A life trapped by a guidewire- A rare sequence of complications after an eletive coronary angioplasty

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Abstract

Though rare, guidewire loss or fracture after percutaneous coronary intervention (PCI) can occur. Coronary perforations (CP) are rare complications of PCI and can be classified as type I (extraluminal crater), II (myocardial or pericardial blushing) and III (contrast streaming or cavity spilling).

Introduction

Bifurcation lesions are complex lesions that remain among the most challenging fields of treatment with percutaneous coronary intervention (PCI). These lesions are associated with increased rates of procedural complications, restenosis, and adverse events than lesions in the body of the vessel (1). Following complex coronary interventions, there is a relatively higher rate of complications, such as coronary dissection, coronary perforation, acute coronary syndrome, and arrhythmias. (2)

Coronary perforations (CP) are rare complications of percutaneous coronary intervention and can be classified as type I (extraluminal crater), II (myocardial or pericardial blushing), and III (contrast streaming or cavity spilling). Types I and II coronary perforations are caused by stiff or hydrophilic guidewires. Type I has a benign prognosis, whereas type II coronary perforations have the potential to progress to tamponade. (2). The incidence of CP during PCI varies between 0,12 and 0,82% (3,4,5) In a large database from British Cardiovascular Intervention Society Database, coronary perforations were more common in women or older, with a greater burden of comorbidity including hypertension, hypercholesterolemia, previous myocardial infarction, peripheral vascular disease, and left ventricular dysfunction.

Coronary guidewire fracture is another rare complication of percutaneous coronary intervention (PCI). Guidewire fracture could be due to: entrapment into or behind stent struts, wire cutting by rotational atherectomy devices, stuck wire into a distal tortuous vessel and structural failure of the wire. Management options include retrieval by snare or wire intertwining, deployment of the stent across broken fragments, or leave the wire alone if it is in an insignificant distal vessel or branch. (6)

Drug-eluting stent (DES) implantation using the 'provisional' approach is the gold standard for percutaneous treatment of patients with unselected bifurcated lesions, although some experts consider this approach unsuitable for the treatment of more complex bifurcation anatomies (7).

Case Report

A 65-year man with type II diabetes and hypertension was referred for elective coronary angiography owing a history of exertional angina and a CT Angiography suggestive of obstructive coronary disease (Calcium score >400 Agatston). Echocardiography displayed mild septum hypertrophy and mild degenerative valve changes without hemodynamic significance. It did not show any segmental kinetic change and an ejection fraction of

65% was calculated by Simpson's method. The systolic function of the right ventricle was preserved (TAPSE = 22) and no pericardial effusion was present.

Coronary angiography revealed non-significant obstructive disease in the left coronary and two critical lesions in the right coronary artery (RCA): critical stenosis of proximal/medium right coronary and a critical lesion at a bifurcation between distal RCA and posterolateral artery (PLA) (figure 1).

The patient was submitted to a percutaneous coronary intervention of bifurcation lesion through balloon inflation (3,0x15 mm) followed by stent implantation in distal RCA (ONYX 3,5mm x 34 mm) (figure 1). PLA was protected by a guidewire (BMW) and it was made proximal optimization technique (POT) to warrant better stent to vessel apposition. When the operator tried to pull out the PLA guidewire it was trapped between the vessel wall and respective coronary stent. It fractured and its proximal extremity was located at the radial artery. A Microsnare technique was carried out trying to remove it, without success.

