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Case Reports

Coronary Stent Off-Wire Dislodgement: Case Report of a Rare Complication

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Abstract

Although several techniques have been reported for managing an on-wire dislodged stent in the coronary artery, very few reports have focused on the much rarer complication of an off-wire dislodged stent. In a 73-year-old man who experienced an off-wire dislodged coronary stent, the proximal elongated segment was lodged in the left main coronary artery, and the distal segment was floating in the aorta like a wind sock. After a failed attempt at retrieval using a gooseneck microsnare, the dislodged stent was successfully removed using a 3-loop vascular snare via the left radial artery. There was no obvious vascular injury. This novel technique for removing a partially floating dislodged stent was successful after conventional retrieval techniques failed.

Keywords: Aorta; complication, intraoperative; endovascular procedure; percutaneous coronary intervention; drug eluting stent

Introduction

Coronary stent dislodgement is a common complication when stent delivery does not go smoothly; it occurs in 0.21% to 8.4% of percutaneous coronary intervention (PCI) procedures.[1] There are many ways to manage a dislodged coronary stent, such as the small-balloon technique, the 2-wire technique, and use of a loop snare, biliary forceps, Cook retained-fragment retriever (Cook Medical), or basket retrieval device[2]; the choice depends on the location and condition of the stent.[3-6] The first choice for retrieving an off-wire dislodged stent is a loop snare.[7] Gooseneck microsnare kits have been used to treat coronary stent dislodgements in the coronary artery and aorta.[8] Coronary stent dislodgment should be recognized immediately to allow for early planning and to prevent serious complications such as thrombosis-related acute myocardial infarction or bleeding.[2] This report describes a patient with an off-wire coronary stent dislodgement that resulted in the proximal end of the stent being stuck in the left main coronary artery (LMCA) and the stent tail floating in the aorta. An unusual but reasonable management technique was successfully used for this dislodgement without causing further complications.

Case Report

A 73-year-old man with a history of hypertension, dyslipidemia, and coronary artery disease underwent PCI 14 years prior. At that time, a 3.0 × 18-mm Endeavor Resolute zotarolimus-eluting stent (Medtronic) was placed in the proximal left anterior descending coronary artery (LAD). Ten years later, he underwent PCI and had a 4.0 × 22-mm Resolute Integrity zotarolimus-eluting stent (Medtronic) placed from the proximal left circumflex artery (LCX) into the proximal LMCA. During a recent admission to the cardiovascular ward for unstable angina, diagnostic coronary angiography performed via the left radial artery revealed a long, diffuse lesion with 80% to 95% stenosis

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extending from the proximal to the middle LAD (Fig. 1) and a lesion with 90% stenosis in the proximal right coronary artery (RCA).

Technique

First, PCI for the RCA lesion was performed without any complications. Then, PCI for the LAD lesion was commenced. A 6F extra backup (EBU) 3.5 guiding catheter was used to smoothly deliver the guidewire (Runthrough NS; Terumo Interventional Systems) into the distal LAD. After performing plain old balloon angioplasty using a 3.25 × 15-mm Accuforce noncompliant balloon (Terumo Interventional Systems) from the side-branch cell of the LMCA-LCX stent to the middle portion of the LAD, a 3.5 × 33-mm Ultimaster Tansei sirolimus-eluting stent (Terumo Interventional Systems) was introduced into the LAD. However, the stent could not be delivered to the target lesion despite multiple attempts at distal advancement. Fluoroscopy revealed that the stent tip was stuck in the LMCA. During an attempt to retract the new stent into the guiding catheter with forceful maneuvering, the stent became detached from the stent balloon and guidewire. The proximal elongated segment of the stent was attached to the LMCA, and the distal segment was floating in the aorta (Fig. 2). To prevent thrombosis, an attempt was made to retrieve the floating segment using a 7-mm Amplatz Goose Neck microsnare (Medtronic), but multiple attempts were unsuccessful. The floating stent segment was waving rhythmically with the patient's heartbeat

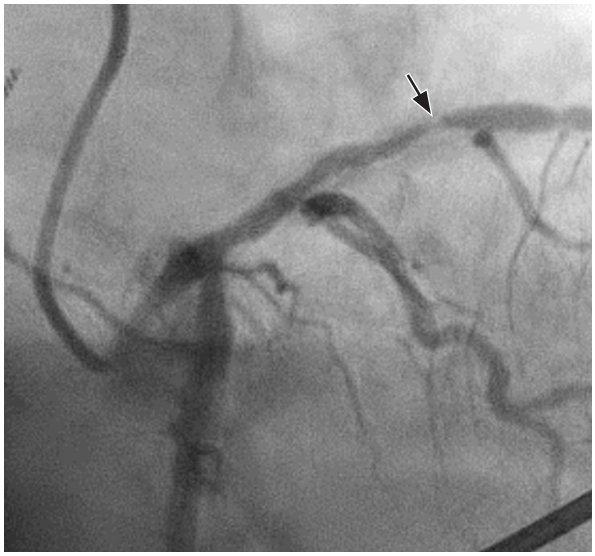

Fig. 1 Angiography of the left coronary artery shows a long, diffuse lesion with 80% to 95% stenosis extending from the proximal to the middle left anterior descending coronary artery (arrow).

