Abraha Hailu, Henok G.Zabher, Mohammed Jeilan. *Ethiop Med J, 2019, Vol. 57, No. 3*

CASE REPORT

MULTI-VESSEL PERCUTANEOUS CORONARY INTERVENTION COMPLICATED BY BROKEN WIRE AND SUCCESSFULLY TREATED WITH TRIPLE ANTICOAGULANTS

Abraha Hailu, MD[1*], Henok G.Zabher[2], MD, Mohammed Jeilan, MD[3]

ABSTRACT

Side branch wiring is used to protect side branch flow after main vessel stenting. Rarely, it becomes difficult to retrieve the jailed wire behind the stent and therefore it may even be detached and remain in the circulation. Retained fractured guidewire fragments are rarely encountered during percutaneous coronary intervention, but may cause serious morbidity and mortality. We present a 52-year old diabetic patient who was diagnosed with ST-Elevation Myocardial Infarction and developed recurrent Non-ST-Elevation Myocardial Infarction with persistent angina. He was treated with staged Percutaneous Coronary Intervention for three-vessel disease. The patient had fractured remnant of guide wire in the Left Circumflex Obtuse Marginal Branch and did not experience any serious complications during a 01-year clinical follow up period. He was successfully treated with triple anticoagulation without peri procedure complications. Four months of follow-up coronary angiography revealed no in-stent restenosis.

Key words: *Percutaneous coronary intervention, broken jailed guidewire, triple anticoagulant therapy*

INTRODUCTION

To our best knowledge, Ethiopia introduced percutaneous coro-nary intervention (PCI) 30 years after the first PCI by Andreas Guntzig in private hospital in 2007 in the capital (1) and after 38 years in its government hospitals, the first of which was Mekelle university college of Health Sciences in December 2015 (2).

During the four decades of the history of PCI, there were increasing incidence of complex PCI and were accompanied by increased incidence of risks of device fracture or dislodgement. Guide wire fractures during PCI are very rare, but in such cases, life-threatening complications such as embolization, thrombus formation and perforation may occur. The management options include percutaneous retrieval, surgical removal and conservative management with antiplatelet/ anticoagulants. There have been several reports of fragments being left in place with-out complications (2-5). We present the case of a 52-year -old male who was diagnosed with ST-Elevation Myocardial Infarction (STEMI) initially managed medically. He subsequently developed recurrent Non -STEMI and persistent angina of Canadian cardiovascular Society (CCS) class IV and treated with staged PCI at Mekelle University Ayder Comprehensive Specialized Hospital. The patient had remnant fractured guide wire in the Left Circumflex Obtuse Marginal Branch (OM1).

The objective of this case report it to show that conservative therapy of retained small, distal coronary wire is an option, as our patient did not experience any serious complications during the procedure as well as during one year follow up period and triple anticoagulants have been used to successfully treat possible complication like intracoronary thrombosis.

CASE PRESENTATION

We present a case of a 52 year old male patient who is Type-2 diabetic for 5 years, hypertensive for 11 years, an ex-smoker (16 pack years), BMI of 26 with Dyslipidemia. Three years ago he presented with typical chest pain of three hours to our medical intensive care unit (MICU) with ST-Elevation in Inferior Leads. This later evolved in to Left Bundle Branch Block (LBBB) pattern, while in MICU with troponin elevation of 317 times above the upper limit of normal (ULN). He was treated with standard medical therapy with the Diagnosis of Killip Class I STEMI. The patient was discharged with Acetic Salicylic acid (ASA), Clopidogrel 75 mg per os (po)/day, Atorvastatin 80 mg po/day, Metoprolol 25 mg po/day, Enalapril 5mg po twice per day, NPH insulin 20/12 IU.

