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Emergency valve surgery for infective endocarditis complicated by acute intracranial hemorrhage: A case report

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ABSTRACT

INTRODUCTION: Optimal timing of surgical treatment for infective endocarditis (IE) complicated by intracranial hemorrhage remains controversial.**PRESENTATION OF CASE:** A 43-year-old man with IE received appropriate antibiotic therapy but had recurrence of cerebral infarction and intracranial hemorrhage (ICH). Emergency valve surgery was performed 2 days after ICH onset because of heart failure and recurrence of cerebral complications. Postoperatively, he showed no neurologic symptoms; neuroimaging showed no enlargement of ICH.**DISCUSSION:** Postoperative risk of neurologic deterioration may be relatively lower than previously thought in patients with IE who undergo surgery within 1 month after ICH onset.**CONCLUSIONS:** Emergency surgery in patients with ICH is justified in cases of multiple indications for such small ICH. Further evaluation regarding the risk of subsequent hemorrhage in patients with ICH who require emergency valve surgery is warranted.© 2017 The Authors. Published by Elsevier Ltd on behalf of IJS Publishing Group Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Cerebrovascular complications occur in 20–40% of patients with infective endocarditis (IE) [1,2]. Moreover, in cases complicated by intracranial hemorrhage (ICH), because of the high risk of postoperative neurologic deterioration due to systemic heparinization during valve surgery, current guidelines recommend that surgical treatment should be delayed for at least 1 month [1]. However, if the patient has other indications for emergency surgery, determining the appropriate timing of surgery is difficult.

Several articles have reported a much lower risk of neurologic deterioration than previously thought in patients with IE who undergo surgery within 1 month after ICH onset [3–7]. Here, we present a case of IE that required surgical treatment 2 days after ICH onset, and we report it in line with the SCARE criteria [8].

2. Presentation of case

A 43-year-old man with a 2-week history of fever was admitted to a local hospital. He had no medical history of hospitalization. Blood analysis revealed an increased C-reactive protein level (8.2 mg/dL) and leukocyte count (11,500/ μ L). Blood cultures were

positive for *Streptococcus mitis*. An echocardiogram showed 8.5-mm long vegetation on the anterior leaflet of the mitral valve and moderate mitral regurgitation.

At the time of IE diagnosis, a systemic computed tomography scan showed no evidence of infarction in any organ. Thus, the patient initially received antibiotic therapy comprised of penicillin G (24 $\times$ 10⁶ mg/day) and gentamicin (60 mg/day). Brain magnetic resonance imaging (MRI) performed after 4 days to detect further small cerebral infarctions showed a 0.7-cm acute cerebral infarction (CI) in the right putamen. After an additional 7 days of antibiotic therapy, brain MRI scan showed recurrence of CI (1.0 cm) in the right frontal lobe (Fig. 1A). Thus, he was referred to us for surgical treatment.

Echocardiography showed enlargement of vegetation on the mitral valve and worsening of mitral regurgitation due to prolapse of the anterior leaflet. He had indications of emergency surgery for recurrent cerebral infarction, but a new ICH in the infarction lesion in the right frontal lobe was observed on the brain MRI scan (Fig. 1B). Therefore, we decided to delay surgery. Two days post-admission, he had progression of heart failure, and the chest radiograph showed worsening of congestion. After the risk of subsequent hemorrhage was discussed between the neurologist and patient, the patient consented to undergo emergency valve surgery 2 days after ICH onset. He had no neurologic symptoms preoperatively.

