Radiology Case Reports 20 (2025) 2285–2289

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journal homepage: www.elsevier.com/locate/radcr

Case Report

Cardioembolic stroke secondary to a cardiac myxoma ☆,☆☆

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ARTICLE INFO

Article history:
Received 16 December 2024
Revised 15 January 2025
Accepted 23 January 2025

Keywords:
Stroke
Young
Cardioembolism
Myxoma
Surgery
Thrombolysis

ABSTRACT

We present the case of a young male who developed a cardioembolic stroke secondary to a cardiac myxoma, a rare but important cause of ischemic stroke, especially in patients without traditional stroke risk factors. The patient, a 32-year-old male, initially presented with altered consciousness and unilateral hemiplegia, with early neuroimaging showing no significant findings; however, follow-up imaging revealed bilateral, multi-territorial ischemic infarctions. Diagnosis was confirmed through echocardiography, cardiac magnetic resonance imaging (CMR) and histopathology, and the patient later experienced central retinal artery occlusion (CRAO) and radial artery occlusion. Surgical resection was performed at 21 days from presentation without significant complications. This case emphasizes the importance of considering cardiac myxoma in the differential diagnosis of ischemic stroke in young patients, the need for thorough diagnostic workup when initial imaging is negative and the challenge of timing surgery, which should be done in a multidisciplinary setting to balance the risks of neurological complications with the benefits of early intervention.

Introduction

Stroke is one of the leading causes of morbidity globally, and most strokes are ischemic in nature [1]. Ischemic stroke has been divided into categories based on etiology to provide the best possible management for each case [2]. Cardioembolism accounts for approximately 20%-30% of all ischemic strokes [2,3]. The most notable causes of cardioembolism are atrial fibrillation and intracardiac thrombi secondary to systolic heart failure [1]. Less common causes, such as an intracardiac myxoma, account for less than 1% of all cardioembolic strokes [1,3]. Atrial myxoma is the most common cardiac tumor and is especially important to consider in young patients presenting

☆ Competing Interests: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

☆☆ Acknowledgments: This research did not receive any specific grant from any funding agency in the public, commercial, or not-for-profit sector.

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https://doi.org/10.1016/j.radcr.2025.01.073

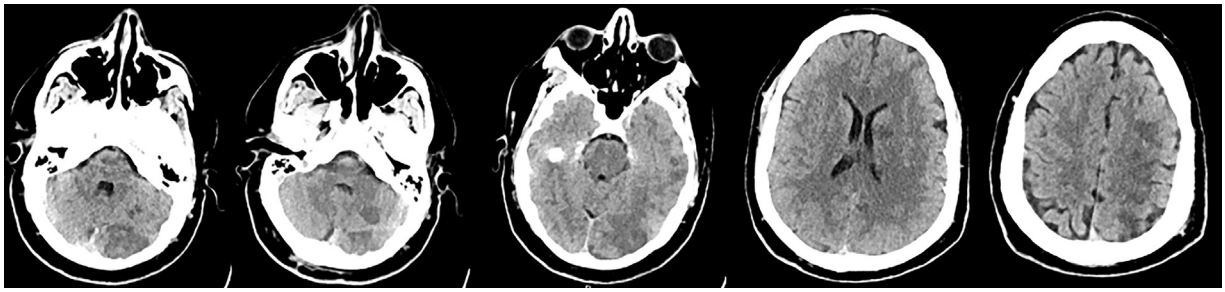

Fig. 1 – Noncontrast CT brain. Noncontrast CT head in axial cuts demonstrating multiple hypodense lesions predominantly affecting the left hemisphere. From left to right: the first image reveals a lesion in the left cerebellar lobe, the second highlights involvement of the left occipital lobe, the third shows a lesion affecting the left basal ganglia and the fourth depicts extensive hypodensities in the left parietal and frontal lobes, reflecting cortical and subcortical involvement.

with cardioembolic stroke [4–7]. We report a case of cardioembolic stroke secondary to a cardiac myxoma in a young male patient and highlight the importance of early surgical intervention in such cases.

