

Percutaneous Retrieval of an Embolized Catheter Tip With the Balloon Dilatation Technique

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Abstract

Introduction: Increasing numbers of complex percutaneous coronary interventions have been accompanied by various intra-procedural complications. The fracture and embolization of devices or their fragments are potentially life-threatening situations, depending on the site of embolization. Different non-surgical methods to handle embolic complications have been proposed for different clinical situations.

Case Presentation: We present a case of a distally embolized catheter fragment that was percutaneously retrieved. The catheter fragment was tightly held by the inflated balloon, moved together with the system, and successfully retrieved out of the circulation via the femoral sheath. Considerable distal embolization of the foreign body and retrieval with the balloon dilatation technique are the unique features of this case.

Conclusions: The present case appears to offer a safe and relatively simple method of balloon dilatation inside the lumen of the embolized fragment when the foreign body is too distal to retrieve with conventional snare systems.

Keywords: Angioplasty, Transluminal, Percutaneous Coronary, Complication, Balloon Dilatation

1. Introduction

Increasing numbers of complex percutaneous coronary interventions are accompanied by various complications (1). Fracture and embolization of devices or their fragments are potentially life-threatening situations, depending on the site of embolization (2, 3). Different non-surgical methods to handle embolic complications have been proposed for different clinical situations (4-7).

2. Case Presentation

A 64-year-old man with a previous history of CABG was admitted with a typical angina pectoris chest pain lasting for two hours. On the electrocardiogram (ECG), marked ST depression was noted on the inferolateral leads. Troponin I was slightly elevated, and heart rate and arterial blood pressure were both within normal limits. On the transthoracic echocardiography (TTE), the ejection fraction was calculated as 42%, with mild aortic and mitral regurgitation. The patient was diagnosed with NSTEMI, and an early interventional strategy was planned.

Coronary angiography revealed subtotal occlusion of a saphenous vein graft, with the ostial and mid portions as the culprit lesions. A percutaneous intervention was planned, with pre-medication using aspirin, prasugrel, and heparin. Since the lesion was highly thrombotic, a dis-

tal embolic protection device (Emboshield Nav, Abbott Vascular, USA) was used during the procedure. After engagement of the saphenous vein ostium with the 7f JR guiding catheter and crossing of the lesions with a hydrophilic guidewire (Fielder J, ASAHI, Japan), the embolic protection device was located distally. The lesions were pre-dilated with 2.5 × 20 mm balloons (Sprinter Legend, Medtronic, USA), followed by implantation of a 3.0 × 28 mm Xience Pro stent (Abbott Vascular, USA) at 14 atm for the mid lesion and a 3.0 × 18 mm Xience Pro stent (Abbott Vascular, USA) at 16 atm for the ostial lesion (Figure 1A and B).

Several attempts at advancing the retrieval catheter of the embolic protection device were unsuccessful because of the struts of the ostial stent. We chose a smaller-sized hydrophilic catheter (4f, Head Hunter 1, Merit Medical, USA) to pass through the 7f JR guiding catheter in order to retrieve the protection device. The hydrophilic catheter was advanced on the preexisting coronary guidewire. However, during manipulations of the hydrophilic catheter at the ostium of the saphenous vein graft, the distal tip of the catheter was seen to break off and be lost in the ascending aorta, while the coronary guidewire and the protection device were seen to be properly localized in the saphenous graft. Fluoroscopic scanning of the entire body demonstrated that the embolized portion of the catheter

was located in the distal segment of the left posterior tibial artery. In order to retrieve the foreign body percutaneously, a left femoral sheath was inserted in the antegrade direction and a hydrophilic guidewire was advanced to the distal portion of the left foot. Since the calibration of the artery was too small at the distal posterior tibial artery, the snare catheter (En Snare, Merit Medical, USA) could not be advanced distally. We introduced a 5f JR diagnostic catheter beyond the popliteal artery, and used the hydrophilic catheter fragment, which had a lumen of 4f and a length of 2 cm (Figure 2A). Over the wire, a small-sized balloon (1.0 × 10 mm, Sprinter Legend, Medtronic, USA) was advanced inside the lumen of the catheter fragment and inflated at 10 atm of pressure to ensure that the balloon tightly held the inner wall of the catheter (Figure 2B). As a whole unit, the diagnostic catheter, the inflated balloon, and the guidewire were pulled out through the femoral sheath.

