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Review article

Cerebral mycotic aneurysm as a consequence of infective endocarditis: A literature review

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ABSTRACT

Background: Cerebral mycotic aneurysm (CMA) secondary to infective endocarditis (IE) is rare. The clinical features of this entity have not been sufficiently clarified.

Methods: The data source of this study was based on comprehensive literature retrieval of articles published in English 1990–2014 in the PubMed, Highwire Press and Google search engine. The search terms were “infective endocarditis” and “intracranial/cerebral mycotic aneurysm”.

Results: The CMAs usually developed 2.1 months after the onset of IE. *Staphylococcus* was the most frequent pathogen and *Streptococcus* was more frequent as evidenced by blood culture. The most common presentation on computed tomography was intraparenchymal hemorrhage. Angiogram was a reliable diagnostic means for determining the location of the aneurysm. The middle cerebral artery was the most commonly affected, and the posterior cerebral artery was more commonly affected. Interventional or surgical treatments of the CMAs were required in most patients, while some were recovered under conservative treatment. Univariate analysis revealed the development of herniation, parent vessel involvement, aneurysm rupture and non-surgical/interventional treatment of the aneurysms were significant predictive risk factors associated with increased mortality.

Conclusion: The CMAs are risky due to their potential consequences of cerebral hernia and aneurysmal rupture. The treatment of this entity is always challenging as it is difficult to determine the timing of the cerebral and cardiac operations concerning the necessity of heparinization in cardiac surgery. Sufficient antibiotics have to be used in IE patients in order to prevent from the potential consequence like CMAs. The choices of treatment for CMAs depend on the conditions of CMAs. They are curable to either conservative, endovascular or surgical management in selected patients. At least a 2-week interval between clipping or surgical excision of the aneurysm and the cardiac procedure is recommended in patients with a ruptured CMA.

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Introduction

Neurological consequences, including stroke or transient ischemic attack, cerebral hemorrhage, mycotic aneurysm, meningitis, cerebral abscess and encephalopathy remain a significant problem of infective endocarditis (IE) [1]. Neurologic complications were significantly associated with *Staphylococcus aureus* infection and with IE affecting both the aortic and the mitral valves [2,3]. *S. aureus* endocarditis increases the risk of neurologic morbidity and mortality [4]. Of these, cerebral mycotic aneurysm (CMA) secondary to IE is at any rate exiguous but potentially fatal. In particular, symptomatic CMAs are uncommon [5]. One to two percent of patients with native valve IE have CMAs [5]. However, there have been no popularly accepted regimens for the management of CMAs [6]. This study aims to present the clinical features, diagnosis, treatment and prognosis of CMAs as a consequence of IE.

Methods

Comprehensive literature retrieval of articles was made in the PubMed, Highwire Press and Google search engine for the year range 1990–2014. The search terms included “infective endocarditis” and “intracranial/cerebral mycotic aneurysm”. The search ended on August 31, 2014. Only articles published in English language were retained. Duplicate publications and articles describing the patients with mycotic aneurysm of other arteries were excluded from the statistical analysis.

Data were extracted from the text, figures, or tables and included details of the study population, demographics, pathologies of IE and CMA, diagnosis, management strategies, prognosis and follow-up.

Measurement data were expressed in mean ± standard deviation with range and median values and were compared by independent sample t-test. Categorical variables were compared by Fisher exact test. Univariate analysis was made to assess the predictive risk factors associated with an increased mortality of this patient setting. $p < 0.05$ was considered statistically significant.

Results

A total of 68 articles [4–74] were collected with 149 patients involved. Gender was not indicated in 21 of these patients. Of

the remaining 128 patients, 83 (64.8%) were males and 45 (35.2%) were females with a male-to-female ratio of 1.8:1. Their ages were 35.9 ± 17.0 (range, 1–87; median, 35) years ($n = 117$).

The duration of IE symptoms was 2.1 ± 2.3 (range, –0.75–6; median, 1.2) months ($n = 8$) (the minus symbol represented an onset of IE symptom after admission).

The major clinical symptoms of IE were described in 45 patients with fever in 42 (93.3%) and chest distress, chest pain and fatigue in 1 (2.2%) patient each. A heart murmur was audible in 33 patients with a systolic murmur in 22 (66.7%) (one of them has a S_3), a diastolic in 2 (6.1%), both systolic and diastolic in 6 (18.2%) and unknown in 3 (9.1%). Eight patients had a significant medical history, including postpartum (3 days after delivery), left middle cerebral artery infarct associated with Down's syndrome and endocardial cushion, aortic valvulotomy for aortic stenosis, previous IE, mitral regurgitation, mitral valve prolapse, mitral valvotomy, right intracerebral aneurysm thrombosis with residual aphasia and right hemiparesis in 1 each.

Six (7.3%) patients did not have a vegetation, while 76 (92.7%) patients had, with the mitral valve being the most frequent location for a vegetation to attach (Fig. 1). Of them, 64 (84.2%) patients had a solitary vegetation, while 12 (15.8%) had multiple vegetations ($\chi^2 = 71.2, p < 0.001$). Dimensions of 9 vegetations from 7 patients were recorded, with a mean of 13.4 ± 5.2 (range, 6–20; median, 13) mm ($n = 9$). The valvular pathologies secondary to IE were mitral regurgitation in 19

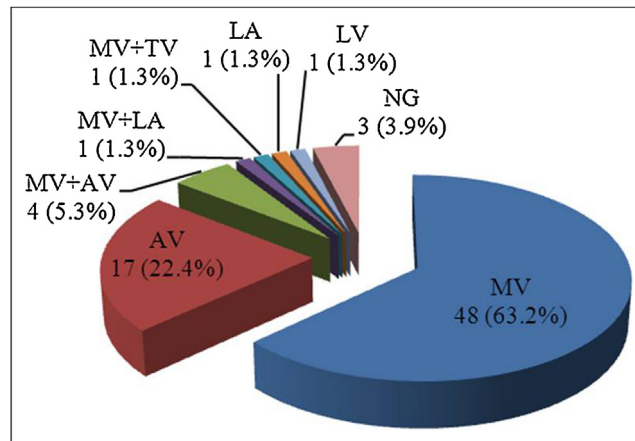


Fig. 1 – Locations of vegetations. AV: aortic valve; LA: left atrium; LV: left ventricle; MV: mitral valve; NG: not given; TV: tricuspid valve.

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