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Case Report

A Tale of Two Dislodged Stents – Successful Retrieval with Limited Hardware using Indigenous Snares

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ABSTRACT
Percutaneous coronary intervention is associated with several complications and stent dislodgement is one of them. Though rare, stent dislodgement can be associated with major adverse cardiovascular events. Retrieval of such stents is possible percutaneously with the help of several retrieval devices and techniques. We report two cases of successful retrieval of dislodged stents during percutaneous coronary intervention (PCI) with limited hardware by indigenously developing a loop snare using a guidewire and a catheter. It also highlights the importance of the availability of specialized retrieval devices in every catheterization laboratory.
Key words: Stent dislodgement, Indigenous, Loop snare.

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INTRODUCTION

Coronary artery disease has achieved epidemic proportions in our country. Percutaneous coronary intervention (PCI) has become the standard line of treatment in coronary artery disease. In today's era PCI has evolved to become a very safe procedure with very low complication rates. However, even with the latest generation of stents one comes across occasional cases of coronary stent dislodgement. Such accidental dislodgement of the stent before deployment at the intended site can lead to life threatening complications like thrombosis or myocardial infarction.

CASE REPORT

Case 1

A 54-year-old man complained of chest pain and dyspnea on exertion for two days. He was a known case of ischemic heart disease and had undergone PTCA to LAD and Ramus Intermedius artery in the past. He was diagnosed with acute coronary syndrome. Coronary angiography was subsequently performed through right femoral artery with a 6F sheath. It revealed 80% stenosis in proximal right coronary artery (RCA) along with 90% stenosis in posterior left ventricular (PLV) branch. Significant calcium deposition was noted in proximal RCA. The RCA was engaged with 6F Judkins Right (JR 3.5) guiding catheter. After adequate pre-dilatation a Xience Prime (Abbott Vascular, USA) stent was deployed in the PLV segment.

We attempted to deploy a (3.5 × 48 mm) Xience Xpedition stent (Abbott Vascular, USA) in the proximal RCA. However, the stent could not pass through the proximal segment because of its calcification and acute curvature. After repeated attempts, the proximal edge of the stent was damaged, probably due to the manipulation of guiding catheter and got crumpled over the balloon. However, the stent system still remained on the guidewire. (Figure 1) The entire system was pulled back into the abdominal aorta. We attempted to withdraw the whole system en masse through the femoral sheath. Contrary to our expectations, this lead to further accumulation and coiling of stent struts at the opening of the guide catheter.

At this juncture, retrieving the disfigured stent was highly challenging. Our options to retrieve it were either through the existing femoral sheath (6F), which could cause vessel trauma (dissection or rupture), or through surgery.

At this critical point, retrieval devices (snare) were not immediately available. Hence, we decided to improvise and utilize the existing hardware. A new 9F sheath was inserted through the left femoral artery and placed *in situ*. We devised an indigenous snare by bending a Grand Slam wire (0.014" Asahi Intech, Japan) in the center and creating a loop similar to a retrieval loop snare. The loop was again bent at an angle of 60° at a 2-cm distance from the tip to give a secondary curve. This looped snare was passed through the renal double curve (RDC) catheter. We successfully reached the area distal to the coronary guidewire in the abdominal aorta; however, despite repeated attempts, we failed to maneuver the stent into the loop of the snare. The stent was completely separated from the balloon, but it was still hanging above the underlying guidewire. We concluded that the loop snare needed more strength and support and hence withdrew the loop snare made of the Grand Slam wire.

A new snare was created using a 0.032" polytetrafluoroethylene (PTFE) wire by using a method similar to that mentioned previously. We attempted to snare the stent. This time the stent system along with the underlying coronary guidewire was successfully maneuvered into the loop of the wire snare. With the stent firmly lodged in the snare, we attempted to pull the entire system into the snare catheter (Figure 2). However, the crumpled stent did not yield. We realized that the stent system was railing on the hard shaft of the underlying guidewire, which did not allow the stent to bend over itself into the snare catheter.

The original guidewire was carefully withdrawn so that the stent railed over the relatively soft distal radiopaque portion. Thus, we successfully pulled the stent into the snare catheter because the radiopaque tip was soft and yielded easily. The entire system was withdrawn successfully through the 9F sheath from the left femoral artery. (video-1) Thus, a major complication was averted by successfully retrieving the stent (Figure 3).

