

How to Manage Jailed Wire Entrapment During Percutaneous Coronary Intervention “Case Report”

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ABSTRACT

Percutaneous coronary angioplasty is a minimally invasive procedure aimed at unclogging a coronary artery with a low complication rate (with a serious complication rate of 3 to 7% and a mortality rate of 1.2%). Device entrapment during PCI is a rare but life-threatening complication that occurs in <1% of PCIs and guidewires entrapment comes on the first line. We present the case of 58-years-old man, smoker, with history of PCI with 3.0x26 BMS on the mid LAD at its bifurcation with the diagonal for angina 20 years before, that presented to our department with evidence of ischemia on myocardial tomoscintigraphy performed 2 months after an anterior MI and in whom the radial coronary angiography reveals a tight calcified mid LAD stenosis just before the BMS and an instant tight restenosis taking the ostium of the diagonal. During his PCI and after wiring both LAD and diagonal with two floppy 0.014 guidewires, dilatation with an NC balloon 2.5x 20 and stenting with 3.0x32 DES, the diagonal guidewire remains trapped between the two stents despite several attempts to pull it back with the appearance of pain and ST-modifications due to diagonal total occlusion with TIMI 0 flow.

We put a second 0.014 guidewire and tried to recross unsuccessfully to the diagonal branch, then we decided to introduce a 1.20x15 balloon over the jailed guidewire until the bifurcation and inflate it gently to reopen the diagonal branch and to unjail the guidewire. We were then able to retrieve the jailed guidewire and to recross to the diagonal branch with the other guidewire and we finished successfully the procedure by Kissing balloon and POT. The patient was discharged 24 hours later with a stable LVEF. The guidewire entrapment has occurred in three points: at the pinched ostium of the diagonal branch, between the two stents and between the new stent and wall calcifications. The solutions in case of jailed guidewire entrapment are to rotate and pullback the guidewire, to use and catheter extension, to use microcatheter under the new stent or to inflate a small balloon in the aim to create a small space under the new stent or to transfer the patient to Surgery. Material entrapment remains a rare but life-threatening complication, its eviction requires the choice of material and gentle manipulations (avoid jailing wire between two stents or under a long stent in case of diffuse calcifications) and its management uses different techniques, the choice of which depends on the clinical and anatomical situation.

Keywords: Case Report; Instant Restenosis; PCI Complication; Device Entrapment; Jailed Wire; Wire Entrapment

Abbreviations: BMS: Barr Metal Stent; DES: Drug Eluting Stent; ECG: Electrocardiogram; LAD: Left Anterior Descending; LVEF: Left Ventricle Ejection Fraction; NC: Non-Compliant; PCI: Percutaneous Coronary Intervention; RCA: Right Coronary Artery

Introduction

Percutaneous coronary angioplasty is a minimally invasive procedure aimed at unclogging a coronary artery with most often the placement of an endoprosthesis, this technique was born in 1977 in Zurich between Dr. Andreas Grüntzig hands [1]. Thanks to the evolution of the technique, its diffusion and the improvement of the material, this technique has succeeded gradually in replacing the coronary artery bypass grafting, which is the gold standard technique in coronary pathology, at the cost of a low complication rate (with a total complication rate of 17 to 23% [2], a serious complication rate of 3 to 7% [3] and a mortality rate of 1.2% [4]). Device entrapment during PCI is a rare but life-threatening complication that occurs in less than 1% of PCIs and it concerns 1.5% of CTO PCI and consists of coronary guide-

wires in 0.5%, balloons in 0.2%, microcatheters in 0.2%, rotational atherectomy burrs in 0.4% and guiding catheter extension in 0.04% [5]. Complete device retrieval is achieved in 63.9% [5], the recommended sequence of steps to manage this entrapment are: pulling, trapping, snaring, plaque modification, telescoping, and surgery [6].

Patient Information

De-identified patient specific information: We present the case of 58-years-old man, smoker, We with history of PCI with 3.0x26 BMS on the mid LAD at its bifurcation with the diagonal for angina 20 years before. He presented to our department with evidence of ischemia on myocardial tomoscintigraphy performed 2 months after an anterior MI (ischemia estimated at 20-25% in the anterior wall) and left ventricle ejection fraction (LVEF) at 47% (Figure 1).

