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Authors: Santosh Kumar Sinha, Puneet Aggarwal, Anupam Singh, Kumar Himanshu

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Unraveling and Entrapment leading to acute loss of jailed wire and its long term follow-up: case report

Santosh Kumar Sinha, Puneet Aggarwal, Anupam Singh, Kumar Himanshu
Department of Cardiology, LPS Institute of Cardiology, G.S.V.M. Medical College, Kanpur, India

Abstract

Jailed wire technique i.e wiring of the side branch (SB) before main vessel (MV) stenting is recommended to keep it open when the SB is deemed important (> 2mm). Rarely, it becomes difficult to retrieve the jailed wire behind the stent and it may suffer fracture or entrapment, although exceedingly rare. It may be asymptomatic or can lead to abrupt closure of side branch resulting into periprocedural myocardial infarction. Here, we report a case of 56-old male who had undergone percutaneous coronary intervention (PCI) of proximal left anterior descending artery in 2012 during which jailed balance middle weight wire (BMW, Abott Vascular, USA) of diagonal branch got unravelled and entrapped. As patient was asymptomatic, he was conservatively managed. 6-years later, he suffered acute inferior wall myocardial infarction with complete heart block. Primary angioplasty of totally occluded right coronary artery was done with 3x38 mm Xience prime stent (Everolimus eluting stent; Abott vascular, USA). In coronary angiography of left system, left anterior descending and diagonal branches were completely patent. The fractured and retained jailed wire was still in diagonal branch with no displacement in comparison with previous coronary angiography. The patient was discharged in stable cardiac condition with appropriate follow up advise. To the best of our knowledge, this is the longest follow up of entrapped, and fractured BMW wire.

Key Words: Entrapment of wire; Jailed wire; Percutaneous coronary intervention; Primary angioplasty; Side branch

Introduction

Coronary guidewire is frequently inserted into the side-branch (SB) as a strategy to keep it open as its occlusion may lead to adverse events in the form peri-procedural myocardial infarction and death if it subtends significant area of myocardium [1, 2]. Stent deployment in the main vessel (MV) “jails” this guidewire which then needs to be pulled behind the stent. Both polymer jacketed and non-polymer guidewires can be used for jailing SB but there are

concerns over wire damage and shearing of the polymer jacket guidewires although they carry the advantage of maximum lubricity which may allows them to be easily withdrawn from a jailed position, and therefore they should be avoided [3, 4]. Non-polymer coated guidewires though appear safe for SB jailing but they do carry a risk of entrapment, and fracture following its unravelling, which is an extremly rare complication whose incidence varies from 0.1–0.2% [5–7]. Over-rotation of the distal tip of the guide wire, or an extreme angulation of SB producing excessive bending may lead to a high tensile load at the junction point between the very flexible distal tip and the remainder of the guide wire, are some of the contributing factors [8, 9]. The management of patients with retained wire fragments within the coronary artery tree is challenging as small segments can be left in-situ without sequelae, or else requires either percutaneous or surgical removal, should there is haemodynamic instability because these fragments are highly thrombogenic [1–3].

