Late MitraClip Embolization
A New Cause of ST-Segment–Elevation Myocardial Infarction

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Percutaneous edge-to-edge mitral valve repair using the MitraClip device (Abbott Vascular) is currently indicated for high-risk patients with symptomatic severe mitral regurgitation. The percutaneous approach, although inferior to surgical mitral valve repair, has an excellent safety profile. We report the first case of ST-segment–elevation myocardial infarction caused by late embolization of MitraClip to the right coronary ostium.

Case Report
An 80-year-old gentleman with severe symptomatic mitral regurgitation and multiple cardiac risk factors including coronary artery disease, moderate aortic stenosis, atrial fibrillation, hypertension, and moderately reduced left ventricular systolic function underwent percutaneous mitral valve repair with 3 MitraClips at another medical center. The first clip was deployed in A2-P2 position with a 12 to 6 o'clock orientation, despite having difficulties grasping the posterior leaflet because of significant degree of flail (Movie I in the Data Supplement). Given a moderate residual regurgitation (Movie II in the Data Supplement), a second clip was placed just lateral to the first one. After full release of the second clip, there appeared to be a single leaflet attachment of both clips with one free clip attached to the anterior leaflet and one free clip attached to the posterior leaflet (Movie III in the Data Supplement). Tissue bridge was gone, and mitral regurgitation was back to its baseline severity. The third MitraClip was deployed in A2-P2 position with a 11 to 5 o’clock orientation, which created a better central tissue bridge, stabilized the previous 2 clips, and reduced regurgitation from severe to mild (Movie IV in the Data Supplement). At the end of the procedure, mean left atrial pressure was 15 mm Hg with no evidence of a significant V wave. Postoperative transthoracic echocardiography showed mild mitral regurgitation with an eccentric regurgitant jet directed anteromedially, estimated mitral valve area of 1.9 cm², and mean transmitial gradient of 1.7 mmHg (Movie V in the Data Supplement).

Six weeks later, he presented to our hospital with a typical chest pain, and evidence of inferior ST-segment–elevation myocardial infarction on ECG (Figure 1). Clinical examination revealed that he was in shock with persistent hypotension, mottled extremities, elevated jugular venous pressure, and an S3. He was emergently intubated and transferred to the catheterization laboratory. Initial fluoroscopic imaging revealed a dislodged MitraClip occluding ostium of the right coronary artery and 2 MitraClips seating on the mitral leaflets (Figure 2A; Movie VI in the Data Supplement). Bradycardia with junctional rhythm necessitated the placement of a temporary pacemaker. Shortly after initial fluoroscopic image, the MitraClip was noted to have dislodged again into the right coronary cusp (Figure 2B; Movie VII in the Data Supplement). Initial attempts to retrieve the clip with a biopomme were unsuccessful because of small size of the forceps relative to the clip, lack of enough support behind the clip, and rapid movements of the trapped clip inside the aortic sinus. Then, a 25-mm Amplatz goose neck snare was introduced, and the MitraClip was successfully snared to the right common femoral artery (Figure 2C and 2D; Movie VIII in the Data Supplement). Surgical cutdown at the arteriotomy site was performed, and the MitraClip was successfully retrieved. During the procedure, the patient developed sustained ventricular tachycardia requiring defibrillation. An intra-aortic balloon pump was placed after retrieval for hemodynamic stabilization, and he was admitted to the intensive care unit. Postoperative transthoracic echocardiography revealed 2 MitraClips seated on the anterior mitral leaflet (Movie IX in the Data Supplement) with a severe eccentric mitral regurgitation, moderate LV systolic dysfunction, severe right ventricular dilation and systolic dysfunction, and a small iatrogenic interatrial septal defect. He developed progressive refractory cardiogenic shock with multiorgan failure despite intra-aortic balloon pump support and multiple vasopressor agents over the 48-hour period after his initial presentation that resulted in his demise.

Discussion
Cases of partial detachment of MitraClip have been reported in 2% to 5% of patients receiving MitraClip1–3; however, complete detachment and embolization of MitraClip are extremely rare, with only 1 case being reported to date.4 MitraClip detachment mostly occurs during the deployment...
of the clip and are recognized immediately. Late embolization of the MitraClip after its deployment has not been reported before. We report the first case of late and complete detachment of MitraClip and embolization into a coronary ostium causing acute myocardial infarction and cardiogenic shock. Although risk factors for late embolization are not fully recognized, it is likely that initial technical factors are a risk factor for embolization. In our case, significant flail status of the posterior mitral leaflet had led to difficult deployment of the first 2 MitraClips during the index procedure and their detachment from 1 leaflet. This would increase the risk of instability and detachment of additional clips. Although the third clip had initially resulted in significant reduction of the regurgitation severity, our fluoroscopic and echocardiographic imaging on presentation with acute decompensation suggested that the third clip was also detached from the posterior leaflet, leading to a highly flail posterior leaflet and its attached clip, which was later dislodged and migrated into the right coronary artery ostium. Therefore, the need to use additional clips to reduce mitral regurgitation and stabilize a highly flail mitral leaflet might be a risk factor for late embolization.

Extra caution must be used when pulling the trapped clip from the coronary ostium, as there is a risk for re-embolization of the clip and stroke. Although surgical cut down for final retrieval of clip may be necessary to avoid the risk of arterial complications, a 16F sheath will allow passage of the clip percutaneously if snared coaxially and a less invasive approach.

Disclosures
None.

References

Key Words: cardiac surgical procedures ▪ mitral valve ▪ mitral valve insufficiency ▪ myocardial infarction ▪ shock, cardiogenic ▪ tachycardia, ventricular
Figure 1. ECG on presentation showing inferior ST-segment-elevation.

Figure 2. Fluoroscopic images of (A) embolized MitraClip in the right coronary artery ostium (white arrow), (B) dislodged MitraClip in the right coronary aortic cusp, (C) secured MitraClip with an Amplatz goose neck snare, and (D) retrieved Mitra-Clip at the femoral artery.
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