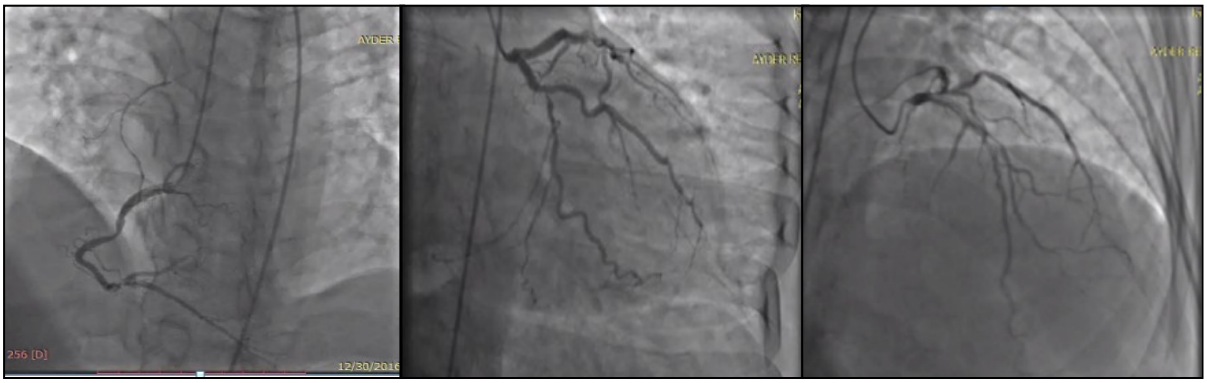
Three months after his first STEMI, he was readmitted with Non-STEMI In another hospital after he presented with sudden onset of squeezing chest pain with presyncope.

[1]Mekelle University, Ayder Comprehensive Specialized Hospital-CHS; Department of Internal Medicine and Cardiology Unit; Mekelle; Ethiopia. [2] Louisiana State University Health Sciences Center Division of Cardiology, Department of Medicine; Shreveport, LA; USA. [3]Aga Khan University Hospital; Nairobi; Kenya
*Corresponding author: abrahahailu45@yahoo.com

Troponin initially was negative followed by serial elevation up to 78 times of the ULN. Echocardiography showed Ischemic Cardiomyopathy with moderate Left ventricular Systolic Dysfunction - Left Ventricular Ejection Fraction (LVEF) of 35% - with mild Mitral Regurgitation (MR). Metoprolol was made 25 mg po twice per day and Isosorbide dinitrate 5mg po twice per day was added with the plan to up titrate the medications.

While the patient was on Optimal Medical Therapy (OMT), he continued suffering from angina (CCS class IV) and six months after his STEMI episode, coronary angiography was done with the intent of revascularization therapy.

He had multi-vessel disease with critical Right coronary artery (RCA) disease at its mid segment and crux, Critical ostial Left circumflex lesion at its bifurcation with the first obtuse marginal (OM1) and moderate stenosis of the mid Left Anterior Descending coronary artery (LAD) and critical stenosis of the ostial first Diagonal (D1) which is a big branch (Figure 1). Hence we advised the patient to undergo Coronary artery bypass surgery (CABG) abroad with an alternative plan of complex PCI to be done in our set up if CABG was not possible.



A. Critical Right coronary artery mid and Crux stenosis

B. Critical Left circumflex ostial lesion at its mid segment

C. Crtical First Diagonal ostial lesion

Figure 1: Diagnostic Coronarography results

As the patient was not able to afford to go abroad for CABG, it was decided to do PCI in our center and the RCA was stented with good result except that the Posterolateral branch was compromised and later completely shut down due to plaque shift.

Sequential bare metal stenting (BMS) of the RCA was done with 2.25x14 mm, 2.25x19 mm, 2.75x29 mm from the crux to proximal part (BMS was the only available stent in the cath lab by then). The D1 was also stented with good result (Figure 2). The LCX lesion PCI was postponed because there were huge challenges to wire the PL branch and the D1 leading to excessive contrast and long procedure (also we did not have an ACT (activated coagulation time) machine).