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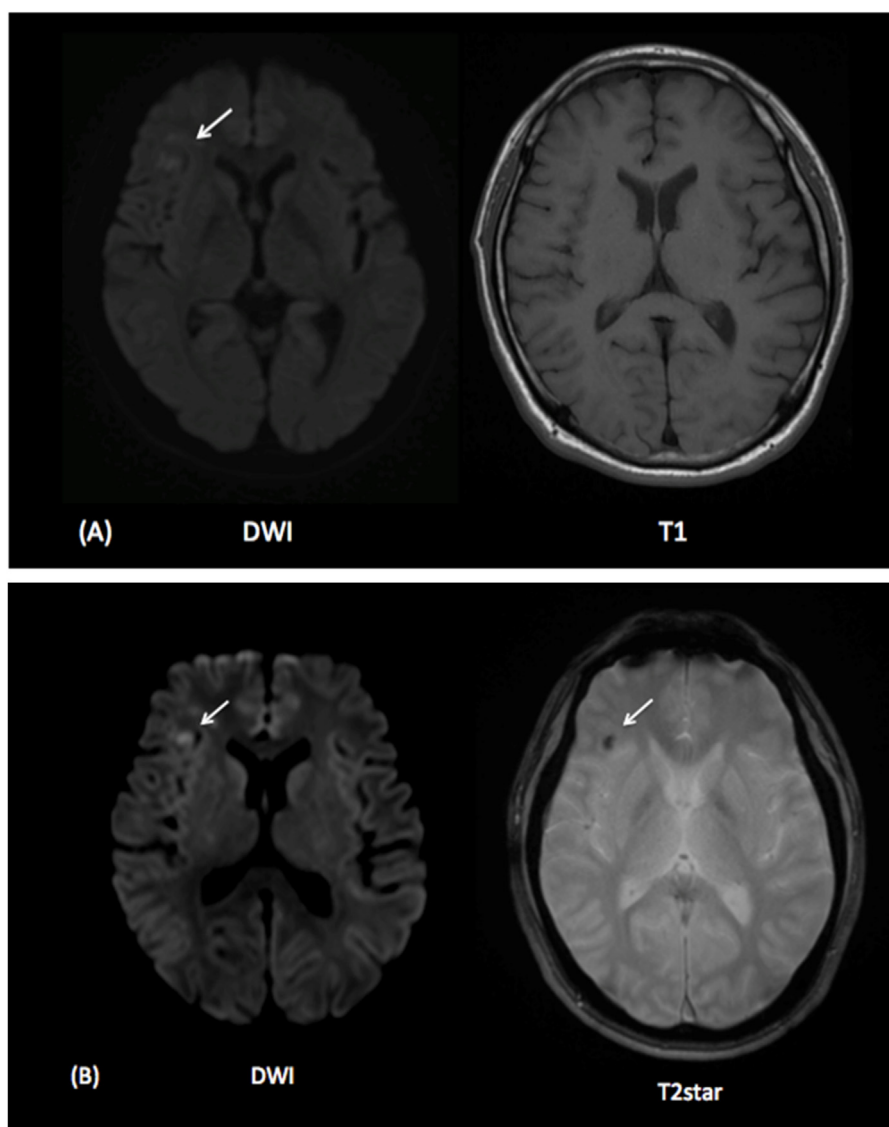


Fig. 1. (A) Brain magnetic resonance imaging (MRI) scans obtained 11 days after antibiotic therapy. (Left) Axial diffusion-weighted image (DWI) showing a high-intensity lesion in the right frontal lobe (arrow). (Right) Axial T1-weighted image showing no hemorrhage in the same lesion. (B) Preoperative brain MRI scans obtained on admission at our hospital. (Left) Axial DWI showing a high-intensity lesion in the right frontal lobe (arrow). (Right) Axial T2-star-weighted image showing microhemorrhage in the same lesion (arrow).

2.1. Intraoperative procedure

The patient was placed in spine position on the operating table. After intubation, median full sternotomy was performed. Valve surgery was performed under usual cardiopulmonary bypass with systemic heparinization and normal tepid temperature. The activated clotting time was maintained more than 450 s during cardiopulmonary bypass. The mitral valve was exposed through left atriotomy; the vegetation was attached to mitral leaflets in A2. A part of A3 was defective, and A2 prolapse due to torn chordae was evident (Fig. 2). Mitral valve repair was performed successfully with vegetectomy and reconstruction of the mitral leaflet, using an autologous pericardial patch. The total aortic cross-clamp time and cardiopulmonary bypass time were 148 min and 194 min, respectively.

2.2. Postoperative results

One week post-surgery, the neuroimaging study showed neither enlargement of the hemorrhagic lesion nor hemorrhagic transfor-

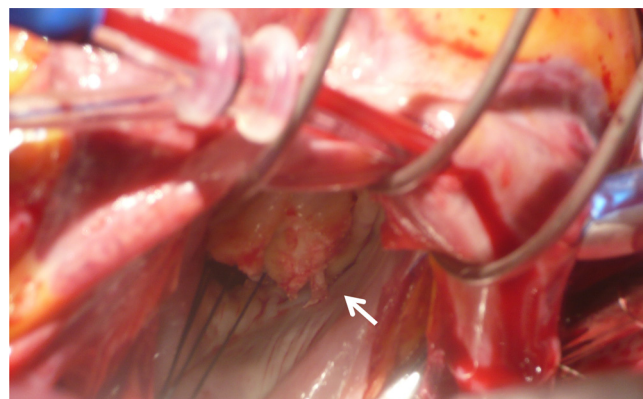


Fig. 2. Intraoperative photograph of the mitral valve. Mitral vegetation is attached to mitral leaflets in A2 (arrow). A2 prolapse due to torn chordae is observed.

