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Case Report

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Unusual complication: successful transcatheter extraction of an embolized coronary stent during percutaneous coronary intervention

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ABSTRACT

Despite advances in coronary angiography, systemic or coronary embolization of the stent remains a potentially lethal complication, although rarely seen. Stent embolization frequently happens following percutaneous coronary intervention in tortuous and calcified segments, with an incidence probability of 0.29% to 0.32%. It is linked to troublesome problems including complete loss of flow, stent thrombosis, coronary artery damage during retrieval procedures, and stent embolization into the systemic circulation. This uncommon consequence might induce significant stress for operators throughout the process. Numerous techniques exist for the extraction of embolized material, with operator expertise and laboratory equipment being the primary determinants of the selected method. We reviewed the techniques used to extract the stent that became loosened in the primary coronary.

Keywords: Coronary complication, embolized coronary stent, percutaneous coronary intervention

INTRODUCTION

Despite advances in coronary angiography, systemic or coronary embolization of the stent remains a potentially lethal complication, although rarely seen.[1] Stent embolization frequently happens following percutaneous coronary intervention in tortuous and calcified segments, with an incidence probability of 0.29% to 0.32%. It is linked to troublesome problems including complete loss of flow, stent thrombosis, coronary artery damage during retrieval procedures, and stent embolization into the systemic circulation.[2] This uncommon consequence might induce significant stress for operators throughout the process. Numerous techniques exist for the extraction of embolised material, with operator expertise and laboratory equipment being the primary determinants of the selected method. We reviewed the techniques used to extract the stent that became loosened in the primary coronary artery during percutaneous coronary intervention.

CASE

An 82-year-old male patient arrived to our outpatient clinic with an exacerbation of chest discomfort. The patient has a history of hypertension and had coronary stenting three years earlier. The patient was evaluated and determined to have a history of percutaneous coronary intervention (PCI) in the right coronary artery (RCA) and circumflex artery (CX) at a different facility three years before. He had third-degree anginal symptoms, classified by the Canadian Society of Cardiology (CCS-3), over the last month. Electrocardiography indicated left ventricular hypertrophy. Transthoracic echocardiography demonstrated a left ventricular ejection fraction of 50%, moderate hypokinesia in the anterior and apical walls, and grade 2 mitral regurgitation. Diagnostic coronary angiography was performed.

After administering local anesthesia, a 6F sheath was inserted into the left radial artery. Coronary angiography utilizing left and right Judkins® catheters revealed calcific 95% restenosis distal to the left main coronary artery (LMCA), extending to the left anterior descending artery (LAD), 95% restenosis proximal to the LAD, and 97% restenosis distal to the stent, extending from the circumflex (CX) ostium to the mid obtuse marginalis (OM). Diffuse restenosis was seen inside the stent extending from the proximal RCA to the distal crux, with repeated stenoses of 50-60% recorded (**Figure 1**).

A percutaneous transluminal coronary intervention (PTCA) was planned for a fragile patient with a SYNTAX Score of 35, targeting the LMCA, LAD, and OM artery.

The ad-hoc PCI continued to operate inside the same session. The LAD and CX crossed over with a floppy wire by planning a provisional approach. Progressive predilatations have been performed on the proximal LAD lesion using a 2.75x15 mm