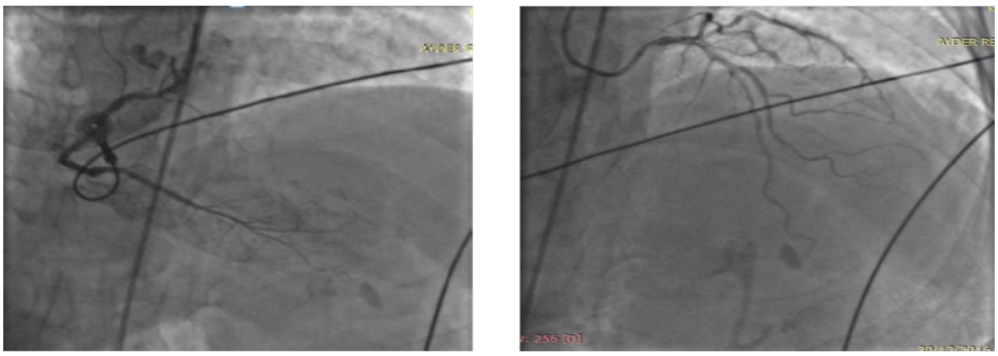


Figure 2: Final result of the RCA and D1 after initial the first PCI

Following his first PCI patient did not have new onset chest pain and his troponin was only six times elevated from pre procedure CA baseline.

Up on follow up after discharge, despite the above intervention and optimal medical management, he continued to have typical angina after he walks 200meters associated with intermittent claudication (he had Doppler proven bilateral lower extremity peripheral arterial disease). Echocardiography showed no significant improvement (EF = 35-40%). He was on: ASA, Atorvastatin, Clopidogrel, , Sublingual Nitroglycerin, Metoprolol 150 mg po twice per days, Enalapril 10 mg po twice per day, Furosemide, Spironolactone, Metformin, Insulin. Plan was made to revascularize the LCX as pain persisted.

Coronarography (for the third time) as part of the staged PCI showed that the PL branch did open completely. PCI was done on the bifurcation of OM1 branch and the mid LCX (medina classification 0, 1, 0). Two wires were put in to the distal LCX and the OM1 (side branch wire protection with provisional stenting). Predilatation made with 2x20 mm balloon (Medtronic) and 2.5x30 mm Drug Eluting Stent (DES). Medtronic was implanted in to the LCX and then overlap stenting proximally with 26x3 mm DES was done with TIMI III flow in both LCX and OM1. Up on a gentle removal of the jailed OM1 PTCA hydrophilic guide wire (B Braun wire); its distal tip of the broke and remained there (Figure 3).