Abbreviations and Acronyms

EBU	extra backup
IVUS	intravascular ultrasonography
LAD	left anterior descending coronary artery
LCX	left circumflex coronary artery
LMCA	left main coronary artery
PCI	percutaneous coronary intervention
RCA	right coronary artery

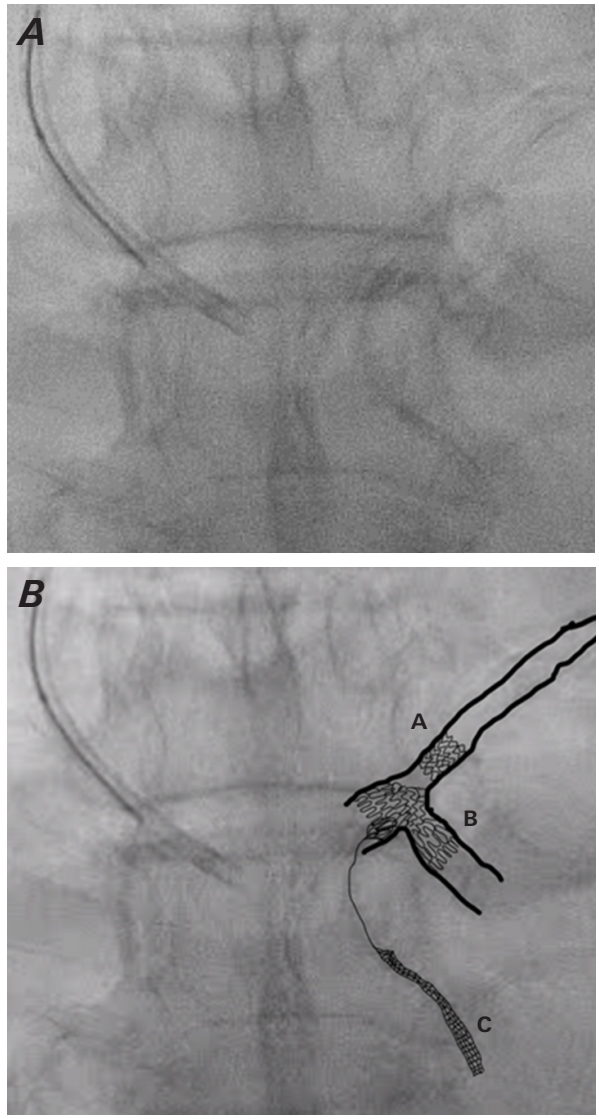

Fig. 2 Coronary angiogram. **A**) The dislodged stent is visible at the right side of the image. **B**) A superimposed schematic shows the location of the dislodged stent; the proximal edge of the "A" stent, which was deployed 14 years prior, is located at the proximal segment of the left anterior descending coronary artery and is not involved in the stent entrapment; the "B" stent, deployed 4 years prior, runs from the proximal left circumflex artery to the middle portion of the left main coronary artery; and the proximal edge of the "C" stent is entrapped by the left main coronary artery stent and has a distal tail floating in the aorta.

and breathing cycle, making approach with the gooseneck microsnare difficult.

After this conventional retrieval method failed, the decision was made to try an Atrieve Vascular Snare Kit (Argon Medical Devices), which is typically used to retrieve a dislodged catheter or guidewire in the peripheral vasculature. The snare is equipped with 3 independent nitinol loops, with tips on each loop allowing for self-sizing and loop diameters ranging from 12 to 20 mm. The snare's 6F delivery catheter (outer diameter, 1.57 mm) was advanced through the 6F EBU guiding catheter without resistance, and the 15° angled tip on the

