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Case Report

Guidewire Entrapment During Percutaneous Intervention for Chronic Total Occlusion: A Rare Case Report

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Abstract

Iatrogenic complications occur in approximately 0.21% of percutaneous coronary interventions (PCI), which are critical for diagnosing and treating acute coronary syndrome. This case report details a rare complication involving guidewire entrapment during a PCI procedure for chronic total occlusion (CTO). A 71-year-old male with a diagnosis of myocardial infarction (MI) was admitted to the catheterization laboratory, where imaging revealed total occlusion of the Left Anterior Descending (LAD) artery. During the intervention, a balloon shaft breakage prevented the stent balloon from being withdrawn, necessitating an emergency surgical intervention. The guidewire was successfully removed, and urgent revascularization was performed through coronary artery bypass grafting (CABG). The patient experienced a stable recovery, being discharged after one week of intensive care unit monitoring and five days of ward observation. This case highlights the potential for severe complications in CTO interventions and suggests that pre-intervention consultation between cardiology and cardiovascular surgery teams could mitigate such risks and improve outcomes.

Keywords: Chronic total occlusion (CTO), Percutaneous intervention complications, Emergency CABG

INTRODUCTION

Cardiovascular diseases remain a leading cause of mortality and morbidity globally. Despite advancements in interventional cardiology, including percutaneous coronary interventions (PCI) for acute myocardial infarction (AMI), complications following these procedures frequently necessitate admission to the intensive care unit (ICU) [1]. Iatrogenic complications, although relatively rare, occur in approximately 0.21% of cases and often require emergency coronary artery bypass grafting (CABG) for resolution [2]. The incidence of immediate CABG following PCI is estimated at around 0.5%.

Common indications for emergency CABG include extensive arterial dissection, perforation leading to tamponade, and recurrent acute vessel closure. Although less common, equipment malfunction, such as the breaking of angiographic devices, can also necessitate emergency surgical intervention [3]. This case report aims to highlight the potential for unexpected iatrogenic complications during PCI, particularly when addressing chronic total occlusions (CTOs), and underscores the importance of preparedness for such eventualities.

CASE PRESENTATION

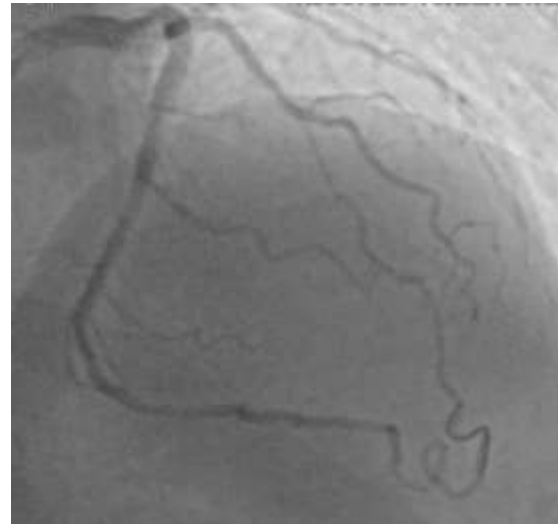
Patient Information: A 71-year-old male with a known history of coronary artery disease presented to the emergency department (ED) with acute chest pain. The patient's past medical history includes hypertension and hyperlipidemia, but no prior coronary interventions. Upon arrival, he exhibited classic symptoms of myocardial ischemia, including persistent chest pain and elevated cardiac biomarkers.

Clinical Findings: The patient was diagnosed with a Non-ST Elevation Myocardial Infarction (NSTEMI) based on clinical presentation and initial diagnostic tests. Physical examination showed no additional significant findings beyond those related to the acute coronary syndrome. The patient was hemodynamically stable but distressed due to persistent chest pain.

Timeline: On Day 1, the patient arrived at the ED with chest pain and was promptly diagnosed with NSTEMI. Initial treatment included administering 300 mg of Aspirin (Coraspin), 600 mg of Clopidogrel, and 8000 U

of Heparin. Following this, he was transferred to the catheter angiography laboratory, where imaging revealed a total occlusion of the Left Anterior Descending (LAD) artery. During the catheterization procedure, an attempt was made to cross the LAD using a retrograde wire technique and a ping-pong method. Despite efforts, the wire failed to cross directly, leading to predilation with a 1.5 mm x 15 mm CTO balloon and balloon dilatation with a 2.0 mm x 15 mm balloon. A 3.0 mm x 30 mm stent was implanted, but complications arose when the stent balloon could not be withdrawn due to shaft breakage and wire entanglement. As a result, surgical intervention was planned.

Figure 1: Angiographic image showing total occlusion of LAD



The surgical intervention involved performing an aortotomy, during which the guide wire was observed in the aortic cavity. The wire was removed surgically, and coronary artery bypass grafting (CABG) was performed on the circumflex obtus marginale (CxOM2), Diagonal2 (D2), and the LIMA-AD. Post-surgery, the patient was stabilized in the intensive care unit (ICU) with low-dose inotropic support and was successfully extubated on postoperative day 4.

On Day 5, the patient experienced a cardiac arrest and underwent Cardiopulmonary Resuscitation (CPR). After 5 minutes of CPR, spontaneous circulation was restored, and hemodynamic stability was achieved with inotropic agents. Echocardiography at this time showed a normal ejection fraction (EF) but revealed a 1.5 cm hematoma. A subsequent re-operation confirmed cardiac tamponade, with approximately 300 ml of

fluid and 100 ml of hematoma drained. The patient received enhanced inotropic support and was transferred to the ward after 2 additional days in the ICU.