Case 2

A 62-year-old man with diabetes presented to us with acute onset of chest pain and dyspnea. His physical examination was within normal limits. He was diagnosed with acute coronary syndrome. Coronary angiography was performed through the right femoral artery route

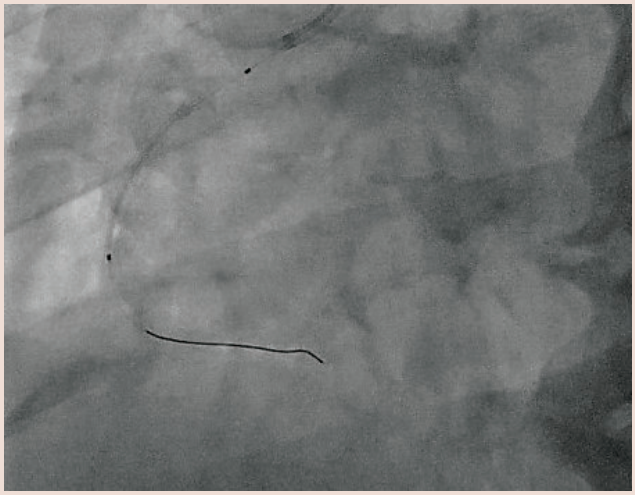

Figure 1: Partially dislodged stent is seen with crumpled struts in proximal RCA.

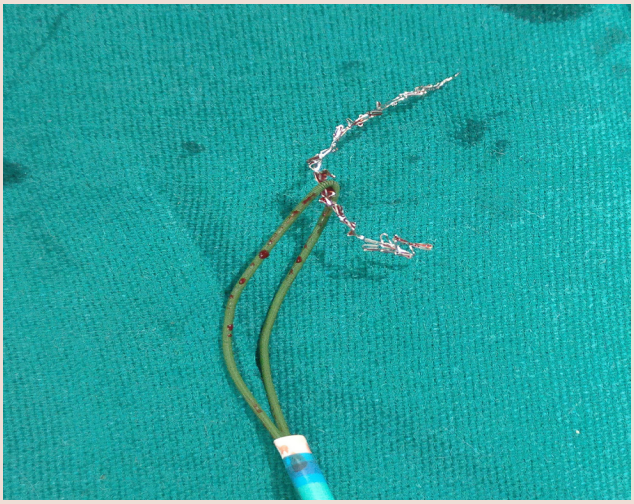

Figure 3: Retrieved stent is seen into the loop snare made from a 0.032″ PTFE wire.

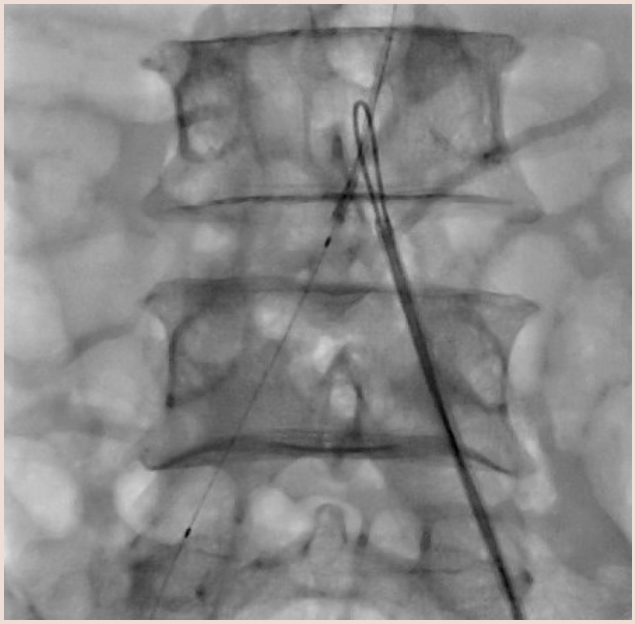

Figure 2: Snare made from a 0.032″ PTFE wire is seen with the dislodged stent held in its loop.

Figure 4: Extremely tortuous RCA is seen.

using a 6F sheath. The angiography revealed 80% stenosis in the proximal LAD coronary artery with tandem lesions in the proximal (70% stenosis) and distal RCA (90% stenosis). Significant tortuosity was noted along the course of the RCA (Figure 4). We decided to perform PTCA of the LAD and RCA.

