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Case Report

Successful Surgical Management of a Retained Guide-Wire Fragment in the Left Main Coronary Artery

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ABSTRACT

Guide-wire fracture during percutaneous coronary interventions is a rare and potentially serious complication. Herein, we report a case of guide-wire fracture inside the left main coronary artery following percutaneous coronary intervention in a 58-year-old man. The patient had severe chest pain, and the extraction of the retained guide-wire fragment was thwarted via percutaneous retrieval approaches. Ultimately, he had a successful emergency surgical extraction of THE retained guide-wire fragment and coronary artery bypass graft surgery. This report indicates that the surgical extraction of a retained guide-wire fragment is still safe and the only option for its treatment after the failure of retrieval approaches. ***(Iranian Heart Journal 2020; 21(1): 115-118)***

KEYWORDS: Percutaneous coronary intervention, Coronary artery bypass, Coronary vessels

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Guide-wire fracture during percutaneous coronary intervention (PCI) is a rare and potentially serious complication, with a reported incidence of around 0.08%. The first case of this complication was reported in the late 1980s. [1] The main causes of fracture mechanisms are wire cutting by directional or rotational coronary atherectomy catheter, wire wedging into the distal or winding vessels, and structural failure. This rare and dangerous complication may be life-threatening and sometimes require emergency cardiac surgery if percutaneous retrieval fails. [2,3] Herein, we report a case of guide-wire fracture during an elective PCI, requiring emergent surgical removal and coronary artery bypass graft surgery (CABG).

Case Report

A 58-year-old male smoker with hypertension was admitted to the emergency department for the sudden onset of typical cardiac chest pain and sweating. The patient had suffered from occlusive coronary artery disease for about 12 years. Due to the history of occlusive coronary artery disease, as well as strong clinical and electrocardiographic evidence of unstable

angina, he was referred for cardiac catheterization. Cardiac catheterization, performed through the right radial artery, revealed a significant lesion in the proximal part of the left anterior descending artery with good retrograde filling via the ipsilateral collaterals and a good run-off. The obtuse marginal artery 2 had a 50%–60% lesion in the mid-part with a good runoff. No other significant lesion was observed.

The physician decided to treat the artery percutaneously. He used a guide wire with hydrophilic coating (PILOT 200) to cross the total occlusion of the left anterior descending artery and a BMW guide wire as an anchoring wire. Unfortunately, however, the PILOT 200 guide wire was detached during the procedure. He used ANDROSNARE MICRO ASM 4 set 3F and ENSNARE 6F but failed to remove the detached fragment of the guide wire from inside the left main coronary artery (Fig. 1 & 2).

Figure 1. Coronary artery angiography, showing a retained guide-wire fragment within the left main coronary artery (arrow) in the right anterior oblique caudal view

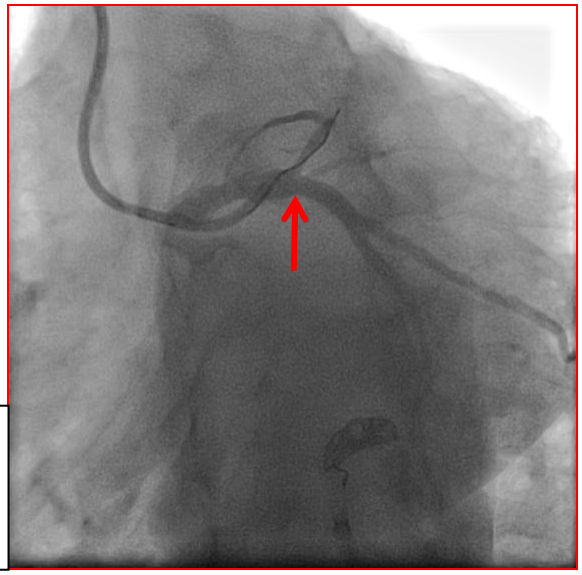

Figure 2. Coronary artery angiography, showing the retained guide-wire fragment within the left main coronary artery (arrow) in the left anterior oblique caudal view