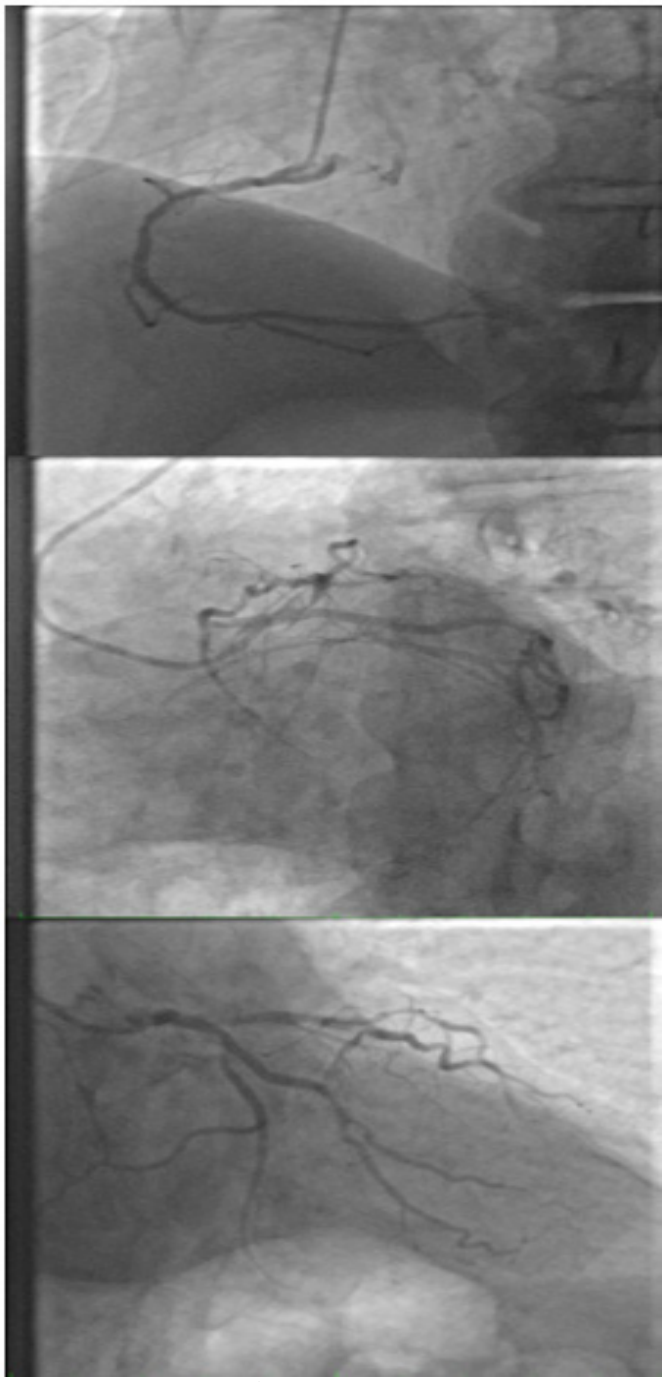

Figure 1. Coronary angiography

non-compliant (NC) balloon (CID® Fluydo, Alvimedica, Saluggia, Italy) and a 3mmx15mm scoring balloon (Wedge, Brosmed®, Guangdong, China). A 3mmx29mm drug-eluting stent (DES) (Firehawk, MicroPort® Shanghai,China), was implanted proximal to the LAD. A 3.5 mmx34 mm (Resolute, Onyx Trucor®, Medtronic, Minneapolis, MN, USA) DES was delivered into the LMCA-left anterior descending lesion, however the stent embolized inside the coronary artery by detaching from the balloon and extending from the LMCA into the aorta (**Figure 2**). The stent wire was secured while the stent balloon was removed. A 2 mmx15 mm semi-compliant balloon (Artimes, Brosmed®, Guangdong, China) was maneuvered across the wire to the distal segment of the stent. The balloon was inflated to a pressure of 4 atm at its distal end, and the embolized stent was extracted into the guiding catheter. A 2mmx15mm semi-compliant balloon (Artimes, Brosmed®, Guangdong, China) was inflated to a pressure of 10-12 atm inside the guiding catheter, after which the whole system was extracted from the coronary artery (**Figure 3**). The embolized stent was re-embolized proximal to the right radial artery during attempts to advance it into the right radial sheath under endoscopic guidance. A 1.5mmx15mm semi compliant (Artimes, Brosmed®, Guangdong, China) balloon (Artimes, Brosmed®, Guangdong, China) was attempted to be reinserted into the catheter through the stent wire, but it was not successful due to stent deformation. Afterwards, the stent was completely removed by manoeuvring with a micro snare (Amplatz, Medtronic®, Minneapolis, MN, USA) (**Figure 4**).