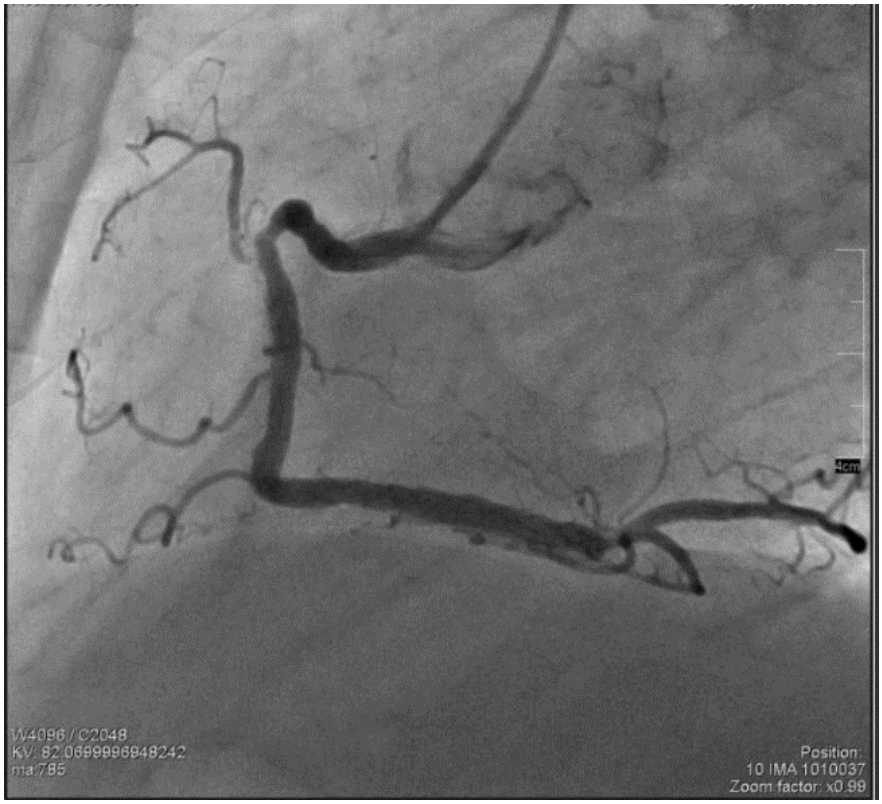


Figure 1- angiogram showing critical stenosis of proximal/medium RCA and a critical lesion at bifurcation between distal RCA and PLA (left profile projection).

Operator called an Heart Team discussion to decide the better strategy to patient, either conservative or cardiothoracic surgery in order to remove intracoronary guidewire. Considering anatomical and technical issues that made unlikely the success of the surgical approach and after risk-to-benefit considerations, experts decided to choose the conservative approach. On the other hand, It was decided to implant a coronary stent in PLA and were implanted two other coronary stents: at the proximal extremity of the first stented lesion to correct a proximal dissection (ONYX 3,5x34m) and at proximal RCA

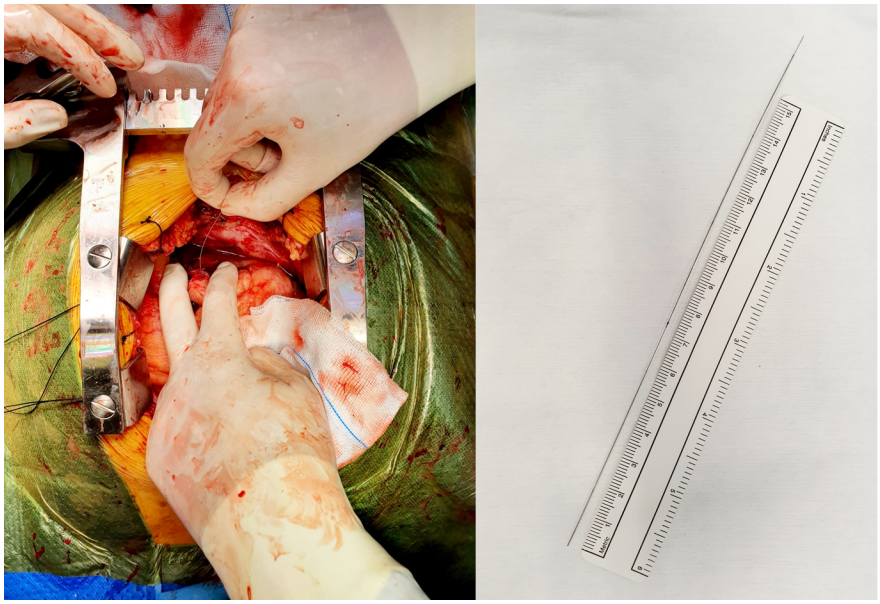
(ONYX 4,0x34 mm) overinflated with high-pressure NC balloon (4x8mm). (figure 2). This strategy sought stabilization of total guidewire alongside RCA to promote endothelialization of the tip of trapped guidewire in coronary vessel wall reducing the risk of in situ thrombosis.

