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Stuck Mitral Valve with Thromboembolic Stroke Managed with Anticoagulation and Mechanical Thrombectomy

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Authors' contributions

This work was carried out in collaboration among all authors. Author AJ designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors GS and AK managed the analyses of the study. Authors NOB and RS managed the literature searches. All authors read and approved the final manuscript.

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Case Study

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ABSTRACT

Heart valve replacements are commonly performed these days in India with mitral valve replacement being most common of all. Thromboemboli are a major source of morbidity in patients with prosthetic heart valves. The incidence of clinically recognizable events ranges from 0.6% to 2.3% per patient-year. Mechanical valve thrombosis is another common complication, incidence of which is estimated at 0.3% to 1.3% per patient-year in developed countries, but as high as 6% per patient-year in developing countries. Management of either complication in these patients requires adequate knowledge and clinical experience. We here describe a rare case of a patient who came to us with both complication of stuck mitral valve prosthesis and embolic stroke simultaneously. We here discuss the approach, monitoring and management of these patients, the clinical difficulties we faced in our case, immediate and short term prognosis of our patient.

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Keywords: Stuck mitral valve; cerebrovascular accident; thromboembolic stroke; mechanical thrombectomy; mitral valve prosthesis.

1. INTRODUCTION

In countries like India, where poverty and poor hygiene continues to be major social problem, rheumatic heart disease (RHD) remains a common cause of cardiac morbidity and mortality. From available data from RHD studies, the estimated average prevalence is 0.5/1000 children in age group of 5–15 years. There are expected to be more than 3.6 million patients of RHD estimated from 2011 census [1]. Almost 44,000 patients are added every year, and expected mortality is 1.5%–3.3% per year [1]. As a part of treatment for these valvular heart diseases valve replacement (s) are commonly performed these days in India. Mitral valve replacement being the most common valve replaced surgically. Valve material can be mechanical or bioprosthesis. Mechanical valve has added advantage of durability but makes it imperative for patient to take lifelong anticoagulant therapy failing which can lead to thromboembolic or hemorrhagic complications. Complications which are usually encountered in post valve replacement patient includes patient prosthesis mismatch, structural valve deterioration, para-valvular regurgitation, thrombo-embolism and bleeding, prosthetic valve thrombosis, infective endocarditis, haemolytic anemia.

We here describe a patient who came to us with both complication of stuck mitral valve prosthesis and embolic stroke simultaneously.

2. CASE REPORT

20 year old young female came to cardiac emergency with chief complaint of acute onset breathlessness and chest pain which was rapidly progressive to New York Heart Association class IV since 2 days and weakness of right upper and lower limb since 6-7 hours which she developed on the way to our hospital from a peripheral heath centre. Patient was a known case of rheumatic heart disease and underwent mitral valve replacement (MVR) with TTK Chitra mechanical mitral valve in 2017 in view of severe mitral regurgitation. She underwent MVR with mechanical prosthesis being a young female with long life expectancy. She recently (1 month back) had abortion followed by dilatation and curettage after which she stopped taking her oral anticoagulant, warfarin. Her referral paper mentioned that she was evaluated locally by echocardiography which was suggestive of stuck mitral valve with large thrombus and hence she was being transferred to tertiary centre for redo-mitral valve replacement. On examination she was in respiratory distress with respiratory rate on 38/min and saturation on 77% in room air. Her pulse rate was 129/min irregularly irregular and low volume, blood pressure was 96/72 mmHg. Bilateral crepts were present on auscultation and mitral click was not audible. She was drowsy disoriented and not moving her right upper and lower limb. Echocardiography was done which showed mitral valve prosthesis with immobile leaflets having peak by mean gradient of 40/26 mmHg across mitral valve but no obvious thrombus could be seen (Fig. 1). Outside echo recordings were reviewed which clearly showed a large thrombus measuring 2.5x1.5 cm on mitral valve prosthesis overhanging into left ventricular cavity (Fig. 2). Patient was admitted and started on diuretics and oxygen support with nasal mask. Cardiovascular thoracic surgical reference was done for immediate redo-MVR but it was advised to medically stabilise the patient and neurologic consultation in view of rapidly progressive and deteriorating neurologic status of the patient. Patient's computed tomography (CT) of brain with angiography showed large non-hemorrhagic infarct in left fronto-temporo-parieto-occipital region (Fig. 3) with non-visualisation of terminal portion of left internal carotid artery (Fig. 4) suggestive of acute embolic stroke. Patients blood report showed normal leucocytes count of 7600/uL, an international normalised ratio (INR) value of 1.3 which was clearly sub therapeutic. In view of critical condition of the patient and large infarct of more than 4.5 hours of duration she was not thrombolysed. She was referred to interventional neuro-radiology within an hour she came to our hospital (7^{th} hour from neurological symptom onset) and planned for intrarterial thrombolysis with or without mechanical thrombectomy. She underwent intra-arterial thrombolysis with alteplase which did not show good results and hence she was then subjected to mechanical thrombectomy almost 8 hours after her symptom onset. After mechanical thrombectomy complete recanalization of left internal carotid artery with good flow in anterior and middle cerebral artery was achieved (Fig. 5). Post procedure patient was started on heparin infusion. Patient showed significant clinical improvement over next 24 hours. She was

