated in nearly whole thoratics, and both lungs were pushed out toward lateral sides. The height of diaphragma was at the fifth intercostal space. The left pleural cavity was obliterated by fibrotic adhesion, 300 ml of amber fluid was noted in the right pleural cavity and 150 ml in the pericardial cavity. In abdominal cavity, 400 ml of yellowish brown, turbid fluid was found, the liver was swollen and reached 5 fingerbreadth below the xyphoid process.

The heart weighed 1,000 gr and was symmetrically enlarged due to dilatation of all chambers

TABLE I LABORATORY DATA

<i>Serum Wasserman reaction negative</i>	
<i>Blood sedimentation rate 3 mm/1⁰</i>	
<i>Blood study:</i>	
<i>Hb (Sahli)</i>	<i>.78%</i>
<i>R.B.C.</i>	<i>408 × 10⁴</i>
<i>W.B.C.</i>	<i>9,200</i>
<i>Hemogram.</i>	<i>normal</i>
<i>Urinalysis:</i>	
<i>Protein</i>	<i>negative</i>
<i>Sugar</i>	<i>negative</i>
<i>Urobilinogen</i>	<i>normal</i>
<i>Blood chemistry:</i>	
<i>Total protein</i>	<i>6.4 gr/dl</i>
<i>A/G</i>	<i>1.38</i>
<i>Urea N.</i>	<i>26.1 mg/dl</i>
<i>Na.</i>	<i>145 mEq/l</i>
<i>K</i>	<i>4.4 mEq/l</i>
<i>Icterus index</i>	<i>3</i>
<i>GOT.</i>	<i>57</i>
<i>GPT.</i>	<i>23</i>
<i>CoCl₂</i>	<i>R₅(6)</i>
<i>Thymol test</i>	<i>4.3</i>
<i>Zn turbid test</i>	<i>14.7</i>
<i>Total cholesterol</i>	<i>141 mg/dl</i>
<i>ASLO</i>	<i>125 unit</i>
<i>CRP.</i>	<i>negative</i>
<i>RA test</i>	<i>negative</i>

and hypertrophy of both ventricles (thickness of ventricular wall, left 2.5 cm, right 1.0 cm). The fibrotic thickness of valves, generally on the aortic and partially on the mitral was found, causing their stenosis, but on the tricuspid and pulmonary valves that was not significant. The endocardium was smooth and glossy but revealed thickening of the wall below the base of the aortic leaflet. The myocardium was firm and reddish brown without discoloration and scars. The mural thrombus could not be seen. The coronary arteries and coronary sinus were widely patent at ostia, but no atherosclerosis.

In other organs, the both lungs contained increased fluid, the liver weighed 1,500 gr and showed prominent congestion. Urinary cysts were found on both kidneys. Slight atherosclerosis with calcification was seen on the aorta.

B) Microscopic Findings:

Heart: The celloidin-embedded large preparation of myocardium revealed prominent hypertrophy of many myocardial fibers with numerous bizarre nuclei. But there were no evidence of myocardial degeneration and necrosis. On the entire left ventricular wall, a finger-like interstitial network of fibrosis with a fibroblastic and collagenous fiber-proliferation, which separated the bundle of muscle fibers, was noted. More prominent areas of scarring were present in the perivascular area, consisting of dense hyaline and collagen. Papillary muscle revealed a little fibrosis. There were seen neither extensive scar nor endocardial fibroelastosis. Inflammatory cell infiltration was not seen in any areas. Coronary arteries showed moderate atherosclerosis without stenosis and intramural small arteries showed no changes.

Lungs: Prominent congestion and edema with partial emphysema were seen on both lungs. Numerous large phagocytes, contained hemosiderin, so-called heart failure cells, filled up the alveoli and alveolar septi were slightly thickened. No inflammatory cell infiltration was seen.

Kidneys: Upper renal tubules were extended and their epitheli were swollen. Moderate atherosclerosis was seen on arteries but no changes on arterioles. There were no pathological changes on glomerulus.

Liver: Prominent congestion was seen. In GLISSON's sheath there were slight proliferation of connective fibers and lymphocytic infiltration.

Other organs: The spleen showed prominent congestion, and the adrenal glands showed cortical atrophy. In gastrointestinal tracts mucous catarrh and moderate congestion were found. Aortic

intima with moderate fibrous thickening contained a few numbers of foam cells.