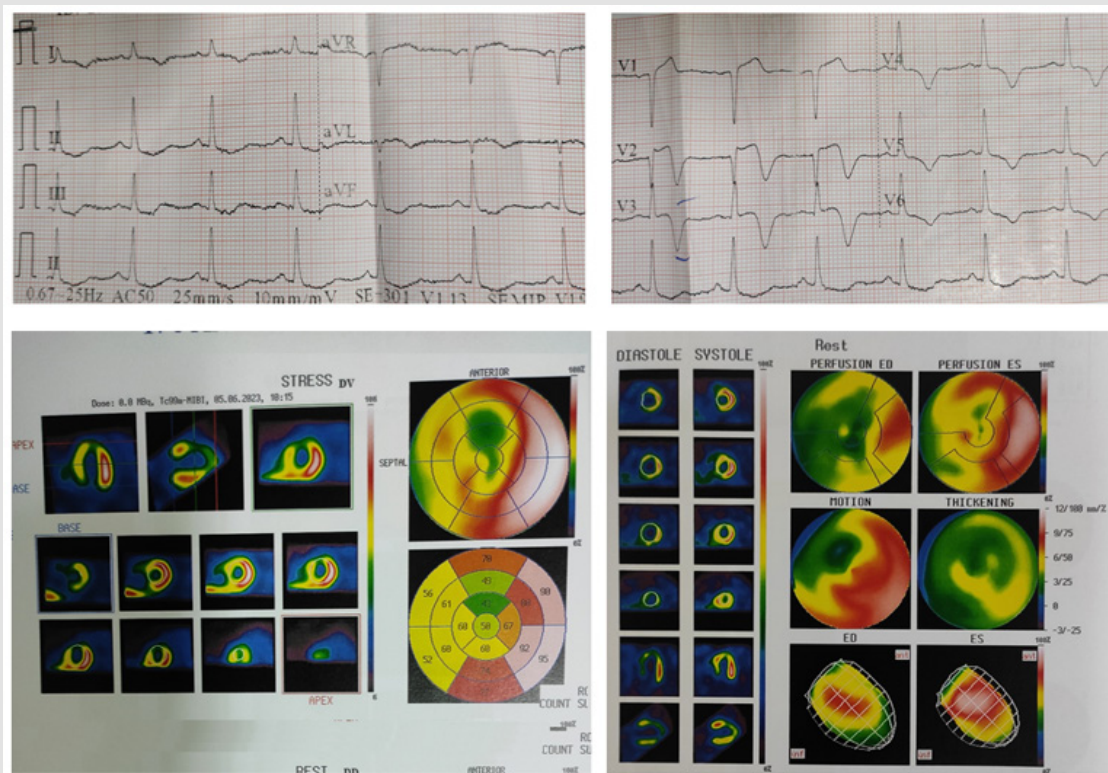


Figure 1: ECG and myocardial tomoscintigraphy.

Clinical Findings

The angiography was performed by 6F right radial access, with Judkins left and right 5F diagnosis catheter. It revealed a tight calcified

mid LAD stenosis just before the 3.0x26 BMS and an instant tight restenosis taking the ostium of the diagonal branch (Figure 2).

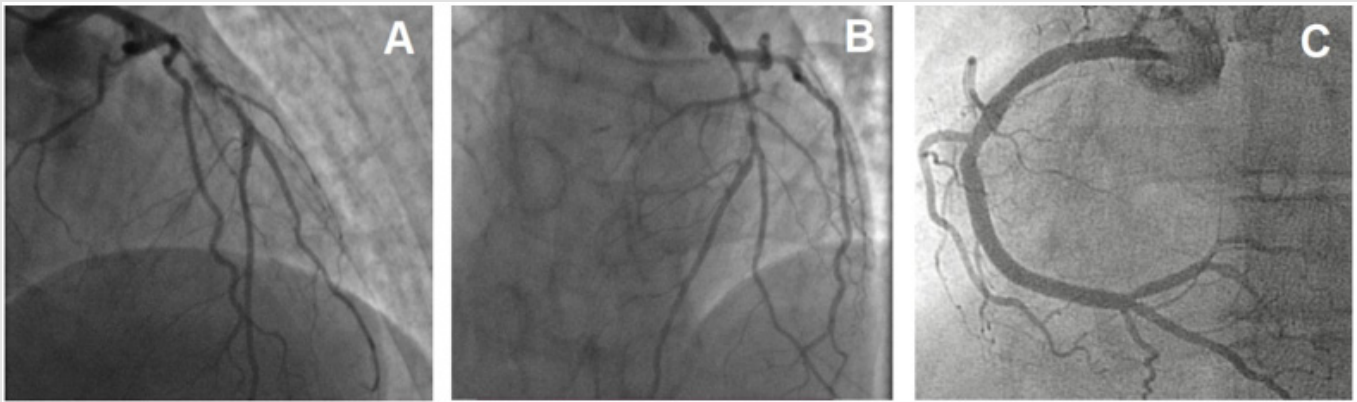


Figure 2: Angiographic finding (A: Cranial RAO view, B: Cranial LAO view, C: RCA in LAO view).