A 6F Judkins Right (JR 3.5) guiding catheter was engaged in the RCA ostium. A 0.014" Runthrough guidewire (Terumo, Japan) was passed through the lesion in RCA and parked in the PLV segment. A (3.0 x 28 mm) Biomatrix Flex stent (Biosensors, Singapore) was passed over the guidewire into the proximal RCA. However, because of the tortuosity of the blood vessel, we were unable to advance the stent beyond the mid segment to the desired location. While attempting to push the stent further, the struts crumpled over and accumulated at its proximal part. Therefore, the entire system was withdrawn into the abdominal aorta.

Similar to the previous case we devised an indigenous snare using a Grand Slam (0.014") coronary wire (Figure 5). The loop was given secondary curve of 60-degree curve at about 2 cm. A new access was created through the left femoral artery with a large 9F sheath. The free ends of loop snare were passed through a renal double curve (RDC 7F) catheter. This assembly was inserted through the left sided access. The dislodged stent was successfully retrieved with help of this indigenous snare of a Grand Slam wire (Figure 5 and 6; video 2). The PTCA was successfully completed later with a smaller (2.75 × 18 mm) Biomatrix flex stent.

DISCUSSION

With the advent of new-generation stents, the risk of stent dislodgment or breakage has significantly reduced to 0.3%–8.4%.[1] However, stent

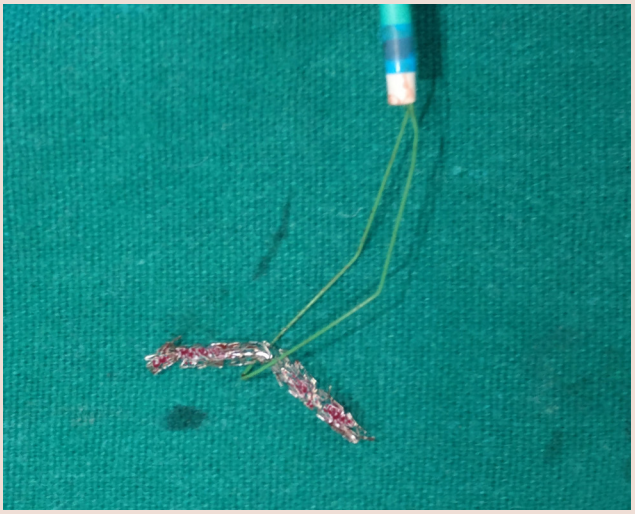

Figure 5: Retrieved stent along with the loop snare made from Grand-slam coronary guidewire.

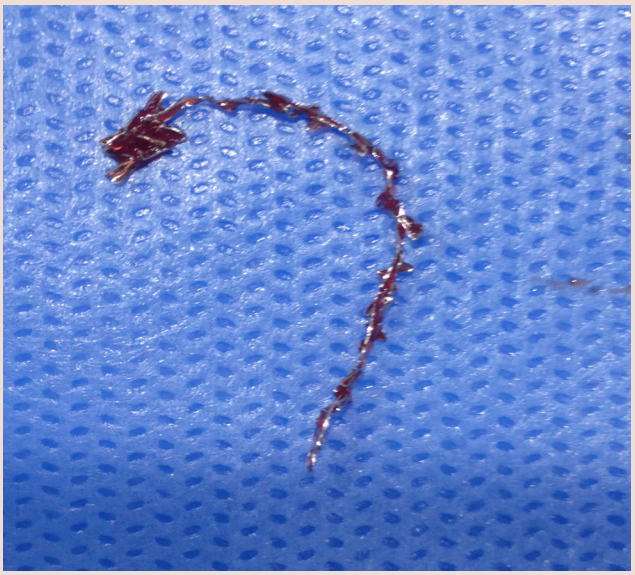

Figure 6: Completely disfigured stent as retrieved from the body.