Figure 2: Wire image sent to LAD with retrograde ping-pong technique



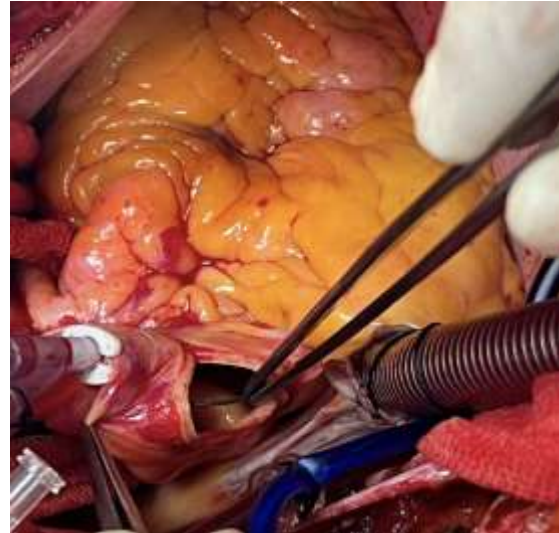
Diagnostic Assessment: Initial diagnostic imaging via catheter angiography confirmed a total occlusion of the LAD artery. Follow-up echocardiography revealed a normal ejection fraction (EF) but identified a 1.5 cm hematoma. During the re-operation, cardiac tamponade was confirmed, and surgical intervention successfully removed 300 ml of fluid and 100 ml of hematoma.

Therapeutic Intervention: The patient's initial medical management included antiplatelet therapy with Aspirin and Clopidogrel, anticoagulation with Heparin, and inotropic support. The catheterization involved a retrograde wire technique, balloon predilation, and stent implantation. When complications arose during the catheterization procedure, aortotomy and surgical wire removal were performed. CABG was conducted to address the occluded arteries (CxOM2, D2, and LIMA-AD). Postoperatively, the patient was managed with inotropic support (Dobutamine and Noradrenaline) and careful fluid management.

Follow-up and Outcomes: During the immediate postoperative period, the patient remained stable with successful extubation and a reduction in inotropic support. Drains were removed, and he

showed no signs of hemodynamic instability. On the 5th postoperative day, the patient experienced a cardiac arrest but was successfully resuscitated. Following reoperation for cardiac tamponade, he was monitored in the ICU with improved stability. The patient was eventually transferred to the ward and remained stable throughout a 5-day follow-up period before being discharged in a stable clinical condition.

Figure 3: Image of angiogram wire seen in aortic cavity



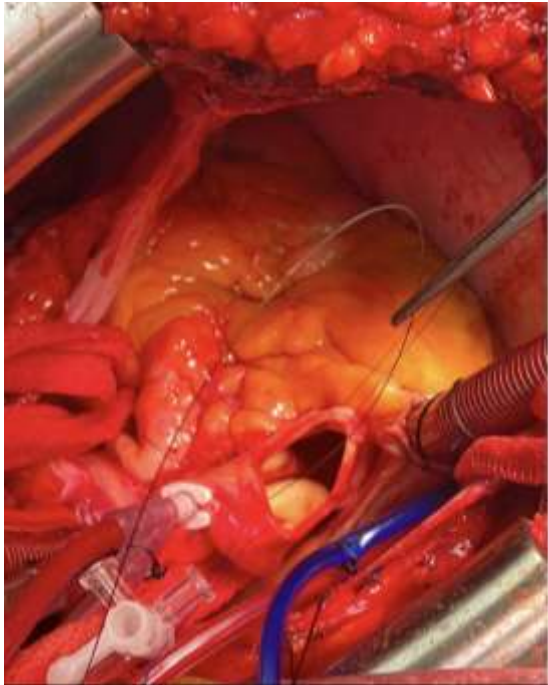
DISCUSSION

In recent years, the scope of percutaneous coronary interventions (PCI) has expanded to include patients with higher risk profiles, including those with chronic total occlusions (CTOs) of coronary arteries [4]. Despite advances in PCI techniques, the mortality associated with emergency coronary artery bypass grafting (CABG) remains elevated. Interventions in the setting of CTOs present significant technical challenges, often resulting in lower procedural success rates and a higher incidence of complications compared to procedures performed on non-occluded or acutely occluded coronary arteries [5].

In the case of our patient, who was a relative of a physician, there was a deviation from standard management protocols to expedite intervention. This deviation potentially contributed to the higher complication rates observed in such scenarios. Specifically, in this instance, PCI was initially attempted for a total occlusion of the Left Anterior Descending (LAD) artery but was complicated by the

need for emergency CABG due to iatrogenic issues [6]. This case underscores the importance of adhering to established protocols and considering CABG as a primary strategy for patients with complex CTOs when initial PCI attempts fail or are fraught with complications.

Figure 4: Image of angiogram wire seen in aortic cavity



Moreover, it is essential to recognize that prolonged exposure to contrast agents during CTO procedures can increase the risk of nephrotoxic effects, which may further complicate the patient's clinical condition [7]. Additionally, although the initiation of high-dose antiaggregant therapy before angiography can mitigate thrombotic risks, it also raises the potential for major bleeding, which may be managed with platelet transfusions and other reversal strategies.

CONCLUSION

Cardiac emergencies involving both interventional and surgical approaches pose significant risks and challenges. For complex cases, especially those involving CTOs and high-risk profiles, a collaborative approach involving cardiology and cardiovascular surgery teams is crucial. This approach ensures that treatment decisions are made based on a comprehensive assessment of potential risks and benefits. A rigorous evaluation of the procedural and clinical risks, as well as careful consideration of possible worst-case scenarios, is essential in optimizing patient outcomes and minimizing complications.

AUTHORS' CONTRIBUTION

VB, and ÜY: Concept and design, data acquisition, interpretation, drafting, final approval, and agree to be accountable for all aspects of the work. VB, and ÜY: Data acquisition, interpretation, drafting, final approval and agree to be accountable for all aspects of the work.

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