Case report

A 32-year-old male with past medical history of hypertension and obesity was brought to the ER after sudden loss of consciousness at home. On assessment, his blood pressure was 160/98. His level of consciousness was reduced. He was opening eyes to verbal command, following simple commands and moaning. His right upper and lower limbs were showing no effort against gravity and there was flattening of his right nasolabial fold. His National Health Institute of Stroke Severity (NIHSS) score was 18. Neuroimaging was promptly ordered for further assessment. Computed tomography (CT) of the brain was unremarkable and CT angiography did not show proximal occlusion. He was managed as a case of acute stroke within window for thrombolysis and subsequently received intravenous thrombolysis (tenecteplase) according to his weight. However, the patient failed to improve or regain his level of consciousness after thrombolytic therapy. CT brain was repeated twelve hours later and showed multiple hypodense lesions involving both anterior and posterior circulations bilaterally. The CT findings were highly suggestive of a cardioembolic etiology (Fig. 1). Magnetic resonance imaging (MRI) of the brain showed that he had an extensive ischemic stroke through diffusion weighted imaging (DWI) (Fig. 2).

In view of these findings, the patient underwent a transesophageal echocardiography (TEE) which revealed a patent foramen ovale (PFO) and an irregular vascular mass in the left atrium attached to the PFO area measuring around 3 cm × 2.4 cm. However, it was difficult to determine whether this lesion was a thrombus or a tumor. Cardiac magnetic resonance imaging (CMR) was performed to assess the nature of the intracardiac mass and confirmed that it was in fact a cardiac myxoma (Fig. 3).

Although cardiac surgery is the definitive management of cardiac myxoma, we had planned to postpone surgical intervention considering the patient's recent extensive stroke. During this time, the patient was aphasic and completely hemiplegic. As there are no clear guidelines regarding the timing of surgery in these patients and cardiac surgery carries a high risk of central complications, he was treated conservatively and observed for the next few days.

However, ten days after his index stroke, the patient developed gangrene of his right fifth digit. This would mark his second event. At this point, cardio-thoracic surgery was consulted, and a multidisciplinary meeting was held between cardiothoracic surgery, neurology, and internal medicine. The risks and benefits were explained to the family. Ultimately, the family decided to proceed with the surgery to avoid any further events.

Unfortunately, the patient became blind in his left eye in the days leading up to the surgery. Ophthalmological assessment of the left eye revealed a cherry red spot indicative of complete retinal artery occlusion (CRAO). This time, he was not a candidate for thrombolytic therapy. This had marked his third cardiac myxoma-related embolic event.

The patient underwent cardiac surgery 21 days after his first event and TEE confirmed successful removal of the myxoma. Histopathological examination later confirmed the diagnosis of cardiac myxoma.

He remained well neurologically postoperatively without further progression of his symptoms. To facilitate early identification of neurological complications, a CT brain was obtained one day pre-operatively as a baseline and again immediately postoperatively. There were no time interval changes in his brain imaging findings.

On day five postoperatively, the patient was discharged home without any further events. On discharge, he still suffered from residual neurological symptoms and blindness in his left eye. He was unable to move his right upper limb but had regained power in his right lower limb.

With intensive physiotherapy, the patient is showing gradual improvement of his symptoms. Three months later, the patient is able to walk, lift his right shoulder, and produce some movements in his right hand. His speech is fluent, and he can carry out normal conversation. However, he remains blind in his left eye.

