

Original Article

Left atrial myxoma with multiple cerebral infarcts and multiple intracranial aneurysms

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Abstract: Atrial myxomas are benign tumors, and most of them are located in the left atrium. Left atrial myxoma commonly leads to cerebral embolic ischemic stroke. The intracranial aneurysm is rarely associated with myxoma. There are few reports about left atrial myxoma leading simultaneously to both anterior and posterior circulation infarction, and multiple intracranial saccular aneurysms. Now we report such a case.

Keywords: Left atrial myxoma, cerebral infarct, intracranial aneurysm

Introduction

Atrial myxomas represent approximately 50% of all cardiac tumors. About 75% of them are located in the left atrium [1]. They are often a source of systemic embolism (central and peripheral). To be more precise, the embolization of tumor particles or thrombotic material mixed with tumor cells occurs in 30%~40% of patients with myxoma [1]. At least half of the cases of cerebral arteries were affected, leading to the embolic ischemic strokes [2, 3]. In addition to these neurological manifestations of myxomas, it is extremely rare to find intracranial aneurysms associated with myxoma or parenchymal brain metastases [3, 4]. We report the case of a young female patient who had simultaneously both anterior and posterior circulation infarction, and multiple intracranial saccular aneurysms due to left atrial myxoma.

Case report

A 24-year-old woman was admitted to our hospital with four days of dizziness, gait disturbance, blurred vision of her bilateral eyes, numbness in her left face and limb, and diplopia on looking to the right. The patient reported a history of palpitation, without other case history and family history. On physical examination, she showed blood pressures of 100/60 mmHg and a regular pulse rate of 80 beats per

minute. On neurologic examination, she had mild somnolence, diplopia on looking to the right, hypoalgesia in her left face and limb, cerebellar asymmetry in her left lower extremity, positive left babinski sign, and positive romberg's sign. On cardiac examination, he had a regular rate of 80 beats per minute in sinus rhythm. Auscultation revealed regular heart action with diastolas murmur as a tumor 'plop' on the apex. The level of CRP (5.27 mg/L) was high, while complete blood count, erythrocyte sedimentation rate (ESR), blood biochemical test including globulin level, and other laboratory results were normal. Electrocardiogram was normal registering sinus rhythm, and chest roentgenogram was normal. Transthoracic echocardiography demonstrated left atrial enlargement, and a large mobile middle-strong echo with regular surface in the left atrium, which originated from interatrial septum and prolapsed into the left ventricle through mitral valve during diastole, suggesting the diagnosis of atrial myxoma (**Figure 1**). Cerebral magnetic resonance imaging (MRI) revealed multiple hyper-intensities in bilateral cerebellums and Pons, and right thalamus, temporal lobe, frontal lobe and parietal lobe on diffusion weighted images (DWI), suggesting acute multiple infarctions (**Figure 2**). Digital subtraction angiography (DSA) showed multiple large saccular aneurysm in the branches of bilateral middle cerebral

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Figure 1. Transthoracic echocardiography demonstrated left atrial enlargement, and a large mobile middle-strong echo with regular surface in the left atrium, which originated from interatrial septum and prolapsed into the left ventricle through mitral valve during diastole, suggesting the diagnosis of atrial myxoma (A-C).

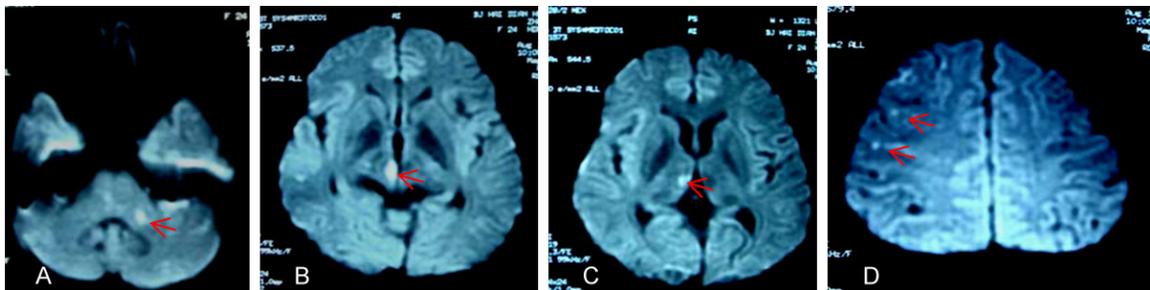


Figure 2. MRI revealed multiple hyperintensities in bilateral cerebellums and Pons (A), and right thalamus (B), temporal lobe (C), frontal lobe and parietal lobe (D) on diffusion weighted images (DWI), suggesting acute multiple infarctions.

