

Rapid Disappearance of Intraventricular Mobile Structures with Steroids in Eosinophilic Granulomatosis with Polyangiitis

Kenichi Sakuta, MD, PhD,* Shinji Miyagawa, MD,* Kenichiro Suzuki, MD,† and Hiroshi Yaguchi, MD, PhD*

Endomyocarditis in Eosinophilic granulomatosis with polyangiitis (EGPA) is a rare complication, commonly involving an apical mass compatible with a thrombus. However, no previous report has discussed mobile structures detected by echocardiography in a patient with EGPA. A 53-year-old man with asthma presented with low-grade fever, consciousness disturbance, and vomiting. Magnetic resonance imaging showed multiple acute infarctions in the bilateral cerebrum and cerebellum. Remarkable eosinophilia was observed, and transthoracic echocardiography showed multiple mobile structures originating from the left ventricular septum. The day after admission, he developed left partial hemianopia and intracranial hemorrhage was identified in his right occipital lobe. Skin biopsy showed infiltration of eosinophils in the arterial wall, and we diagnosed EGPA. Myocardial biopsy was performed from the right ventricular wall, and eosinophilic infiltration into the endocardium and myocardium was observed. Endomyocarditis secondary to EGPA was confirmed, and steroid therapy was immediately initiated. Ten days after steroid therapy, the mobile structures in the left ventricle disappeared completely. He suffered no recurrence of stroke with continued steroid therapy. Mobile structures in the left ventricle in patients with active EGPA could be treated conservatively with steroid therapy.

Key Words: Eosinophilic granulomatosis with polyangiitis—endomyocarditis—multiple acute infarction—mobile structure

© 2019 Elsevier Inc. All rights reserved.

From the *Department of Neurology, Kashiwa Hospital, The Jikei University School of Medicine, Chiba, Japan; and †Department of Cardiology, Kashiwa Hospital, The Jikei University School of Medicine, Chiba, Japan.

Received May 30, 2019; revision received July 1, 2019; accepted July 25, 2019.

This work was performed at Kashiwa Hospital, The Jikei University School of Medicine.

Financial Disclosure: The authors declare that they have no competing interests.

Address Correspondence to: Kenichi Sakuta, MD, Department of Neurology, Kashiwa Hospital, The Jikei University School of Medicine, 163-1 Kashiwashita, Kashiwa-shi, Chiba 277-8567, Japan. E-mail: kenichisakuta@yahoo.co.jp.

1052-3057/\$ - see front matter

© 2019 Elsevier Inc. All rights reserved.

<https://doi.org/10.1016/j.jstrokecerebrovasdis.2019.104326>

Introduction

Eosinophilic granulomatosis with polyangiitis (EGPA; Churg–Strauss Syndrome) is necrotizing eosinophilic vasculitis that predominantly affects small vessels, and its clinical manifestation varies according to the affecting organs.^{1,2} Cardiac involvement in EGPA is common and is the most important prognostic factor for high mortality.^{3,4} Endomyocarditis, which is a phenotype of cardiac complications, typically involves an apical mass compatible with a thrombus.⁴ However, no reports have discussed mobile intracardiac structures in a patient with EGPA. We report a rare form of cardiac involvement in such a patient, observed as mobile structures in the left ventricle.

Case Report

A 53-year-old man with asthma, sinusitis, and moderate eosinophilia was admitted to our hospital with

consciousness disturbance and vomiting. Seven days prior to admission, he suffered a low-grade fever and an asthma attack. On examination, his body temperature was 37.6°C. Neurological examination revealed right complete hemianopia and horizontal nystagmus, and his National Institutes of Health Stroke Scale score was 2. His white blood cell count showed a remarkable eosinophilia of 17,000 eosinophils/ μ L. His creatinine, C-reactive proteins, and immunoglobulin E levels were measured at 1.34 mg/dL, 9.25 mg/dL, and 1620 IU/mL (normal level: < 170 IU/mL), respectively. The patient's erythrocyte sedimentation rate was 50 mm/h. Perinuclear antineutrophil cytoplasmic antibody testing was positive. Three blood cultures came back negative. We performed brain magnetic resonance imaging (MRI) and magnetic resonance angiography immediately after admission, which showed multiple infarctions in the bilateral cerebrum and cerebellum, and some infarcts were hemorrhagic (Fig 1A–C). Microbleeds were detected in the right thalamus and right occipital lobe; magnetic resonance angiography showed no remarkable abnormalities. Transthoracic echocardiography revealed multiple mobilized and tufted masses originating from the left ventricular septum (Fig 1D, E); left ventricular diastolic volume was 97.3 mL/m², left ventricular systolic volume was 28.3 mL/m², and left ventricular ejection fraction was 71%. Color Doppler echocardiography showed trivial mitral regurgitation with no tricuspid regurgitation suggesting acute heart failure.