Figure 2 - angiogram after PCI of RCA obstructive lesions (left anterior oblique projection).

After the procedure, the patient remained asymptomatic and hemodynamically stable. Echocardiography did not reveal pericardial effusion either any other change in relation to the previous exam. Patient was discharged next day with the following medication: acetylsalicylic acid 100mg, Clopidogrel 75 mg, bisoprolol 2,5 mg, atorvastatin 40 mg , ramipril 5 mg, metformin 1000mg and sitagliptin 5 mg. He maintained follow-up in cardiology consultation during 3 years without any clinical intercurrence during this period.

Three years later the patient was admitted in the emergency department after a syncopal episode preceded by chest discomfort and diaphoresis. At admission patient presented with chest discomfort, diaphoresis and widespread weakness and had signs of shock as hypotension, impaired tissue peripheral perfusion (hiperlactacidemia 5,1 mmol/L), tachycardia (120 bpm) and tachypnea (30 cpm) . EKG showed sinus rythm, 120 bpm, with Q waves in DIII and aVF and 1 millimeter horizontal ST-segment depression in V4, V5 and V6 derivations. Emergence echocardiography showed a pericardial effusion with 25 mm in posteroinferior topography and collapse of right cardiac cavities. It was performed an emergent pericardiocentesis with immediate drainage of 1500mL of hematic-looking liquid.

After clinical and hemodynamic stabilization of the patient, taking into account his clinical background and the possible iatrogenic etiology of hemopericardium, the cardiac surgery reference center was contacted and the patient was transferred to that department to be submitted to an emergent exploratory sternotomy.



After median sternotomy and pericardiotomy surgeons could observe an externalized guidewire on the lower wall, on the way to the PLA that was partially removed through the inferior heart wall (total extension of 17 cm) (figure 3).

A B

Figure 3- Manual extraction of guide wire after pericardiotomy (A). Extenson of extracted guidewire (B).

Concurrently during intraoperative transesophageal ecocardiography it was observed a hyperechogenic filamental structure along the ascending aorta (figure 4).

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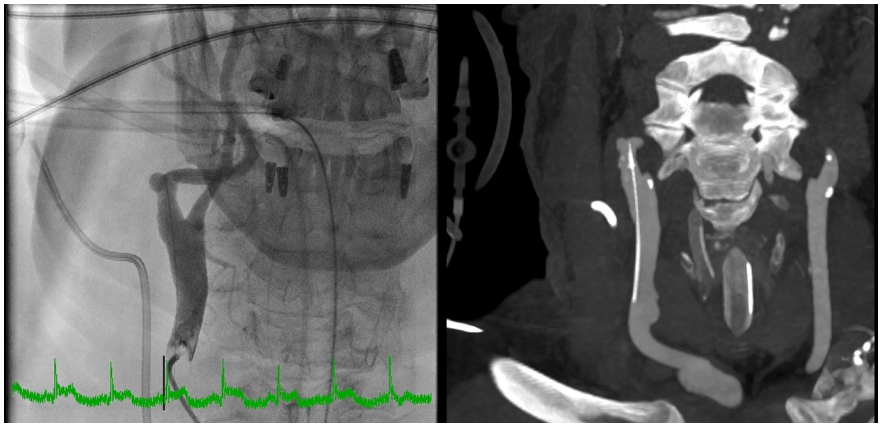
Figure 4- Intraoperative transesophageal ecocardiography showing a hyperechogenic filamental structure along the ascending aorta