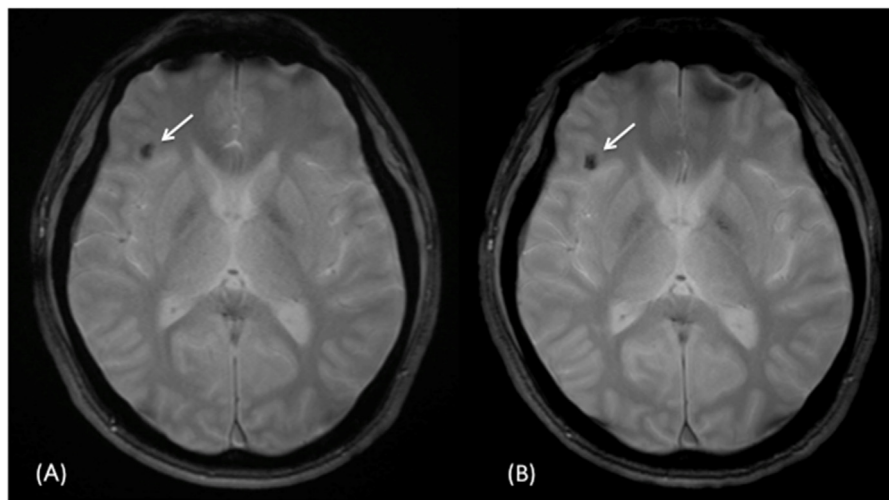


Fig. 3. Preoperative (A) and postoperative (B) T2-star-weighted brain magnetic resonance imaging scans. The hemorrhagic lesion cannot be obviously differentiated.

Table 1

Interval between intracranial hemorrhage and operation, and the prevalence of neurological deterioration in patients from recent studies.

Author	Journal	Number of patients	Interval between ICH and surgery	Result
Snygg-Martin et al. [5]	Clin Infect Dis, 2008	1	5 days	No complication
Yeates et al. [6]	Heart Lung Circ, 2010	1	≤2w 1	No complication
Fukuda et al. [7]	Interactive Cardiovasc Thorac Surg, 2012	1	≤2w 1	No complication
Yoshioka et al. [3]	Eur J Cardiothorac Surg, 2014	20	≤1w 5 1–2w 6 2–4w 9	No neurological deterioration
Raman et al. [4]	Asian Cardiovasc Thorac Ann, 2016	6	≤2w 6	No neurological deterioration

mation of the CI (Fig. 3A–B). Mitral regurgitation was not detected on postoperative echocardiography. The patient showed no neurologic deterioration and discharged uneventfully on postoperative day 26.

3. Discussion

Neurologic deficits are a frequent complication of IE, occurring in 20–40% of patients. The most common neurologic occurrence is CI followed by ICH caused by mycotic aneurysm rupture, which is associated with increased mortality [1].

Guidelines from The Society of Thoracic Surgeons recommend surgery without delay in cases after silent embolic CI or transient ischemic attack, if the risk of neurologic prognosis is low [1]. However, in cases complicated by ICH, guidelines published in 2009 recommended that surgery should be delayed for at least 1 month after diagnosis because of heparinization and hypotension during cardiopulmonary bypass as well as cerebral edema in areas of the disrupted blood-brain barrier [2].

Recently, several authors have reported that the postoperative risk of subsequent hemorrhage might be much lower than previously thought in patients with IE who undergo surgery within 1 month after ICH onset (Table 1). Yoshioka et al. reported on 30 patients with IE complicated by ICH [3], 20 of whom underwent valve surgery within 28 days. The postoperative neuroimaging study demonstrated that neither neurologic deterioration nor exacerbation of hemorrhagic lesions occurred in all patients regardless of the timing of surgery. Recently published guidelines relented their recommendation to delay surgery in class IIa, instead of class I, which was originally recommended in the 2009 guidelines [1–3]. Our patient underwent surgery 2 days after ICH onset and showed neither neurologic deterioration nor expansion of ICH postoperatively.

Previous cases, along with the present one, should be carefully interpreted because of the study designs, small numbers of reported cases, and small sizes of hemorrhagic lesions. No study has reported which ICHs have a low risk of subsequent hemorrhage and which have high risks in emergency surgery. Additionally, our patient was young and had a better vascular status than the typical patient with stroke. Hence, the risk of worsening of postoperative intracerebral bleeding was probably relatively low. A multidisciplinary approach is advocated for individualized risk estimation.

4. Conclusions

We believe that emergency surgery in patients with ICH is justified if there are indications for emergency surgery and the ICH is small. Further evaluation is warranted for the risk of subsequent hemorrhage in patients with ICH who require emergency valve surgery.

Conflicts of interest

None.

Sources of funding

None.

Ethical approval

This presentation is approved by ethical committee of our hospital.

Consent

Informed consent was obtained from the patient in written and verbal form.

Author contribution

Takasumi Goto performed data collection, and manuscript preparation of this case report. Toshihiro Ohata performed the procedure. Takayuki Shijo and Daisuke Yoshioka performed proof-reading of this case report. Mitsunori Kaneko supervised this case report.

Guarantor

Mitsunori Kaneko have full responsibility of this case.

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