The catheter fragment was seen to be tightly held by the inflated balloon, and it was moved together with the system and successfully retrieved out of the circulation via the femoral sheath (Figure 3A and B). The broken catheter tip after removal is demonstrated in Figure 4A and B. During the procedure, the patient was free of ischemic lower-limb symptoms, although the posterior tibial artery pulse was absent due to the embolized material.

The patient was safely transferred to the coronary care unit, where he remained hemodynamically stable after the procedure. Post-operative ECG did not show any signs of myocardial ischemia. Moreover, the distal arterial pulses were palpable, without symptoms of limb ischemia. The patient was discharged with medications, including aspirin, prasugrel, bisoprolol, ramipril, and atorvastatin. Clinical control visits two weeks and three months after the procedure showed that the patient remained symptom-free in terms of angina and claudication.

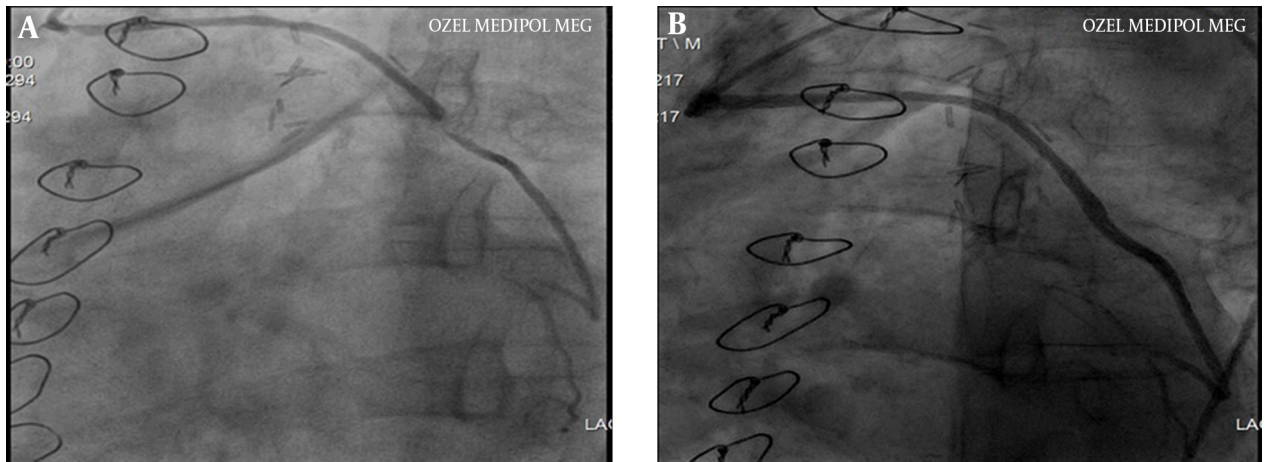


Figure 1. A, Angiographic View of the Saphenous Vein Graft Lesions at the Ostial and Mid Portion; B, Successful Stenting of the Saphenous Graft Lesions

