

PERCUTANEOUS RETRIEVAL OF BROKEN JAILED WIRE DURING CORONARY INTERVENTION: WHAT WE LEARN

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ABSTRACT:

Side branch wiring is frequently used to protect side branch flow after main vessel stenting as recommended by European Bifurcation Club. Rarely, it becomes difficult to retrieve the jailed wire behind the stent and therefore it may even be detached and required to be removed. This case report presents such a case and also highlights procedural pitfalls and technique of removal of broken jailed wire.

KEYWORDS:

Jailed wire, retrieval, percutaneous coronary intervention

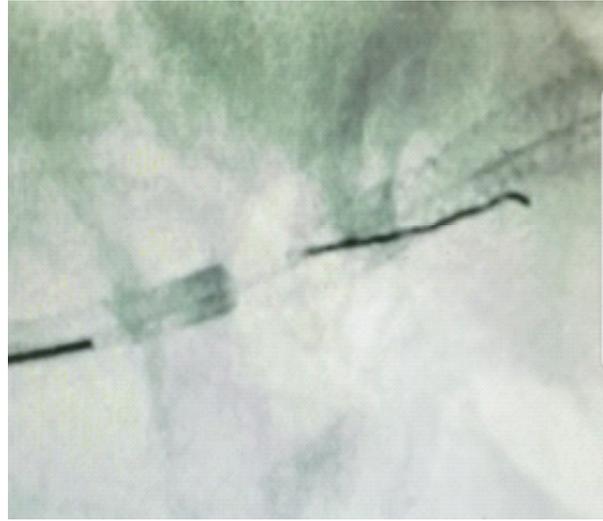
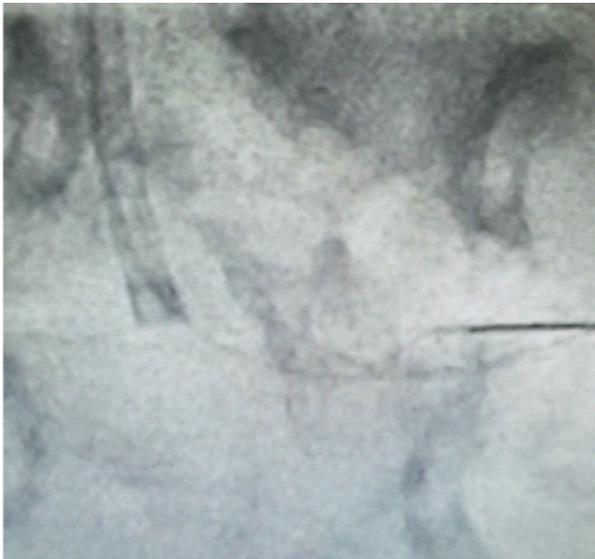
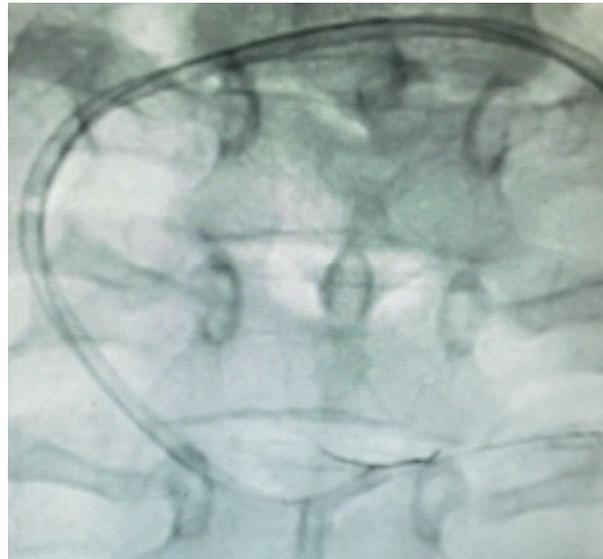
INTRODUCTION:

In bifurcation PCI when coronary wire is placed inside branch and jailed during stenting, it may stuck and detach behind the stent during its removal after stenting. Its removal can be made percutaneously and in some cases by surgery.¹⁻³

CASE REPORT:

We describe a case of 42 years old female who presented with exertional chest pain of three months duration. Her chest pain was progressive and was in CCS angina class III on treatment. Her past medical history was significant for recent onset diabetes since 1 year and was on oral hypoglycemic agents for that. She was booked for routine elective coronary angiography and ad hoc PCI if needed. Her pre cath routine laboratory reports were within normal limits. Her angiogram was done through right radial approach and revealed severe proximal stenosis of left anterior descending coronary artery (LAD) adjacent to first diagonal branch (D₁) which itself shows severe ostial stenosis. Other vessels that is left circumflex and right coronary arteries showed no significant disease. A percutaneous coronary intervention of LAD and D₁ bifurcation was planned with a provisional single stent approach. Procedure was started as per standard steps. Left system was engaged with extra backup (XB 3, Cordis corporation) guiding catheter. Two balanced middle weight (BMW, Abbot Vascular) were used and were placed one in LAD and the other one in diagonal. Lesion in LAD was dilated with a compliant 2 x 10 mm balloon and 3 x 20 mm Promus Element Plus (Boston Scientific) drug eluting stent was placed in proximal LAD with proximal end of stent covering LAD ostium and