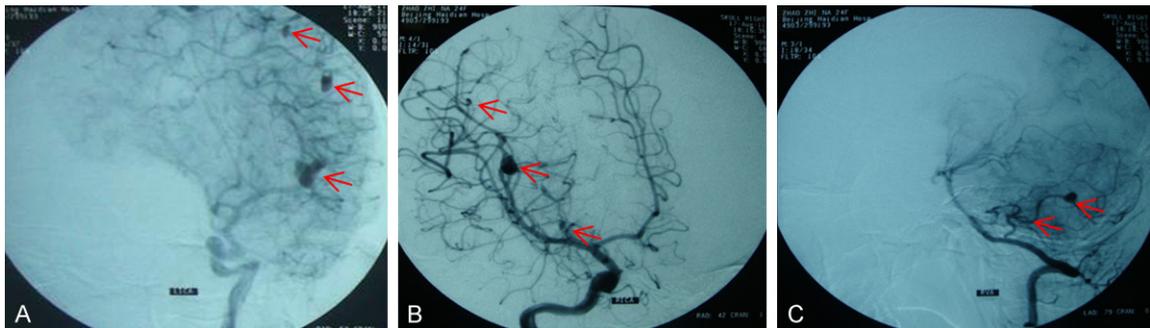


Figure 3. DSA showed multiple large saccular aneurysm in the branches of bilateral middle cerebral artery (A, B) and distant right posterior inferior cerebellar artery (C), and multiple small peripheral saccular dilatation on both middle cerebral artery territories (A-C).

artery and distant right posterior inferior cerebellar artery, and multiple small peripheral saccular dilatation on both middle cerebral artery territories (**Figure 3**).

Discussion

Cardiac myxomas remain the most common cardiac benign neoplasms, representing as

many as 50% of all primary tumors of the heart [1]. Myxomas are particularly frequent from the third to the sixth decades of life and show a 2:1 female predominance [2]. Although the occurrence of atrial myxoma is normally sporadic, as many as 7% of cases are familial, with the most notable condition being Carney syndrome, an autosomal dominant complex of cutaneous and cardiac myxomas, pigmentation, and endo-

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Table 1. To comparison of previous literatures and current case

	Age (years)	Sex	Intracranial aneurysms	Stroke/TIA
Our case	24	Female	Multiple large saccular aneurysm in the branches of bilateral middle cerebral artery and distant right posterior inferior cerebellar artery.	Multiple cerebral infarctions in bilateral cerebellums and Pons and right thalamus, temporal lobe, frontal lobe and parietal lobe.
Ivanović et al [1]	44	Female	Small saccular aneurysm in the origin of left posterior inferior cerebelli artery	Subarachnoid hemorrhage
Sabolek et al [16]	43	Female	Fusiform aneurysms in the left antery cerebral artery, branches of right middle cerebral artery and basilar artery.	Small hemorrhage in left thalamus. Multiple old cerebral infarctions in bilateral hemispheres cerebellums and Pons. A new large cerebral infarction in the left frontal lobe.
Yeh et al [11]	40	Male	No	Infarction over the left middle cerebral artery
Jean et al [18]	32	Female	Multiple, peripherally located, fusiform cerebral aneurysms.	TIA

crine abnormalities [4, 6] About 75 percent originate in the left atrium, and 15 to 20 percent in the right atrium. Most myxomas arise from the interatrial septum at the border of the fossa ovalis, but they can also originate, in descending order of frequency, from the posterior atrial wall, the anterior atrial wall, and the atrial appendage [7]. Only 3 to 4 percent of myxomas are detected in the left ventricle, and only 3 to 4 percent in the right [7]. Myxomas of the heart valves are rare [7]. The cells giving rise to the tumor are considered to be multipotential mesenchymal cells that persist as embryonal residues during septation of the heart and differentiate into endothelial cells, smooth muscle cells, angioblasts, fibroblasts, cartilage cells, and myoblasts [8, 9].

Systemic embolization is the provoking symptom in 16%, but may be present at any time in as many as one-third of patients. Neurologic symptoms have been reported in 26% to 45% of patients, with embolic cerebral infarct being the most frequently observed event [2]. Neurological symptoms attributable to cardiac myxoma can be categorized as acute or delayed. In the acute setting, cerebral infarctions due to tumour embolus are the most common complication. Intracranial aneurysms are the delayed complication and more rare than cerebral infarctions.

Cerebral infarctions

In the acute setting, Cardioembolism is the most common neurological complication, and the mobility, not the size, of the myxoma appears to be related to embolic potential. Histologically, 41% of cardiac myxomas have surface thrombi, and systemic embolization most likely is related to myxoma surface throm-

bus [8]. And 22% of embolus is deciduous fragment of myxomatous tissue. Embolic potential is also related to texture or shape of myxoma [4]. For the cardiac myxomas, which is solid and round, superficial thrombus is the source of embolus, but for the cardiac myxomas, which is soft and irregular in shape, embolus most likely is related to both embolic surface and deciduous fragment of myxomatous tissue [10]. In addition, myxomatous emboli may invade the vessel walls, which may leads to thickening of the cerebral arterial vessel walls and arteriostenosis, than may leads to cerebral ischemia [4]. In this case, MRI revealed multiple infarction lesions coexisting in internal carotid artery and vertebral-basilar artery distribution. DSA do not demonstrate thickening of the cerebral vessel walls or arteriostenosis. So Cardioembolism was the cause of cerebral infarction. Transthoracic echocardiography demonstrated cardiac myxomas with regular surface were solid, round and mobile. So surface thrombus embolization may be the suspected pathogenesis.