Diagnostic Assessment

We decided to perform PCI by radial access under dual antiplatelet therapy. We started the procedure under 5000 UI of Heparin with an Extra Backup (EBU) 3.5 6 F guiding-catheter, we crossed the lesion with a first 0.014 floppy guidewire and we put a second 0.014 Floppy

wire in the diagonal branch, however after dilatation with an NC balloon 2.75x 20 and stenting with 30.x32 DES inflated at 14 ATM and just before performing the POT the jailed guidewire remains trapped between the two stents despite several attempts to pull it back with the appearance of pain and ST-modifications due to diagonal total occlusion with TIMI 0 flow (Figure 3).

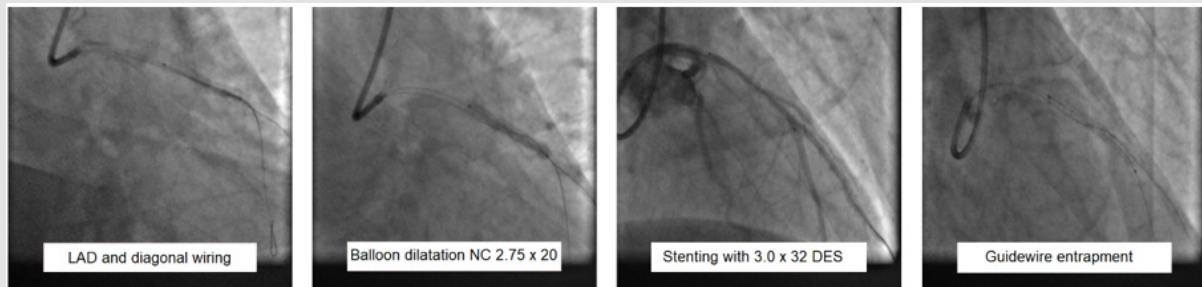


Figure 3: Entrapment of the jailed guidewire and diagonal branch occlusion.

Therapeutic Intervention

After having unsuccessfully tried to re-access to the diagonal branch and to pullback the jailed guidewire, we decided to introduce a small coronary balloon 1.20x15 over the jailed guidewire between the two stents till the bifurcation and inflate it gently at 8 ATM in order to create a small space between the stents to unjail the guidewire and reopen the diagonal branch. We were then able to retrieve the

jailed guidewire and to recross to the diagonal branch with the other guidewire and we finished successfully the procedure by Kissing balloon (2.5x12 and 3.0x12 NC Balloons) and POT (3.5x15 NC balloon) (Figure 4).

Follow-Up and Outcomes

The patient remained stable after the procedure with LVEF at 50% and was discharged 24 hours later.