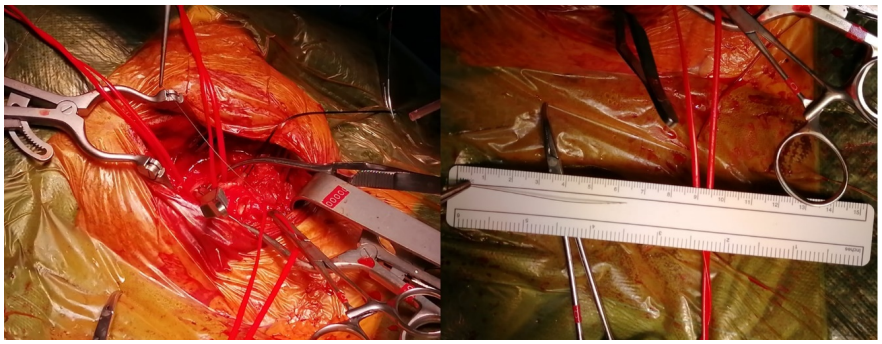
After remotion of the distal portion of the trapped guidewire through pericardial space , it was decided to perform an Computed tomography angiography that shown a foreign body (extension of 6 centimeters) in internal right carotid artery, associated with a pseudoaneurysm at the distal end of it (figure 5)



A B

Figure 5- Computed tomography angiography showing a fragment of the trapped guidewire in right coronary artery (A) and pseudoaneurysm at the distal end of it (B)

Owing to the risk of a percutaneous intravascular approach, conditioned by the presence of a pseudoaneurysm, it was removed through transverse arteriotomy of the carotid artery by a vascular surgeon. The pseudoaneurysm was removed intraoperatively and a top-to-top anastomosis between carotid bifurcation and right internal carotid artery was performed with Prolene 6/0 (figure 6).



A B

Figure 6- Arteriotomy of right internal carotid artery (A) and remotion of fragment of trapped guidewire (B).

The patient was discharged few days later, with any other intercurrence during hospitalization and 18 months later, patient remains asymptomatic, with excellent functional status.

Discussion

Coronary perforation during or after percutaneous interventions are rare but potentially life-threatening incidents often resulting in emergency surgery. While iatrogenic perforations occurred in the catheterization laboratory may be treated immediately at the site of their occurrence with several possible techniques, namely through different kinds of covered stents, rupture of pre-existing coronary pathology frequently is associated with a possible delayed diagnosis, giving rise to serious clinical events (i.e. myocardial infarction, cardiac tamponade, malign arrhythmias or sudden death). (8)

Though rare, guidewire loss or fracture after PCR can occur. There are different percutaneous and surgical approaches that try to fix this possible complication. When percutaneous techniques are not successful, depending on patient clinical factors and the length of free wire in the aorta, both surgery or a conservative approach, which includes the extension of double antiplatelet therapy, are valid. (9, 10) In this clinical case the risk-to-benefit was considered favorable to a conservative strategy given the low probability of success of surgery approach removing trapped guidewire. In order to prevent thrombotic events, a stent was implanted in PLA to promote endothelization of the trapped guidewire in the coronary vessel and long-term double antiplatelet therapy was prescribed.

Conclusion

There are different percutaneous and surgical approaches that try to fix PCI complications. The choice between surgery or a conservative approach is decided in each case, according to tecnhical and patient features. In this clinical case, the risk-to-benefit was considered favorable to follow an initial conservative strategy after a guidewire fracture given the low probability of success of surgery approach removing it.

Figure Legends

Figure 1- angiogram showing critical stenosis of proximal/medium RCA and a critical lesion at bifurcation between distal RCA and PLA (left profile projection)

Figure 2 - angiogram after PCI of RCA obstructive lesions (left anterior oblique projection).

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Figure 4- Intraoperative transesophageal ecocardiography showing a hyperechogenic filamental structure along the ascending aorta.

Figure 5- Computed tomography angiography showing a fragment of the trapped guidewire in right coronary artery (A) and pseudoaneurysm at the distal end of it (B).

Figure 6- Arteriotomy of right internal carotid artery (A) and remotion of fragment of trapped guidewire (B).

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