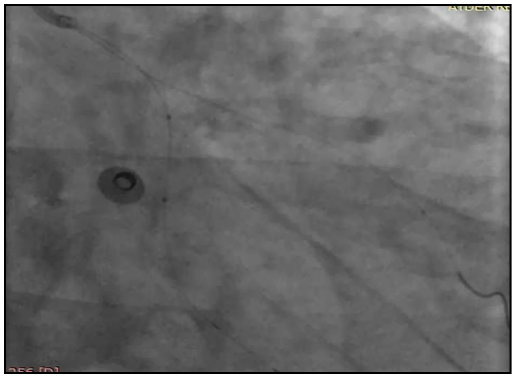


Figure 3a: wiring both vessels for side branch protection

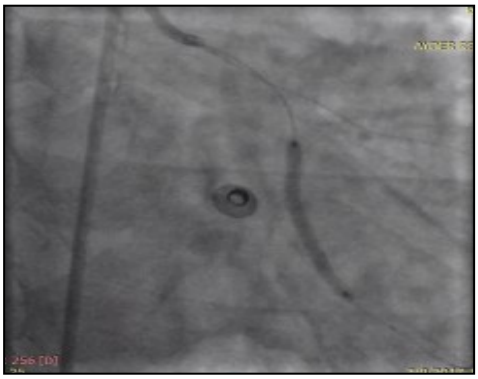


Figure 2b: LCX stenting after predilatation

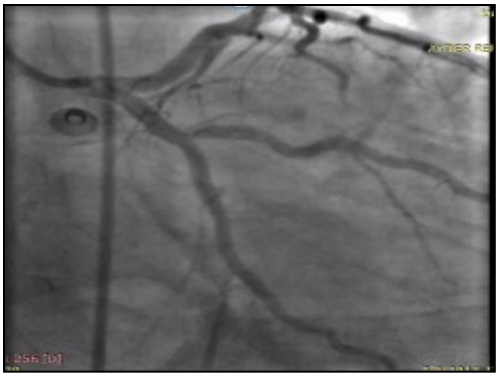


Figure 3c: Final result of stenting

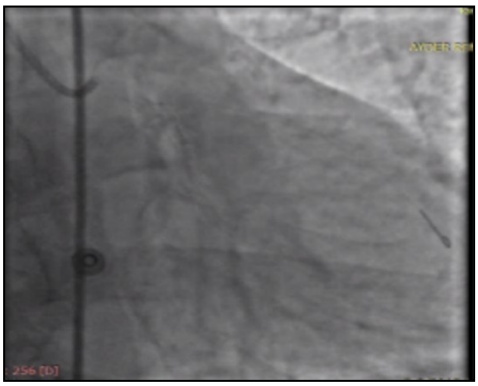


Figure 3d: With follow-up on triple anticoagulation

The patient was closely. He was put on increased dose of Clopidogrel to 150 mg po daily for two weeks, Enoxaparin for five days, ASA 81mg po daily and warfarin for four months in addition to his other OMT drug regimens. Subsequently patient was pain free and his Ejection Fraction (EF) did not deteriorate.

After four months of triple anticoagulation with Clopidogrel 75 mg po/day, ASA 81mg po/day and Warfarin with target INR of 2-3; coronary angiography was done and there was good flow (TIMI III) on the vessel with the jailed broken wire inside (OM1) and the LCX (Figure 4).

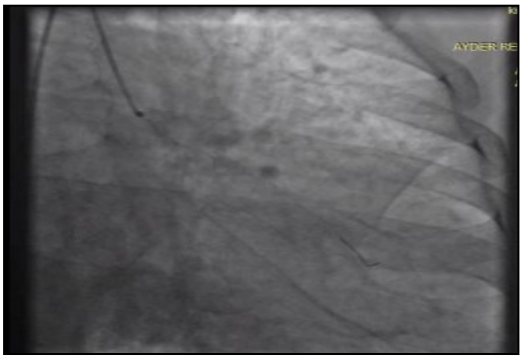


Figure 4a: Broken jailed guide wire in the first obtuse marginal

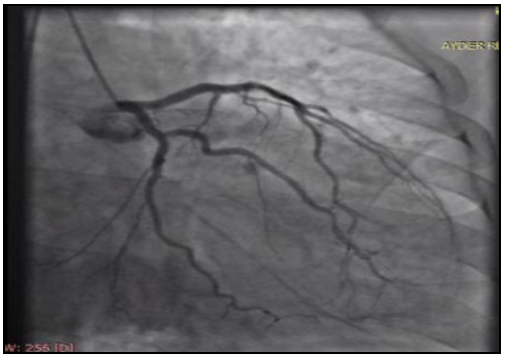


Figure 4b: Good flow in the left circuflex coronary system (with broken wire in situ)

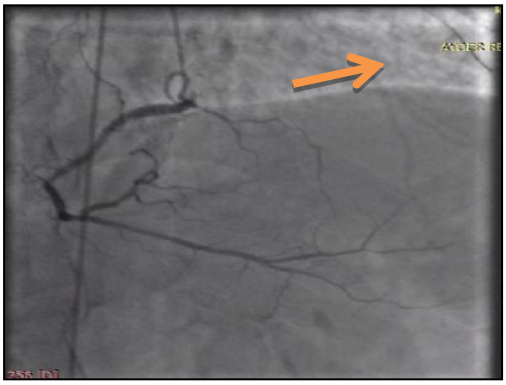


Figure 4c: The Posterolateral branch flow is maintained and the broken wire seen at 4 months in cranial view (arrow)

DISCUSSION

Guide wire fractures during PCI are very rare, occurring in approximately 0.1-0.8% of cases (2). Guide wire remnants could lead to life threatening complications such as thrombosis, emboli, and perforation. Their management depends on the clinical situation of the patient, as well as the position and length of the remnant. The best management of entrapped guidewires is still far from clear. There are several methods recommended for the management of fractured guide wires, including emergent surgery, loop snare re-moval, stenting over the retained wire, and conservative treatment among others (2-9).