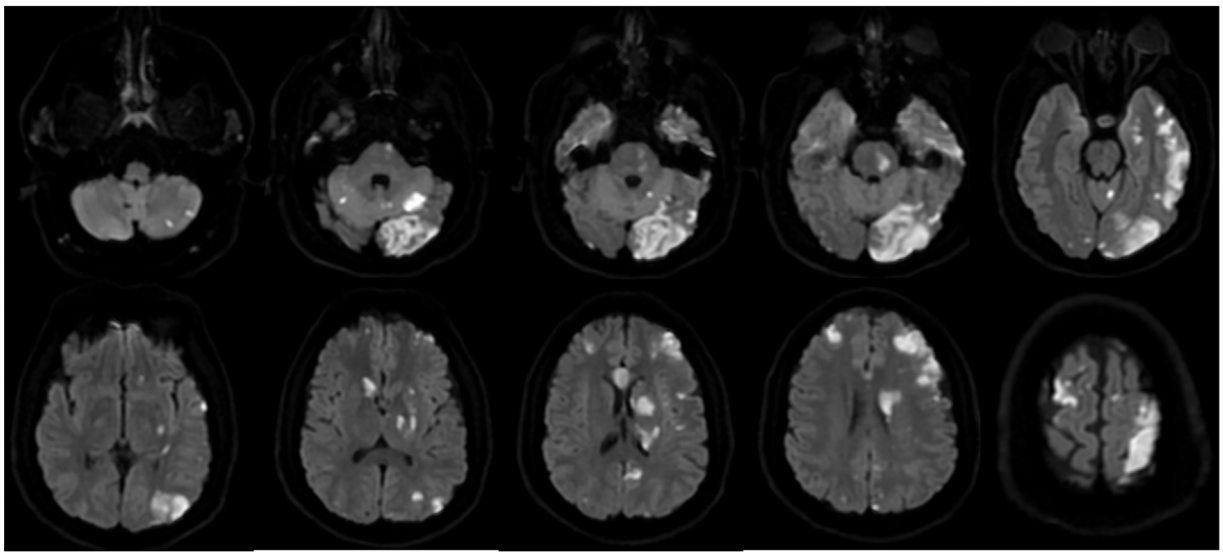

Fig. 2 – MRI brain. The figure shows axial cuts of an MRI brain in Diffusion-Weighted Imaging (DWI) sequences illustrating hyperintense lesions in multiple regions, including the brainstem, cerebellum, basal ganglia, occipital lobes, parietal lobes and frontal lobes, consistent with acute ischemic infarctions. The lesions are bilateral and involve both supratentorial and infratentorial regions, with a marked left-sided predominance and asymmetric distribution.

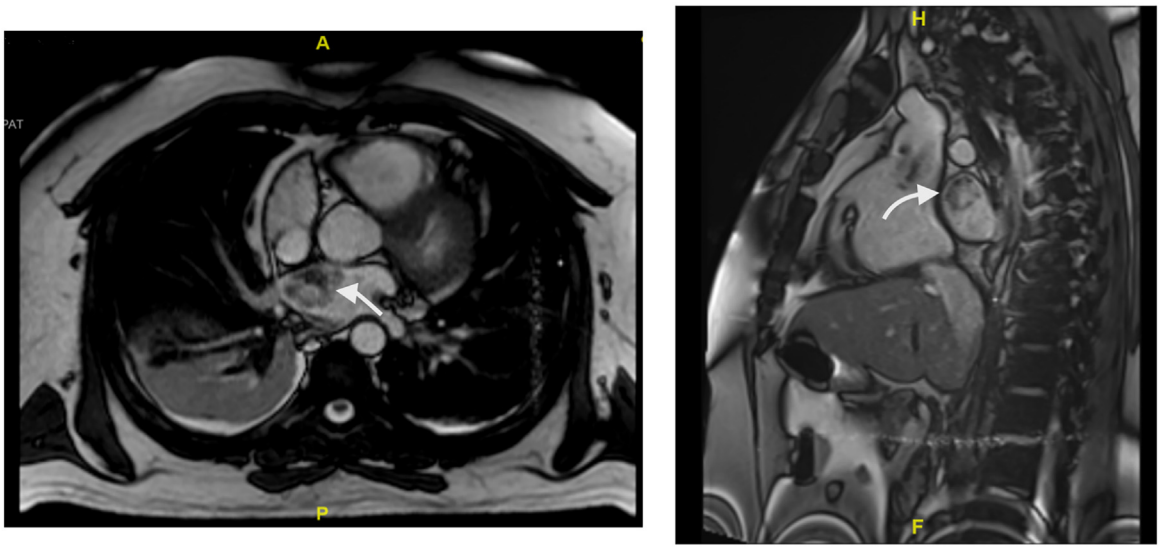

Fig. 3 – Cardiac MRI. Cardiac MRI showing a left atrial myxoma in axial T2 Steady-State Free Precession (T2-TRUFI) sequence (A) and sagittal T2-TRUFI sequence (B) as indicated by the white arrows. The lesion is heterogenous, displaying signals of varying intensity and measuring around 2.4 x 3.3 cm along its axial and craniocaudal axes, respectively. It is fairly defined, confined to the left atrium and attached to the interatrial septum.