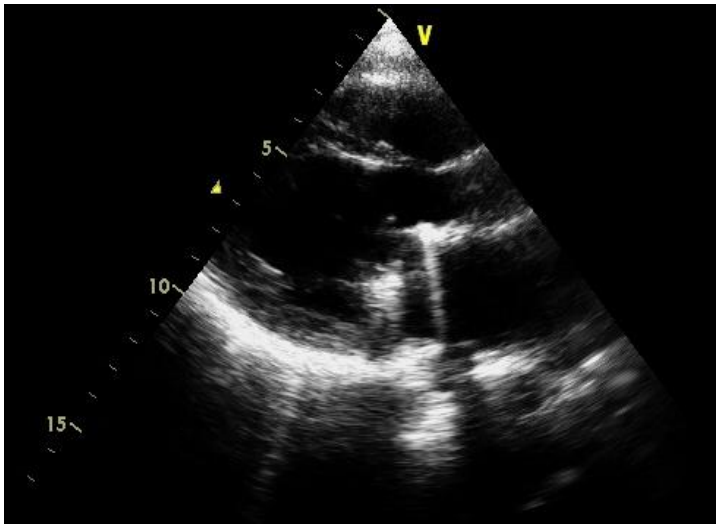

Fig. 1. 2D ECHO at JJ Hospital on presentation showing stuck mitral valve with no obvious vegetation

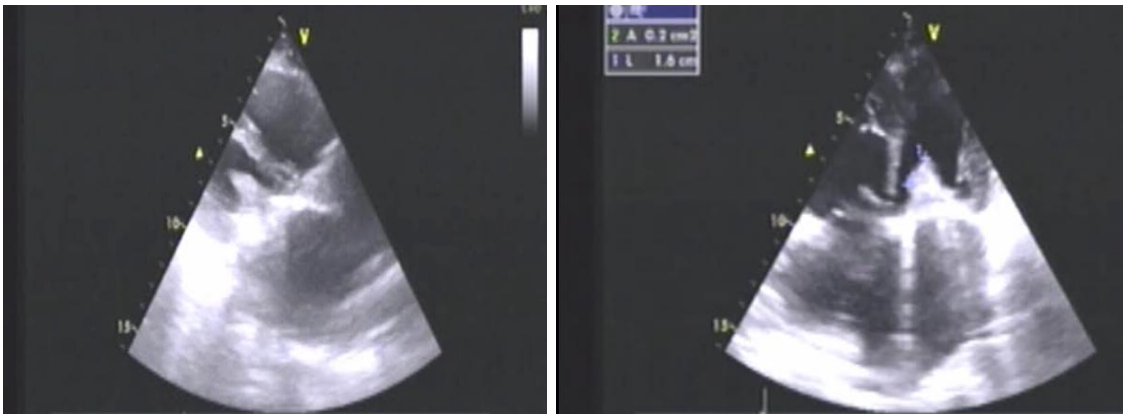

Fig. 2. 2D ECHO done at a peripheral centre 1 day before presentation showing obvious vegetation on mitral prosthesis. Left: Parasternal long axis view. Right: Apical 4 chamber view