The day after admission, left partial hemianopia appeared. Brain imaging showed intracranial hemorrhage in the right occipital lobe and incremental microbleeds in bilateral cerebral white matter. Our differential diagnoses

were infective endocarditis, primary angiitis of the central nervous system, or other vasculitic diseases. Although we initiated antibiotic therapy, the patient's laboratory data did not improve, and the left ventricular mobile structures did not change remarkably. On the 10th hospital day, purpura was detected on his left plantar skin, and he underwent skin biopsy. Pathological findings revealed infiltration of inflammatory cells and eosinophils in the arterial wall (Fig 1G, H), which confirmed EGPA. A myocardial biopsy was then obtained from the right ventricular wall, and eosinophilic infiltration into the endocardium and myocardium was seen, which confirmed eosinophilic endocarditis (Fig 1I, J). Steroid therapy as an intravenous steroid pulse (1000 mg/day for 3 days) and orally (0.5 mg/kg, daily) was immediately initiated. We avoided anticoagulation therapy because the patient presented with intracranial hemorrhage and hemorrhagic infarction. The left ventricular mobile structures were no longer present on echocardiography 10 days after initiating steroid therapy (Fig 1F). The patient was discharged with mild visual field disturbance 72 days after hospitalization. During 1 year of follow-up with continued steroid therapy, he experienced no recurrence of stroke.

Discussion

In this case, we clarified the clinical course of the mobile structures in the left ventricle associated with EGPA.

We reported mobile structures in the left ventricle in patients with EGPA with pathologically-proven endomyocarditis for the first time. Endomyocarditis was observed in 27% of patients with EGPA, and most were confirmed as having inflammation, by echocardiography,

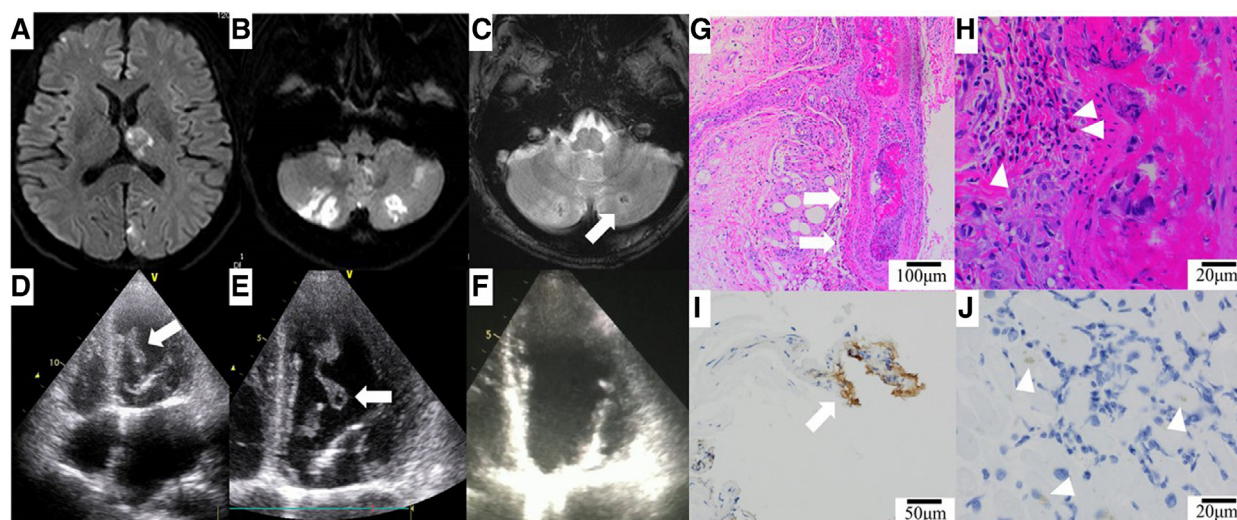


Figure 1. (A–C) Magnetic resonance image (MRI) on the day of admission. Diffusion-weighted image showing multiple infarctions in bilateral cerebrum and cerebellum; some of the infarcts were hemorrhagic (arrow). (D and E) Four-chamber echocardiographic view on the day of admission showing mobile structures in the left ventricle (arrow). (F) Four-chamber echocardiographic view 10 days after initiating steroid therapy. The mobile structures have disappeared. (G and H) Left plantar skin biopsy with hematoxylin and eosin staining showing active inflammation in the vessel wall (arrow) and eosinophilic infiltration (arrowhead). (I and J) Staining for major basic protein, an eosinophil granule protein, in an endomyocardial biopsy specimen. Eosinophilic infiltration into the endocardium (arrow) and myocardium (arrow head) are seen.

