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Surgical Treatment for Löffler's Endocarditis With Left Ventricular Thrombus and Severe Mitral Regurgitation: A Case Report

Hidekazu TANAKA, MD
Hiroya KAWAI, MD, FJCC
Kazuhiro TATSUMI, MD
Toshiya KATAOKA, MD
Tetsuari ONISHI, MD
Takahisa NOSE, MD
Takahiro MIZOGUCHI, MD
Mitsuhiro YOKOYAMA, MD,FJCC
Yutaka OKITA, MD*

Abstract

A 65-year-old female was admitted to our hospital because of dyspnea. Laboratory examinations revealed hypereosinophilia at a local hospital. Transthoracic and transesophageal echocardiography showed normal left ventricular dimension and function. The left ventricular apex was obliterated and the posterior and lateral walls were thickened by an abnormal mass. The posterior mitral leaflet was encapsulated by this abnormal mass. The limited motion of the posterior mitral leaflet caused mitral malcoaptation, resulting in severe mitral regurgitation. Hypereosinophilia was considered to be idiopathic, as no other disorders known to cause secondary eosinophilia were found. No other organ dysfunction was associated with the condition. Thus, the diagnosis was Löffler's endocarditis associated with hypereosinophilic syndrome. The patient was given conservative medical treatment immediately on admission. However, heart failure caused by mitral regurgitation would be difficult to treat with conservative medical treatment, so we chose a surgical strategy. The symptoms obviously improved after valve replacement and removal of the abnormal mass, and the patient was discharged. However, she died of cerebral infarction at a local hospital 3 months later.

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Key Words

■**Endocarditis (Löffler's endocarditis)** ■**Mitral valve, regurgitation**
■**Mitral valve, replacement** ■**Thrombosis**

INTRODUCTION

Löffler's endocarditis is a rare cardiac condition with a poor prognosis[1–3]. Endomyocardial damage and fibrosis as well as mural thrombus restrict the filling and output of the ventricle and also interfere with movement of the atrioventricular valves, leading to significant valvular regurgitation[1,2,4,5]. Conservative treatment with cortisone, or immunosuppressive or cytotoxic agents is often disappointing or leads to remissions of short duration. Therefore, surgical correction of such a life-threat-

神戸大学大学院医学系研究科 循環呼吸器病態学，*呼吸循環器外科学：〒650–0017 神戸市中央区楠町7–5–2
Division of Cardiovascular and Respiratory Medicine, Department of Internal Medicine, *Department of Cardiovascular, Thoracic, and Pediatric Surgery, Kobe University Graduate School of Medicine, Kobe
Address for correspondence: KAWAI H, MD, FJCC, Division of Cardiovascular and Respiratory Medicine, Department of Internal Medicine, Kobe University Graduate School of Medicine, Kusunoki-cho 7–5–2, Chuo-ku, Kobe 650–0017 ; E-mail : hkawai@med.kobe-u.ac.jp
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Table 1 Laboratory data upon admission to a local hospital (January 4, 2003)

Complete blood cell count		ALP	610 IU/*l*
WBC	7,920/μ*l*	γ-GTP	141 IU/*l*
Neu	36.6%	LDH	606 IU/*l*
Eosino	39.3%	CK	47 IU/*l*
Baso	0.4%	TC	181 mg/d*l*
Lym	16.0%	TG	71 mg/d*l*
Mono	7.7%	HDL-C	47 mg/d*l*
RBC	345×10^4/μ*l*	Na	139 mEq/*l*
Hb	10.3 g/d*l*	K	3.9 mEq/*l*
Ht	31.3%	Cl	108 mEq/*l*
Plt	8.1×10^4/μ*l*	CRP	11.0 mg/d*l*
Blood chemistry		Arterial blood gas (room air)	
BUN	28 mg/d*l*	pH	7.441
Cr	0.97 mg/d*l*	P_{CO_2}	31.5 mmHg
T-Bil	0.81 mg/d*l*	P_{O_2}	58.5 mmHg
AST	43 mg/d*l*	O_2Sat	91.6%
ALT	31 mg/d*l*	BE	−1.2 mmol/*l*
ChE	123 IU/*l*	HCO_3^-	21.4 mmol/*l*

Table 2 Laboratory data upon admission to our hospital (February 7, 2003)