There are no clear guidelines for the immediate medical management for ischemic stroke, the main issue is early secondary prevention [11, 12]. Anticoagulants and antiplatelet agents are used with the presumption that some of the embolic component is a thrombus, but may not be protective [11], in addition, research about thrombolysis for ischemic stroke is also reported, with only 5 case reports, but the effect and safety are uncertain [13-15]. In this case, there was no opportunity for thrombolysis with a course of disease of 4 days. Anticoagulation was unsuitable due to large lesion area with high risk of bleeding. So antiplatelet agents and neurotrophic drugs were given.

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Multiple intracranial aneurysms

Intracranial aneurysms are the delayed neurologic complication and more rare than cerebral infarctions. Cerebral imaging often demonstrates intracranial saccular aneurysm, fusiform aneurysm, vessel irregularity with stenosis, and intracranial metastasis. Sabolek [16] find 91% of aneurysms were fusiform dilatation and others were saccular dilatation in 34 patients with intracranial aneurysms associated with left atrial myxomas from the first patient reported by Marchand in 1894, occurring with the highest frequency in the trunk or branch of middle cerebral artery with more in the left, rare in vertebral-basilar artery and its branch. Intracranial aneurysms can rupture leading to intracranial hemorrhages or subarachnoid hemorrhage, but the risk of this has not been quantified [17]. Thromboembolic events emanating from an aneurysm can result in transient ischaemic attacks, which are radiographically occult. Haemodynamically significant vessel stenosis can cause intermittent ischaemic symptoms. Parenchymal and intraventricular metastases, although uncommon, result in symptoms referable to the area of brain involved and the mass effect they create [17]. There was report about delayed neurologic complication present several years after resection of the primary tumour.

Intracranial aneurysms must be the result of embolism of myxomatous emboli. The pathogenesis of aneurysm formation in myxoma patients is not fully understood. Two theories on the pathophysiology of intracranial aneurysms have been widely accepted [17-19]. The original theory suggested that postembolic vascular damage and subsequent scarring resulted in an alteration of flow dynamics that promoted aneurysm formation. In later studies, histopathological evidence showed active invasion of the vascular wall by viable tumour emboli. The ensuing inflammation and fibrosis weaken the elastic media, resulting in erosion of the arterial wall and subsequent aneurysm formation. This process can be slowly progressive and may help explain why patients with intracranial aneurysms present several years after resection of the primary tumor [17].

DSA is gold standard of diagnosis of intracranial aneurysms. In this case, DSA showed multiple large saccular aneurysm in the branches of bilateral middle cerebral artery and distant

right posterior inferior cerebellar artery, while aneurysms were most fusiform dilatation occurring with the highest frequency in the middle cerebral artery with more in the left, rare in vertebral-basilar artery in the past documents. So it was a rare case. Comparison of the previous literatures and the current case were shown in **Table 1**.

Doxorubicin had been used with surgery for recurrent primary atrial myxoma with apparent success [20]. But Roehgen reported that doxorubicin did not prevent enlargement of the aneurysm and may not be effective in cerebral vascular lesions for a patient with progressive myxomatous aneurysms in the right middle cerebral artery [21]. Radiation therapy or chemotherapy in the management for myxomatous aneurysms are not sure effect because the pathogenesis is unclear [20] Jean has isolated and resected a myxomatous aneurysm located in cerebral cortex. But myxomatous aneurysms are often multiple, involved all intracranial arteries, and most located in peripheral branch, so it cannot be curable by operation. The effect of interventional therapy and surgery therapy on myxomatous aneurysms in trunk of cerebral artery is controversial. But enlarged aneurysms or intracranial bleeding may require invasive management [22]. For our patient, surgery therapy was not used because of widespread and multiple aneurysms with irregular shape.

Conclusion

In general, left atrial myxoma commonly may cause multiple cerebral infarcts and multiple intracranial aneurysms, which leading to permanent neurologic impairment. Left atrial myxoma is generally curable if surgically excised, and the prognosis is excellent [9]. The outcome after cardiac myxoma resection is favorable, with a 20-year survival rate of 85%, and the recurrence rate of atrial myxoma after resection is low (5%) [23]. Preoperative disability resulting from embolic events should be avoided by the early detection and resection [9]. But intracranial aneurysms may present several years after resection of the primary tumour, so following up by Cerebral Computed Tomography (CT), MRI or DSA after operation is necessary.

Disclosure of conflict of interest

None.

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