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Case Report

Surgical retrieval of an entrapped stent and a stuck snare device during percutaneous coronary intervention

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ABSTRACT

A 69-year-old male patient with a history of percutaneous coronary intervention (PCI) to the proximal left anterior descending coronary artery (LAD) underwent another PCI to the stenosis of the medium LAD as part of therapy for angina pectoris. Interruption of stent delivery because of past stent led to stent entrapment and a stuck guidewire. A snare catheter device was applied to retrieve the stent; however, the device lost mobility. Surgical removal and coronary artery bypass grafting (CABG) were required. We herein report some surgical techniques for resolving this complication of PCI.

<**Learning objective:** Despite the recent advancements in devices and/or technical skills, the complications of PCI will never be eliminated. This case report provides a suggestive lesson with regard to open heart surgery for PCI complication; furthermore, only a few reports have described details concerning these PCI complications from the viewpoint of a surgeon. Physicians and surgeons should learn the emergent surgical techniques for resolving PCI complications.>

Introduction

Despite advancements in devices and/or technical skills, there will always be complications concerning percutaneous coronary intervention. Most complications are resolved via endovascular techniques. However, some cases require open heart surgery. This is a surgical case report describing surgical techniques for resolving PCI complications, such as an entrapped stent and a stuck snare device.

Case report

The patient was a 69-year-old male with a history of angina pectoris at the age of 58 years old with subsequent PCI to a proximal LAD stenosis. Similar symptoms resulted in the patient undergoing coronary angiography approached via the left radial artery. There was no in-stent restenosis, but he was found to have 90% stenosis in the medium part of the LAD. Intravascular ultrasound showed that one-to-two stent strut was protruded at the ostium of LAD. After expanding the lesion with a balloon device, another stent was to be placed in the LAD. However, the previous stent interrupted ®several devices, such as GuideLiner catheter (Vascular Solutions Inc., Minneapolis, MN, USA), were used. Furthermore, it was found that the stent had dislodged to the ostium of the left coronary artery. The snare device (Goose Neck Snare®, Medtronic, Dublin, Republic of Ireland) was used to retrieve the stent and the guidewire; however, this resulted in immobilization of all the equipment (Fig. 1). Since it was difficult to recover the stent via endovascular approaches, the patient was transferred to our hospital for surgical retrieval of all the equipment.

After establishing cardiopulmonary bypass and achieving cardiac arrest, both the aorta and the catheter were cross-clamped. Transection of the aorta exposed the snare device, which seized the tip of the stent tightly. The stent was fully stretched with the guidewire inside and hanging from inside of the ostium of the left coronary artery. Both the stent and the guidewire were cut near the seizing point of the snare device to release the tension of each device that was stuck. Initially, only the guidewire was held in the cutting edge of the stent, and it was being pulled out with little resistance. Subsequently, the stent was carefully retracted, resulting in easy removal of the entire length of the stent from the LAD (Fig. 2). Coronary artery bypass grafting was performed to the LAD along with a great saphenous vein graft to preclude coronary thrombosis secondary to remnants. The remaining stent and guidewire in the aorta were removed, together with the snare device, from the radial artery sheath after aortic declamping. Ex-

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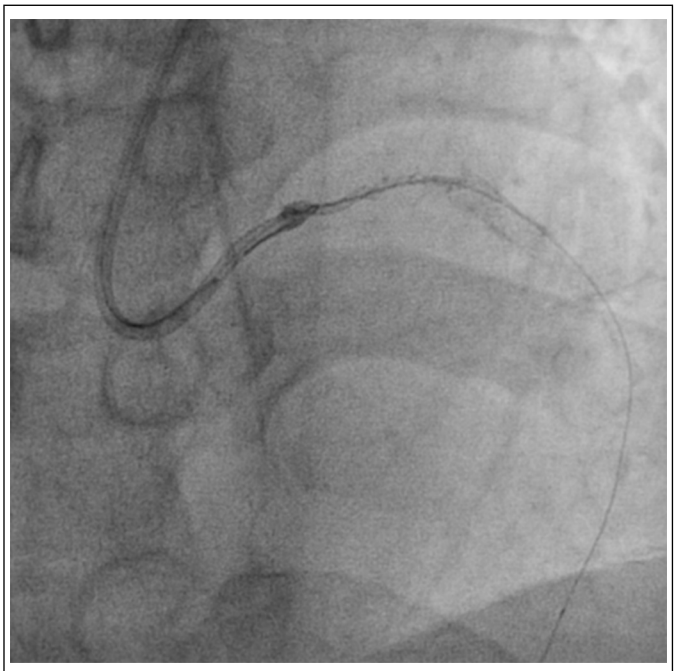

Fig. 1. Coronary angiography showing the snare device seizing the stent and the guidewire.

Fig. 3. Postoperative coronary angiography showing good patency of the saphenous vein graft and no remnants of the PCI materials.

tracorporeal circulation time, cross-clamping time, and operation time were 114, 82, and 286 min, respectively.

