

SUCCESSFUL RETRIEVAL OF DISLODGED PACLITAXEL-ELUTING STENT WITH A NITINOL LOOP SNARE: A CASE REPORT

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Coronary stent dislodgment or embolization before deployment is a rare but challenging complication in interventional cardiology. Intracoronary embolization of the dislodged stent is associated with a high risk of coronary occlusion, due to thrombus formation and subsequent myocardial infarction. Furthermore, systemic embolization may cause severe cerebrovascular events. Nonsurgical retrieval strategies for this complication have been suggested, but bailout cardiac surgery may be indicated if percutaneous retrieval attempts fail. To our knowledge, this is the first case report of intracoronary drug-eluting stent dislodgment, and successful retrieval was accomplished by a loop snare technique. With the increasing trend of using drug-eluting stents in percutaneous coronary intervention, the likelihood of stent dislodgment or embolization may increase. It should be kept in mind, especially by coronary interventionists, how to manage this complication.

Key Words: coronary angioplasty, dislodged stent, complication, loop snare
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Coronary stents are useful devices in treating acute or threatening occlusive coronary dissection or suboptimal dilatation after percutaneous coronary intervention (PCI). The devices are also associated with a lower restenosis rate compared with balloon angioplasty alone [1,2]. In addition, drug-eluting stents decrease the rate of target vessel revascularization, more than bare metal stents [3]. Dislodgment of the coronary stent before deployment is a rare but challenging complication in interventional cardiology [4–6], and several percutaneous retrieval techniques have been suggested [6–10]. Here, we report a case in which a drug-eluting stent was stripped from its balloon, incarcerated within the right coronary artery (RCA), and retrieved successfully by using a loop snare.

CASE PRESENTATION

A 64-year-old man with previous anterior wall myocardial infarction, hypertension, and hypercholesterolemia had suffered from class II angina for 2 months. Exercise stress test revealed dynamic ST-segment depression over leads II, III and aVF on electrocardiography. Dipyridamole ²⁰¹thallium myocardial perfusion scintigraphy showed fixed defects in the left anterior descending artery (LAD)-related territories, but partially reversible reduction of thallium uptake over RCA-related territories. Because of the refractory symptoms despite maximal medical therapy, intervention in the RCA was undertaken.

A 6Fr sheath was placed in the left radial artery. Diagnostic coronary angiogram showed a totally occluded proximal LAD distally supplied by collateral circulation from the left circumflex artery. A critically stenotic lesion with 99% lumen narrowing was found in the mid-third segment over the highly tortuous RCA (Figure 1). A 6Fr ART 4.0 guiding catheter (Boston Scientific/Scimed, Natick, MA, USA) was used to engage the right coronary ostium.

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Figure 1. Coronary angiogram showing mid-third stenosis of a highly tortuous right coronary artery.

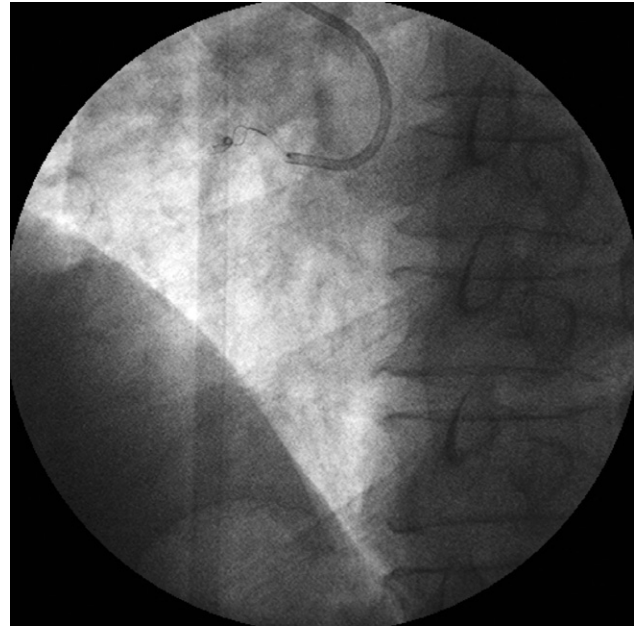


Figure 2. A 4Fr nitinol goose-neck snare used to capture the dislodged paclitaxel-eluting stent (Taxus) over the proximal right coronary artery segment.