Complete blood cell count		T-Bil	1.0 mg/d*l*
WBC	3,500/μ*l*	AST	41 mg/d*l*
Neu	65.0%	ALT	26 mg/d*l*
Eosino	1.0%	ChE	118 IU/*l*
Lym	28.0%	ALP	220 IU/*l*
Mono	6.0%	γ-GTP	62 IU/*l*
RBC	268×10^4/μ*l*	LDH	456 IU/*l*
Hb	7.8 g/d*l*	CK	38 IU/*l*
Ht	23.8%	TC	200 mg/d*l*
Plt	4.2×10^4/μ*l*	TG	87 mg/d*l*
Coagulation system		HDL-C	47 mg/d*l*
APTT	35.8%	Na	130 mgEq/*l*
PT	87.2%	K	4.7 mEq/*l*
PT-INR	1.06	Cl	94 mEq/*l*
FDP	16.4 μg/m*l*	CRP	0.39 mg/d*l*
D-dimer	20.9 μg/m*l*	Arterial blood gas (O_2 6 *l*)	
ATIII	66%	pH	7.506
Blood chemistry		P_{CO_2}	30.8 mmHg
TP	6.6 g/d*l*	P_{O_2}	214 mmHg
Alb	3.0 g/d*l*	O_2Sat	100%
BUN	25 mg/d*l*	BE	1.6 mmol/*l*
Cr	1.63 mg/d*l*	HCO_3^-	25.9 mmol/*l*

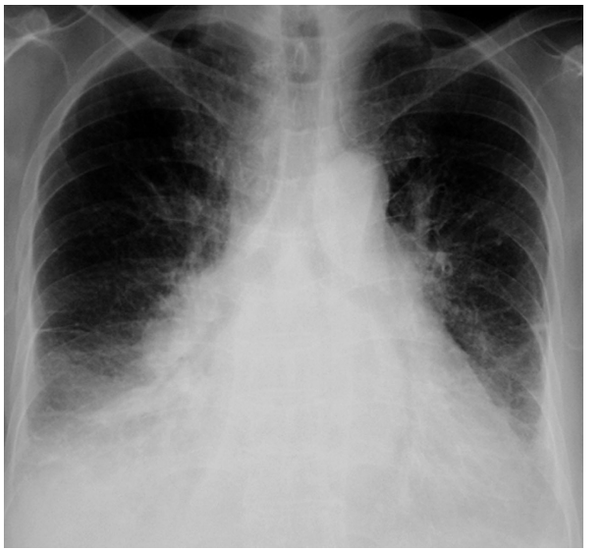

Fig. 1 Chest radiograph

ening mechanical disturbance of cardiac function seems worthwhile[6]. We describe a case of Löffler's endocarditis complicated with severe mitral regurgitation which was successfully treated by cardiac surgery. However, the patient died of cerebral infarction 3 months after surgery.

CASE REPORT

A 65-year-old female was admitted to a local hospital because of dyspnea accompanied by severe mitral regurgitation and pulmonary congestion. Laboratory examinations revealed hypereosinophilia (**Table 1**). She was treated with diuretics, human atrial natriuretic peptide and dopamine for congestive heart failure. She was transferred to our institution 1 month later due to refractory heart failure.

Physical examination showed blood pressure of 106/70 mmHg and a regular pulse of 120 beats/min. A Levine IV/VI holo systolic murmur and III sound was observed in the apex. Coarse crackles were heard in both lower lung fields and edema was observed in both crus. Laboratory examinations (**Table 2**) revealed a leukocyte count of 3,500/μ*l* with 1.0% eosinophils (absolute eosinophil count 35/μ*l*). Chest radiography (**Fig. 1**) revealed pulmonary congestion, bilateral pleural effusion and cardiomegaly (cardiothoracic ratio of 66%). Electrocardiography (**Fig. 2**) revealed sinus tachycardia and poor R progression in leads V_1 to V_4.

Thoracic enhanced computed tomography (**Fig. 3**) revealed an old thrombus-like low-density mass at the left ventricular apex. Coronary angiography

