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A Case of Successful Treatment of Infective Endocarditis Complicated with Intracranial Hemorrhage, and Literature Review

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ABSTRACT

The risks of neurological deteriorations during open heart surgery under heparinization in patients with infective endocarditis complicated by intracranial hemorrhage remain unknown. The optimal timing for heart surgery is still a point of conflict. We report a case in which a young man who had suffered from infective endocarditis complicated with intracranial hemorrhage successfully received mitral valve replacement on day 9 after the onset of intracranial hemorrhage.

INTRODUCTION

Intracranial hemorrhage (ICH) is not uncommon in patients with infective endocarditis (IE) and increases morbidity and mortality rates. The optimal timing for heart surgery is controversial due to lack of big cohort reports and controlled studies. The 2009 European Society of Cardiology (ESC) Guideline on the prevention, diagnosis, and treatment of IE recommended that surgery be postponed for at least 1 month in IE patients complicated with ICH (Class 1 Level C) [Habib 2009]. 2011 Surgical Management of Endocarditis: the Society of Thoracic Surgeons (STS) Clinical Practice Guideline also recommended that it is reasonable to delay valve replacement for at least 4 weeks in patients who have had any ICH (Class IIa, Level C) [Byrne 2011]. But some authors reported that the risk of postoperative neurological deteriorations resulting from the exacerbation of hemorrhagic lesions seemed relatively low [Yoshioka 2014], even in patients who underwent valve surgery within 2 weeks of ICH onset. Here we report a case in which the patient had a relatively small ICH lesion with mild neurologic symptoms but a declining cardiac function. The surgery of mitral valve replacement was successfully performed on day 9 after the onset of ICH.

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CASE REPORT

On Jan 29, 2014, a 21-year-old young man presented with a 3-month history of fever, fatigue, and shortness of breath. He had been treated in a community hospital, where blood culture was positive for Streptococcus viridans. An echocardiography on admission showed multiple vegetations on both anterior and posterior leaflets, including a big (1.85 × 0.91 cm^2) mobile one on the anterior leaflet with severe regurgitation and a jet directing toward posterior. His renal function was also impaired (elevated Bun and Cr). The patient was treated with antibiotics (ceftriaxone sodium and moxifloxacin hydrochloride). His inflammatory indicators were under control and renal function improved. On day 6 after admission, which was February 4, he complained of bilateral eye pain. A head computer tomography (CT) showed subarachnoid hemorrhage (Figure 1). Cerebral computer tomography angiography (CTA), brain magnetic resonance imaging (MRI) and

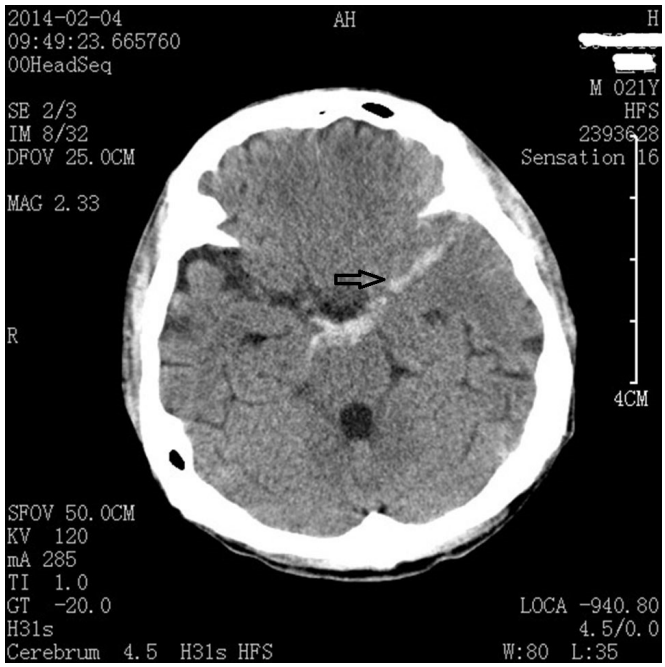

Figure 1. Head CT scan showed subarachnoid hemorrhage (arrow).

