CASE REPORT

TECHNICAL CORNER

Devastating Consequences of a Jailed Knuckled Wire in CTO PCI of an Anomalous RCA

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ABSTRACT

A knuckled tip of a jailed guidewire may lead to distortion of the main branch stent when pulled back after balloon dilatation of the side branch ostium. The distorted stent can be crushed to the side of the vessel as a bail-out intervention. (Level of Difficulty: Advanced.) (J Am Coll Cardiol Case Rep 2020;2:499-502) © 2020 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

A 60-year-old man without a prior history was admitted to the emergency department of another hospital with ongoing chest pain. Upon detection of ST-segment elevation in the inferior leads, the patient was directly taken to the angiography laboratory. In the left coronary system, there was moderate stenosis in the circumflex artery, but no total occlusion was detected. Attempts to cannulate the right coronary ostium failed, although they used different catheters. The patient was taken to the intensive care unit, and thrombolytic therapy was administered. At 4-month follow-up, the patient was still reporting chest pain.

PAST MEDICAL HISTORY

The patient had no medical history prior to presentation with acute inferior myocardial infarction.

DIFFERENTIAL DIAGNOSIS

The most probable diagnosis at presentation was acute inferior myocardial infarction because of ongoing chest pain and accompanying ST-segment elevation in inferior leads. The cause of chest pain in the second admission at the fourth month might be a sign of a late-onset pericarditis or ongoing ischemia.

LEARNING OBJECTIVES

- To understand the role of a Judkins left 4 catheter to engage the RCA when it arises from the left cusp and it cannot be found with Judkins right and Amplatz left catheters.
- To understand the significance of removing the previous jailed wire before dilatation of the side branch.
- To understand the role of a small balloon or microcatheter if a guidewire cannot be retracted easily.
- To avoid retracting a jailed wire with a knuckled tip before fixing it.
- To be able to crush a distorted stent to the side of the vessel with a new stent.

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INVESTIGATIONS

A positron emission tomography scan revealed viable tissue in the inferior wall upon detection of fixed perfusion defect in myocardial perfusion scintigraphy, and the patient was scheduled for coronary angiography again.

MANAGEMENT

The patient was taken to the coronary angiography laboratory, but the right coronary artery (RCA) could not be engaged again by Judkins right and Amplatz left 1 and 2 catheters (Figure 1A). Then, a Judkins left 4 catheter was able to cannulate the RCA ostium, which originated from left coronary sinus in close proximity to the ostium of the left main coronary artery. Stabilization of the catheter was achieved by anchoring a side branch with a 2-mm balloon at 6 atm (Figure 1B). A Pilot 50 guidewire was advanced through a Finercross microcatheter. Following balloon dilatations, a 3 × 28-mm drug-eluting stent (DES) was deployed in the proximal RCA (Figure 1C). When it was noticed that the first guidewire was in the right ventricular (RV) branch, an attempt was made to advance a new guidewire into the main RCA (Figure 1D). Following failure of the antegrade approach, a retrograde attempt enabled advancement of the wire into the occluded RCA with a microcatheter through septal collaterals (Figures 1E to 1G). The wire was externalized, and a second DES was deployed crossing the ostium of the RV branch (Figure 1H). Because the flow in the RV branch deteriorated, a 2-mm balloon was inflated at the ostium after rewiring, which provided a TIMI (Thrombolysis In Myocardial Infarction) flow grade 3 (Figure 2A). Unfortunately, the jailed guidewire with the knuckled tip in the RV branch was not pulled before inflation of the balloon at the RV branch ostium. After balloon inflation at the RV branch ostium, all of our attempts to pull the jailed wire back failed. Moreover, our

**FIGURE 1** Stenting of RCA Originating From the Left Cusp Via Retrograde Approach

(A) Amplatz left guiding catheter was unable to engage the RCA ostium. (B) RCA originating from the left cusp was intubated by a Judkins left catheter, which was stabilized by an anchor balloon in the proximal side branch (arrow); flow is shown after 2-mm balloon inflation. (C) Blood flow after deployment of a 3 × 28-mm DES. (D) The vessel with the wire inside was an RV branch, and the main RCA was originating from the mid-portion (arrow). (E) Failure of antegrade wiring (black arrow) and switch to retrograde approach (blue arrow shows the tip of the microcatheter). (F) Microcatheter was advanced through the RCA (arrow). (G) Externalization of the wire; note the knuckled wire in the RV branch (arrow). (H) Second DES in the main artery deteriorated the flow in the RV branch (arrow). DES = drug-eluting stent; RCA = right coronary artery; RV = right ventricular.
gradual increase in the force of pull back resulted in fracture of the guidewire as well as distortion of the stent in the proximal RCA (Figure 2B). Destroyed stent also caused the balloon and the wire within to be trapped in the RV branch (Figure 2C). Following all of these unintended consequences, we moved on wiring the RCA antegradely with intravascular ultrasound guidance (Figure 2D). Thankfully, our attempt to advance the wire between the destroyed stent and the vessel wall was successful. Two more DES were deployed in the RCA, crushing the destroyed stent and fractured knuckled tip of wire to the side of the vessel and jailing the balloon and the other wire in the RV branch (Figure 2E). The procedure was completed with TIMI flow grade 3 in both RCA and RV branch (Figure 2F). The patient was free of symptoms, and a control angiography was performed 3 months after the first procedure (Figure 2G). The RV branch was occluded with the jailed wire and balloon in the same place (Figure 2H). The flow in the RCA was normal.

**DISCUSSION**

Leaving a wire in the side branch while stenting the main branch is strongly recommended to keep the side branch open. However, if the tip of the wire in the side branch is knuckled and balloon dilatation of the ostium is performed before wire removal, the procedure can be complicated by wire entrapment and distortion of the stent. Herein, we present a chronic total occlusion percutaneous coronary intervention in an RCA originating from the left coronary sinus, which could be completed by crushing a destroyed stent and a fractured guidewire to the vessel wall and leaving a trapped balloon and a wire in the RV branch. In this case, a knuckled tip of a jailed guidewire complicated an otherwise successful procedure. The most important point to be emphasized is the necessity of removing the jailed wire when you inflate a balloon in the side branch ostium. Moreover, a knuckled tip of a jailed wire should not be overlooked. A knuckled tip of a guidewire may lead to distortion of the stent during
retraction even if it is in a main branch (1,2). When a jailed wire put up resistance during retraction, using a small balloon or a microcatheter may be useful, causing a diminutive deformation of the stent that can subsequently be fixed by post-dilatation (3). There are also several stent retrieval techniques described, such as the low-pressure balloon inflation technique, small-balloon technique, double-wire technique, and loop snare technique, which can help to take the distorted or dislodged stent back into the guiding catheter (4,5). However, these techniques may also cause dissection or perforation of the vessel if the stent is remarkably distorted. Crushing a distorted stent to the vessel wall by another stent is another rational bailout option that which can be performed as an initial approach or following the previously mentioned techniques depending on the severity of stent distortion and the hemodynamic status of the patient (6).

**FOLLOW-UP**

The patient has been followed-up uneventfully since the procedure.

**CONCLUSIONS**

A distorted stent can be crushed to the vessel wall as a bailout option. Confirming that the new wire is passing between the vessel wall and distorted stent by using an intracoronary imaging modality, such as intravascular ultrasound, is of great importance.

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**KEY WORDS** crushing, distorted stent, ruptured wire