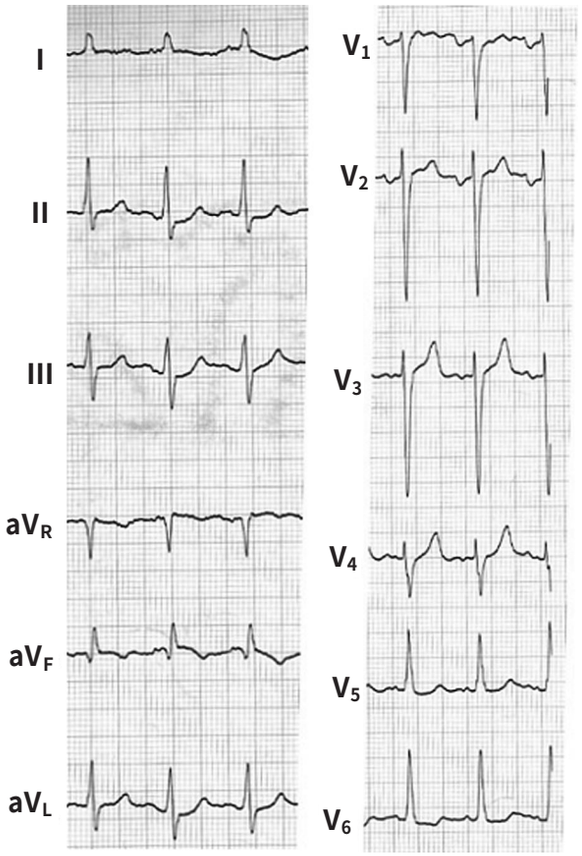

Fig. 2 Electrocardiogram

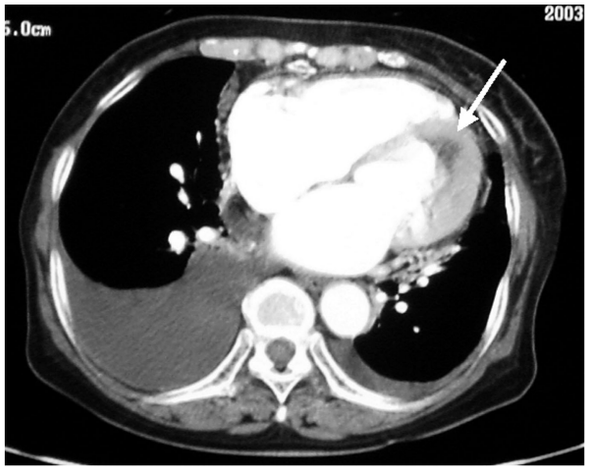

Fig. 3 Thoracic enhanced computed tomogram
An old thrombus-like low-density mass was shown at the left ventricular apex (*arrow*).

did not reveal significant stenosis but left ventriculography (**Fig. 4**) confirmed the thoracic computed tomography findings. Her mitral regurgitation was Seller's grade III, and ejection fraction, pulmonary

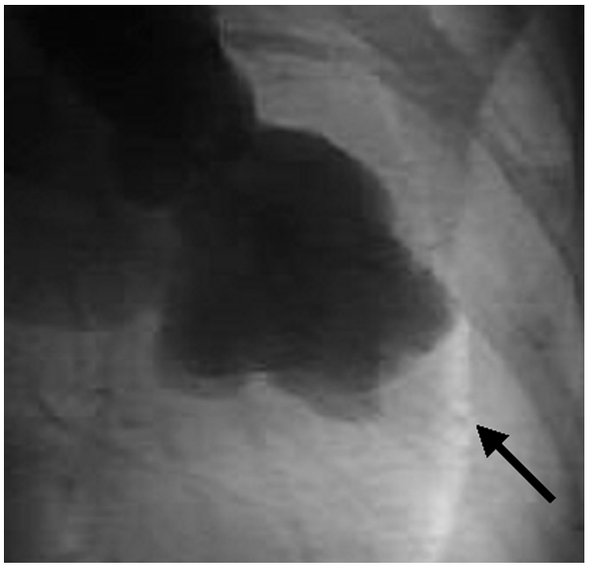

Fig. 4 Left ventricular angiogram (enddiastole)
The left ventricular apex was obliterated (*arrow*).

capillary wedge pressure, pulmonary artery pressure, and cardiac index were 65%, 22 mmHg, 72/32 mmHg and 2.30 *l*/min/m^2, respectively.

Transthoracic echocardiography (**Fig. 5**) showed that the left atrial diameter was slightly increased, and the left ventricular dimension and function were within the normal range. The left ventricular apex was obliterated and the posterior and lateral walls were thickened by an abnormal mass. The anterior mitral leaflet was normal, but the posterior mitral leaflet, its chordae tendinae, and papillary muscle were encapsulated by the abnormal mass. Mitral regurgitation was severe due to apical displacement of the coaptation point of the mitral leaflets. Moderate tricuspid regurgitation was evident and the estimated pressure difference between the right ventricle and the atrium was 78 mmHg, suggesting severe pulmonary hypertension. Transesophageal echocardiography (**Fig. 6**) clearly revealed the abnormal mass in the mitral valve apparatus, leading to mitral malcoaptation.