The target stenotic lesion was crossed with a 0.014'' × 190-cm High Torque Whisper wire (Guidant, St. Paul, MN, USA). After pre-dilation with a 3.0 × 15 mm Aqua T3 balloon catheter (Cordis, Miami Lakes, FL, USA) over the mid-RCA stenotic lesion, a 3.5 × 16-mm paclitaxel-eluting stent (Taxus, based on the Express stent; Boston Scientific/SciMed, Natick, MA, USA) was advanced but failed to cross the tortuosity over the proximal RCA. When the balloon catheter was withdrawn, however, the Taxus stent had unexpectedly slipped from the balloon and dislodged in the proximal RCA. A 4Fr nitinol goose-neck snare (Microvena, Vadnais Heights, MN, USA) with a 4-mm diameter loop was advanced using a guiding catheter and positioned proximally to the stent, and attempts were made to tighten it under fluoroscopic guidance (Figure 2). After attempted retrieval for about 20 minutes, the stent was finally extracted and pulled back with the guiding catheter, out of the artery sheath. To offer better backup support, a 6Fr Scimed Amplatz AL2 guiding catheter (Boston Scientific/Scimed, Natick, MA, USA) was used to engage the RCA ostium, and then the stenotic lesion was crossed with a 0.014 inch × 175-cm Rinato PTCA extra-support guidewire (Asahi Neo, Akatsuki-cho, Seto, Japan). The reference diameter proximal to the stenotic lesion was 4.25 mm. A 4.0 × 12-mm bare-metal stent (Driver; Medtronic, Shoreview, MN, USA) was deployed successfully over the lesion, followed by post-dilation

using a 4.5 × 12-mm noncompliant Nimbus balloon catheter (ClearStream, Enniscorthy, Co. Wexford, Ireland) up to 16 atm. The final result showed a widely patent RCA with estimated residual stenosis of less than 20% (Figure 3). The residual stenosis was due to eccentric calcification of the lesion. After the procedure, serum cardiac enzyme levels were within normal limits, and no dynamic ST-T segment deviation was noted. The patient experienced a smooth course of hospitalization and was discharged 2 days later.

DISCUSSION

Coronary stenting has proved useful in the management of acute or threatening occlusive coronary dissection following PCI [1], and is associated with a lower restenosis rate compared with balloon angioplasty [2]. Dislodgment of a stent from the delivery balloon during deployment is a rare complication, reported in 1–8.4% of procedures, and may result in systemic or intracoronary stent embolization [6]. While systemic embolization may cause severe cerebrovascular events, intracoronary embolization is associated with a high risk of coronary thrombosis and subsequent myocardial infarction [4]. Different percutaneous techniques have been described to retrieve unexpanded stents from the coronary circulation, including the use of biliary or myocardial biopsy forceps [6,7],

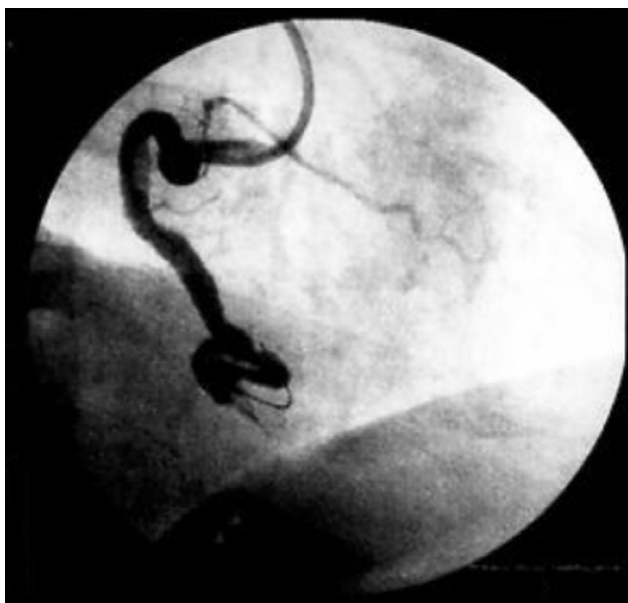


Figure 3. After successfully retrieving the dislodged Taxus stent, a Scimed 6Fr Amplatz guiding catheter is used to increase guiding support, and then a Medtronic Driver bare-metal stent is deployed and post-dilated to give a widely patent right coronary artery.

multipurpose baskets, two twisted guidewires, low-profile angioplasty balloon catheters, loop snares [8], and distal protection devices [9]. However, if retrieval of the embolized stent is not technically feasible, another technique is to compress the stent against the arterial wall with a second stent [10]. Bailout cardiac surgery may be indicated [5].

So far, there are no reports of dislodgment or embolization of a paclitaxel-eluting stent in the literature, making this case report the first. Retrieval of a drug-eluting stent will probably damage the drug coating, which may hamper its anti-proliferative effects on in-stent restenosis. Retrieval techniques used for bare-metal stents should be applied to retrieve a drug-eluting stent. The Express stent platform usually offers excellent deliverability and conformability, and there are no reports of dislodgment of the Express stent. However, when such an episode does occur, the retrieval technique and devices should be available to overcome such unexpected complications.