cardiac MRI, or both.³⁻⁷ Both cardiac MRI and echocardiography are useful to detect mural thrombi, which are often accompanied by endomyocarditis, seen most often as thickened apex to lateral wall.^{4,5,7} According to a previous case report, 90 days of anticoagulation therapy was necessary for the mural thrombus to disappear.⁷ The mobile structures in our patient differed from the previously reported mural thrombus in that the mobile structures disappeared within only 10 days of initiating steroid therapy, and without anticoagulation therapy. The pathological progression in patients with active EGPA has 2 stages: a prevasculitic phase with eosinophilic infiltration into various organs, and a vasculitic phase with fibrinoid necrosis with granuloma formation.^{1,8} The progression of eosinophilic endocarditis finally results in endocardial fibrosis.⁹ Reversibility decreases with progression of inflammatory structural destruction or fibrosis, and these changes in the myocardium or valves result in acute heart failure.¹⁰ Our patient appeared to present at a relatively early stage because the echocardiographic abnormalities were found secondary to cerebral infarction, not acute heart failure. We speculate that the clinical manifestation in early stages of EGPA may vary according to the main location of the eosinophilic infiltration. Eosinophilic infiltration frequently occurs in the myocardium and endocardium; however, if this occurs in the chordae tendineae or papillary muscle, edematous thickening secondary to inflammation can cause these structures to appear mobile, as in our patient. Because cardiac MRI sometimes shows myocardial edema in patients with EGPA, the mobile structures in our patient may have been composed of edematous thickening of normal anatomical structures.⁵ Therefore, mobile structures in the left ventricle in patients with active EGPA could be treated conservatively with steroid therapy.

Consent to Publish

Written informed consent was obtained from the patient for publication of this case report and any accompanying data.

Acknowledgments: The authors acknowledge Hatsue Ueda (National Cerebral and Cardiovascular Center), Masataka Nakano (Kashiwa Hospital), and Masahumi Suzuki (Kashiwa Hospital) who kindly interpreted the pathological findings in this study. The authors thank Prof. Osamu Ohara for editorial assistance. We thank Jane Charbonneau, DVM, from Edanz Group (www.edanzediting.com/ac) for editing a draft of this manuscript.

References

1. Greco A, Rizzo MI, De Virgilio A, et al. Churg-Strauss syndrome. *Autoimmun Rev* 2015;14:341-348.
2. Comarmond C, Pagnoux C, Khellaf M, et al. Eosinophilic granulomatosis with polyangiitis (Churg-Strauss): clinical characteristics and long-term followup of the 383 patients enrolled in the French Vasculitis Study Group cohort. *Arthritis Rheum* 2013;65:270-281.
3. Hazebroek MR, Kemna MJ, Schalla S, et al. Prevalence and prognostic relevance of cardiac involvement in ANCA-associated vasculitis: eosinophilic granulomatosis with polyangiitis and granulomatosis with polyangiitis. *Int J Cardiol* 2015;199:170-179.
4. Neumann T, Manger B, Schmid M, et al. Cardiac involvement in Churg-Strauss syndrome: impact of endomyocarditis. *Medicine* 2009;88:236-243.
5. Cereda AF, Pedrotti P, De Capitani L. Comprehensive evaluation of cardiac involvement in eosinophilic granulomatosis with polyangiitis (EGPA) with cardiac magnetic resonance. *Eur J Intern Med* 2017;39:51-56.
6. Yune S, Choi DC, Lee BJ, et al. Detecting cardiac involvement with magnetic resonance in patients with active eosinophilic granulomatosis with polyangiitis. *Int J Cardiovasc Imaging* 2016;32(suppl 1):155-162.
7. Masaki N, Issiki A, Kirimura M, et al. Echocardiographic changes in eosinophilic endocarditis induced by churg-strauss syndrome. *Intern Med* 2016;55:2819-2823.
8. Churg A, Brallas M, Cronin SR, et al. *Formes frustes of Churg-Strauss syndrome*. *Chest* 1995;108:320-323.
9. Karthikeyan K, Balla S, Alpert MA. Non-infectious aortic and mitral valve vegetations in a patient with eosinophilic granulomatosis with polyangiitis. *BMJ Case Rep* 2019;12:e225947.
10. Gudmundsson GS, Ohr J, Leya F, et al. An unusual case of recurrent Löffler endomyocarditis of the aortic valve. *Arch Pathol Lab Med* 2003;127:606-609.