Case Report

Successful percutaneous removal of dislodged ring-marker of optical coherence tomography catheter using the twisted wire technique with a guide-extension catheter: A case report

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ABSTRACT

An 81-year-old male with diabetes and hypertension was admitted to our hospital due to chest pain on exertion. Coronary angiography revealed a severe stenosis at the middle of right coronary artery (RCA). We performed percutaneous coronary intervention under the guidance of optical coherence tomography (OCT) to the lesion in the middle RCA. After balloon dilations, a drug-eluting stent was deployed to the lesion. Then, OCT examination was performed. At that time, fluoroscopy revealed a foreign body over the 0.014-inch guidewire in the distal RCA, which was the ring-marker of OCT catheter. As RCA blood flow was well preserved, percutaneous removal of the dislodged ring-marker was immediately attempted. At first, we tried to remove the dislodged ring-marker with the guide-extension catheter trapping technique. However, it failed and advanced balloon catheter made the dislodged ring-marker migrate more distally. Therefore, we tried the twisted wire technique with the guide-extension catheter and finally the dislodged ring-marker was removed with it. To the best of our knowledge, this is the first case report of a successful percutaneous removal of a dislodged ring-marker of OCT catheter using the twisted wire technique with a guide-extension catheter.

<Learning objective: Although intravascular foreign bodies during percutaneous coronary intervention (PCI) are very rare, it is one of the challenging complications. In this case, we experienced the dislodgement of ring-marker of optical coherence tomography catheter which was removed by twisted wire technique with a guide-extension catheter. The twisted wire technique with a guide-extension catheter can be a useful approach for percutaneous removal of foreign bodies, when other percutaneous retrieval techniques are unsuitable.>

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Introduction

Although intravascular foreign bodies during percutaneous coronary intervention (PCI) are very rare, we occasionally experience it and that can result in life-threatening complications including embolization, thrombosis, and vessel injuries. We report on a case of removal of a dislodged ring-marker of optical

coherence tomography (OCT) catheter during PCI for the treatment of right coronary artery (RCA) stenosis.

Case report

An 81-year-old male with diabetes and hypertension was admitted to our hospital with chest pain on exertion. He had a history of PCI in the distal RCA and the proximal left descending artery one year previously. Coronary angiography revealed severe stenosis in the middle RCA (Fig. 1). We performed OCT-guided PCI to the lesion in the middle RCA. A total of 8000 U heparin was intravenously administered. A 7-French SAL1.0 guiding catheter

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Fig. 1.

Images of initial coronary angiography. Left anterior oblique view showing a severe stenosis (arrow) in the middle RCA (A). Right anterior oblique view revealing a severe stenosis (arrow) in the middle RCA (B). RCA, right coronary artery.

with side holes (Launcher, Medtronic, Minneapolis, MN, USA) was inserted into the RCA via the right radial artery. The lesion was crossed by a 0.014-inch guidewire (SION Blue, Asahi Intecc, Aichi, Japan). Another 0.014-inch guidewire (SION, Asahi Intecc) was inserted into the right ventricular branch (RVB). Then, the OCT (Dragonfly OpStar, Abbott Vascular Japan, Tokyo, Japan) was pulled back from distal RCA. After the OCT examination, the lesion was repeatedly dilated with a 3.0 mm × 15 mm semi-compliant balloon catheter (Ryurei, Terumo, Tokyo, Japan). We then deployed a 3.5 mm × 21 mm drug-eluting stent (DES) (Ultimaster Tansei, Terumo, Japan). Then, OCT examination was performed again. Before injection of contrast, fluoroscopy revealed the migrated

ring-marker to the tip of OCT catheter (Fig. 2A). However, the operator was unaware of the migrated ring-marker of OCT catheter and inserted it into distal RCA. OCT examination was performed and it showed a malapposition of the stent. After removal of the OCT catheter from RCA, the operator was aware of the foreign body in the distal RCA, which was the ring-marker of OCT catheter (Fig. 2B). As RCA blood flow was well preserved, we immediately tried percutaneous removal of the dislodged ring-marker. First, in order to obtain optimal stent apposition, additional balloon dilations were performed with a 3.5 × 8 non-compliant balloon (Powered3 NC, Nipro, Tokyo, Japan). Second, a 0.014-inch guidewire (SION, Asahi Intecc) inserted into the RVB was removed and

Fig. 2.

Removal of dislodged ring-marker of OCT catheter. (A) Fluoroscopy showed the ring-marker (arrow) migrated to the tip of OCT catheter. (B) The dislodged ring-marker (arrow) in the distal RCA. (C) A 0.014-inch guidewire (SION, Asahi Intecc, Aichi, Japan) inserted into the distal RCA through the deployed stent and the side of dislodged ring-marker (arrow). (D) A guide-extension catheter (Guideplus EL, Nipro, Osaka, Japan) (dotted line) was inserted into the proximal site of the dislodged ring-marker (arrow) over two guidewires (Sionblue and Sion, Asahi Intecc). (E) The dislodged ring-marker (arrow) was trapped by the twisted guidewires and pulled into the guide-extension catheter. (F) The guide-extension catheter (dotted line) and the twisted 0.014-inch guidewires were pulled back together through the 7-French guiding catheter. OCT, optical coherence tomography; RCA, right coronary artery.