Case report

The patient was a 62-year old male who presented with retrosternal chest discomfort with sweating for 4-hours duration with an episode of syncope. He was diabetic, smoker, and hypertensive. Blood pressure was 100/70 mmHg in right arm while pulse rate was 36/minute. Electrocardiogram suggested acute inferior wall myocardial infarction (IWMI) with complete heart block. Temporary pacing wire was inserted and was paced. He had suffered anterior wall myocardial infarction six years earlier in 2012 for which he had been thrombolysed with reteplase. Coronary angiography on next day at that time revealed critical lesion (90%) in proximal left anterior descending artery (LAD). A large diagonal branch (D1) was coming out of the lesion (Fig. 1A, B). Right coronary artery (RCA) was normal (Fig. 5A). Percutaneous coronary intervention (PCI) of LAD was planned. LAD and D1 were wired and parked distally with 0.014" balance middle weight wire (BMW; Abott Vascular, USA). The proximal lesion of LAD was primarily predilated with a 2.5x10 and 2.75x10 mm Sprinter legend balloon (Medtronik, USA) and stented with 3x28 mm everolimus eluting stent (Xience Prime, Abott Vascular, USA) at 16 atm pressure. In the final angiogram both LAD and diagonal branches were completely open (Fig. 2A, B). However, while the guidewires were being pulled back from the coronary arteries at the end of the procedure, the distal end of the *jailed wire* could not be moved and eventually unravelled and then snapped behind the LAD stent (Fig. 2B). The final angiographic result was satisfactory with TIMI III flow in the LAD and D1 and no evidence of residual thrombus or dissection, entrapped wire was left in-situ (Fig. 3A, B). His hospital course was uneventful and discharged in stable condition. After

discharge the patient was followed regularly and he did not show any signs of reversible as his tread mill test after six week was negative. This time in February 2018, he was shifted to cath lab for primary PCI in lieu of acute IWMI. Left system showed patent stent in LAD with retained jailed guidewire in D1. The retained, broken *jailed wire* was still in place with no displacement in comparison with previous coronary angiography (Fig. 4A, B). Right coronary artery (RCA) showed total occlusion in proximal segment (Fig. 5B). It was wired with pilot 50 (Abott Vascular; USA). Proximal segment was dilated with 2x10 mm Meverik balloon (Boston Scientific, USA) and stented with 3x38 mm everolimus eluting stent (Xience Prime, Abott Vascular, USA) at 10 atm pressure achieving TIMI III flow (Fig. 6A, B). After 3 days, complete heart block reverted to normal sinus rythym. He was discharged with appropriate advise. The patient has remained in stable condition until now.

Discussion

Ever since the first cases of broken guidewires were reported in 1980 which was surgically removed, anecdotal cases have been reported [1]. Despite refinements in technology in manufacturing of guidewires, the incidence of this complication has not been reduced as more complex interventions including bifurcation lesions are being dealt. Unraveling with entrapment of jailed wire is more common with hydrophilic wires (polymer jacket wires), when it is jailed between overlapping parts of stents, calcified and tortuous vessels, and stents itself increases shear force during wire retrieval and therefore the chance of wire detachment [3]. This can be managed conservatively, by percutaneous retrieval or surgery. Conservative approach is ventured when radiopaque part of a guidewire is in a small side branch which had no clinical sequels as this segment of guidewire is less thrombogenic than its metallic peers. Percutaneous retrieval include snares, dotter basket snares, FilterWires, and retrieval forceps depending on the spatial orientation and anatomical position of the guidewire [5, 6]. Surgery is exercised if everything else fails and patient needs bypass in lieu of incomplete revascularization [6]. In our patient, as the radiopaque portion of the guidewire was retained in a not so big side branch and the remaining part of the wire showed that ruptured occurred at the junction of radio opaque part with the rest of the wire. Therefore, we decided to continue with the conservative strategy.

Exercise needs to cautioned while manipulating SB wire as wire tip may migrate into small vessel terminal branches. Sometimes, it may be wrapped around three quarter (270°) of the MB stent as a result of persistent antegrade tension on SB wire during MB stent deployment. Also, one should refrain from deploying MB stent to high pressure across a

jailed wire, and high pressure post dilation before removal of jailed wire in particular. If at all, the wire has fractured, the possibility of retained filaments needs to be considered, and if necessary, further stenting should be performed to exclude the potentially thrombogenic filaments from the circulation. Sometimes, antegrade tension on the side-branch wire may produce a looping of the wire around the contralateral side of the vessel and this loop may be trapped during stenting of main branch. Therefore, some traction should be maintained on the jailed wire during the main stent advancement, keeping the wire from looping and thus hugging the corner and diminishing the chances of side-branch wire trapping during low pressure stent implantation. The wire can then be easily removed before high pressure final strut apposition.