maintaining saturation of 98% in room air, her gradient across mitral valve decreased to 15/8 mmHg, her pulse rate was 92/min and chest clear. In view of good response to heparin, patient was continued on heparin intravenous infusion. Over next few days she regained her consciousness started following simple verbal commands, was able to produce sounds but couldn't form words and had power of 1/5 in right upper and lower limbs. She was later, after 1 week, started on warfarin (5 mg) and ecosprin (75 mg) for maintenance. Patient was discharged once a therapeutic INR levels were reached and she, along with her relatives, was counselled and advised for strict compliance to drugs and testing protocols with regular follow up and physiotherapy at home. Her gradient across mitral valve decreased to 12/6 mmHg on the day of discharge.

3. DISCUSSION

Thromboemboli are a major source of morbidity in patients with prosthetic heart valves. The incidence of clinically recognizable events ranges from 0.6% to 2.3% per patient-year [2]. Risk factors for thromboembolism include the inherent thrombogenicity of the prosthesis, valve position (mitral > aortic), valve number, time spent out of the therapeutic range of anticoagulation, a history of thromboembolism, hypercoagulable state, atrial fibrillation, left atrial enlargement and LV systolic dysfunction. Cerebrovascular accidents (CVA) in patients with prosthetic valves

may be hemorrhagic or athroembolic in nature, and may be unrelated to the valve entirely. In a prospective study of 89 patients presenting with CVA more than 90 days following mechanical valve placement, 77.5 percent of patients experienced cerebral hemorrhage, 17 percent embolic stroke, and eight percent were non-embolic lacunar infarcts [3]. Management of acute embolic stroke in patients with mechanical prosthetic heart valves is as per recent stroke guidelines. It advocates thrombolytic therapy for a patient who presents within 3-4.5 hours of symptom onset and mechanical thrombectomy or intrarterial thrombolysis according to individual clinical profile up to 12-24 hours.

Fig. 3. CT Brain showing hypodensity and loss of gray white matter differentiation in left fronto parietal region

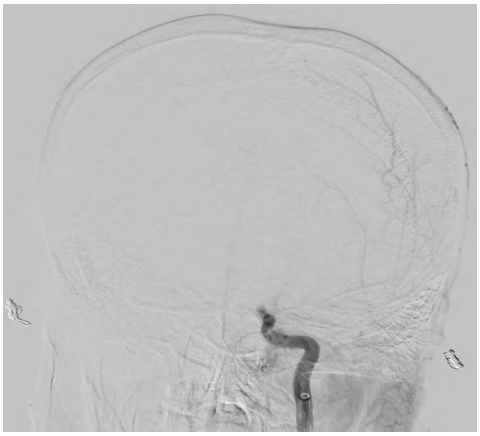

Fig. 4. Cerebral angiogram showing non visualisation of terminal portion of left internal carotid artery

The incidence of mechanical valve thrombosis is estimated at 0.3% to 1.3% per patient-year in developed countries, but as high as 6% per patient-year in developing countries [2]. Fibrinolytic therapy is reasonable for patients with recent-onset (<2 weeks) NYHA Class I or II symptoms and small thrombus burden (<0.8 cm^2) and for sicker patients with larger thrombi when surgery is either not available or inadvisable. Fibrinolytic therapy is generally recommended for patients with right-sided prosthetic valve thrombosis. Some patients with no or minimal symptoms and small thrombi can often be managed with intravenous UFH alone and then converted to fibrinolytic therapy if unsuccessful.

