

CASE REPORT **OPEN ACCESS**

# Successful Percutaneous Retrieval of an Embolized MitraClip From the Right Subclavian Artery

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## ABSTRACT

Single leaflet device attachment (SLDA) after mitral transcatheter valve edge-to-edge repair (M-TEER) has been reported in up to 5% of patients. However, complete embolization of the M-TEER device is exceedingly rare. Device retrievals in all previously reported cases were completed by vascular surgery cut down at the end. In this case, we are presenting a complete percutaneous retrieval of M-TEER device from the right subclavian artery, which indicates the importance of procedural planning and appropriate equipment selection.

## 1 | Introduction

Mitral transcatheter valve edge-to-edge repair (M-TEER) is a well-established treatment approach for high-surgical-risk patients with severe mitral valve regurgitation (MR). The single leaflet device attachment (SLDA) rate has been reported up to 5% after the M-TEER procedure [1]. Although late and complete embolization of the MitraClip device is very rare, it can present unique retrieval challenges. Here, we present a case describing the successful percutaneous retrieval of an embolized MitraClip device from the right subclavian artery.

### 1.1 | Case Presentation

A 67-year-old female patient who has had an M-TEER procedure 54 days ago for secondary mitral valve regurgitation presented to the hospital with a sudden onset of severe shortness of breath with minimal exertion. At the time of presentation, she was in atrial fibrillation and was volume overloaded. Her past medical history included hypertension, hyperlipidemia, diabetes, atrial fibrillation, stroke, chronic kidney disease, heart failure with reduced ejection fraction, and tricuspid valve

endocarditis status post bioprosthetic valve replacement. During workup for the dyspnea, a chest x-ray was obtained that showed a foreign body concerning for an embolized clip (Figure 1). Transthoracic echocardiogram showed severe mitral valve regurgitation with one SLDA. Transesophageal echocardiogram confirmed the regurgitation and the SLDA, with a finding in the posterior leaflet suggestive of tissue disruption (Video S1). Further evaluation by computed tomography (CT) scan confirmed the location of the embolized clip in the right subclavian artery, between the right vertebral and right carotid artery. Although the patient did not have neurologic or ischemic symptoms, due to the risk of device thrombosis and propagation to the vascular system, the decision was made to retrieve the embolized clip. In the setting of high body mass index and challenging location of the embolized device (bifurcation of right vertebral and right carotid artery), percutaneous approach deemed to be more appropriate in our discussion with cardiac surgery and vascular surgery teams.

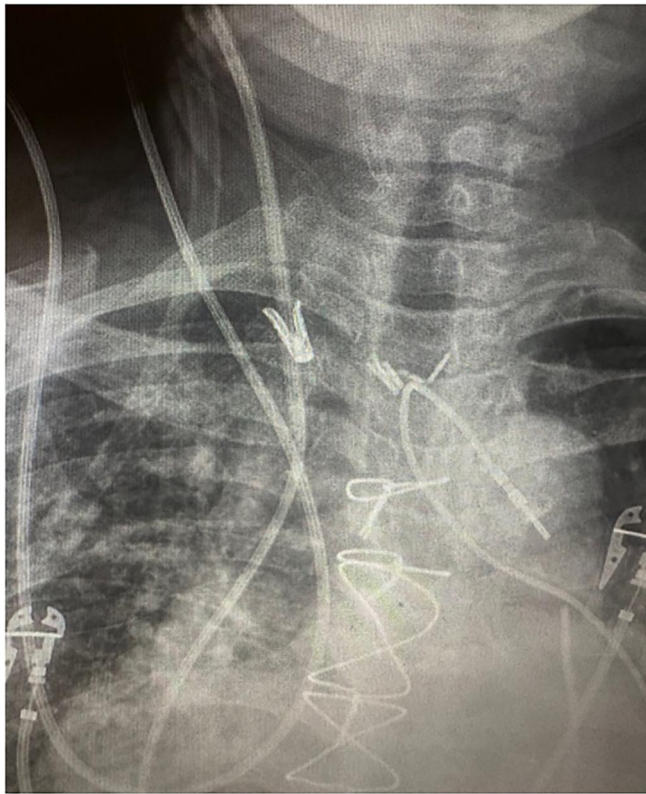
### 1.2 | Management

To precisely localize the embolized device and plan the procedure, we obtained upper and lower extremity CT angiography.