Pathological Diagnosis:

1. Idiopathic myocardial hypertrophy (heart weight 1,000 gr) with relative insufficiency of aortic and mitral valves
2. Prominent congestion on general organs
3. Anasarca and hydrops (ascites 400 ml, right pleural fluid 300 ml and pericardial fluid 150 ml)
4. Prominent pulmonary edema and subcutaneous edema on both legs
5. Pulmonary saccular emphysema on the left upper lobe
6. Fibrous pleural adhesion, left
7. Multiple cysts on kidneys
8. Moderate atherosclerosis of aorta
9. Bilateral hydrocele testis
10. Slight osmotic nephrosis
11. Slight glandular hypertrophy of prostate

The cause of death was cardiac failure.

DISCUSSION

The patient repeated the symptoms of cardiac failure, with death coming ten years after the cardiomegaly was indicated. There was no hypertension. While autopsy-findings revealed the cardiac enlargement and myocardial hypertrophy, there were no evidences of pathological changes on the cardiac valve, coronary arteries and intramural small arteries.

Histologically hypertrophy of myocardial fibers and slightly diffuse interstitial fibrosis were seen. There were neither endothelial thickening nor deposits of amyloid and glycogen in myocardial cells.

Familial incidence of cardiomyopathy was not found.

These findings conform to the criteria of idiopathic myocardial hypertrophy already reported.

On gross examination, from the reported cases of idiopathic myocardial hypertrophy in the literature, the heart may show generalized ventricular hypertrophy and varying degree of dilatation, usually right atrium^{8,22} No pathological changes on the valve^{5,22} and epicardium in the majority but some authors showed slight thickening on the mitral and tricuspid valves, collagenous thickening^{15,28} or round cell infiltration²⁸ of epicardium.

Almost of cases revealed no prominent changes in endocardium,⁸⁻¹⁰ but ever endocardial fibroelastosis or endomyocardial fibrosis was noted in a few cases.^{5,15,22}

FOWLER et al.⁸⁻¹⁰ noted wall-standing-thrombus in the half of their cases and another authors^{5,15,22} reported the cases with mural thrombus.

The microscopic picture might be more varied. Myocardial hypertrophy was constant findings, but the amount of myocardial fibrosis varied considerably from none to gross scars, that was, in the cases of MASSUMI et al.²² diffuse type of fibrosis took the greater part, in ones of FOWLER et al.⁷⁻¹⁰ and SANDERS et al.²⁸ focal lesion type of fibrosis was shown. However, DYE et al.⁵ noted extensive scars.

Microscopic evidence of vacuolation, fatty degeneration and glycogen accumulation in the heart muscle were seen, but it was not particular.^{21,28}

Although inflammatory cells were usually not present,⁵ in a few cases there was enough infiltration of cells to indicate a myocarditis.^{10,22,29}

OKADA^{25,34} collected the 67 cases of idiopathic myocardial hypertrophy from the literature. He summarized the most of the pathologic findings of reported cases was the muscular hypertrophy and dilatation of both ventricles. The vacuolation, mucoid or fatty degenerations of myocardium were observed in the half of these cases and loss of myocardial fibers and myocardial necrosis, infiltration of lymphocytes, plasma cells and histiocytes were noted in a few cases. The myocardial fibrosis was found in 29%, and these patterns were the replacement of the lost myocardium, interstitial form due to myocardial

edema and irregular form scattered in perivascular area.

The present case may be required the differentiation from a myocarditis, especially viral myocarditis³⁶ of FOWLER's secondary myocardial disease⁷ or of SEGAL's specific myocardial disease.¹⁵

The symptoms and clinical course of the patient may be distinguishable from the acute stage of myocarditis, and its pathological feature of myocardial fibrosis would not indicate the scars after the chronic myocarditis.

In the published cases of obscure cardiac enlargement with fibroelastosis,^{15,20,22} the familiar metabolic disturbance or infantile myocarditis in infant,^{18,19} and non-specific reaction due to chronic congestive heart failure in adult,³⁵ were often discussed. But in this case the endocardial fibrosis was not observed.