The jailed wire helps to keep the SB open and, in case of occlusion, it acts as the only marker of the SB position, facilitates the access to the SB by favorably changing the angle of the bifurcation; is a modality of anchoring that facilitates the intubation of the guiding catheter, providing a firmer support for the balloon to cross the origin of the SB; and rarerly it can be used as a rescue procedure, to pass a low-profile balloon and dilate the SB. In recent past, most of the described fractured wires were non–polymer-coated wires, likely due to the higher use of these wires for this indication. Because wire fracture occurs very infrequently, many patients would be necessary for a comparative study between different types of wires to demonstrate the superiority of one over the other.

Conflict of interest

None

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Figure legends

Figure 1. Coronary angiography of left system revealing critical lesion (90%) in proximal LAD with a large diagonal branch coming out of the lesion (D1)

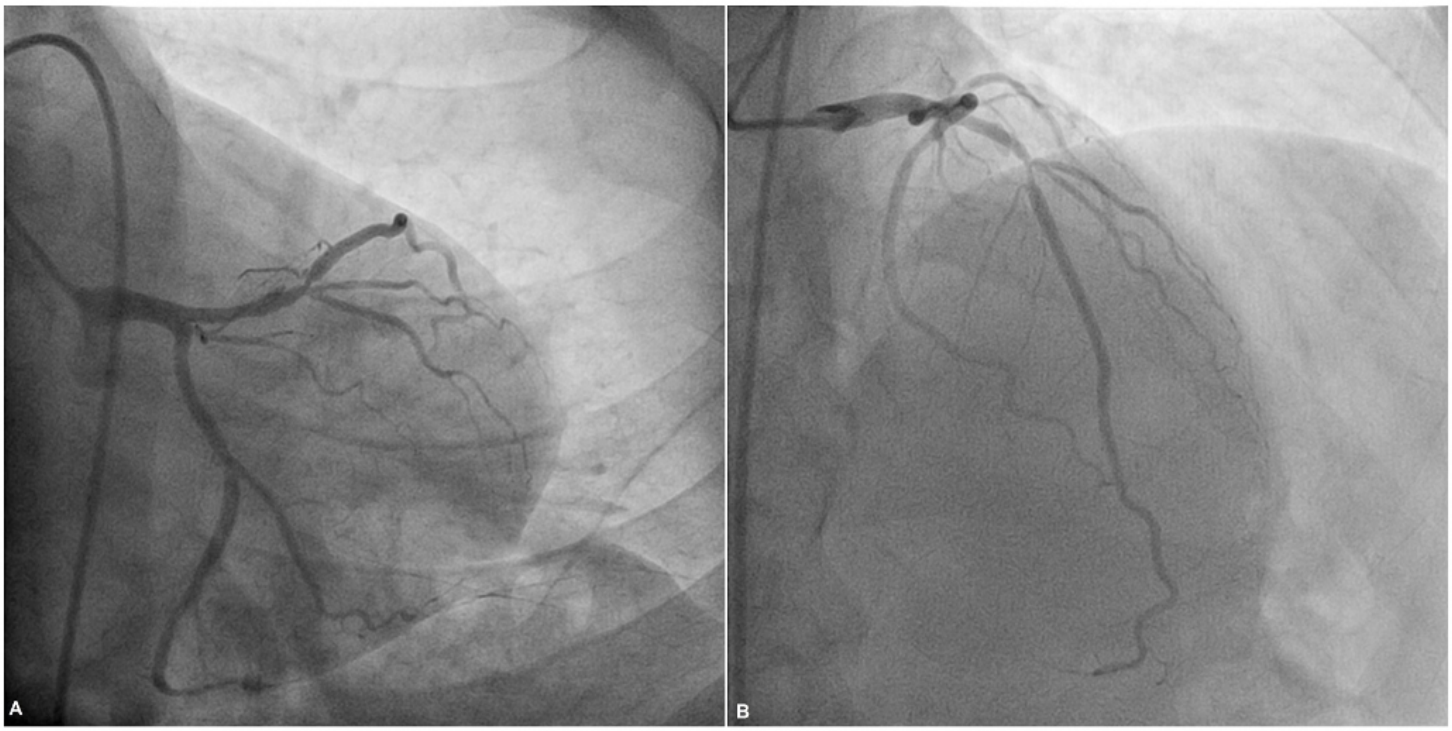
Figure 2. LAD being stented with 3x28 mm Xience Prime stent at 16 atm pressure (A); The distal end of the *jailed wire* could not be moved and eventually unravelled and then snapped behind the LAD stent while the jailed wire was being pulled back from D1(white arrow; B)