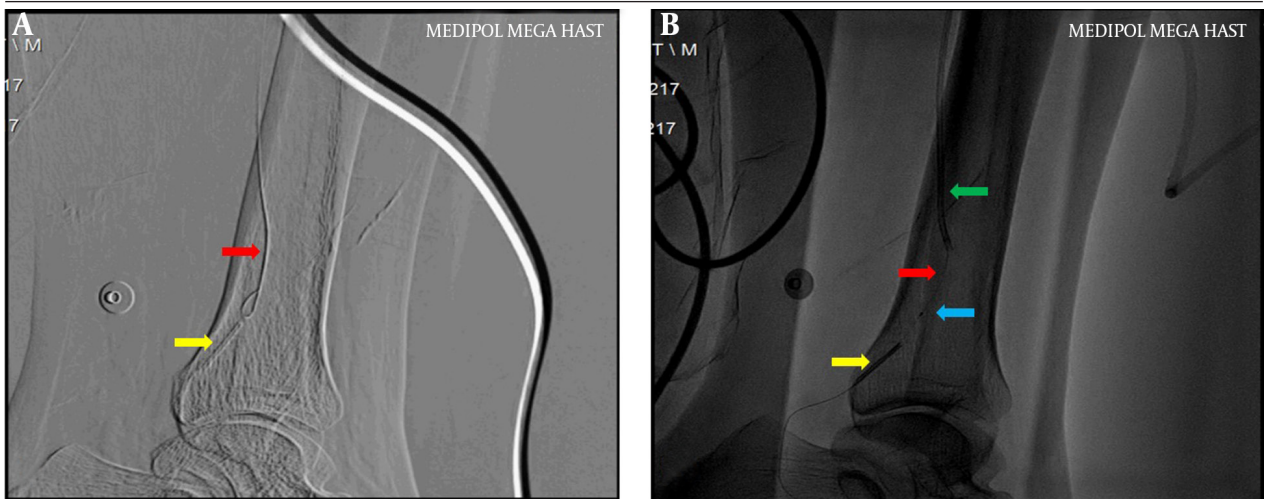
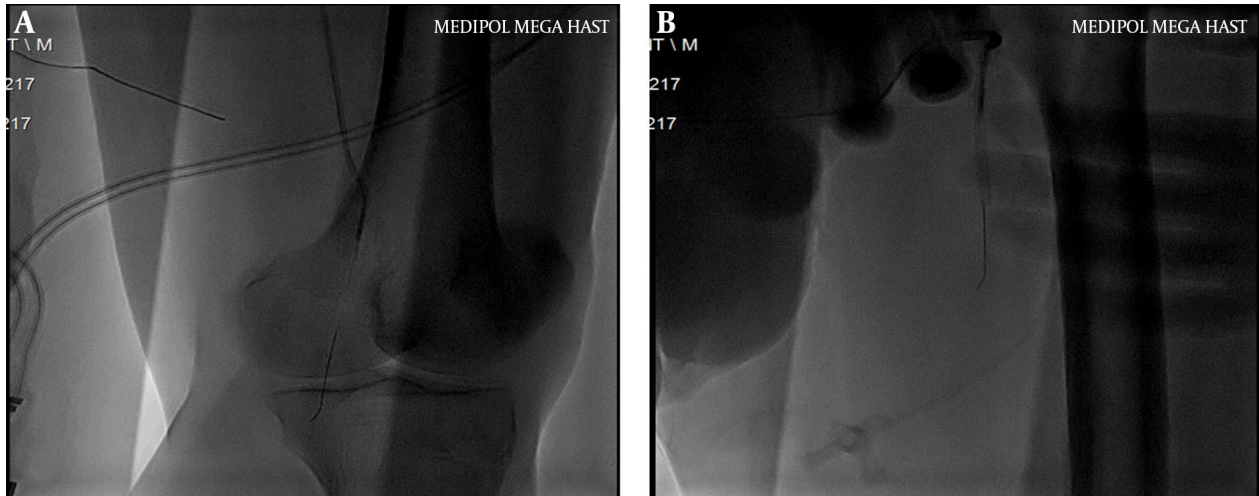


Figure 2. A, Yellow Arrow, Fluoroscopic Appearance of the Embolized Catheter Tip Found at the Left Ankle Level; Red Arrow, Hydrophilic Guidewire Near the Embolized Catheter; B, Yellow Arrow, Catheter Fragment; Red Arrow, Guidewire; Blue Arrow, Single Marker of the 1.0 × 10 mm Balloon Before Advancing into the Catheter Fragment; Green Arrow, 5f JR Diagnostic Catheter.