Discussion

Cardiac myxoma is the most common cardiac tumor, and it usually occurs in the left atrium [5,6]. It occurs more frequently in women [4]. The presentation varies and can often be misleading, delaying the diagnosis [7]. Patients can present with obstructive symptoms, embolic symptoms, or nonspecific systemic symptoms [8–11]. This case report discusses a patient who presented with embolic symptoms in the form of ischemic stroke, central retinal artery occlusion, and radial artery embolism. Emboli from a cardiac myxoma can affect both anterior and posterior circulations; however, anterior circulation involvement is more common [12,13].

A cardiac workup was obtained early on in light of the patient's age and lack of improvement after intravenous thrombolysis, which revealed a lesion suspicious of a cardiac myxoma. This highlights the importance of echocardiography in

all, but especially young, patients presenting with ischemic stroke. However, it is important to note that initial imaging can be misleading, as the myoxma may be confused with a thrombus on transthoracic echocardiography [14]. Transesophageal echocardiography is more sensitive in detecting cardiac myxomas, with a sensitivity of 100%, deeming it superior to transthoracic echocardiography in these cases [14]. Cardiac MRI can also be obtained in patients with high suspicion and inconclusive echocardiographic findings. Confirmation of the diagnosis is by histopathological assessment of the mass [15].

The most challenging aspect of this disease entity is treatment. Thrombolysis has been used on several occasions in patients with cardiac myxoma related ischemic stroke; however, it is usually before the diagnosis of cardiac myxoma. It has been used with varying degrees of success [16]. The success of thrombolysis depends on the nature of the embolus. With a cardiac myxoma, emboli can be composed of tissue, a thrombus, or a combination of both [17,18]. Naturally, one would assume that patients with a thrombotic embolism would benefit more from thrombolysis [19]. The fact that our patient deteriorated in spite of intravenous thrombolytic therapy suggests that his embolus may have been mostly composed of tissue rather than thrombotic material [19].

Thrombectomy, on the other hand, appears to be more successful in treating these patients and providing symptomatic relief [3,20–22]. The time window for thrombectomy, however, is unclear. Upon reviewing the literature, some physicians have performed thrombectomy up to 48 h after symptom onset [21]. It has also been performed at 4.5 and 23 h, the latter being in the case of a posterior circulation stroke [3,20].

The definitive treatment of cardiac myxoma is timely cardiac surgery in order to prevent further complications [12,23]. This is a particularly difficult issue, as there are no guidelines stating when it is safe to perform cardiac surgery after an ischemic stroke in these cases [3,16]. In 2 case reports, surgical intervention was performed as early as 48 h after the onset of ischemic stroke [24,25]. One case report states that surgery was performed immediately; however, it is unclear exactly when [26]. Others have reported that surgical intervention was performed at days five and seven [3,23]. One study presented 23 patients who underwent surgical resection within 3-4 weeks of stroke onset without hemorrhagic transformation post-operatively [19]. Xindu Wu et al. [3] highlight the fact that most hemorrhagic transofrmation occurs within 7 days of acute stroke; therefore, it may be reasonable to proceed for surgery after this time period to attempt to minimize the risk.

Conclusion

By presenting this case, we highlight the importance of prompt cardiac workup in young patients presenting with stroke. We also discuss the dilemma surrounding the timing of cardiac surgery in patients presenting with cardiac myxoma-related acute ischemic stroke. Our patient underwent surgery at 21 days without any progression of his neurological deficit or hemorrhagic transformation postoperatively. There is definitely a need to collect more data on cardiac myxoma-related stroke in order to develop appropriate management guidelines going forward. In the meantime, these cases should be managed with an individualized, multidisciplinary approach to provide the best outcome possible.

Author contributions

Dr. Shareefa wrote the article and obtained the relevant clinical data. Dr. Athari was the primary physician involved in the patient's care and also edited the written manuscript. All authors read and approved the manuscript.

Patient consent

Informed consent was obtained from the patient and his legal guardian (father) prior to drafting this manuscript.

They were informed that all patient-identifying information would be kept confidential apart from the patient's risk factors (including elevated BMI/obesity). Only radiological imaging would be used in the case report. No personal images or videos will be included. No information regarding the hospital or country in which the patient was managed will be included in the case report.

They were informed that the purpose of this case report is to increase education regarding this issue and facilitate timely management should this case present itself again in the future.

Both verbal and written informed consent was obtained.

As the patient had dense right sided weakness and aphasia, written consent was obtained from his legal guardian.

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