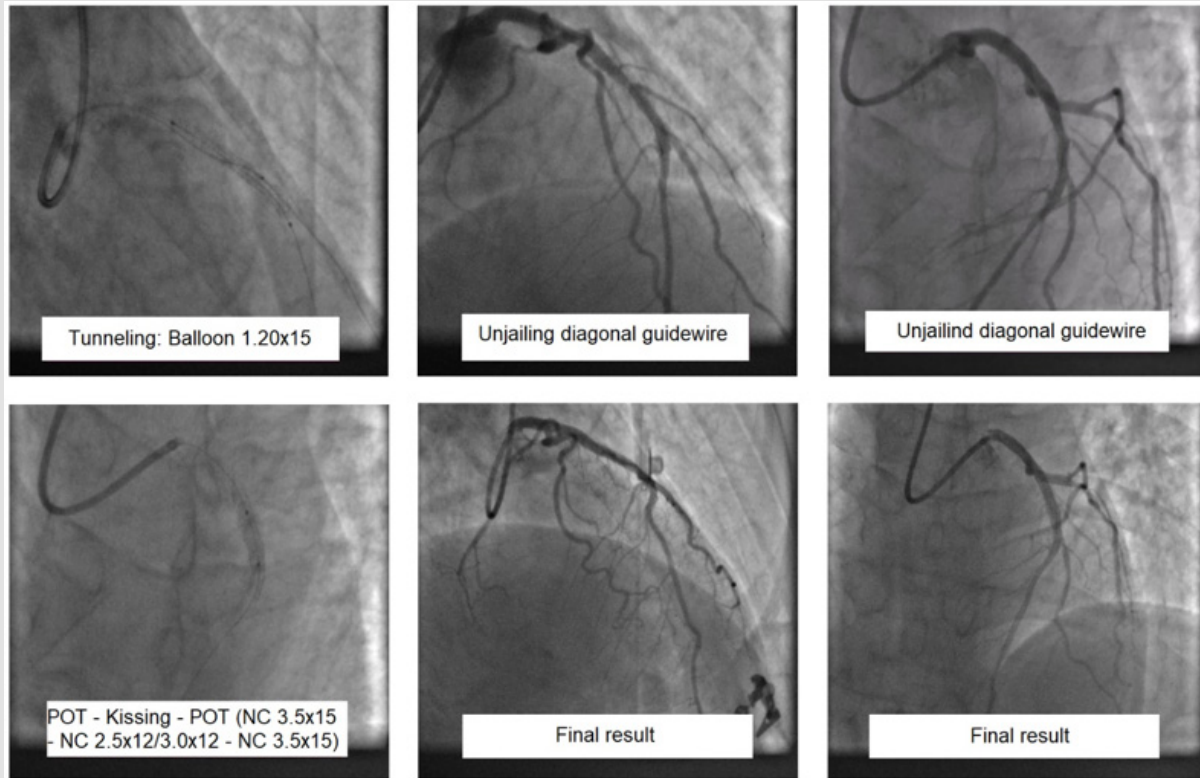


Figure 4: Management (Tunneling) and final result.

Discussion

Our technique for this patient was to create, thanks to low inflation of the 1.20x15 balloon, a small space (Tunneling) under the new stent to unjail the trapped guidewire and reopen the diagonal branch.

The possible guidewire entrapment sites are [7] (Figure 5):

- The pinching of the calcified ostium of the diagonal branch.
- Between the two stents struts.
- Between the new stent and the wall calcifications.

The possible solutions in the case of jailed guidewire entrapment are:

- To rotate and pullback the guidewire with risk of its total rupture.

- To use catheter extension and snare and pullback strongly the guidewire with risk of its total rupture [8].
- In these two techniques the rupture will occur at the distal part of the guidewire which is not a drama in itself because the distal part remains trapped under the stent and will be endothelialized [9].
- To use microcatheter under the new stent with the risk of jailing the microcatheter (passive material under the stent) [8].
- To use a small balloon in order to create a small space under the stent (tunneling) as we did in this case [10] (Figure 6).
- To transfer the patient to Surgery [11].

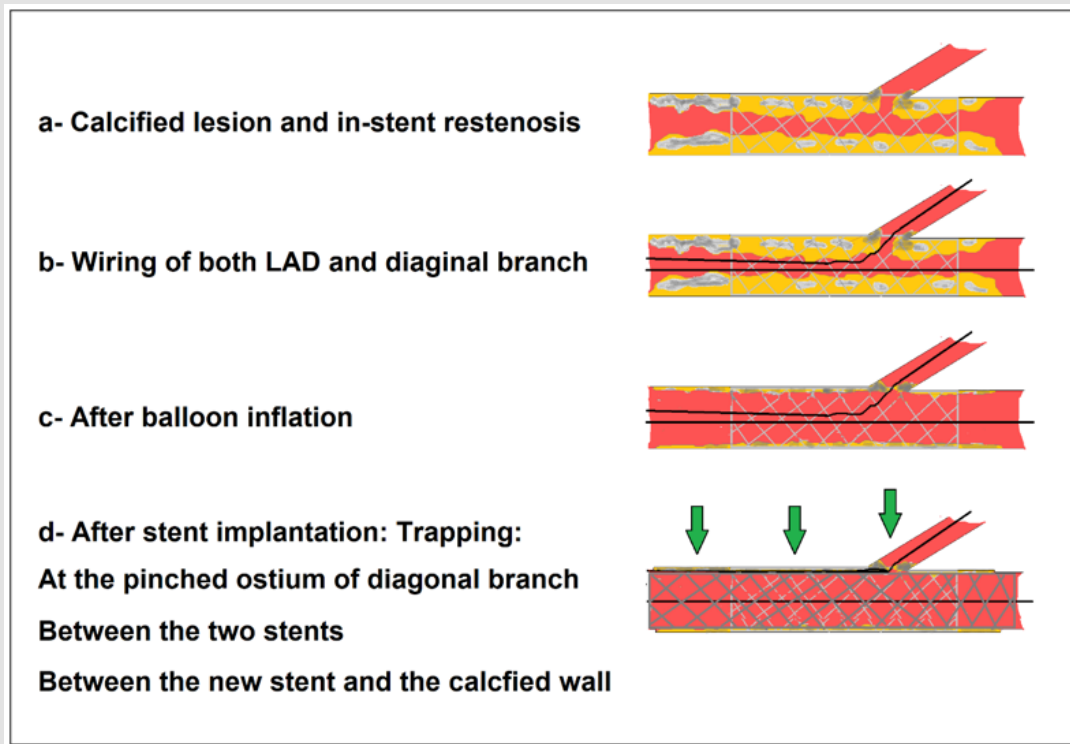


Figure 5: Possible mechanisms of guidewire entrapment.