The patient recovered very well. Coronary angiography conducted 10 days after surgery showed good patency of the bypass graft, the unchanged previous stent, and no remnants (Fig. 3). He was discharged in good condition 12 days after surgery.

Discussion

Even experts cannot avoid complications regarding PCI. According to the 2011 Japanese Association of Cardiovascular Intervention and Therapeutics Academic Committee report, the incidence rate of PCI complications accounts for 1.0% of all PCI, and the rate of emergent surgery accounts for 0.06% of all [1].

Details concerning these PCI complications were not analyzed satisfactorily. Surgical retrievals of entrapped devices have recently been reported [2–4]. PCI complications regarding entrapped or dislodged devices are important because over 50% of them require a surgical approach for resolution [5].

Nonsurgical retrievals with snare devices, low-profile balloon catheters, and two- twisted guide wires are well known for resolving device problems [6–8]. However, if these solutions do not work, invasive open heart surgery is required. The snare device

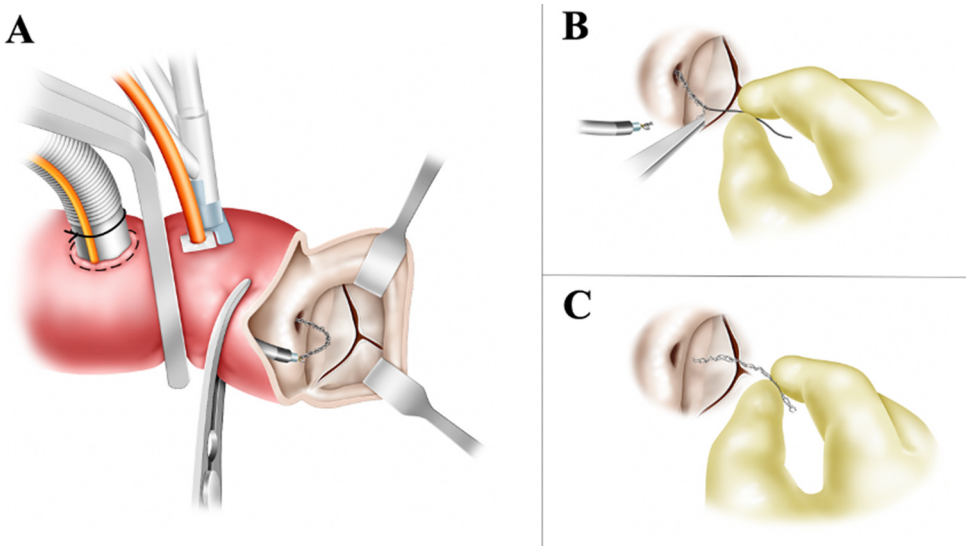

Fig. 2. Illustration of stent retrieval procedures A, Surgeons view of the stent and wire stuck with the snare device after transection of ascending aorta. B, Extraction of the wire from the cut end of the stent. C, Removal of the stent.

was designed as a catheter which permits a 90°-angled wire loop to be passed over the distal end of the equipment and cinched tightly.

In this case, we used the snare device to capture the dislodged stent at the ostium of the left coronary artery. Although the stent was successfully captured, the stent and the snare device lost their mobility. There are other reports that surgical retrieval of PCI device was required after failure of the snare device. Tamura reported a case of detached balloon catheter at the entry of the left coronary artery [4]. They removed the balloon catheter directly under the aortotomy. Yoshida reported a stuck snare case similar to ours in that the snare device and the guidewire were immobilized [5]. They found the guidewire left partially in the coronary artery secondary to difficulty of complete removal. In both cases, CABG was performed because of risks of coronary obstruction due to remnant wire or injury due to coronary artery.

The second stent dislodgement and its retrieval during PCI is particularly rare. There are several case reports describing that second stent was entrapped with a previously implanted stent or deployed stent [9,10]. They eventually extracted both dislodged and previous stent, resulting in coronary artery dissection. On the other hand, a little is known about surgical technique of the retrieval of second stent. In the present case, second stent was entrapped with the one implanted 10 years earlier. In-stent restenosis was not observed in the previously implanted stent. The both stent and the guidewire were cut to release the tensed traction to each other. The wire is then removed first to simplify subsequent removal of the stent without any injury to the left coronary artery. This experience suggested that interrupting coronary flow under cardiac arrest or releasing devices from the tensed traction may provide interactional change among the stents and the guidewire that can ease the retrieval.

We carefully observed the left coronary artery from the aorta to avoid leaving any remnants, but we were unable to observe beyond this. An intraoperative fluoroscopy was useful for checking the remnants and is potentially useful for assessing the necessity for CABG. On the other hand, if remnant remains at the main trunk of the left coronary artery, CABG to LAD and LCX are required.

Although the devices and/or technical skills have progressed recently, the complications of PCI will never be eliminated. Physicians and surgeons should learn the emergent surgical techniques for resolving PCI complications.

Declaration of Competing Interest

None of the authors of this manuscript has any financial or personal relationship with other people or organization that could inappropriately influence their work.

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