In the event of failed percu-taneous retrieval (the preferred approach of treating guidewire remnants) and persistent signs of ischemia, patients should be urgently referred for surgical therapy [3, 4]. During PCI Tornus catheter has been applied to patients with severe coronary artery disease when balloon catheter or microcatheter cannot be crossed across the lesion after successful wire crossing as is reported by Cho YH et al.

This complication could be life-threatening because it can lead to myocardial ischemia, infarction, or lethal arrhythmia due to intracoronary thrombosis (5, 6).

The first cases of guidewire entrapment were reported in the late 1980s at the start of the coronary angioplasty era (8). Despite the development of more flexible and high quality guidewires, the incidence of this complication has not decreased. Reasons on why guide wires break inside the coronary during PCI could be related to:

- material use and operator technique utilized (Excessive rotation (>180^0 in a fixed distal end wire, Jailed wire between overlapping stents, Over sizing of stents and excessive post dilatation, use of firm tipped guidewire**,** sharp curving of guidewire tip**,** use of rotablator**,** extensive maneuvers with balloon or stent catheter**,** Use of stiff thrombectomy catheter**,** Use of multiple guidewires**,** use of hydrophilic guidewires).

- lesion characteristics (Stenting of bifurcation lesions, tortuous and calcified lesion, chronic total occlusion, Intervention of stent restenosis, Coronary intervention through stent striates, extensive atherosclerosis of full-length coronary vessel, kinky segmented and irregular shaped coronary vessel (7,8); and
- prolonged percutaneous coronary intervention session (10).

Guide wire segments retained within the coronary circulation may remain benign for a long time, particularly if they are entrapped within a small and distal part of the vessel and do not have accompanying total coronary occlusions (5). Reasons could be vascular endothelial cell covering over the guide wire fragments making them immobile and non-thrombogenic.

In patients with high surgical risk, some physicians preferred leaving the guidewire fragment within the coronary bed. They followed up such patients with systemic anticoagulation. But, coronary segment that contained guidewire remnant did show up progressive stenosis in subsequent angiography with unforeseen late sequelae (11). With technological improvements in the guidewire, physicians began to intervene in more complex coronary lesions. The risk of guidewire entrapment remained at the same level, or perhaps even increased. Since 2000, new interventional techniques have been introduced to the arena of interventional cardiology. Retrieval of entrapped guidewire has been carried out via a special snare catheter, using a balloon as a wedge for extracting guidewire fragments. Fixing the guidewire to the coronary bed with stents has been performed and reported (12).

Based on the previous reports and physicians' experiences in the treatment of retained fragments of guidewire, surgical approach should be the last resort. Interventional techniques and/or conservative management should be preferred. If entrapped guidewire remnants are non-metallic, fragmented and localized in distal part of vessels or chronically occluded vessels, they can be followed up conservatively.

It may be 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 peers). Several reports have confirmed short- and long-term safety and efficacy of this method in this group of patients (13).

In our patient, the radiopaque portion of the guidewire was retained in a relatively big side branch. Careful evaluation of cine films showed no part of guide wire in the proximal Left Circumflex (LCX) and aorta and the guidewire fractured exactly near bifurcation of LCX stent and OM1. Therefore, it was reasonable to leave it in place without further action. We put him on Enoxaparin initially and then warfarin with a target INR of 2-3, clopidogrel and ASA with clinical follow up. Coronary angiography four months later and clinical status at one year follow up proved safety of this approach at least for that period of time as were also reported by others with seven years of follow up (13).