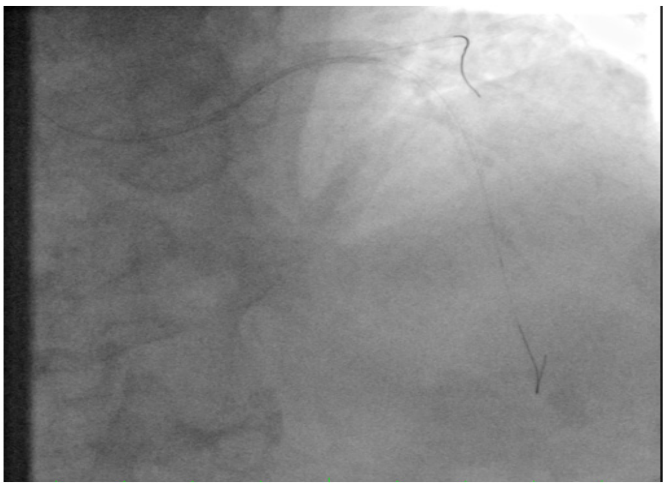

Figure 2. Angiographic visualization of a balloon-stripped embolized stent inside the coronary artery

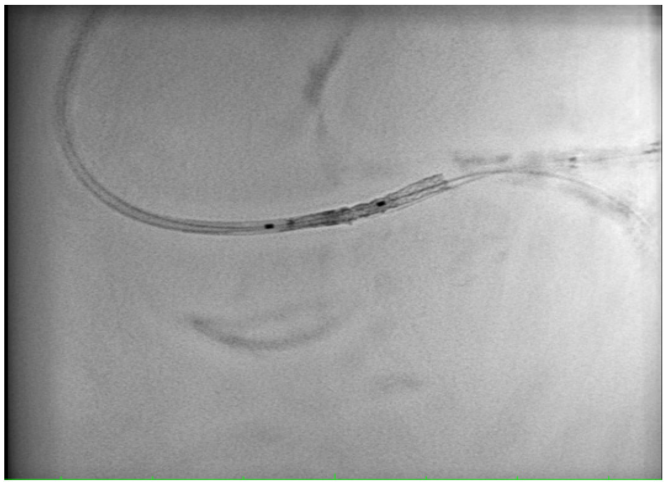

Figure 3. Extraction of the embolized stent into the catheter via a balloon

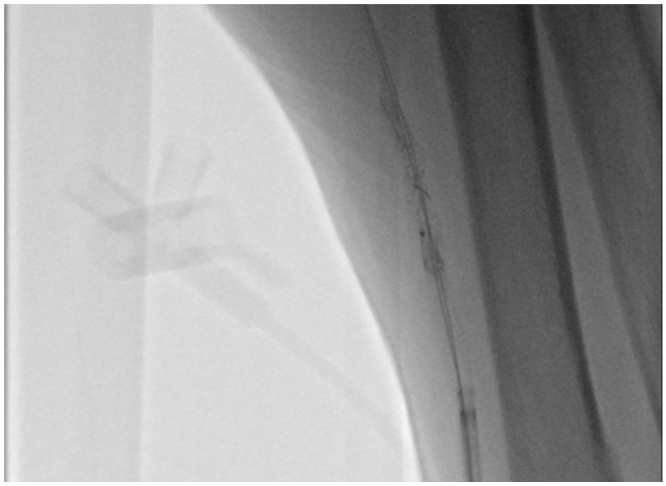

Figure 4. Extraction of the embolized stent from the sheath via a snare

Radial artery control imaging showed no complications (Removed stent material shown in **Figure 5**).