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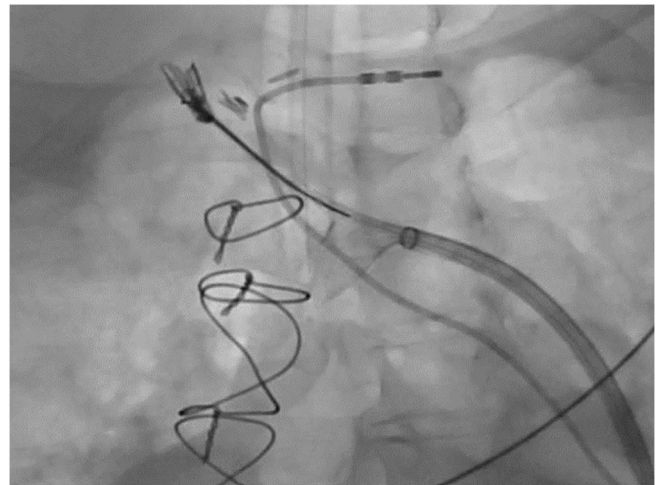


**FIGURE 1** | Embolized MitraClip in the chest X-ray.



**FIGURE 2** | Delivering ONO device to innominate artery.

After deploying two Perclose Proglide® closure devices, we obtained a large-bore access in the right femoral artery using a 33-centimeter 20 French DrySeal Flex Introducer Sheath (Gore Medical, W. L. Gore & Associates). We then introduced a floppy wire (Wholey wire; Mallinckrodt, Hazelwood, MO, USA) to the right subclavian artery and passed the embolized clip with careful movements. A 65-centimeter 12 French DrySeal Flex Introducer Sheath (Gore Medical, W. L. Gore & Associates) was advanced over the wire into the proximal aortic arch. We then advanced the ONO retrieval device (ONOCOR) through the 12 French sheath and partially unsheathed it under the innominate artery (Figure 2). We now advanced a six French 7 mm goose neck snare catheter (Microvena, St. Paul, MN) to



**FIGURE 3** | Snaring the embolized clip.



**FIGURE 4** | Embolized MitraClip device after successful retrieval. [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1002/ccd.70860)]

the embolized clip and snared the clip into the ONO device (Figure 3). We slowly pulled the embolized clip, ONO device, and the 12 French sheath back to the descending aorta while fully externalizing the ONO basket to secure the snared clip in the ONO device. We needed to perform small maneuvers to ensure the clip remained in a favorable orientation and pulled the ONO basket and the snared clip into the 20 French sheath (Video S2). The device was successfully retrieved (Figure 4), and the right femoral access was closed using preclosed Perclose Proglide® devices, and complete hemostasis was achieved. The

final angiographic images did not show any injury to the right subclavian or carotid arteries.

## 2 | Discussion

This case report describes the successful complete percutaneous retrieval of an embolized device from the mitral valve to the right subclavian artery. Complete embolization of the M-TEER device is very rare, and embolization to the right subclavian artery has not been reported before.

Alessandrini et al. reported leaflet tear, SLDA, injury to the leaflet by the clip or delivery device, and history of endocarditis as the most common reasons for M-TEER failure. In addition, the etiology of complete device embolization could be multifactorial, including poor grasp or severe leaflet tissue disease, especially in patients with a history of endocarditis, steroid use, and collagen vascular disease [2]. In our study, after complete retrieval of the embolized device, we were able to see portion of leaflet tissue in the locked clip (arrow in Figure 4). This suggests that patient's leaflets were remarkably diseased that could not retain the MitraClip device. The transesophageal echocardiogram also shows distorted posterior leaflet indicating the leaflet damage (Video S2). Our patient's previous infective endocarditis may have compromised the structural integrity of the mitral valve leaflets, predisposing them to leaflet injury, impaired device attachment, and eventual device embolization. Atrial fibrillation is also associated with more severe valvular disease, and patients with atrial fibrillation and MR are sicker than those without atrial fibrillation [3]. Our patient had several episodes of atrial fibrillation with rapid ventricular response that could potentially contribute to trauma to the MitraClip device and leaflet. The explanted MitraClip device was sent for pathological evaluation. Gross examination confirmed the presence of native leaflet tissue attached to the device. As only a gross examination was requested, detailed histopathologic and microscopic analyses were not performed.

Although complete embolization of the M-TEER device is rare, establishing a percutaneous approach to safely retrieve the device in this high-risk patient group is critical. Majority of complete device embolization have been reported in the venous system. Chitsaz et al. reported MitraClip embolization to the ostium of the right coronary artery [4], and Sticchi et al. reported embolization of the device to the left ventricle [5]. Both teams were able to partially retrieve the device percutaneously and required a surgical cut down for final retrieval. Our study is the first to report successful complete percutaneous retrieval of an embolized MitraClip from the right subclavian artery. Using the  $\bar{O}\bar{N}\bar{O}$  device in our case was essential and helped in successful retrieval without further embolization and surgical cut down. We believe that establishing a completely percutaneous approach for device retrieval is important, as patients present with varying comorbidities, procedural risks, and embolization sites that may make surgical retrieval technically challenging or prohibitively high risk. Finally, it is very important to have a multi-disciplinary approach to these cases to have a bailout strategy in case of further device embolization or procedural related complication.

## 3 | Conclusion

Although complete embolization of MitraClip is very rare, patients with diseased leaflets or poor leaflet grasp are at risk of the embolization. Percutaneous device retrieval is feasible and safe when performed with precise planning and appropriate equipment.

### Conflicts of Interest

The authors declare no conflicts of interest.

### Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

### References

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### Supporting Information

Additional supporting information can be found online in the Supporting Information section.

**Supporting File 1:** ccd70860-sup-0001-S\_Video\_1.pptx.

**Supporting File 2:** ccd70860-sup-0002-S\_Video\_2.pptx.