Hypereosinophilia was considered to be idiopathic, as no other disorders known to cause secondary eosinophilia were found. No other organ dysfunction was associated with the condition. Thus, the diagnosis was Löffler's endocarditis associated with hypereosinophilic syndrome.

Upon admission, the patient was treated with oxygen inhalation, diuretics, dopamine, dobutamine and human atrial atriuretic peptide, but the

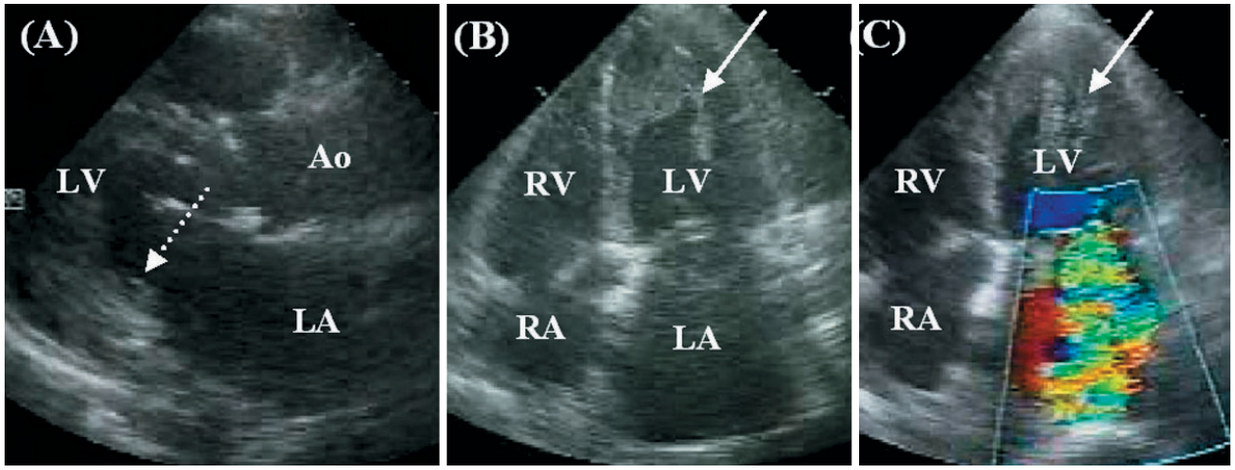

Fig. 5 Transthoracic echocardiograms
A: Parasternal long-axis view. *B*: Apical four-chamber view. *C*: Apical four-chamber view (color Doppler).
The left ventricular apex was obliterated, and the posterior and lateral walls were thickened by an abnormal mass that differed from the myocardium (*arrow*). The anterior mitral leaflet was normal, but the posterior mitral leaflet was encapsulated by the abnormal mass (*dotted arrow*). Mitral regurgitation was severe due to apical displacement of the coaptation point of the mitral leaflets.
LV = left ventricle; Ao = aorta; LA = left atrium; RV = right ventricle; RA = right atrium.

