

CASE REPORT

Nightmare of Coronary Wire Loop Jail from Side Branch to Main Vessel during Primary Percutaneous Coronary Interventions

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Abstract

Background: Guide wire breakage and entrapment inside the coronary circulation are rare but extremely dangerous complications of coronary intervention that can be life-threatening by resulting in embolization of thrombi, perforation of the coronary vasculature, and thrombus development.

Case Presentation: A male patient who developed a complication of left circumflex artery guide wire looped and trapped under left anterior descending artery (LAD) stent during Primary PCI and went for emergency cardiac surgery for removal.

Management & Results: Guide wire entrapment during the intervention should always consider this as a risk factor, especially when intervening in the tortuous coronary vasculature, and it is important to keep several wires, snare wires, and a surgical team on board as a backup.

Conclusion: Although guide wire entanglement infrequently occurs during interventions, interventionists should always be on the lookout for it, especially in patients with convoluted coronary arteries. Before working on these patient's coronary arteries, it's essential to have a surgical team, lots of wires, and snare wires on hand. These preventative measures may be effective in reducing death and morbidity under adverse conditions.

Keywords

Guide Wire, Wire Loop Jailing, Coronary Angiography, Percutaneous Coronary Intervention, Left Circumflex Artery, Left Anterior Descending Artery.

Introduction

A rare but extremely serious complication of coronary intervention is the fracture of guide wire and entrapment inside coronary circulation, which can be life-threatening by causing embolization to thrombi, perforation of coronary vasculature, and thrombus formation¹.

This complication was first reported in the 1980s, and the incidence of 0.08% was documented in a case series of 2238 patients who went to coronary intervention². Even with the advancement of interventional techniques and modern equipment, the risk of fracture and entrapment of wire is still worrisome in complex interventions, including complete occlusion and bifurcated lesions.

Several management plans have been suggested for the removal of the trapped segment of the guide wire. Still, surgery has been recommended in many cases along with percutaneous retrieval of the wire, but in an emergency, cardiac surgery is preferred^{2,3}.

A male patient with 66 years of age presented to the National Institute of Cardiovascular Disease, Karachi, with ST-segment Elevation Myocardial Infarction and developed a complication of left circumflex artery (LCx) guide wire looped and trapped under left anterior descending artery (LAD) stent during Primary PCI and went for emergency cardiac surgery for removal.

Case Presentation

A 66-year-old male presented to the emergency department (ER) with a complaint of chest pain and shortness of breath for 3 hours in functional class III/IV. At presentation, vitals were blood pressure 80/50 mmHg, heart rate 120 bpm, oxygen saturation was 80%, on chest examination, bilateral upper mid zone crepts.

On cardiovascular examination, S1 and S2 were audible with no added sounds. The patient had a history of hypertension and smoking. 12-lead ECG showed ST-segment elevation in V1, V6, lead 1, and aVL and was diagnosed as extensive anterior wall myocardial infarction (AWMI) with Killip class IV.

Patients develop ventricular tachycardia (VT)/ventricular fibrillation (VF) in ER, three times electrically cardioverted, four minutes of CPR done, patient return of spontaneous circulation (ROSC) achieved and intubated. High-risk consent was taken, and the patient was shifted for primary PCI.

Management & Results

A coronary angiogram was performed through the right femoral artery; LvEDP was 40 mmHg. LHC showed total occluded LAD from ostial-proximal with severe disease in LCx and RCA. Primary PCI to LAD was decided, an EBU 3.5 guidewire was taken, and choice floppy wire was crossed in LAD and LCx.

Export catheter did in LAD; after that severe lesion, it seems that was predilated with 2.0 x 15 balloon. A stent of size 3.5x18 was deployed in ostial-proximal LAD, and re-crossing of wire was attempted, but unable to pull out the wire due to LCx wire looped and entrapment under the LAD stent.

Sequential small balloons were taken, initially over the wire 1.0x10 mm, and 1.25x6 mm balloons were taken behind the stent struts and inflated (Figure 1).

However, a percutaneous retrieval of the wire was unsuccessful. A cardiothoracic surgeon was consulted, and surgical removal was planned. The patient was hemodynamically stable and was shifted to Operation Theater (OT) after IABP placement for wire retrieval and revascularization.

