

Broken Coronary Stent Catheter Retrieval Percutaneously Case Report and Literature Review

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Abstract

We present a 73-year-old male patient with an unusual complication of a broken coronary stent catheter during percutaneous coronary angioplasty, which was successfully retrieved by balloon trapping and pulling-back method, along with literature review of similar cases.

Keywords: Coronary stent catheter break, percutaneous coronary intervention, percutaneous retrieval

INTRODUCTION

As interventional cardiology era has been improving and advanced percutaneous coronary interventional procedures have been increasingly performed worldwide, operators might be confronted with some complications. We report a case of coronary stent delivery catheter breaks and its successful retrieval, and we review the literature in this regard.

CASE REPORT

A 73-year-old male patient was admitted to the emergency department with unstable angina pectoris. After his medical therapy was initiated, diagnostic coronary angiogram was performed. Coronary angiogram revealed a critical stenosis of obtuse marginal branch of the left circumflex artery. Percutaneous intervention to the obtuse marginal branch of the left circumflex artery was mandatory.

The procedure started with puncture of the left common femoral artery, which was extremely tortuous. After

obtaining a successful vascular access, the left main coronary artery was cannulated by a 6-French (6F) EBU guiding catheter (Medtronic Inc., Minneapolis, MN, USA). The patient was anticoagulated by administration of 100 U/kg unfractional heparin (UFH). Then, the operator passes through the critical stenosis by instrumentality of a soft 0.014-inch CHOICE floppy coronary guidewire (Boston Scientific, Marlborough, MA, USA). Subsequently, the critical stenotic lesion was predilated successfully with a 2.0 mm × 20 mm predilation balloon (Invader, Alvimedica Medical Technologies, Turkey) at 12 atmospheric (atm) pressure. Following successful predilation, the operator decided to proceed to the next step, which was implantation of a drug-eluting coronary stent (PROMUS Element, Boston Scientific, Marlborough, MA, USA). Although the whole delivery catheter was inside the guiding catheter, the stent did not reach the critical lesion.

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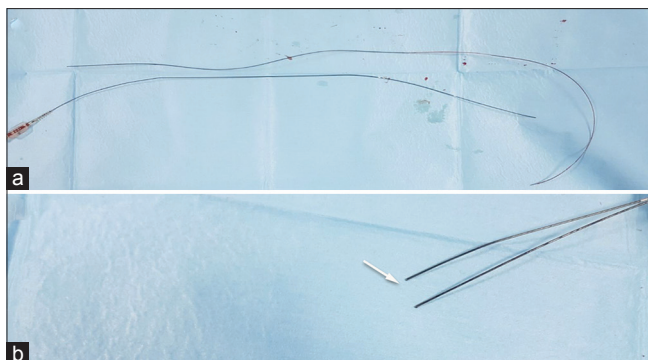


Figure 1: (a) Two broken parts of the whole coronary stent catheter. (b) The site of catheter break (white Arrow)

Suddenly, it was realized that while it was pushed forward, the delivery catheter broke into halves in the guiding catheter because of the extremely tortuous vascular access. One of the broken parts of the delivery catheter was totally inside the body, and the other part was partially in the guiding catheter and its hub was out of the guiding catheter. The operator pulled back the distal part of the broken delivery catheter out of the body [Figure 1]. After that, a 2.5 mm × 20 mm coronary predilation balloon catheter (Invader, Alvimedica Medical Technologies, Turkey) was inserted into the guiding catheter and passed by the proximal half of the broken stent delivery catheter. By the help of inflation coronary balloon inside of the guiding catheter, the broken part of the stent delivery catheter was trapped inside of the guiding catheter between the predilation balloon and the guiding catheter wall [Figure 2]. It was achieved by withdrawal of the broken part of stent delivery catheter into the guiding catheter by trapping and pulling back the inflated predilation balloon repetitiously [Figure 2]. Just after being sure that the broken part of the catheter was totally in the guiding catheter, all the system was pulled out of the body. After the successfully management of this complication, the left main coronary artery was engaged by a new EBU guiding catheter (Medtronic Inc., Minneapolis, MN, USA). The procedure was continued by crossing the critical stenotic lesion. Finally, a 3.0 mm × 38 mm drug-eluting coronary stent (PROMUS Element, Boston Scientific, Marlborough, MA, USA) was implanted successfully, and the procedure was terminated without any complication.

DISCUSSION

Inadvertent retention of coronary hardware such as guidewire, stent or balloon delivery catheter, distal part of atherectomy devices, or dislodged coronary stents due to entrapment or catheter break is very uncommon complication, which leads to myocardial ischemia or infarction, vascular tissue injury, and even death, during percutaneous coronary interventions. Management of such complication requires additional intervention such as surgical or percutaneous intervention. There are several established several retrieval methods for overcoming this unwanted complication with regard to percutaneous intervention. These methods can be summarized

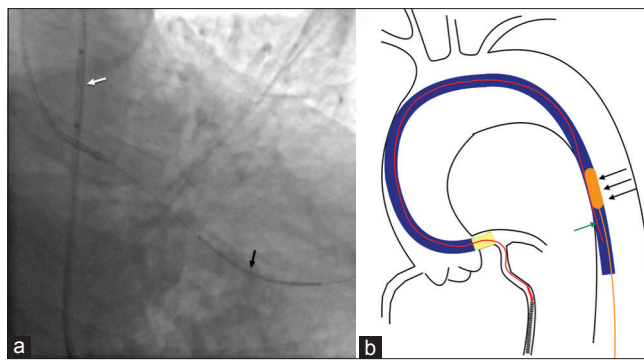


Figure 2: (a) Coronary angiogram view of broken stent delivery catheter in the coronary vasculature. Black arrow shows the coronary stent in the left circumflex artery. Trapping balloon (white arrow) traps the proximal half of the broken catheter. (b) The illustration of the technique. The proximal part of the broken stent catheter (green arrow). Broken catheter is trapped by inflation of balloon (black arrow)

as small balloon technique, two-wire technique, snares, forceps, retrieval baskets, specific retrieval devices, and distal embolic protection devices.^[1] Despite these well-established techniques, compensation for such complication can be very challenging sometimes.