Therefore, the patient was referred for emergent CABG. On admission in the operating room, the patient was agitated and suffered severe chest pain. He was in a stable hemodynamic state with an epinephrine infusion. Without delay, he was prepared for the induction of anesthesia. He was monitored with a pulse oximeter and standard electrocardiography. The veins on both arms were immediately cannulated with 16-G catheters after a subcutaneous lidocaine (1%) injection. The blood pressure was monitored via the left radial artery. The patient was induced with sufentanil (50 µg), etomidate (16 mg), and cisatracurium (16 mg). Anesthesia was maintained using an infusion of sufentanil (2 µg/kg/h), propofol (50–75 µg/ kg/min), and cisatracurium (2 µg/kg/ min). Subsequently, a catheter was inserted in the right subclavian vein for central vein pressure (CVP) monitoring. Under general anesthesia, median sternotomy was performed, followed by aortic and right atrial cannulations (unicaval approach). Cardiopulmonary bypass (CPB) was initiated through systemic cooling to 33 °C. After aortic cross-clamping, an infusion of antegrade and retrograde cold blood cardioplegic solutions was done. Following transverse aortotomy, the remanent of the guide wire was removed from the left main coronary artery ostium. Subsequently, the left internal mammary artery was anastomosed to the left anterior descending artery and the obtuse marginal artery 2 was grafted with the saphenous vein. The grafts were positioned and checked successfully. Following rewarming, normal sinus rhythms occurred. The patient had uneventful weaning from CPB. The operation course was uneventful, and he was finally extubated in the Open Heart Intensive Care Unit after 6 hours. He was in a complete alertness state without any hemodynamic complications. Finally, he was discharged home in a good overall condition 7 days later.

DISCUSSION

Although PCI has been a progressive technological improvement of devices and techniques, its accidental complications remain technically challenging. A fracture or retained guide wire during PCI is a well-known rare but feared complication (estimated incidence of 0.1%–0.2%). The complications of guide-wire remnants following guide-wire fracture are perforation, thrombosis, embolic events, and vessel occlusion. [2,3] Several risk factors, sometimes in combination, have been suggested for guide-wire entrapment. These suggested risk factors for guide-wire entrapment are type of procedure ("jailing" of the wire between overlapping stents or between stent and vessel wall), type of lesion (bifurcation lesions, chronic total occlusions, and lesions in very tortuous and calcified vessels), type of material used (hydrophilic wires), and excessive rotation of the guide wire. In our case, it appears that the use of a "hydrophilic" wire facilitated the occurrence of this event. [1,3] The optimal management of guide-wire entrapment depends on the site and extent of the guide-wire remnant and is controversial. Therefore, it should be managed on an individual basis. The therapeutic options of guide-wire fracture are percutaneous retrieval, surgical removal, or leaving the guide-wire remnants in-situ. The first preferable option is the removal of the retained guide-wire remnants from the coronary circulation. [3] The percutaneous retrieval methods for the extraction of a retained guide-wire fragment are the double- or triple-wire rotation technique, the deep wedging of the guiding catheter and the traction of the system, retrieval using the balloon inflation

technique, retrieval by snare loops, retrieval using microcatheters (Tornus catheters), extraction with Bioptome, and stenting over the retained wire. [3,4] When percutaneous retrieval techniques fail, some physicians believe that if the guide-wire remnant is jailed in a distal portion of a small vessel without inducing ischemia, conservative therapy may be safe. Nevertheless, others believe that leaving guide-wire remnants in situ is not advisable due to thrombotic risks, and surgical removal should be performed. Eventually, the other preferable approach is surgical extraction. [1,3] Emergent cardiac surgery is sometimes associated with significant morbidity and mortality. The surgical removal of a retained guide-wire fragment is direct coronary arteriotomy or aortotomy. The surgical extraction of proximal wire entrapment is sometimes the left main coronary arteriotomy and patch repair. [3,5] In our case, the percutaneous retrieval of the retained guide-wire fragment failed. Since the guide-wire fragment was in the left main coronary artery and the patient suffered severe chest pain, emergent cardiac surgery for the removal of the retained guide-wire fragment and CABG was performed.

In conclusion, guide-wire fracture during PCI is a rare complication with favorable early and long-term outcomes when recognized timely and managed properly. Physicians should be aware of this rare complication and prepared to manage it. Furthermore, the surgical extraction of A retained guide-wire fragment is still safe and the only option for its treatment after the failure of retrieval approaches.

Conflict of Interest

The authors have no conflict of interest.

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