We here described a patient who came to us with both complication of stuck mitral valve prosthesis and embolic stroke simultaneously. Intravenous recombinant tissue plasminogen activator (rt-PA) given within 3 hours of stroke onset is considered the standard treatment of stroke and is approved by the health authorities of most countries. It increases the rate of favourable outcomes from the range of 20% to 38% to 31% to 50% [4]. As it was more than 6 hours of neurological symptom onset, intravenous thrombolysis was not an option. Due to rapidly progressing neurological deterioration patient could not be taken for redo mitral valve replacement. So patient was started on injectable heparin infusion after ruling out the intracranial hemorrhage with the computed tomography of brain; which also showed major infarct in left internal carotid artery territory and complete occlusion of terminal portion of left internal carotid artery. Intra-arterial (IA) thrombolysis is a promising strategy for acute ischemic stroke. In IA thrombolysis, the cervicocephalic arterial tree is traversed with an endovascular microcatheter delivery system, the catheter port is positioned immediately within and adjacent to the offending thrombus and fibrinolytic agents (Alteplase most commonly) are infused directly into the clot. It permits high concentrations of lytic agent to be delivered to the clot while minimizing systemic exposure. IA thrombolysis achieves higher recanalization rates than intravenous thrombolysis with acceptable hemorrhagic complications. However, this approach did not work in our patient, as cerebral angiography did not show well established flow, and patient was planned for mechanical thrombectomy. For anterior circulation acute ischemic stroke, thrombectomy is indicated in select patients up to 16 hours from symptom onset or time last known well for unwitnessed

strokes, including wake-up strokes [class I, level A], and is indicated in select patients up to 24 hours from last known normal [class IIa, level B] [5]. Post mechanical thrombectomy angiography showed near complete recanalization and good flow in distal circulation. Alteplase given within 4.5 hours of symptom onset significantly increases the likelihood of recovery with greater benefit seen with shorter onset-to-treatment times [6]. Symptomatic intracranial bleeding is the most feared complication. Mechanical thrombectomy in stroke improves the chances of good outcome in a subset of patients with large vessel occlusion and also give a broader time window for active intervention [6]. Complications of endovascular procedures are usually the one related to vascular access, radiological contrast media and device-related vascular injury.

We did not thrombolyse our patient due to neurological contraindication and poor consciousness level. We started our patient on intravenous Heparin infusion after which our patient showed significant reduction in gradient across mitral valve at repeat evaluation on day 2. We continued heparin for next few days by the time therapeutic INR was achieved with warfarin.

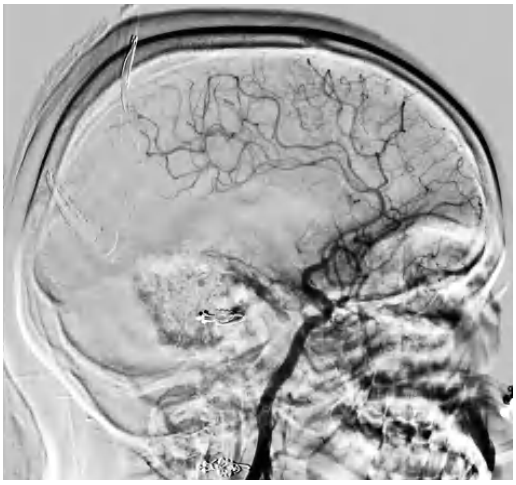

Fig. 5. Cerebral angiogram, post intra-arterial thrombolysis and mechanical thrombectomy, showing complete recanalization of left internal carotid artery and good distal flow

4. CONCLUSION

In patients with stuck mitral valve with large thrombus redo-MVR is the treatment of choice. However, in some patients where the thrombus is already embolised in major cerebral vessels, there is paucity of definitive management guidelines. The management of these patients needs to be individualised. The management involves multimodal approach involving experts from different specialities like Cardiology, Cardiovascular thoracic surgery, Neurology, Interventional neuro-radiology, Intensivist and sometimes Neurosurgery. With combined efforts and management these patient can be stabilised and discharged successfully as in this case.

CONSENT

As per international standard or university standard, patient's consent has been collected and preserved by the authors.

ETHICAL APPROVAL

As per international standard, written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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