advanced to the distal RCA through the deployed stent and the side of dislodged ring-marker with a dual lumen catheter (Crusade, Kaneka Medix, Osaka, Japan) (Fig. 2C). Third, a guide-extension catheter (Guideplus EL, Nipro, Osaka, Japan) was inserted into the proximal site of the dislodged marker over two guidewires (Sionblue and Sion, Asahi Intecc) (Fig. 2D). Fourth, we attempted to advance the balloon 1.5 × 12 mm (Regnam, Abbott Vascular Japan) to the distal site of the dislodged ring-marker over a 0.014-inch guidewire (SION, Asahi Intecc) to trap the dislodged ring-marker with the balloon. However, it failed and advanced balloon catheter made the dislodged ring-marker migrate more distally. Therefore, we tried the twisted wire technique with the guide-extension catheter. Guidewires (Sionblue and Sion, Asahi Intecc) were twisted about 20 times and tangled, and then we slowly pulled back the twisted guidewires. The dislodged ring-marker was trapped by the twisted guidewires and pulled into the guide-extension catheter (Fig. 2E). Then, we carefully pulled back the guide-extension catheter and the twisted 0.014-inch guidewires together through the 7-French guiding catheter (Fig. 2F). Finally, we successfully retrieved the whole system without vascular complications.

Discussion

In this case study, we experienced an adverse event related to dislodged ring-marker of OCT catheter during OCT-guided PCI for the treatment of severe stenosis in the RCA. The dislodged ring-marker of OCT catheter was percutaneously removed using the twisted wire technique with a guide-extension catheter.

Many case studies have reported various intravascular foreign bodies, including a dislodged stent, broken guidewire, disrupted microcatheter, and entrapped ruptured balloon [1–7]. In previous case studies, foreign bodies were retrieved with various techniques, including the use of a snare catheter, the small balloon inflation technique, the twisted wire technique, and the

guide-extension catheter trapping technique [1–7]. However, to the best of our knowledge, this is the first case of successful percutaneous removal of a dislodged ring-marker of OCT catheter using the twisted wire technique with a guide-extension catheter.

The OCT catheter, Dragonfly OpStar (Abbott Vascular Japan), has a circular ring-marker at 82 mm proximal from the lens marker to clarify the survey pullback length (Fig. 3A). This circular ring-marker is wound onto the OCT catheter. In this case, during PCI procedure, the ring-marker migrated towards the OCT catheter tip and incidentally stopped on the guidewire port of OCT catheter (Fig. 3B). At the OCT examination after DES deployment, fluoroscopy showed the migrated ring-maker on the guidewire port of the OCT catheter (Fig. 2A). Therefore, the guidewire was incidentally passed through into the guidewire port of OCT catheter and the ring-marker (Fig. 3B). However, the operator was unaware of this migrated ring-marker to the tip of OCT catheter and injected contrast during the OCT examination, it made the migrated ring-marker move more distally and completely dislodged from the OCT catheter. (Fig. 2B and Fig. 3C). Although the exact mechanism that caused migration of the ring-marker is unknown, possibilities include pinching on the ring-marker with excessive power as inserting OCT catheter, a stack of OCT catheter as pulling back the OCT catheter, and initial failure of the OCT catheter were considered.

Various techniques for removal of foreign bodies in the coronary artery have been reported [1–7]. However, in this case, the use of snare catheter was not feasible due to the small size of the dislodged ring-marker and the small balloon inflation technique was inappropriate because it was unclear if the balloon would pass through into the dislodged ring-marker. Therefore, the guide-extension catheter trapping technique was firstly attempted. However, as the balloon catheter had advanced distally through the side of dislodged ring-marker, the ring-marker migrated further. Therefore, we tried the twisted wire technique with the guide-extension

Fig. 3.

Dislodgement of ring-marker of OCT catheter. (A) OCT catheter, Dragonfly OpStar (Abbott Vascular, Tokyo, Japan). Normal positions of ring-marker (arrow) and lens-marker (arrow head). (B) Ex-vivo image representing the ring-marker (arrow) migrated to the tip of OCT catheter and guidewire passed through into wire port of OCT catheter and ring-marker. Arrow head shows lens-marker. (C) Ex-vivo image showing the ring-marker (arrow) completely dislodged from OCT catheter. Arrow head shows lens-marker. OCT, optical coherent tomography.

catheter. The potential advantage of using guide-extension catheter in addition to the twisted wire technique is that foreign bodies in the coronary artery can be removed more smoothly through the guide-extension catheter. Previous case studies [8,9] have reported the benefits of using guide-extension catheter include crossing proximal calcification, tortuosity and deployed stent with better support, and allowing distal stent delivery. Proximal calcification, tortuosity, and deployed stents can make the retrieval of foreign body with the twisted wire technique more challenging. Therefore, the usage of guide-extension catheter brings the same benefits as foreign bodies in the coronary artery are removed with twisted wire technique. However, the twisted wire technique with a guide-extension catheter requires completely removing guidewires from coronary artery. Therefore, this technique should be attempted, when other percutaneous retrieval techniques are unsuitable.

Conclusion

To the best of our knowledge, this is the first case report of a successful percutaneous removal of a dislodged OCT catheter's ring-marker using the twisted wire technique with a guide-extension catheter. If other percutaneous retrieval techniques are unsuitable, the twisted wire technique with a guide-extension catheter can be a useful approach for percutaneous removal of foreign bodies.

Conflict of interest

The authors declare that there is no conflict of interest.

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