In the literature, there are several case reports, including different clinical scenario and various implementation of retrieval technique [Table 1]. Wani *et al.*^[2] reported a case of stent delivery catheter break during percutaneous coronary angioplasty. In this case, the complication was successfully managed by compression of the fractured part of the delivery catheter in the guiding catheter by balloon trapping and removing the entire system out of the body. In the literature, there are several similar cases.^[4,6,7,13-15] Another retrieval method was mentioned by Chan *et al.*^[3] In the course of balloon dilation of side branch ostium after main vessel stent deployment, the shaft of balloon catheter accidentally broke, and Chan *et al.* retrieved the broken part of the catheter by means of using an alligator forceps. An alternative approach for retrieval the foreign bodies in coronary circulation is balloon-supported catheter-assisted retrieval technique. Kunwar *et al.*^[5] made a success of restraining of the broken part of balloon catheter between guiding catheter and dilation balloon, followed by ensheathing this broken part into the guiding catheter. A relatively simple method, which was gently withdrawing the entire system as a unit without any additional technique was applied by O'Neill *et al.*^[9] In another complicated case, after failed attempts by using snare, two-wires and balloon techniques to remove a broken intravascular ultrasound catheter in the coronary vasculature, Chang *et al.*^[12] achieved to remove it by the help of using distal embolic protection device. Vimal Mehta *et al.*^[11] achieved to retrieve the distal portion of a broken thrombectomy catheter by means of guiding catheter-supported balloon inflation and pulling-back technique. Similar problems might emerge during advanced percutaneous coronary interventions as well. Imamura *et al.*^[10] reported a case of Rotablator® (Boston Scientific,

Table 1: Literature review of retrieval methods

Case	Author	Journal	Publication year	References	Retrieval method
1	Wani <i>et al.</i>	Korean Circulation Journal	2010	[2]	Balloon trapping and pulling back whole assembly
2	Chan <i>et al.</i>	Catheterization and Cardiovascular Interventions	1999	[3]	Alligator forceps grasping
3	Kharge <i>et al.</i>	<i>Texas Heart Institute Journal</i>	2012	[4]	Balloon trapping and pulling back whole assembly
4	Kunwar <i>et al.</i>	<i>Journal of Clinical and Diagnostic Research</i>	2017	[5]	Balloon-supported catheter-assisted retrieval technique
5	Kayaert <i>et al.</i>	Cardiovascular Revascularization Medicine	2013	[6]	Balloon trapping and pulling back whole assembly
6	Trehan <i>et al.</i>	Catheterization and Cardiovascular Interventions	2003	[7]	Balloon trapping and pulling back whole assembly
7	Gürbüz <i>et al.</i>	Türk Kardiyol Dern Ars	2015	[8]	Balloon-assisted loop snare retrieval
8	O'Neill <i>et al.</i>	<i>BMJ Case Reports</i>	2015	[9]	Traction whole system without using additional tool
9	Imamura <i>et al.</i>	Cardiovascular Intervention and Therapeutics	2017	[10]	Retrieval of a trapped burr using a balloon and Guideliner®
10	Mehta <i>et al.</i>	The International Journal of Angiology	2013	[11]	Catheter-assisted balloon inflation and pulling back
11	Chang <i>et al.</i>	International Heart Journal	2009	[12]	Retrieval with embolic protection device
12	Mehta <i>et al.</i>	Cardiovascular Intervention and Therapeutics	2014	[13]	Balloon trapping and pulling back whole assembly
13	León Jiménez <i>et al.</i>	Catheter Cardiovascular Intervention	2017	[14]	Balloon trapping and pulling back whole assembly
14	Fanari <i>et al.</i>	Cardiovascular Revascularization Medicine	2015	[15]	Balloon trapping and pulling back whole assembly

Marlborough, MA, USA) driveshaft fracture and retrieval of entrapped burr by means of squeezing between inflated balloon and GuideLiner® (Japan Lifeline, Tokyo, Japan) and pullback into the guiding catheter.

Sometimes, operators can be encountered similar complications during percutaneous peripheral vascular interventions. Gürbüz *et al.*^[8] experienced and reported such a complication which occurred after peripheral vascular intervention. In this case report, a broken self-expandable peripheral stent catheter was retrieved successfully by a technique which included a loop snare combined with an inflated balloon.

Consequently, until recently, several retrieval methods have been applied, but none of these methods are like our retrieval technique. On the basis of literature review, our technique, which is balloon trapping and withdrawing the broken hardware and getting it into the guiding catheter before pulling back the whole system, is a unique technique and till now this method is never reported in the interventional era. This method might be safer than other techniques because the broken catheter is completely in the guiding catheter while pulling all systems out of the body. Finally, this method should always be kept in mind in case of a similar complication.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have

given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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