Because the fracture in the OM1 developed after stent deployment at the main branch, we could not determine the mechanism of fracture in this particular case. However, trapping of the distal tip of the wire, or stent deployment over a severely angulated guide wire are two possible expla-nations. This is similar to a report by Alexiou K et al in their description of three cases of entrapped guidewires mentioned that all three presented cases, detachment of the guidewire tip occurred suddenly without any feeling of traction on guidewire mobility by the operator. This could be the scenario in our case (4).

In conclusion, even though the most ideal management option for remnant guide wires is their removal, conservative treatment with the fragments left in situ may be successful in cases in which patients remain asymptomatic and hemo-dynamically stable with administration of in-tensive anti-platelet medications (triple anticoagulation in this case) with close observation. The duration of triple anticoagulation needs to be studied even though some recommend lifelong.

Informed Consent of a patient*:* Written informed consent was obtained from the patient to publish this case report.

ACKNOWLEDGEMENT

The authors would like to extend their acknowledgement to the cardiac catheterization laboratory team /Physicians, nurses and radiology technicians/ of Mekelle University Hospital-College of Health Sciences, Mekelle; Ethiopia for their assistance in the diagnostic procedure. We are also grateful to the patient for his cooperation.

REFERRENCES

1. Shashu BA, Ayele MA. The pattern of coronary artery diseases as diagnosed by coronary angiography and the outcome of Percutaneous Coronary Intervention (PCI) in Ethiopia. Ethiop J Health Dev 2014
2. Christian J Leuner, Abraha Hailu Weldegerima; Cardiology services in Ethiopia, Euro Heart J 2018;29:2699–2700.
3. Hartzler GO, Rutherford BD, McConahay DR. Retained percutaneous transluminal coronary angioplasty equipment components and their management. Am J Cardiol 1987;60:1260-4.
4. Kilic H, Akdemir R, Bicer A. Rupture of guide wire during percutaneous transluminal coronary angioplasty: A case report. In J Cardiol, 2008; 128: e113–e114
5. Alexiou K, Kappert U, Knaut M, Matschke K, Tugtekin SM. Entrapped coronary catheter remnants and stents: Must they be surgically removed? Tex Heart Inst J, 2006;33:1339-1342.
6. Van Gaal WJ, Porto I, Banning AP. Guide wire fracture with retained filament in the LAD and aorta. Intern J Cardiol 2006;20;112(2):E9-11.
7. Cho YH, Park S, Kim JS et al. Rescuing an entrapped guidewire using a Tornus catheter. Circ J 2007;71:1326 –1327.
8. Demircan S, Yazici M, Durna K, Yasar E. Intracoronary guidewire emboli: A unique complication and retrieval of the wire. Cardiovasc Revasc Med, 2008;9:278–280.
9. Lopez-Minguez JR, Davila E, Doblado M, Merchan A, Gonzalez R, Alonso F. Rupture and intracoronary entrapment of an angioplasty guidewire with the X-Sizer thromboatherectomy catheter during rescue angioplasty. Rev Esp Cardiol 2004;57:180–183.
10. Micovic SV, Nezic D, Mangovski L, Djukanovic B, Vukovic P. Coronary-coronary bypass to reconstruct coronary artery bed following removal of a guidewire entrapped in a stent. Thorac Cardiovasc Surg 2009;57:153-155.
11. Karabulut A, Daglar E, Çakmak M. Entrapment of hydrophilic coated coronary guidewire tips: which form of management is best?. Cardiology Journal 2010;17(1):104-8.
12. Doorey AJ, Stillabower M. Fractured and retained guide-wire fragment during coronary angioplasty: Unforeseen late sequelae. Cathet Cardiovasc Diagn 1990;20:238-240.
13. Capuano F, Simon C, Roscitano A, Sinatra R. Percutaneous transluminal coronary angioplasty hardware entrapment: Guidewire entrapment. J Cardiovasc Med (Hagerstown), 2008; 9:1140-1141.
14. Pourmoghaddas M, Fard OH. Retained jailed wire: a case report and literature review. ARYA Atherosclerosis 2011;7(3):129.