Figure 3. Fluoroscopic Views Showing the Successful Retrieval Through the Femoral Sheath of the Catheter Tip as a Whole Unit With the Diagnostic Catheter, Inflated Balloon, and Guidewire



A, Passing through the popliteal level; B, Entrance into the femoral sheath.

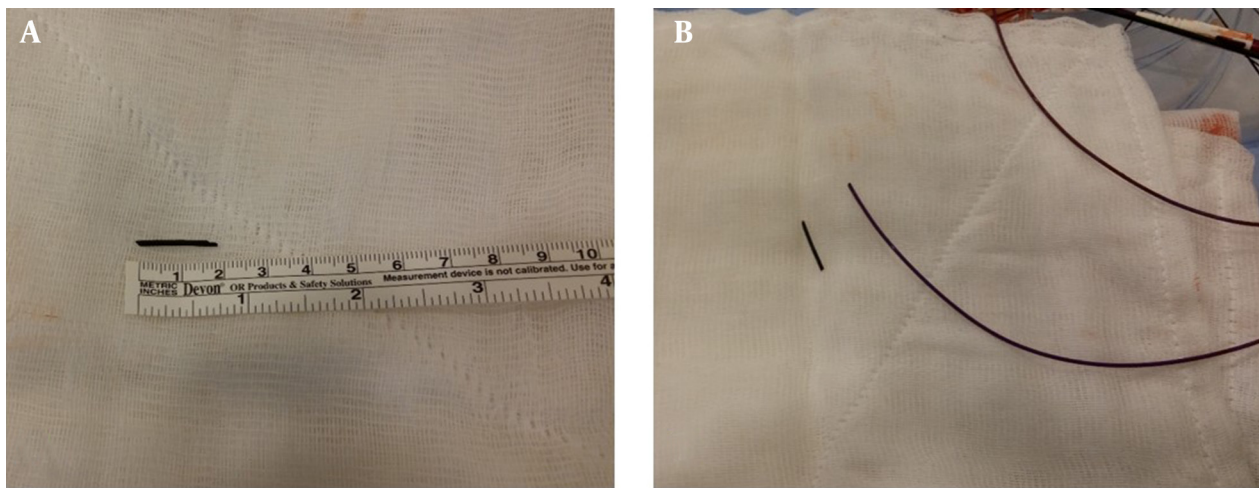


Figure 4. Catheter Fragment After Removal

3. Discussion

In the present case, we demonstrated a percutaneous procedure in which a hydrophilic catheter was broken and embolized to a distal segment of the posterior tibial artery. After carefully examining the patient for the development of ischemic lower-limb symptoms; we decided to retrieve the foreign body percutaneously, which was a relatively safer and non-invasive procedure, since the patient remained asymptomatic after embolization. Practically, the patient would have been referred to a vascular surgeon if: 1) severe ischemic symptoms developed during the procedure, 2) the foreign body could not be retrieved percutaneously, or 3) the lumen of the catheter fragment could not be successfully wired by a coronary guidewire. However, conservative follow-up was not a

liable option in this case, since the posterior tibial artery pulse was absent during the procedure. In addition, in case of failure of the percutaneous procedure, the surgical alternative would also have been easy, with a low risk of adverse events.

Due to the increasing numbers of complex percutaneous coronary interventions, physicians in catheterization laboratories have begun to encounter various procedure-related complications (1). Depending on the level of expertise, many of the ‘unexpected’ fractures or embolic events can be managed percutaneously (2, 3). Patients who experience embolization of foreign bodies in the vasculature have a considerably increased risk for adverse events, depending on the site of embolization.

Different surgical and non-surgical methods to handle embolic complications have been proposed for different clinic situations (4-9). Our study appears to offer a safe and relatively simple method of balloon dilatation inside the lumen of the embolized fragment, to be used when the foreign body is too distal to retrieve with conventional snare systems (10).

Footnote

Authors' Contribution: Oguz Karaca, performed the case and drafted the manuscript; Beytullah Cakal, performed the case; Onur Omaygenc, performed critical revision of the manuscript for important intellectual content; Muhsin Turkmen, provided technical and material support.

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