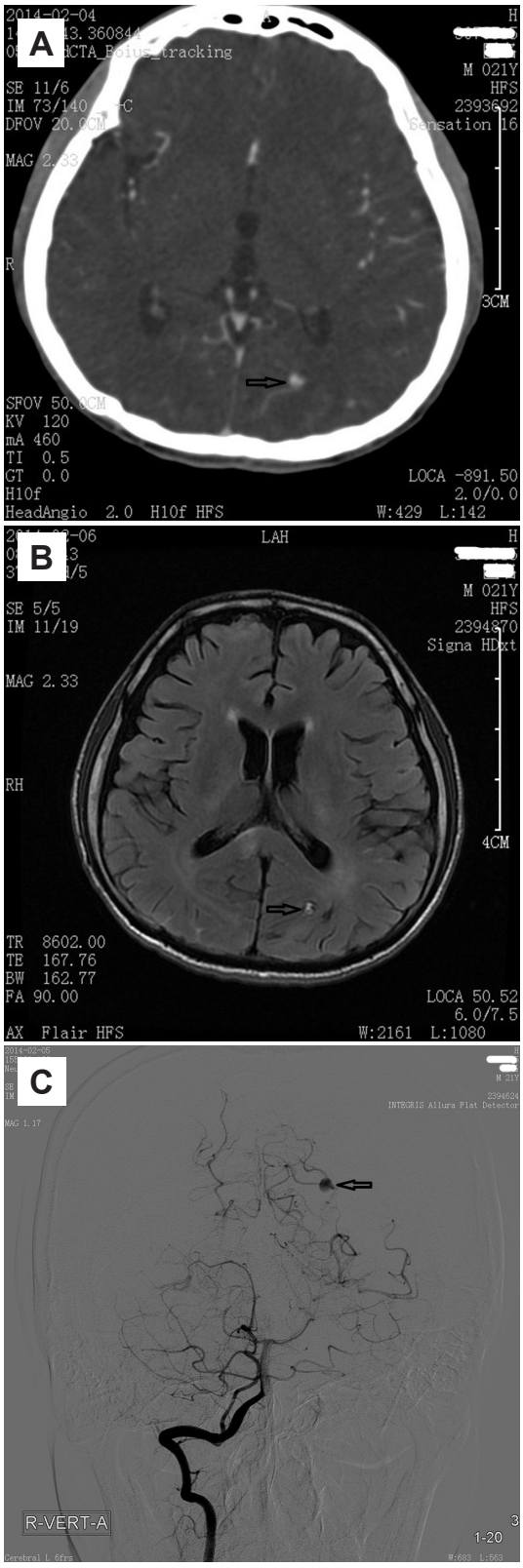

Figure 2. A, Cerebral CTA showed the mycotic aneurysm (MA) (arrow); B, Brain MRI showed the MA (arrow); C, Cerebral angiography showed the MA (arrow).

Figure 3. The mycotic aneurysm disappeared after treatment with liquid embolic agent Onyx 18.

cerebral angiography were then performed and revealed a mycotic aneurysm (Figure 2, A, B and C). On February 6, the mycotic aneurysm (MA) was treated with the liquid embolic agent Onyx 18 (Figure 3). On February 8, the patient developed pink frothy sputum and exacerbation of shortness of breath. Chest X-ray showed bilateral ground glass opacity suggestive of pulmonary edema. Repeated echocardiography showed enlargement of the vegetation on the anterior leaflet (2.5×1.3 cm^2) with worsening mitral regurgitation. On February 13, 9 days after subarachnoid hemorrhage, repeated CT scan ruled out severe ICH or large infarction. The patient was brought to the operating room for urgent mitral valve replacement with a Medtronic #29 mechanical valve. He recovered without notified complications and was discharged home on February 19, 2014, with an additional three weeks of antibiotic treatment at the local hospital.

DISCUSSION

ICH in patients with IE mainly includes intracerebral hemorrhages, subarachnoid hemorrhages, and hemorrhagic infarctions. Intracerebral hemorrhage and subarachnoid hemorrhage are mainly due to ruptured MA [van Gijn 2001], which is the most common cause that can be treated definitively. The other mechanism of intracerebral hemorrhage and subarachnoid hemorrhage is rupture of pyogenic arteritis, which is difficult to be detected by CTA, MRA, or angiography. And it also can't be surgically resected or occluded before valve surgery. Hemorrhagic infarction is a hemorrhagic transformation of an infarcted area, which commonly occurs in large cerebral infarction. Such transformations are relatively rare in IE-related infarction.

If ICH is due to a ruptured MA, and if the aneurysm has been detected and treated either by surgical resection or interventional occlusion, heart surgery or even early heart surgery (within 2 weeks) may not carry a risk of neurological deterioration postoperatively, provided that the patient has no coma, major neurological deficit, or increased intracranial pressure. The etiology of ICH in our case was MA, which was treated with interventional occlusion. Heart surgery was then performed in urgency on day 9 after the onset of ICH with good result.

But if no MA is detected (especially after angiography), ICH is considered to be caused by rupture of pyogenic arteritis. Early surgery should be practiced with caution. It is important to use a sufficient amount of antibiotics to control the infection. Delaying heart surgery seems reasonable in this setting. If the patient's condition compels the surgery to be done as early as possible, the following neurological factors should be considered: level of consciousness and the changes in hematoma size and position, midline deviation, and cerebral cistern compression. Of these factors the level of consciousness is often associated with the severity of brain damage and should be considered first. For small hemorrhagic lesions (focal subarachnoid hemorrhages or intracerebral hemorrhages <10 mm in diameter), early surgery might be safe [Yoshioka 2014]. As for hemorrhagic infarction, as long as the small hemorrhage is within infarction, it is thought that early surgery carries a low risk of postoperative exacerbation of ICH if the lesion does not enlarge in the course of antibiotic treatment before surgery. This might be due to the fact that bacterial embolism is unlikely to be lysed during heparinization and reperfusion injury is less likely to occur.

The characteristics of patients with IE combined with ICH vary widely. It is difficult to determine the optimal timing of surgery in such a situation. Therefore, the key point of success depends on abundant experience as well as excellent coordination in the multidisciplinary team including cardiologists, neurologists, neurosurgeons, intensive care specialists, interventional radiologists, and cardiac surgeons.

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