Lymphocytic myocarditis as a cause of fulminant fatal heart failure

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A 63-year-old Hispanic woman with prior systemic hypertension was well until 39 days before death when she fainted in her kitchen and was hospitalized. An electrocardiogram and telemetry monitoring disclosed sinus bradycardia (50 beats per minute) with first-degree atrioventricular block, left bundle branch block, frequent atrial and ventricular premature complexes, and sinus pauses up to 8 seconds. An echocardiogram showed mitral regurgitation (2+/4+) and an ejection fraction of 60%. An angiogram disclosed normal coronary arteries. The left ventricular and aortic pressures were normal. During her 3 days in the hospital, she had recurrent sinus pauses with associated syncope, and a permanent atrioventricular sequential pacemaker was implanted.

Thereafter, she felt well and was active until 22 days before she died, when exertional dyspnea appeared and progressed, prompting rehospitalization 20 days before death. Her blood pressure was 120/75 mm Hg, her paced heart rate was 80 beats per minute, and her temperature was normal. A grade 2/6 apical systolic ejection murmur and a third heart sound were audible. She had diffuse pulmonary rales and decreased breath sounds at both lung bases. A chest radiograph showed pulmonary vascular congestion, cardiomegaly, and bilateral pulmonary effusions. An electrocardiogram disclosed atrioventricular sequentially paced rhythm with no ST-T changes. Her serum troponin I level was 6.6 ng/mL, and her creatine phosphokinase level was 189 U/L with an MB fraction of 39 ng/mL. Her brain natriuretic peptide level was 2570 ng/L, and her white blood cell count was $10.7 \times 10^3/\text{mm}^3$. An echocardiogram showed severe global hypokinesis with an ejection fraction of 35%.

Over the subsequent 19 days in the hospital, the patient's status progressively deteriorated, requiring intravenous inotropic support, mechanical ventilation, and continuous veno-venous hemodialysis. She also developed hemodynamically unstable

Figure. The heart in the patient described. (a) View of dilated right and left ventricles just caudal to the atrioventricular valves. (b) Transverse cuts of the cardiac ventricles. (c) Close-up view of the ventricular septum and right and left ventricular walls. Linear scars are present in the septum and in the posterior wall of the left ventricle. (d) Low-power view of foci of lymphocytes in an area of scar. (e) Low-power view of collections of lymphocytes in areas of scar between muscle bundles. (f) Higher-power view of lymphocytes associated with myofiber necrosis. Hematoxylin and eosin stains. (Photographs by Jong Mi Ko.)

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atrial fibrillation and had multiple electrical cardioversions. Right-sided heart catheterization a day before death showed the following pressures (in mm Hg): right atrial mean, 15; right ventricle, 25/10; pulmonary artery, 30/20. The cardiac output was 2.1 L/min and the cardiac index, 1.1 L/min/m². She was transferred to Baylor University Medical Center 12 hours before death, which resulted from inadequate perfusion of multiple body organs.

At necropsy, the heart weighed 470 grams. The quantity of subepicardial adipose tissue was increased. The coronary arteries were widely patent with no identifiable plaques. All 4 cardiac chambers were dilated (Figure). The 4 valves were anatomically normal. Multiple myocardial lesions were present grossly in the left ventricular wall and ventricular septum, and histologically numerous foci of lymphocytic infiltrates were present with associated myocardial cell necrosis and foci of replacement fibrosis (Figure).

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This patient had a clinical course of about 40 days, and it was characterized initially by syncope, presumably the result of prolonged sinus pauses without electrocardiographic evidence of myocardial damage. Her final 20 days were characterized by progressive and finally fatal heart failure. Cardiac studies during her final days disclosed angiographically normal coronary arteries but generalized inadequate cardiac function. This short clinical course suggests, of course, an acute myocarditis that would be characterized by the presence of numerous polymorphonuclear leukocytes in the myocardial walls. What was observed histologically, however, was the presence of numerous lymphocytes in the ventricular walls and associated microventricular scars compatible with her 40-day course. No polymorphonuclear leukocytes were seen in the myocardial walls.

Such cases appear unusual. One of us (WCR) has previously studied at necropsy 14 patients who had died suddenly out of the hospital from lymphocytic myocarditis without evidence of congestive heart failure (1, 2), and others have described similar cases (3–9). The present case of lymphocytic myocarditis with clinical evidence of heart failure is the first seen by one of us (WCR). A search of previous publications disclosed only 9 previously reported patients with fatal heart failure from lymphocytic myocarditis (Table) (10–13). Why patients with lymphocytic myocarditis appear to present more frequently with sudden arrhythmia—either fatal or nonfatal—than with heart failure is unclear. Such, however, is the uniqueness of the patient described here.

Table. Data in 9 previous necropsy reports of patients with lymphocytic myocarditis and fatal heart failure

Case	First author, year (reference)	Age at death (years)	Sex	Previous signs and symptoms	Months of illness before death	Prior conduction defect (type)	Heart weight (grams)
1	Kawai, 1988 (10)	18	F	URI, dyspnea, palpitations	11	0	370
2	Kawai, 1988 (10)	28	M	URI, dyspnea, edema	78	0	660
3	Okabe, 1992 (11)	54	F	Chest pain	74	+ (3°)	480
4	Okabe, 1992 (11)	56	F	Dyspnea	36	+ (IVCD)	530
5	Okabe, 1992 (11)	52	F	Dyspnea	36	+ (IVCD)	430
6	Morimoto, 1992 (12)	31	F	URI	12	+ (IVCD)	510
7	Morimoto, 1992 (12)	40	M	Dyspnea, edema, fever	21	0	940
8	Morimoto, 1992 (12)	7	F	Abdominal pain, dyspnea, fever	6	+ (2°)	280
9	Itoh, 1997 (13)	47	F	Fever, nausea	0.7	+ (3°)	NA

URI indicates upper respiratory infection; IVCD, intraventricular conduction delay; 2°, type II second-degree heart block; 3°, third-degree heart block; NA, not available.

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