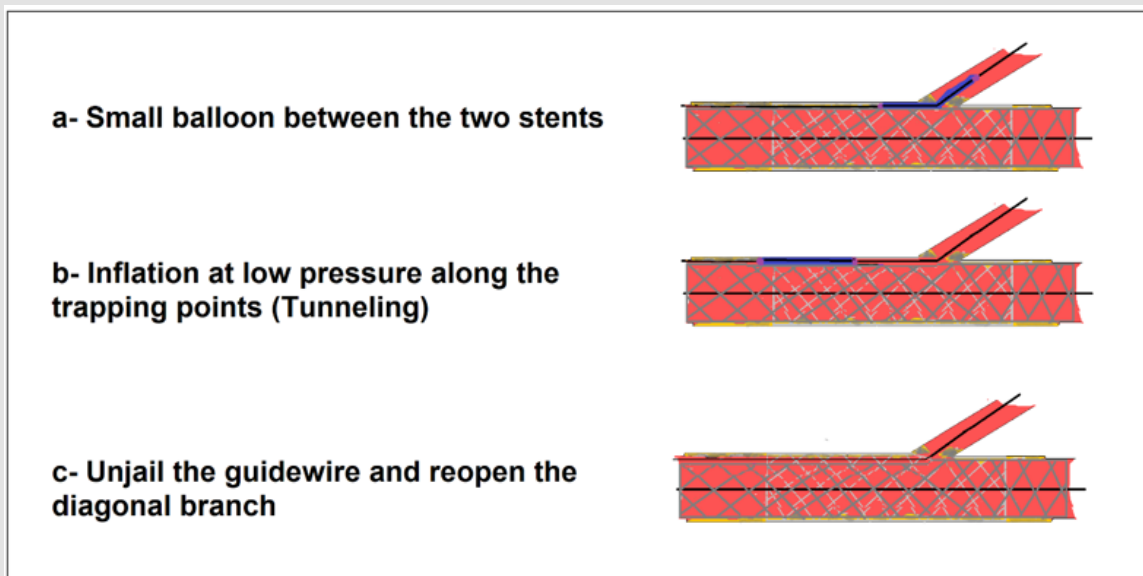


Figure 6: Tunneling technique to unjail the trapped guidewire.

Conclusion

Material entrapment remains a rare but life-threatening complication, its eviction requires the choice of material size and gen-

tle manipulations (avoid jailing wire between two stents or under a long stent in case of diffuse calcifications) and its management uses different techniques, the choice of which depends on the clinical and anatomical situation.

The Primary Take-Away Lesson of this Case and Impact on Daily Practice

This case demonstrates that in-depth knowledge of the techniques and tools required can help maximize the likelihood of successful equipment retrieval and minimize complications. It also demonstrates the interest of the technique that we have called “Tunneling” to unjail the trapped guidewire.

Learning objectives

- To know different techniques to manage jailed guidewire entrapment.
- To describe our new technique (Tunneling) helping to retrieve a trapped material.

Patient Perspective

The patient says he is asymptomatic and satisfied with the impact of the angioplasty on his physical statement despite the painful episode during the procedure.

Informed Consent

The patient consented to sharing and publishing his case and procedure images subject to anonymity.

Ethics Approval and Consent to Participate

The patient consented to undergo the procedure.

Consent for Publication

The patient consented to the sharing and publication of data, images and results.

Availability of Data and Material

The images presented during this work are available from the corresponding author on reasonable request.

Competing Interests

The authors declare that they have no competing interests.

Funding

Not applicable.

Authors Contributions

- NZ was responsible for realization of the percutaneous procedure and participated in the writing of the manuscript.
- AB participated in the percutaneous procedure and the writing of the manuscript.
- NI participated in the realization of echocardiography and the follow-up of the patient during hospitalization.

- MH participated in the realization of echocardiography and in the writing of the manuscript.
- KB participated in the follow-up of the patient after hospitalization.
- TC participated in the realization of echocardiography and in the writing of the manuscript.
- SB participated in the writing of the manuscript.
- HR participated in the writing of the manuscript.

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