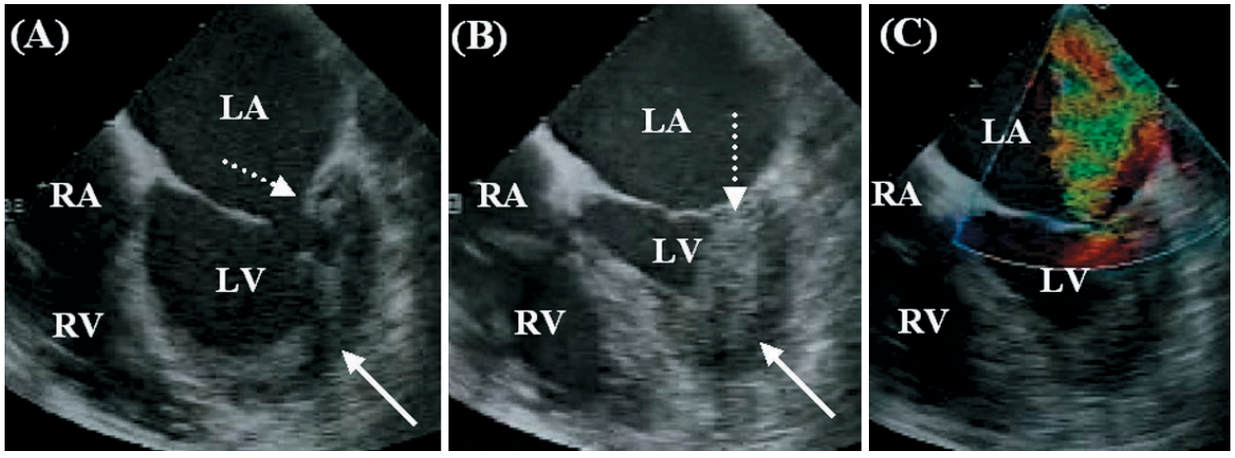

Fig. 6 Transesophageal echocardiograms
A: Enddiastole. *B*: Endsystole. *C*: Color Doppler.
The abnormal mass was shown in the left ventricle, especially the left ventricular apex, posterior and lateral walls (*arrow*). The posterior mitral leaflet, its chordae tendineae and papillary muscle were encapsulated by the abnormal mass (*dotted arrow*), leading to severe mitral regurgitation.
Abbreviations as in Fig. 5.

patient's clinical condition continued to deteriorate. We considered that treating heart failure caused by mitral regurgitation with conservative medical management would not be optimal, so we chose a surgical approach.

At surgery, the anterior mitral leaflet was normal and the posterior mitral leaflet was shortened, but neither leaflet was prolapsed. The inner wall of the left ventricle was covered throughout with old thrombus, and the apex had been consumed by this thrombus. This thrombus totally encapsulated the posterior mitral leaflet, its chordae tendineae and papillary muscles. These masses were manually removed, revealing smooth and pale endocardium. Valve replacement (advantage valve, 27 mm) was performed with preservation of the native valve tis-

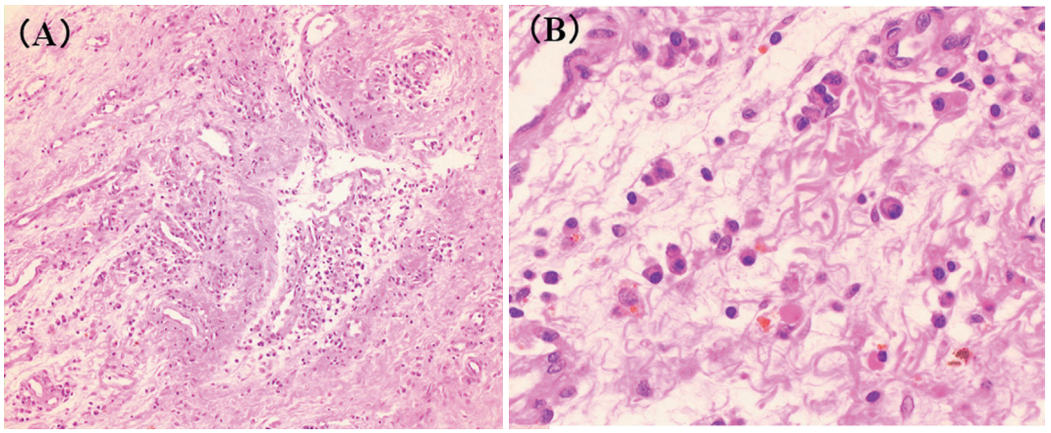

Fig. 7 Photomicrograph of the myocardium of the extracted left ventricle
Tissue mostly consists of fibrous thrombus. Invasive inflammatory cells mainly consist of phagocytes, and eosinophils and fibrosis were absent (hematoxylin-eosin staining; *A*: × 100, *B*: × 400).

sue, papillary muscle and chordae tendineae.

Histological examination of the excised tissue (**Fig. 7**) showed that most of the tissue consisted of fibrous thrombus was infiltrated with inflammatory cells comprising mainly phagocytes, but eosinophils and fibrosis were absent.

After surgery, transthoracic echocardiography showed that mitral regurgitation had disappeared, and the patient's symptoms improved. The signs of heart failure had disappeared and chest radiography became normal. Since her eosinophil count was normal, specific treatment with corticosteroids or hydroxyurea was not introduced, and she was treated with anticoagulant only with a target international normalized ratio of 2.5. However, she died of cerebral infarction 3 months later at the local hospital.

DISCUSSION

The present case demonstrates that a patient with left ventricular mural thrombus and severe mitral regurgitation caused by Löffler's endocarditis can be successfully treated with valve replacement and removed thrombus. However, the patient died of cerebral infarction 3 months after surgery.