Figure 3. The final angiographic result was satisfactory with TIMI III flow in the LAD and D1 and no evidence of residual thrombus or dissection, entrapped wire (white arrow) was left in-situ (A; B)

Figure 4. After 6-years in 2018, left system showed patent stent in LAD with retained jailed guidewire in D1with no displacement in comparison with previous coronary angiography

Figure 5. Right coronary artery (RCA)- appearing normal at first presentation in 2012 (A); showing total occlusion in proximal segment during index event in 2018 (B). Temporary pacing wire also seen along with retained jailed wire (white arrow)

Figure 6. RCA being stented with 3x38 mm Xience Prime stent at 10 atm pressure achieving TIMI III flow (A; B)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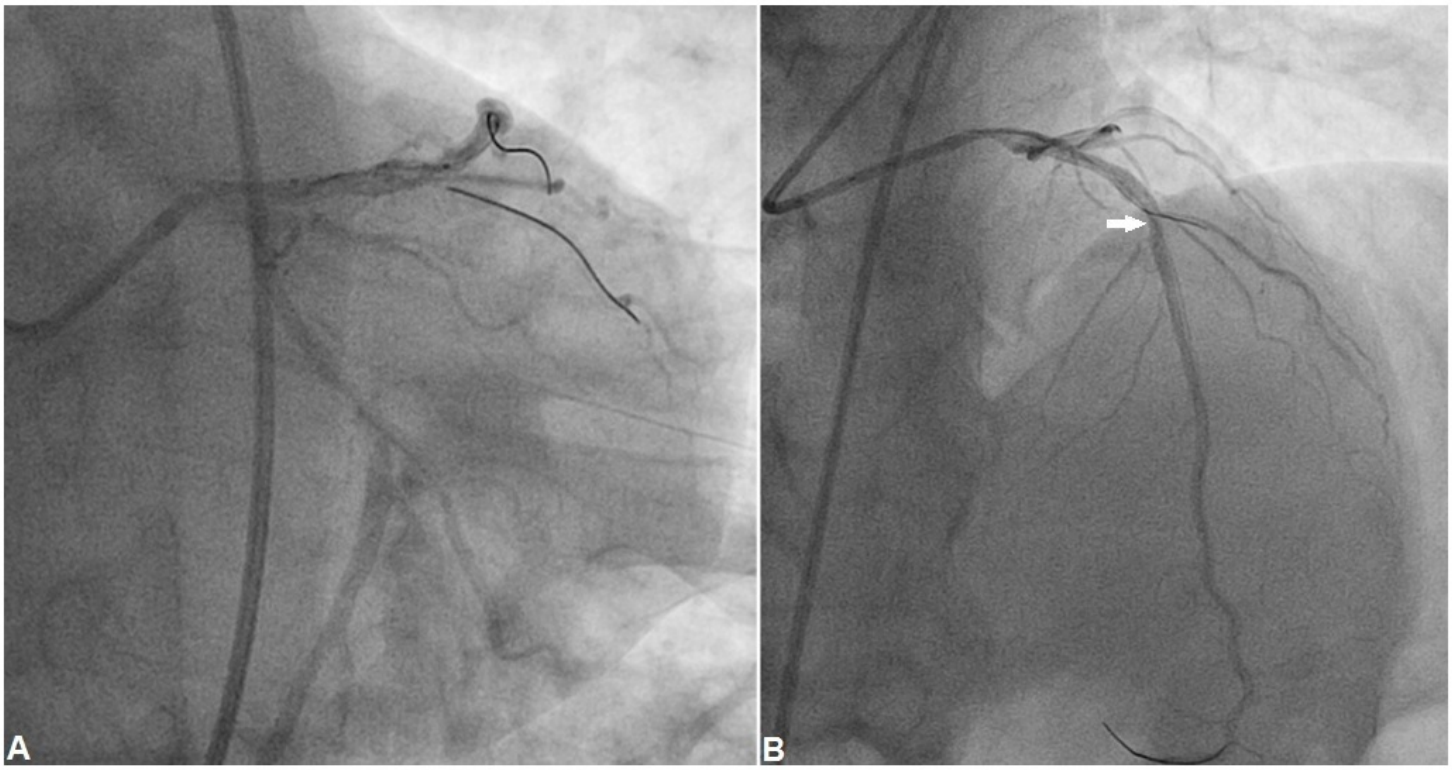
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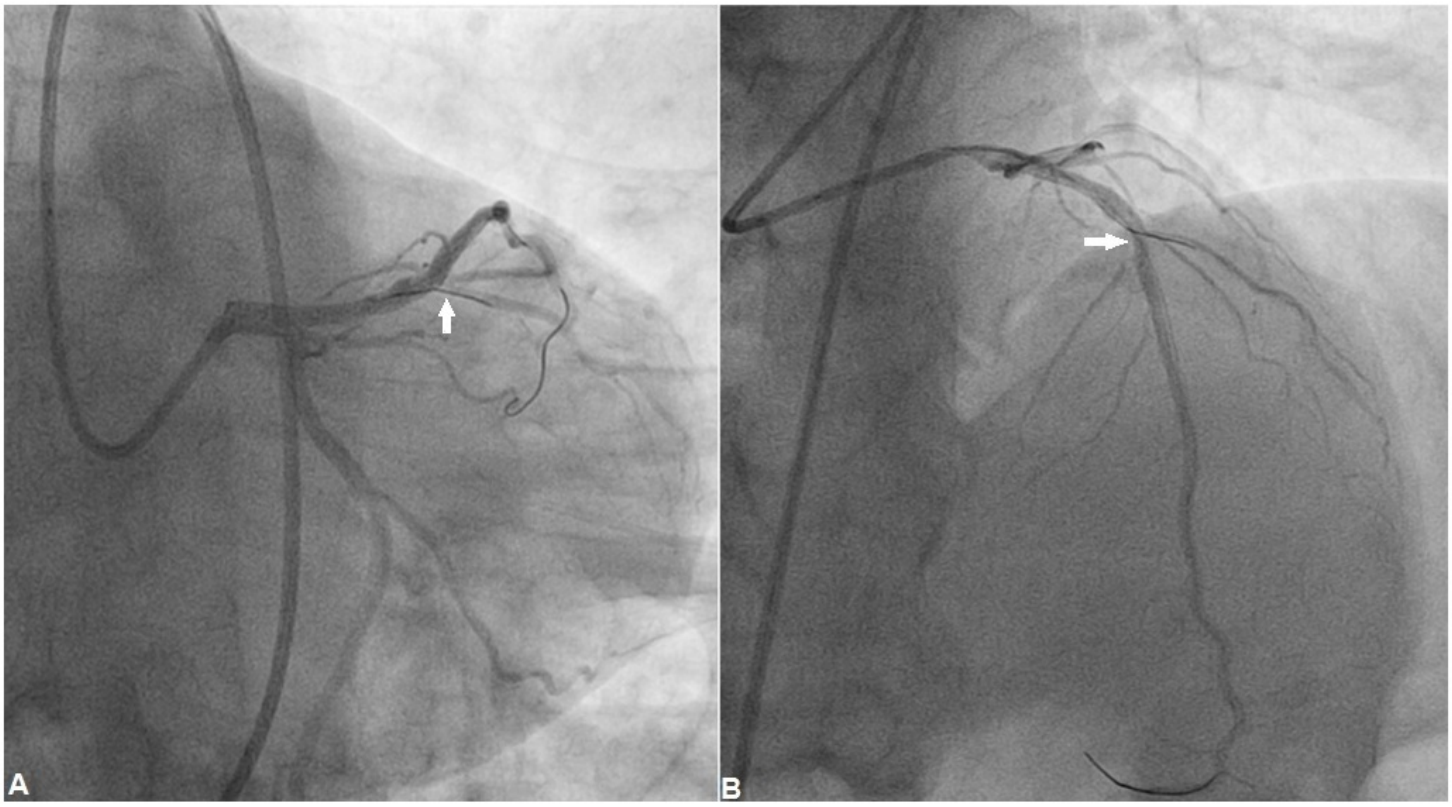
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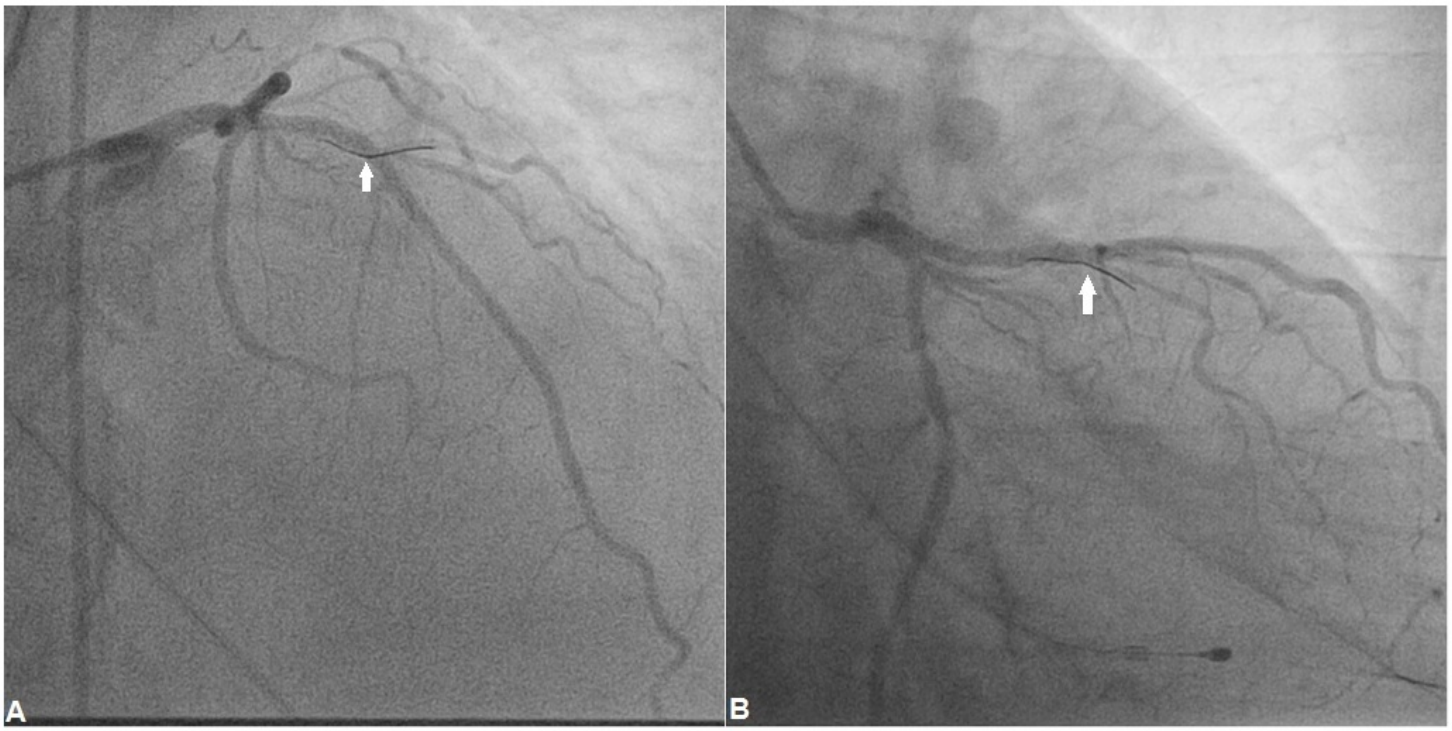