The familial and hereditary nature of the illness should be discussed on the strict search for familial history, whereas idiopathic cardiomegaly

TABLE II THE CASES OF PRIMARY MYOCARDIAL DISEASE, OF WHICH THE HEART WEIGHED OVER 800 GR

Fowler ⁹	1965	825 gr	Endocardial fibroelastosis
Sugiura ³¹	1967	815 gr	Idiopathic cardiomegaly
Kurose ²¹	1968	850 gr	Idiopathic myocarditis
Dye ⁵	1963	850 gr	Endocardial fibroelastosis
Dye ⁵	1963	1020 gr	Idiopathic cardiomegaly
Evans ⁶	1949	1134 gr	Familial cardiomegaly
Doane ⁴	1944	1150 gr	Idiopathic cardiomegaly
Oosuzu ²⁶	1962	1350 gr	Familial cardiomegaly

TABLE III THE AUTOPSIES, OF WHICH THE HEART WEIGHED OVER 800 GR IN THE DEPARTMENT OF PATHOLOGY, KYUSHU UNIVERSITY

1.	800 gr	67 yr.	M	Aortic valve disease
2.	800 gr	27 yr.	M	ASD + Mitral valve disease + Pericarditis constrictiva
3.	800 gr	30 yr.	F	Aortic atherosclerosis with severe stenosis
4.	800 gr	47 yr.	M	Aortic and mitral valve disease
5.	808 gr	58 yr.	M	Mitral valve disease + Arteriosclerosis + Nephrosclerosis
6.	820 gr	31 yr.	M	Aortic valve disease
7.	820 gr	22 yr.	M	Mitral and aortic valve disease + Pericarditis
8.	820 gr	39 yr.	M	Mitral and aortic valve disease
9.	833 gr	46 yr.	M	Mitral valve disease + Arteriosclerosis + Nephrosclerosis
10.	835 gr	30 yr.	F	Aortic valve disease + Aortic aneurysm
11.	900 gr	23 yr.	M	Pericarditis fibrosa chronica
12.	920 gr	30 yr.	M	Fallot's tetralogy
13.	922 gr	23 yr.	M	Patent ductus Botalli + Aortic and mitral valve disease
14.	925 gr	54 yr.	M	Right iliac arterial aneurysm + Pericarditis chronica + Myocardial scars
15.	932 gr	40 yr.	M	Aortic valve disease + Arteriosclerosis
16.	940 gr	33 yr.	M	Marfan's syndrome
17.	980 gr	25 yr.	M	Aortic and mitral valve disease
18.	1000 gr	62 yr.	M	Idiopathic cardiomegaly

must be excluded from the cardiac enlargement of obvious cause.³⁴ The similarity of the pathologic feature between idiopathic and familial cardiomegaly was reported,^{1,6,27} but in a few cases of familial cardiomegaly, medial hypertrophy of intramyocardial small arteries was noted.^{2,32}

The heart of the present case weighed 1,000 gr. It is known that the heart weight may be influenced by age, body height and body weight.

While the special features of primary myocardial disease might be cardiomegaly, the heart weight of the almost cases reported was within 500–600 gr.^{5,8,25,34}

The cases of primary myocardial disease reported in literature, the heart weight of which were over 800 gr, were illustrated in Table II.

In a series of 15,700 consecutive autopsies in the Department of Pathology, Kyushu University during the past 64 years, there were 18 cases, the heart weight of which weighed over 800 gr^{13,14} (Table III).

The heart weight of the present case was the largest of these 18 cases, the majority of which revealed cardiac valve disease and combined two or more diseases that developed cardiac enlargement.

An eminent cardiac enlargement of 1,000 gr due to unknown etiology as this case would be rare for a Japanese.

SUMMARY

This report presented a case, a male, 62 years, which having a prominent cardiomegaly, died following an episodes of heart failure for ten years.

At autopsy cardiac hypertrophy of 1,000 gr in weight was found and cause of cardiac enlargement was of unknown etiology. The similarity of pathologic features between this case and idiopathic myocardial hypertrophy from literature, was discussed and 18 cases with the heart weight over 800 gr, in autopsy cases at the Department of Pathology, Kyushu University, were reported.

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LEGENDS FOR FIGURES

Fig.1. The electrocardiogram showing atrial fibrillation, incomplete right bundle branch block and myocardial damages with ST-T changes.

Fig.2. The X-ray film of the chest. The shadow of the heart indicates the enlargement of right atrium and both ventricles.

Fig.3. Gross appearance of the heart (The front).

Fig.4. Gross appearance of the heart (The back). Prominent dilatation of right atrium.

Fig.5. Cutting of left ventricle reveals fibrous thickening of aortic valve.

Fig.6. The celloidin-embedded large preparation of myocardium is showing dilatation of both ventricles, and hypertrophy of left ventricular wall.

Fig.7. Hypertrophy of myocardial fibers and slight interstitial fibrosis. H-E stain. 96 X.

Fig.8. Small scars of connective tissues in the perivascular areas. The small intramural artery does not show any changes. H-E stain. 96 X.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 6.

Fig. 5.

Fig. 7.

Fig. 8.