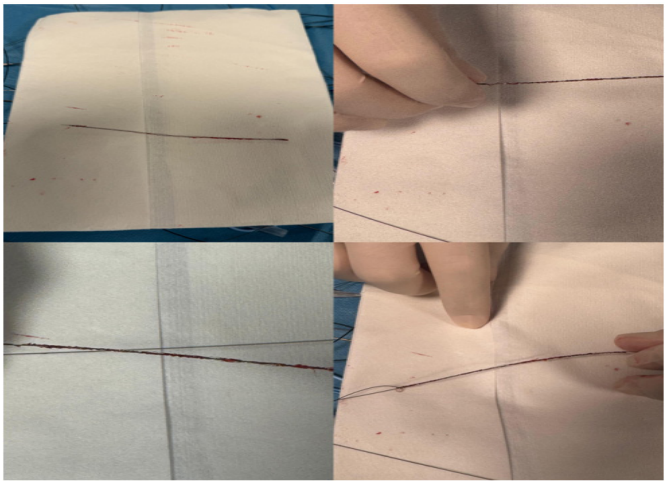

Figure 5. Removed stent material

Following to the puncture of the right femoral artery, the surgery proceeded via a 7F sheath inserted into the right femoral artery. The LMCA was cannulated with the assistance of a 7F EBU guiding catheter. Following the advancement of floppy wires to the LAD and CX, a 3.5mmx34mm (Resolute, Onyx Trucor®, Medtronic, Minneapolis, MN, USA) stent was deployed in the LMCA-LAD with the assistance of a guideliner (Terumo®, Minnesota, USA). Following proximal optimization (POT) with a 4mmx12mm NC (CID® Fluydo, Alvimedica, Saluggia, Italy) balloon, the CX was rewired. The strut at the Cx osteal was expanded using a 1.5mmx15mm semi-compliant balloon (Artimes, Brosmed®, Guangdong, China). 3.5 mmx15 mm NC (CID® Fluydo, Alvimedica, Saluggia, Italy) balloon were introduced to the LAD, and 3 mmx12 mm NC (CID® Fluydo, Alvimedica, Saluggia, Italy) balloon were introduced to the CX. Kissing dilatations were executed. Subsequently, a final POT was conducted using a 4.5mmx12mm NC (Fluydo, Alvimedica®, Saluggia, Italy) balloon, and the procedure was ended without complications.

Post-procedure, the patient was admitted to the coronary intensive care unit. Hydration initiated. On the third day of hospitalization, the patient, exhibiting excellent overall health, stable vital signs, no active cardiac complaints, and no abnormalities in routine assessments, was discharged with a medical treatment regimen.

DISCUSSION

Despite becoming less prevalent now due to advancements in the stent industry and increases in percutaneous coronary procedures, stent embolization remains particularly stressful for the operator and could result in lethal consequences for the patient.[3,4] To avoid this unfavorable situation, careful planning must occur before to the procedure, and the laboratory equipment should be carefully evaluated.

In cases of stent embolisation, a definitive protocol is lacking, consequently requiring the extraction of the embolised stent from the coronary circulation by multiple methods.

If the wire of the embolized stent remains maintained, the embolized material may be extracted via the catheter by inserting low-profile balloons over the wire and inflating them distal to the stent.[5]

Provided that the sizes of the embolized stent are suitable for the originating coronary artery and the wire within the stent remains intact, the stent may be positioned at the original site utilizing balloons of progressively increasing diameters, commencing with low-profile balloons and advancing to the appropriately sized balloon.

If the wire of the embolized stent is lost, the stent may be retrieved into the catheter using two wires that pass between the stent struts, advanced distally to the stent and creating a twisted wire configuration distally.

When these procedures fail, one approach is to grab the proximal end of the stent using a coronary snare and retrieve it into the catheter.[6]

One option involves compressing a balloon positioned on a wire next to the embolized stent and then deploying a stent in that region, however this approach is not widely favored.

CONCLUSION

The selection of approach is dependent upon the patient's clinic, the operator's expertise, and the laboratory's equipment. This case describes the sticking of a stent into a catheter using a distally inflated balloon and the subsequent removal of the stent from the radial area using a snare. Despite rotational atherectomy being a more suitable option in our case because of significant coronary calcification, we decided to scoring balloons due to their unavailability in our laboratory.

ETHICAL DECLARATIONS

Informed Consent

The patient signed and free and informed consent form.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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