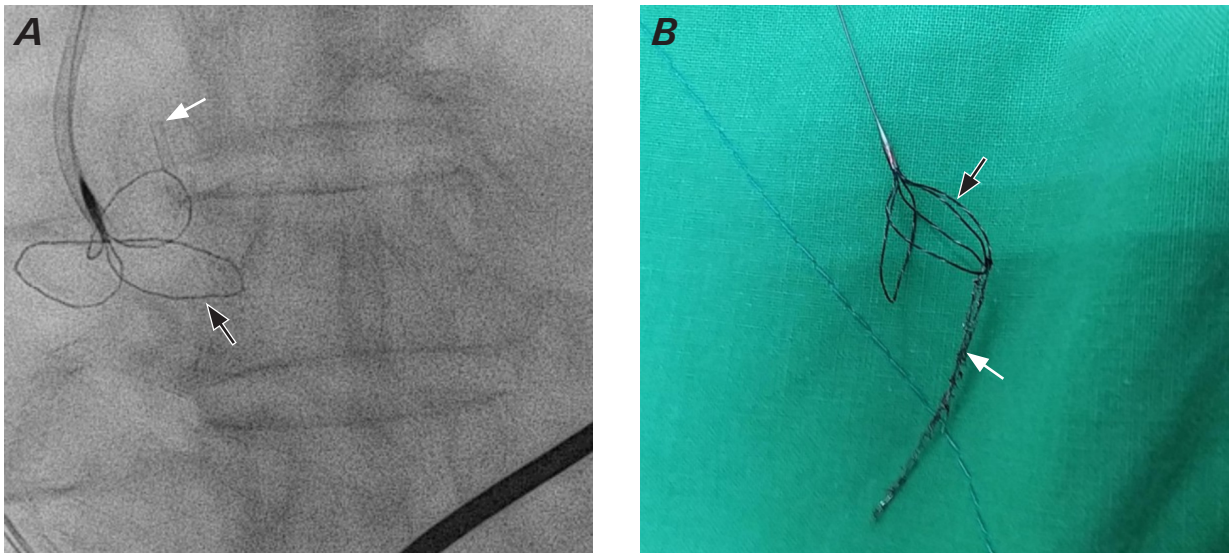

Fig. 3 The 3-looped vascular snare. **A**) Coronary angiography shows the snare (black arrow) and stent (white arrow). **B**) The 3-looped vascular snare (black arrow) is pictured alongside the retrieved stent (white arrow).

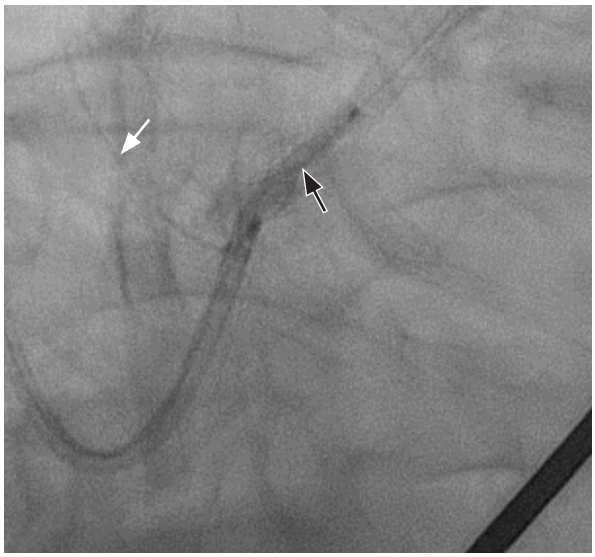

Fig. 4 Balloon dilation of the LMCA after stent retrieval. The fragments of the broken stent string (white arrow) are adherent to the LMCA after removal of the dislodged stent. Plain old balloon angioplasty with a noncompliant balloon (black arrow) is performed from the proximal left anterior descending coronary artery to the LMCA.

LMCA, left main coronary artery.

catheter enabled an easier approach to the floating stent. The stent was successfully retrieved (Fig. 3) without any angiographically obvious injury.

Although the bulk of the stent was retrieved, a fragment of the broken string remained adherent to the LMCA (Fig. 4). After performing plain old balloon angioplasty with a 2.0 × 15-mm NC EMERGE balloon (Boston Scientific) from the proximal LAD to the LMCA, the lesions from the middle LAD to the LMCA were assessed using intravascular ultrasonography (IVUS). This examination revealed a stent malapposition in the middle LMCA (Fig. 5A). The ostial LAD was stent free, indicating that the proximal edge of the stent was located at the proximal segment of the LAD (Fig. 2B) and was not involved in the stent entrapment. Because there was a type B dissection in the middle LAD, a 3.0 × 38-mm Ultimaster Tansei sirolimus-eluting stent (Terumo Interventional Systems) was positioned and deployed via a 5.5F GuideLiner V3 extension catheter (Teleflex Incorporated). Dilation with a 3.25 × 15-mm Accuforce noncompliant balloon (Terumo Interventional Systems) was performed for proper stent apposition. On reexamination, IVUS showed a lump of metal

