Transcatheter mitral valve repair clip embolization to the right coronary artery

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Central Message:

Although rare, MitraClip embolization can be life threatening. We report the treatment of one such case as the only survival to discharge in the literature.

Abbreviated legend for central picture:

The mitraclip can be seen embolized to the right coronary artery ostium

Glossary of Abbreviations

ASD – Atrial Septal Defect

MR - Mitral Regurgitation

POD – Post Operative Day

RCA – Right Coronary Artery
Introduction

Though transcatheter mitral repair with MitraClip has been deemed a safe procedure for high-risk surgical populations, it does carry the possibility of complications. MitraClip procedure complications can be categorized as procedural (related to the deployment itself) or device-related and can result in re-intervention, extended hospital stay, and increased mortality [1]. One of the rarest structural complications is MitraClip embolization, in which the entire MitraClip or a fragment embolizes into the left ventricle or out of the heart. Two cases of RCA embolization have been reported, both of which were treated nonsurgical by catheter-based methods, were not successful in seeing the patient to discharge [2,3]. We describe a patient who suffered MitraClip embolization to the ostium of the right coronary artery (RCA), resulting in non-ST segment elevation myocardial infarction (NSTEMI) from occlusion of the RCA, as well as refractory severe mitral regurgitation (MR) and congestive heart failure. The patient provided written informed consent for publication of study data; IRB approval was not required.

History:

The patient is a 65-year-old morbidly obese male with severe MR, hypertrophic cardiomyopathy, non-obstructive coronary artery disease, atrial fibrillation, prior transient ischemic attack, hypertension, and asthma. He was deemed to be a poor surgical candidate because of these comorbidities and the patient wanted to avoid surgery at nearly any cost. He was treated for his MR with 2 MitraClips in the A1-P1 and A2-P2 positions with improvement in his MR to mild. While his two MitraClips were still firmly implanted on the mitral apparatus, the patient developed further dilation of the left ventricle with functional MR, prompting return a year later for
reintervention. A third MitraClip was placed in the A1-P1 location. The repair was deemed satisfactory, and his symptoms improved.

Six months after the second MitraClip application, he presented to an outside hospital with 24-hour history of severe shortness of breath with minimal exertion. His workup included CT chest, and cardiac catheterization (Figure 1). A MitraClip was identified in the RCA ostium. A transesophageal echo confirmed this along with an iatrogenic atrial septal defect (ASD), severe MR, and severe right ventricle dysfunction. He was eventually transferred to our institution after several days at outside hospitals.

He was medically optimized and then taken to the operating room urgently. After initiating cardiopulmonary bypass, the aorta was crossclamped, and the heart was arrested. The aorta was opened and the MitraClip was immediately seen embedded in the ostium of the RCA (Figure 2). The device was easily removed with no obvious adverse sequelae. However, a #3 probe could not be passed via the ostium. Due to concern for thrombus beyond the opening, the RCA was bypassed using a saphenous vein. When irrigating the coronary in a retrograde fashion minimal flow was noted out the RCA ostium. Attention was turned to the mitral valve. Operative findings include two disassociated MitraClips located on A2 with several segments of P2 disrupted. He underwent a mitral valve replacement with 31/33 mm On-X Mechanical Valve, and his moderate tricuspid regurgitation was treated with a 34 mm Medtronic Simulus Band. He also had ligation of left and right atrial appendages, Cox IV maze, and ASD closure.

While attempting to come off bypass, a hematoma was noted in the left ventricle and on further inspection a small tear was noted adjacent to the RCA ostium requiring a patch repair with bovine pericardium and externally knotted prolene stitches. It was hypothesized that the clip may
have partially eroded into the coronary wall creating a weak area that ruptured once the aortic root was pressurized again.

He had a prolonged ICU stay due to inotrope and epoprostenol weans, transferring to the general ward on POD 5. His hospital course was complicated by AKI which resolved by discharge on POD 11. Follow-up at 6 months showed recovery from surgery and resolution of symptoms. A poor quality echo was performed but could not evaluate the mitral valve. It did show a severely dysfunctional right ventricle consistent with the preoperative findings and the chronicity of his RCA occlusion, this despite our efforts to bypass the vessel.

Discussion:

Embolization of MitraClip is a rare complication [1]. There have been two other reports of MitraClip embolization to the coronary artery [2, 3]. Both patients had significant comorbidities. Both patients had the embolized MitraClip captured and removed via catheter-based methods, and neither survived the hospitalization. The first patient developed progressive refractory cardiogenic shock with multiorgan failure despite support and died within 2 days. The second patient died due to sepsis 2-weeks after clip retrieval. The latter also needed thrombolysis to the right coronary due to presumed thrombosis, correlating with concerns we had in our case.

Conclusion:

We describe successful surgical management of a patient after MitraClip embolization of the coronary artery.
References


Legends

Figure 1 Legend: Echo, CT, and cardiac catheterization images demonstrating the MitraClip embolized to the RCA ostium.

Figure 2 Legend: The mitraclip can be seen embolized to the right coronary artery ostium.
MitraClip Embolization to the RCA
A Rare and Potentially Devastating Complication
A Case Report

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