jailed the BMW wire in D₁. Stent was deployed at 14 atmospheric (atm) pressure while the nominal deploying pressure of the stent was 11 atm. Stent expanded adequately. After this step wire exchange was attempted by the operator. Jailed BMW wire in D₁ was pulled so that it could be placed in LAD artery. Jailed wire stucked and operator pulled it so that it could be pulled in the guider. Inadvertently this wire spring coil open up and broke inside the guider somewhere in the middle part of it. Operator sought expert opinion to rescue and retrieve the broken wire. The second operator took the lead and planned for removal of wire by trapping balloon technique. Firstly he took another access from the left femoral access and another Judkins left 4 (JL 4) guider was also engaged in left system. This was done to deal with dissection of left main stem that could happen. Secondly he took guide extension catheter (guideline) through XB guider and placed it near the proximal edge of stent so that 2.5 x 12 mm NC balloon could be inflated inside guide-liner as close to stent as possible for trapping the broken wire. This was done as a safety step because if wire broke it must be inside the coronary, not outside in the aorta. That could ultimately result in call for emergency cardiac surgical intervention. First attempt of trapped removal of guide wire, guide-liner and NC balloon was unsuccessful. Second attempt was done by placing balloon half outside guide-liner tip but was again un-successful. Careful magnified view of stent showed that it had become distorted and had pulled into left main stem by the second attempt of removal. Actually NC balloon has also trapped stent and pulled it because it was half outside guide-liner tip. Fortunately no

Figure 1: Broken jailed wire**Figure 2: Guide-liner till the tip of broken wire****Figure 3: An attempt to pull back wire by trapping balloon****Figure 4: Broken wire coming out**

dissection occurred. The situation had become more worsen by this attempt. Stent was distorted but slender open up broken wire was still inside XB guider. The distorted stent fortunately resulted in slight backward movement of broken jailed wire. Third attempt of removal by trapping balloon was attempted and was successful this time and entire system including XB guider, trapped wire by balloon and BMW wire were removed as a unit. Due to stent distortion and its pull back into LMS, another LMS-LAD cross over stent was placed from ostium of left main and covering D₁ ostium. Post

dilating the entire stent length was the final step to conclude the procedure. Patient was discharged on third post operative day with no complication.

DISCUSSION:

Broken retained coronary guide wire inside coronary arteries is a rare complication of PCI in current era. The first case of broken guide wire was reported more than three decades earlier when the main treatment option was by cardiac surgery.¹ Due to advancement in guide wire technology, the incidence of this complication has reduced in skilled hands. With improvements in skill, treatment

of more complex cases and side branch protection by wire placement as recommended by EBC, the risk of wire entrapment remains the same. Broken segments of guidewires may predispose coronary thrombosis and systemic embolisation.² In some cases the risk of guidewire rupture during its retrieval from behind the stent is more than in other cases. First of all, guidewire detachment especially its radiopaque portion is more common with so-called hydrophilic coating wires, so these types of guidewires should not be used as a jailed wire in treatment of bifurcation lesions. Secondly, this condition is more common when the guidewire is jailed between overlapping parts of stents. Stenting of calcified and tortuous parts of vessels also increases shear force during wire retrieval and therefore the chance of wire detachment.³ Treatment options for this complication depend on the site of entrapment and clinical sequels of the foreign body and are divided to conservative management, interventional techniques, and surgery.

Conservative management is appropriate when risks of intervention outweigh its benefits in a particular patient. It is logical to leave a radiopaque part of a guidewire in a small side branch which had no clinical sequels. This segment of guidewire is less thrombogenic than its metallic part. Several reports have confirmed short- and long-term safety and efficacy of this method in this group of patients making sure that a small part of a guidewire has been retained in a small side branch.

The total length of retained guidewire is variable and not completely detected by fluoroscopy¹ and its distal radiopaque segment may be the peak of an iceberg with its metallic part remaining in the main branch and even in aortic bulb or aorta. In this case, the wire must be retrieved by either interventional or surgical routes since remaining of thrombogenic proximal part of the guidewire may

provoke thrombotic sequels.

Many interventional techniques include retrieval of segments of guidewire by manufactured snares, homemade snares, paired guide wires knotted together, trapping balloon, FilterWires, and retrieval forceps depending on case scenario.¹⁻¹² Both proximal part and radiopaque distal part have been reported to be successfully captured by snares, depending on visibility and accessibility of each part. Choice of the retrieval device and its size depends on position of the guide wire and its location. If percutaneous treatment options failed surgery is the treatment option.¹³

In our patient, jailed guide wire stuck probably because of higher stent deploying pressure. When stuck, instead of using small balloon to pass behind struts to create some space for the removal of stuck wire, operator just pulled it. It results in opening of coils of spring tip of guide wire and ultimately it broke but fortunately some part of it remained inside guider. Here snare cannot be used because spring coil opened up and only a slender wire was connecting jailed part from piece inside guider. We tried trapping balloon technique. But one attempt of trapping done half balloon outside guide liner tip resulted in stent trapping and distortion. Fortunately no dissection occurred. So trapping should had been done inside guider or guide liner. Slender open up part of spring coil had enough strength to trap third time and ultimately retrieved jailed wire. A step not done but was an afterthought that, we could pull guideliner with trapped balloon not the entire system, that would eliminate the need of another access and another guide.

CONCLUSION:

We learnt procedural pitfalls, team approach, trying different methods but within safe limits and the fact that trapping was a successful technique in many situations. Every misadventure teaches and guides for better planning of procedure.

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