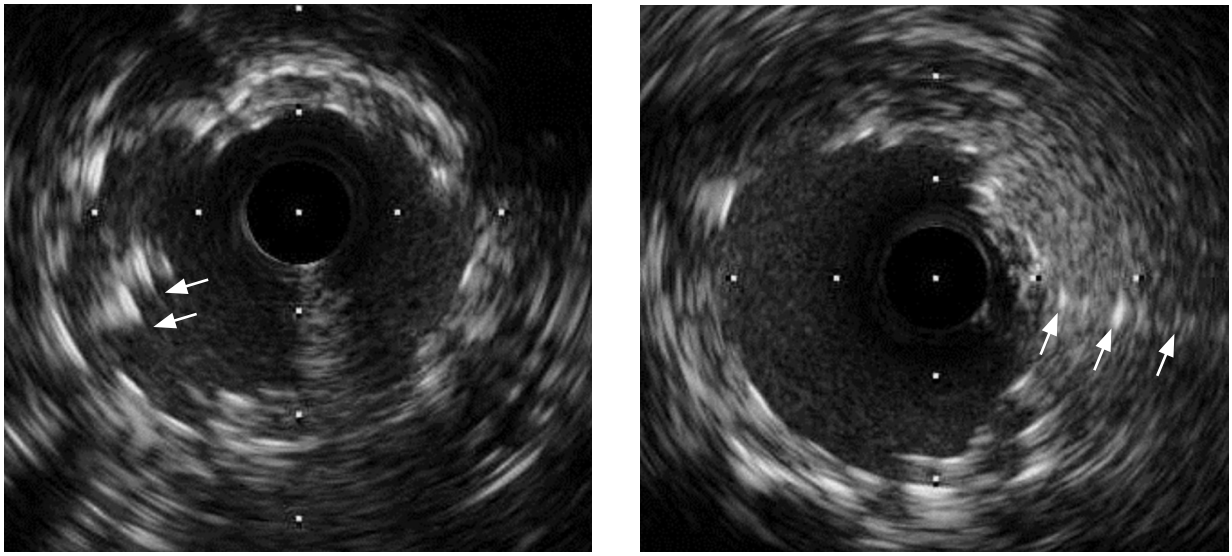

Fig. 5 Intravascular ultrasound of the left coronary artery. **A**) Stent malapposition (arrows) is visible in the LMCA. **B**) After balloon dilation of the LMCA, linear metal material (arrows) is visible; this likely represents the broken stent string at the middle of the LMCA.

LMCA, left main coronary artery.

that resembled the crushed stent strut (Fig. 5B). Finally, a 4.0 × 15-mm Ultimaster Tansei sirolimus-eluting stent (Terumo Interventional Systems) was deployed from the proximal LAD to the ostial LMCA, with a satisfactory angiographic result (Fig. 6). The patient remained event free for more than 1 year during outpatient follow-up.

Discussion

In this patient, the mechanism of stent entrapment in the LMCA could not be determined because of the limited IVUS image resolution. There are 2 possible mechanisms: either the original stent became entrapped at the side-branch cell of the LMCA-LCX stent during delivery, or it became entrapped at the proximal edge of the LMCA-LCX stent in the LMCA because of malapposition. To prevent the stent from becoming stuck at the LMCA during delivery, a better choice of technique would have been to use an extension catheter to deliver the stent to the target lesion, bypassing the high-resistance site.

The off-wire dislodged stent—with the proximal elongated segment attached to the LMCA and the distal segment floating in the aorta—looked like a koinobori, which is a "carp steamer" decorative windsock. This is a rare complication with a challenging retrieval process, as the preferred retrieval technique for an off-wire dislodged stent in the coronary artery is endovascular snaring or surgical removal.[6,7] The floating stent was waving with each heartbeat and breathing cycle, making retrieval more difficult. This appears to be the first documented case of an off-wire, koinobori-like dislodged stent retrieved uneventfully using a 3-loop vascular snare. The type of snare used for this procedure has 3 independent nitinol loops with diameters ranging

Fig. 6 Final angiography of the left coronary artery shows optimal results in the left main coronary artery and the left anterior descending coronary artery.

from 12 to 20 mm, and the catheter has a 15° angled tip that provides better direction control for snare navigation. The delivery catheter was advanced without resistance through the guiding catheters, and the dislodged stent with the snare system was retracted via the left radial artery, without obvious vascular trauma. The 3-loop snare facilitated this novel attempt at removing a koinobori-like dislodged stent after conventional retrieval techniques failed.

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