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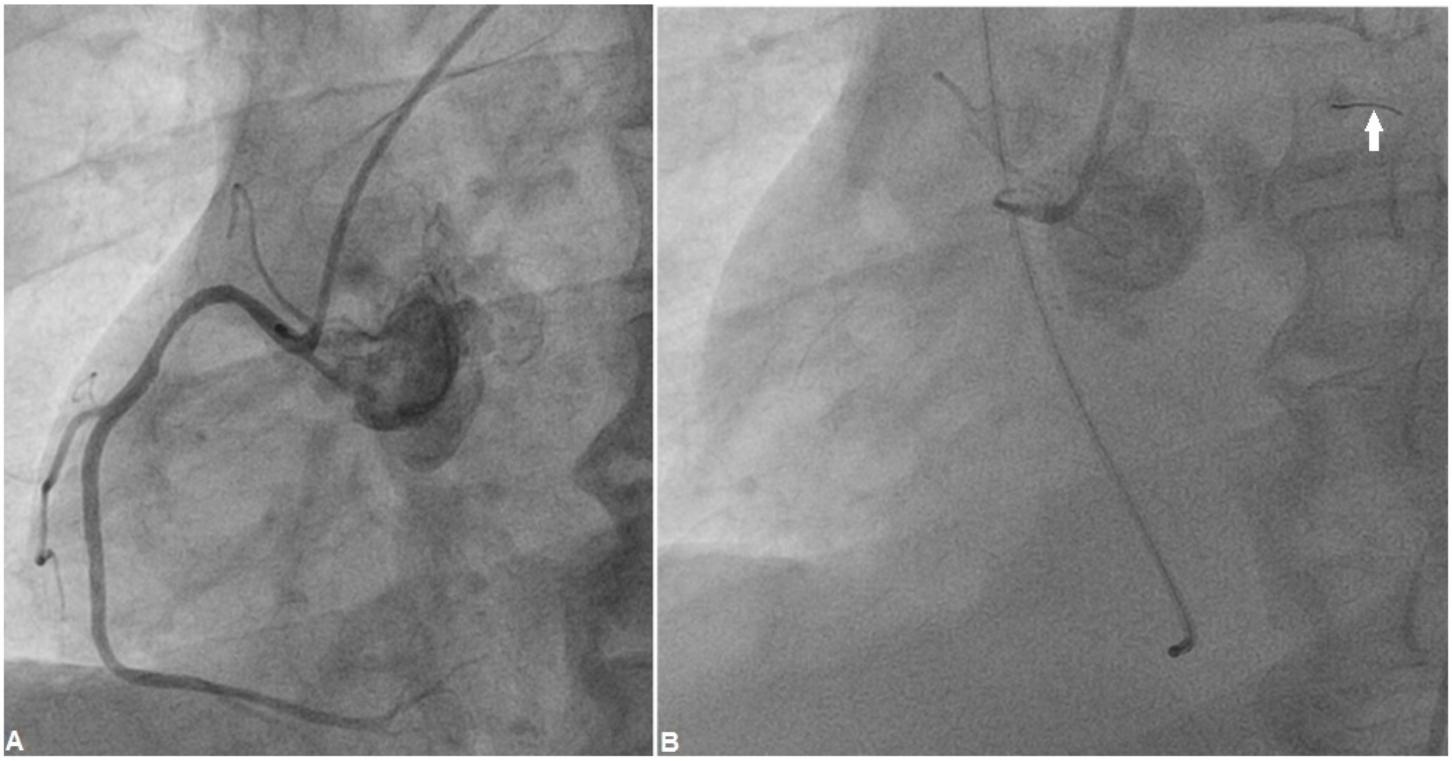
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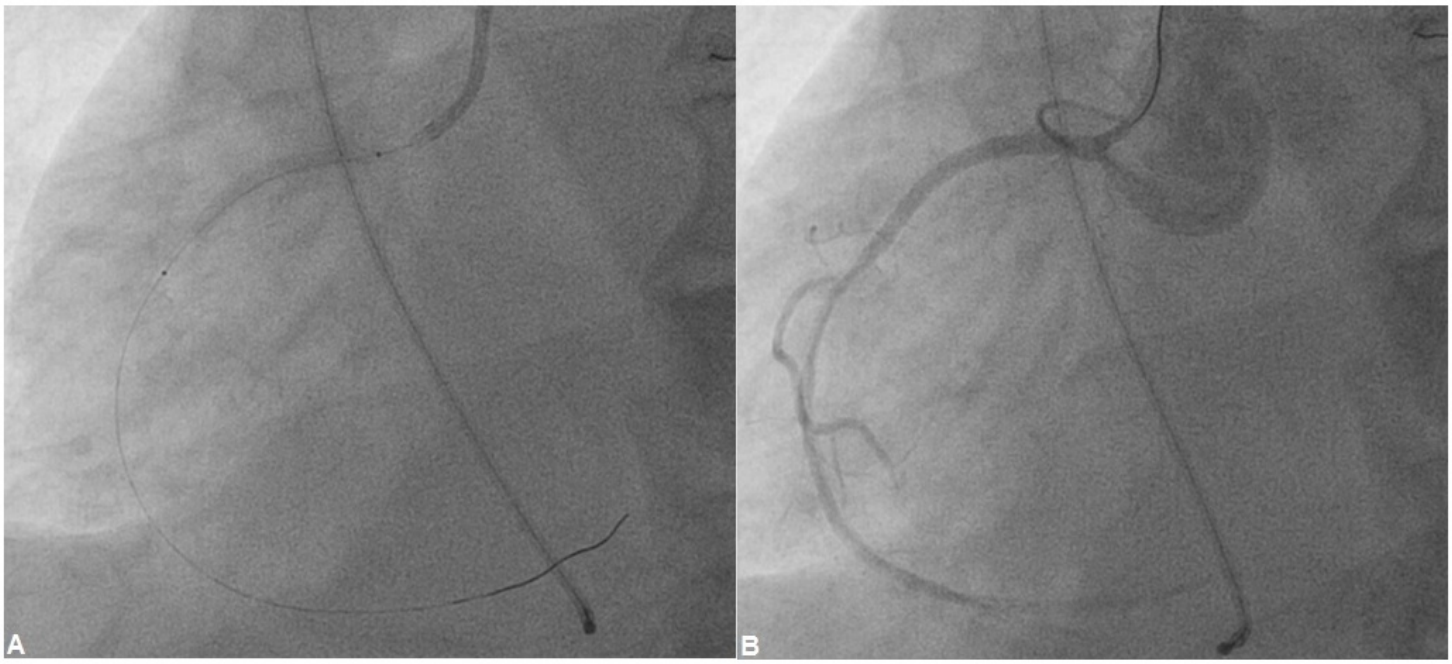
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