In our case, it might have been impossible for a low-profile balloon to advance beyond the unexpanded stent, or the guiding catheter might have been dislodged from the RCA ostium when the stent was pulled back toward the guiding catheter by another balloon inflated distally to it. We considered that a nitinol goose-neck snare was the best device for retrieval of an unexpanded stent in this case. This snare has two advantages. First, the loop is perpendicular to the catheter, making intracoronary snaring easier than with a straight

device. Second, the loop is made from nickel-titanium, increasing its tensile strength and reducing the chance of cable fracture. The snare technique has also been used for retrieval of other intravascular foreign bodies, (e.g. fractured port catheters, embolization coils or pacemaker transducers,) and serves as a useful and safe alternative procedure to surgery.

Coronary stent dislodgment from the delivery system occurs most often when the stent-balloon assembly is pulled back into the guiding catheter, because the target lesion either cannot be reached or cannot be passed [6]. The possible causes of failure to deliver a stent include: poor support of the guiding catheter or the guidewire, vessel tortuosity proximal to the lesion, and severe vessel calcification. In our case, the proximal tortuosity of the RCA limited the advance of the Taxus stent, which is based on an Express stent and has reduced trackability. After retrieving the dislodged stent, we used several techniques to facilitate stent deployment, such as selection of guiding catheters with appropriate configuration for strong backup support, deep seating of the guiding catheter within the coronary artery, and use of extra supportive wires.

With the increasing trend toward using drug-eluting stents in PCI, the likelihood of stent dislodgment or embolization may increase. Interventional cardiologists should be familiar with these retrieval techniques, and retrieval devices should be available in the catheterization room.

REFERENCES

1. Fischman DL, Leon MB, Baim DS, et al. A randomized comparison of coronary-stent placement and coronary angioplasty in the treatment of coronary artery disease. *N Engl J Med* 1994;331:496-501.
2. Erbel R, Haude M, Hopp HW, et al. Coronary-artery stenting compared with balloon angioplasty for restenosis after initial balloon angioplasty. Restenosis Stent Study Group. *N Engl J Med* 1998;339:1672-8.
3. Indolfi C, Pavia M, Angelillo IF. Drug-eluting stents versus bare metal stents in percutaneous coronary interventions (a meta-analysis). *Am J Cardiol* 2005;95:1146-52.
4. Shiojima I, Ikari Y, Abe J, et al. Thrombotic occlusion of the coronary artery associated with accidental detachment of undeployed Palmaz-Schatz stent. *Cathet Cardiovasc Diagn* 1996;38:360-2.
5. Erez E, Herz I, Snir E, et al. Surgical removal of stent entrapped in proximal left coronary artery system. *Ann Thorac Surg* 1996;62:884-5.
6. Eggebrecht H, Haude M, von Birgelen C, et al. Nonsurgical retrieval of embolized coronary stents. *Catheter Cardiovasc Interv* 2000;51:432-40.

7. Eekhout E, Stauffer JC, Goy JJ, et al. Retrieval of a migrated coronary stent by means of an alligator forceps catheter. *Cathet Cardiovasc Diagn* 1993;30:166–8.
8. Elsner M, Peifer A, Kasper W. Intracoronary loss of balloon-mounted stents: successful retrieval with a 2 mm “Microsnare” device. *Cathet Cardiovasc Diagn* 1996;39:271–6.
9. Webb JG, Solankhi N, Carere RG. Facilitation of stent retention and retrieval with an emboli containment device. *Catheter Cardiovasc Interv* 2000;50:215–7.
10. Curran PJ, Currier J, Tobis J. Percutaneous snare retrieval of a partially embedded wallstent. *Catheter Cardiovasc Interv* 2004; 61:400–2.

以鎳質環狀套圈成功取出脫落於冠狀動脈內藥物塗層支架之經驗 — 病例報告

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在介入性心導管治療時，發生冠狀動脈支架脫落或栓塞的情況，雖然並不常見，但是一旦發生的時候，經常都是極為棘手的問題。在冠狀動脈裡發生支架脫落與栓塞，可能會造成血栓阻塞甚至引起心肌梗塞，若是在操作過程中使得支架掉落到周邊大血管，最糟糕莫過於發生嚴重的腦血管阻塞。雖然過去針對單純金屬支架在冠狀動脈血管內脫落後，有零星的病例與文獻報告討論如何以經皮介入性治療的方式取出，但是沒有文獻報導過藥物塗層支架脫落的案例。萬一這些介入性治療的嘗試都失敗，還是要考慮以外科開刀取出的可能性。本文報告一位病患在接受藥物塗層支架治療時，支架在右冠狀動脈近端脫落，最後有驚無險的以鎳質金屬套圈將其取出，並成功完成右冠狀動脈中段狹窄病灶的支架置放。隨著藥物塗層支架的發展與治療優點，冠狀動脈支架的使用有越來越多的趨勢，從事介入性心導管治療之醫師，必須對於此併發症的處置了然於心。

關鍵詞：冠狀動脈整型術，支架脫落，併發症，鎳質環狀套圈
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