Löffler[7] described two patients with progressive cardiac failure, eosinophilia, and mitral regurgitation murmurs in 1936. He reported that autopsy revealed extensive fibrous thickening of the mural endocardium of both the right and left ventricles with a superimposed thrombus in the left ventricle[7]. The typical patient with Löffler's endocarditis is a man in his fourth decade who lives in a temperate climate and has hypereosinophilic syndrome. A major cause of the morbidity and mortality in this syndrome is cardiac involvement, which is found in 54% to 73% of cases[8].

Löffler's endocarditis is thought to evolve through three stages. The first is an acute necrotic stage, followed by a thrombotic stage, which leads into a fibrotic stage. In the acute necrotic stage, there is damage to the endocardium and infiltration of the myocardium with eosinophils and lymphocytes. Clinical cardiac findings at this stage can be absent with normal echocardiography and angiography. The thrombotic stage is characterized by the formation of thrombus along the damaged endocardium of either or both ventricles. In the fibrotic stage, progressive scarring of the endomyocardium may lead to endomyocardial fibrosis, causing restrictive cardiomyopathy. Hypereosinophilia is not often identified in the thrombotic and fibrotic stages. Therefore, our case was regarded as the thrombotic stage.

About 30% of patients with Löffler's endocarditis have clinically significant and progressive mitral regurgitation[9]. As demonstrated by both echocardiographic and pathological studies[9,10], mitral regurgitation results from posterior leaflet motion being limited by adherence to, and eventual incorporation within, the posterobasal endocardial surface of the left ventricular wall. A major cause of mitral regurgitation in our case was mitral malcoaptation due to apical displacement of the coaptation point of the mitral leaflets caused by left ventricular thrombus.

Conservative medical treatment during the course of early Löffler's endocarditis results in

38% good and 31% partial responses[11-13]. Corticosteroids appear to have a beneficial effect on acute myocarditis and together with cytotoxic drugs (hydroxyurea in particular) may improve survival substantially. If patients are refractory to these strategies, interferon-α, hydroxyurea or vinca alkaloids[13] can be administered to inhibit eosinophil degranulation. Conventional therapy for heart failure with digitalis, diuretics, afterload reduction, and anticoagulants are adjuncts in the management of these patients.

Little has been reported regarding the surgical approach to treat Löffler's endocarditis[14-16]. No strict indication for surgical treatment has been established and the long-term prognosis of this strategy remains unknown. Davies *et al.*[17] encouraged surgical treatment in patients with severe heart failure caused by severe mitral regurgitation irrespective of whether they had hypereosinophilia. Moraes *et al.*[18] reported that surgical treatment appeared to offer significant palliation of symptoms when the fibrotic stage had been reached. We chose immediate surgical treatment because our patient had refractory heart failure as a result of mitral regurgitation caused by Löffler's endocarditis, and the thrombotic stage had been reached on admission to our hospital. Left ventriculography was performed before surgery, because we were not convinced that the abnormal mass in the left ventricle was thrombus. Caution should be exercised in such cases suspected of thrombus.

Most patients with Löffler's endocarditis are given anticoagulants throughout the course of their illness, as emboli and thrombotic complications are common. After surgery, our patient was treated with anticoagulants only. However, since the cause of cerebral infarction might be recurrent or residual thrombus resulting from Löffler's endocarditis, we should have administrated additional medical treatment such as corticosteroids or hydroxyurea to prevent recurrence after surgery.

要　　約

左室壁在血栓と高度僧帽弁逆流を伴ったLöffler心内膜心筋炎に対して外科手術を施行した1例

田中　秀和　　川合　宏哉　　辰巳　和宏　　片岡　俊哉　　大西　哲存
野瀬　貴久　　溝口　貴裕　　横山　光宏　　大 北　　裕

症例は65歳，女性．呼吸困難の加療のため当院に入院した．前医で好酸球増多を指摘されていた．経胸壁および経食道心エコー図検査では左室拡大は認められず，壁運動も良好であったが，心筋とは輝度の異なる異常組織によって左室心尖部から後側壁にかけての壁厚が増大し，左室心尖部が狭小化していた．僧帽弁後尖はこの異常組織によって覆われ，可動性が制限されていたため，僧帽弁尖の接合が不良であり，高度の僧帽弁逆流が認められた．二次的に好酸球増多を呈する疾患は否定的であり，心病変の存在により本症例は好酸球増多症候群に合併したLöffler心内膜心筋炎と診断した．患者は入院後，ただちに保存的加療が開始されたが，改善せず，僧帽弁逆流による心不全のコントロールが困難であったため，僧帽弁置換術と異常組織の除去術を行った．術後症状は改善し退院したが，3ヵ月後に脳梗塞を発症し，近医で死亡した．

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