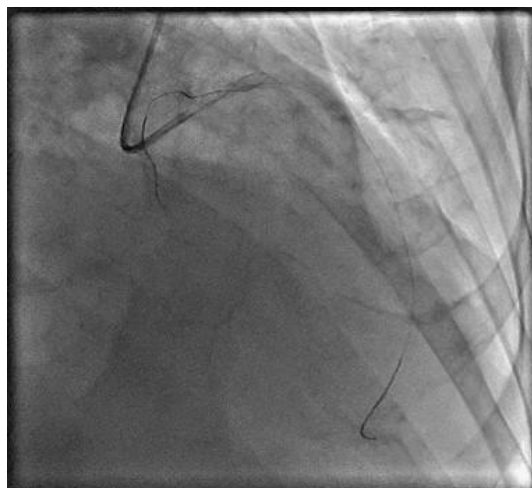


Figure 1: LCx wire looped and entrapment under LAD stent

Patients were put on cardiopulmonary bypass, the anterior wall of LV was completely infarcted, all coronaries were heavily calcified vessels, stent lodged proximal in LAD, and LCx wire felt in LCx with disease vessel proximally. As wires were jailed in the stent and crushed at Ostia of stent LAD and LCx incised and wires removed with stent after aortic cross-clamp and cardioplegic arrest (Figure 2). LAD endarterectomy was performed and reversed saphenous vein graft anastomosis. Reverse saphenous vein grafts were anastomosed to OM1 and RCA. The patient shifted to ICU with an open chest; he remained in ICU for 24 hours and developed asystole; immediate cardiac CPR was done, but due to a large infarcted myocardium patient could not survive.

Discussion

Fracture and retained Guidewire during coronary angiography left in coronary arteries is a rare but extremely life-threatening condition, which was first reported in 1980, and surgery was considered as mainstay treatment⁴. The retained fragments of wire can lead to thrombosis, embolism, dissection, and ruptured coronary vasculature⁵.

Factors that cause damage to Guidewire include excessive rotation of wire over 180 degrees which can lead to wire fracture. In comparison, complex lesions of coronary circulation and unusual anatomical bifurcation of lesions or diseased calcified and tortuous vessels with multiple uses of the same wire can develop changes in the structure of the wire. They can increase the risk of wire entrapment^{5,6}.

This risk significantly increases when intervention is performed in total occlusion of vessels in complex

bifurcated lesions, which can cause entrapment of wire between stents or vessels^{7,8}.

Drug-eluting stents have shown a decrease in endothelialization around the stent, which may leave empty spaces around the stent or incomplete expansion of the stent, both of which can cause the wire to get stuck if passed from the stented area of the vessel⁹. Even with the advanced and good quality of Guidewire, the occurrence of this complication can be expected.

Entrapped Guidewire increases the chances of thrombus formation, which can lead to coronary artery occlusion and embolization in the systemic circulation. Guidewire segments inside the coronary circulation will cause injury to coronary endothelium and deposition of platelets and can cause vascular compromise to the myocardium. Most of the time Retained segment of the guide wire is difficult to locate; the distal radiopaque segment can help visualize the stuck segment^{7,10}.



Figure 2: Surgically removed wires with stent

According to literature, anatomical location and clinical feature of the foreign body are kept as an important consideration for the treatment, which can be surgical retrieval of the stent, Coronary intervention, or conservative management⁷.

So far, Surgical retrieval and percutaneous removal are recommended in the majority of cases from the proposed treatment options³. Percutaneous removal strategies suggest that entrapped segment of the wire can be removed by two or more wires in the surrounding of the stuck segment and applied to twist around the retained segment when it is gripped in between twisted wires. Then pulling the wire out of the vasculature and removing it from circulation^{11,12}. Balloon inflation near the wire is another approach for removal of wire, in which the balloon is inflated at the terminal part of the catheter near the trapped wire and retracting the wire with the whole system of the balloon¹⁰. Snare loop can also be used for retrieval of fractured wire by tornus microcatheter⁹.

Surgical intervention is taken into consideration when percutaneous retrieval is impossible or failed, and the revascularization of the vessel is important^{7,13}. The bypass has been an immediate choice with surgical extraction by arteriotomy of coronary vessels for the removal of wire.

The removal of the guide wire is a preferable option, but not in certain cases in which the guide wire is in small side branches of the coronary artery.

Here, it is reasonable to leave a guide wire inside the coronary circulation. Conservative management might be successful in such patients who are kept on continuous follow-ups and antiplatelets and anticoagulation for a longer duration. These follow-ups can be helpful for early identification of ischemia if it ever occurred¹⁰.

Conclusion

Even though guide wire entanglement during an intervention is uncommon, interventionists should constantly be aware of the possibility, especially in patients with tortuous coronary arteries. It is crucial to have a surgical team, several wires, and snare wires available before dealing with these patients' coronary arteries. In bad circumstances, these preventative interventions may be successful in lowering death and morbidity.

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