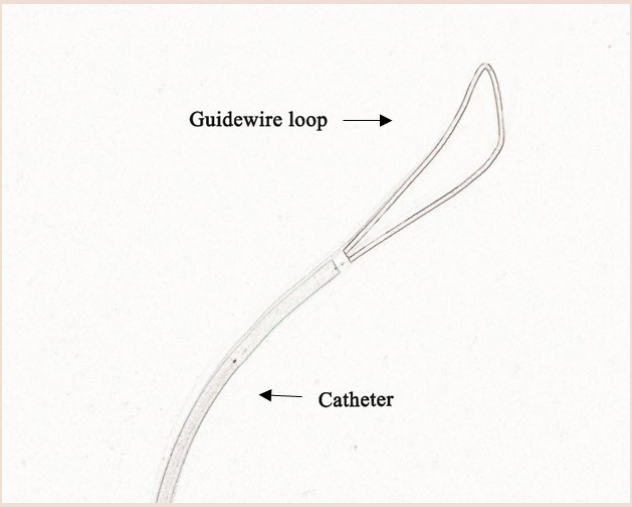

Figure 7: Schematic description of design of "homemade" snare.

dislodgement or breakage can lead to major adverse events such as myocardial infarction, sudden cardiac death, or acute limb ischemia. Factors associated with stent dislodgment can be divided into two groups, namely native vessel characteristics, such as Tortuous anatomy, heavily calcified lesions, and distally located lesions, and procedural characteristics, such as inadequate guide support, inadequate lesion preparation, jerky or forceful movements during delivery of the stent across the lesion, entrapment of the guidewire, and manually crimped stents.[2] Various methods have been described in the literature for percutaneous retrieval of these broken stents, such as snare kits, forceps technique, crushing the stent against the wall by using a new stent, or sequential dilatation of the balloon; the results vary with the methods.[3] A loop snare kit is the easiest and most efficient way to retrieve dislodged materials, such as stent, piece of broken guidewire, or catheter. Devices such as Amplatz gooseneck snare (Medtronic, USA),[4] EN snare kit (Merit Medical, USA), and multisnare (PFM Medical,USA) are available. However, the cost of commercial snares is a major limiting factor in our country; hence, they may not be immediately available during an emergency.

Percutaneous retrieval of the stent is usually preferred; in this technique, foreign material does not remain in the body, and the chances of residual coronary obstruction are minimal. Repeated stent retrieval attempts can cause dissection, perforation, and distal embolization, which may require an emergency surgery.[5] Hence, sometimes deploying or crushing a stent *in situ* is a relatively safe option.

We devised an indigenous makeshift snare kit using a coronary guidewire and catheter by two different methods. In the first case, our initia attempt to retrieve the partially dislodged stent by using a Grand Slam (0.014") wire was unsuccessful. Hence, a PTFE guidewire (0.032" or 0.81 mm), which provided relatively high support, was used to create the loop snare. In the second case, the loop snare was devised by folding a Grand Slam (0.014") wire (Figure 3 and 5). In both the cases, the dislodged stent system was hanging in the abdominal aorta; hence, to reach it, the RDC catheter was selected because of its short length and adequately curve. This makeshift loop snare was passed through a large-bore sheath because the disfigured stent system requires a larger space than an intact stent during retrieval.

CONCLUSION

During emergencies, if a snare kit is not available, we can design a temporary loop snare by using either a 0.032" PTFE wire or a coronary guidewire (BMW or Grand slam) by bending it at the center and creating a loop at the bend. (Figure 7). Such indigenous snares are highly useful during emergenceis such as those reported in this study. Withdrawal of disfigured or undeployed stent should not be performed using a small-bore access sheath (6F). The disfigured stent was still on the guidewire; thus, we could maneuver it into the snare. If the stent were not on the guidewire, the retrieval of the stent percutaneously would have been extremely difficult. The stent may not coil over itself into the snare if it is laid on the stiffer shaft of the coronary guidewire. It can be retrieved by carefully positioning the soft distal tip of the guidewire on the stent. With this small maneuver, we can successfully pull the stent into the snare catheter. A calm and composed demeanor with presence of mind is required to handle such situations. This technique cannot be considered an alternative to standard retrieval devices, and catheterization laboratories should be well equipped with catheters in case of emergency. This article can be a

lesson for young aspiring cardiologists regarding adequate preparedness before proceeding for complex coronary interventions.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

ABBREVIATIONS

PTCA: Percutaneous transluminal Coronary Angioplasty; **LAD:** Left Anterior Descending Artery; **RCA:** Right Coronary Artery; **PLV:** Posterior Left Ventricular branch; **DES:** Drug Eluting Stent; **PTFE:** Polytetrafluoroethylene.

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