CASE REPORT

Guidewire fracture during percutaneous coronary intervention

Ruptura de fio-guia durante intervenção coronária percutânea

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DOI: 10.31160/JOTCI201927A201723

ABSTRACT – Rupture and entrapment of a guidewire are rare complications of percutaneous coronary intervention; nevertheless, they deserve attention due to the possible outcomes. We report the case of a patient undergoing percutaneous coronary intervention for treatment of unstable angina. During the procedure, the guidewire fractured in the left main coronary artery and migrated to the left anterior descending artery. Another invasive procedure was necessary to remove the fragment retained in the coronary circulation. There are many treatment options, and the approach must be individualized, according to the clinical and hemodynamic conditions of the patient and position of the fragment.

Keywords: Percutaneous coronary intervention/instrumentation; Endovascular procedures; Equipment failure

RESUMO – A ruptura e o aprisionamento do fio-guia são complicações raras da intervenção coronária percutânea, mas que merecem atenção, devido aos possíveis desfechos. Relatamos o caso de um paciente submetido à intervenção coronária percutânea para tratamento de angina instável. Durante o procedimento, o fio-guia sofreu fratura no tronco da artéria coronária esquerda e migrou para a artéria descendente anterior. Foi necessário novo procedimento invasivo para retirada do fragmento retido na circulação coronariana. As opções terapêuticas são diversas, sendo a abordagem individualizada conforme as condições clínicas e hemodinâmicas do paciente e a posição do fragmento.

Descritores: Intervenção coronária percutânea/instrumentação; Procedimentos endovasculares; Falha de equipamento

INTRODUCTION

Percutaneous coronary intervention (PCI) is the most common invasive procedure to treat coronary artery disease.¹ The increasing number procedures performed has been accompanied by a rise in complications related to the intervention. Intracoronary guidewire rupture, although rare, is a possible and potentially serious complication, since it can progress with the formation of emboli, thrombi or perforation of the artery or myocardium.² Many approaches may be adopted to deal with this complication, ranging from conservative treatment to percutaneous or surgical removal of the fragment.

We report a case of guidewire rupture during PCI at a tertiary care hospital in the city of Criciúma (SC, Brazil). This report was submitted to the Internal Review Board of the hospital and approved according to opinion number 1.604.064.

CASE REPORT

A 75-year-old male patient was admitted to hospital for PCI and stent placement due to unstable angina. He presented dyslipidemia and arterial hypertension, and was on simvastatin, hydrochlorothiazide, losartan, acetylsalicylic acid, and diltiazem. A previous echocardiogram had showed hypertrophic left ventricle, preserved systolic function, moderate aortic stenosis, and fibrocalcific degeneration of mitral and aortic valves. A previous coronary angiography showed a 70% focal lesion in the proximal third of the first left marginal branch (LMA1), a mild lesion in the mid-third and distal...
third of the left anterior descending artery, a mild lesion in the proximal third of the second diagonal branch, and a mild lesion in the mid-third of the left circumflex artery (Figure 1).

A Launcher EBU 3.5 6F catheter (Medtronic Inc., Minneapolis, MN, USA) was introduced by femoral access to catheterize the ostium of the left main coronary artery (LMCA), going beyond the lesion with a metallic PT² guidewire Moderate Support J-TIP 0.014 (Boston Scientific, Marlborough, MA, USA). The attempt to deploy a 2.75x12mm Integrity Stent (Medtronic Inc.) failed because it did not cross the lesion. The Launcher EBU 3.5 6F catheter was then replaced by another Launcher EBU 4.0 6F catheter and, in an attempt to reintroduce the guidewire, it fractured in the distal region of the LMCA, migrating to the left anterior descending artery at the bifurcation with the first septal branch (Figure 2).

We chose to attempt percutaneous retrieval of the guidewire fragment with a thrombus extractor and loop-shaped wire, both unsuccessful. The final angiography showed that the left anterior descending artery and its septal branch maintained Thrombolysis in Myocardial Infarction (TIMI) 3 flow. Clinically, the patient remained asymptomatic and hemodynamically stable throughout the procedure. The patient was admitted to the intensive care unit for 48 hours and subsequently to the ward, and received anticoagulation with enoxaparin and dual anti-platelet treatment (acetylsalicylic acid and ticagrelor) in this period. The case was discussed among the cardiology team of the hospital, which concluded that the best option would be the percutaneous retrieval of the fragment with a specific device.

Nine days after the incident, another attempt was made to remove the fragment. An EBU 4.0 6F catheter was inserted through the left common femoral artery. With the help of a 2-mm Amplatz Goose Neck microsnare (Boston Scientific) and a PT² Moderate Support J-TIP 0.014 metallic guidewire, the fractured fragment was caught and successfully removed (Figures 3 and 4). The procedure was completed

![Figure 1](image1.png)  
**Figure 1.** Coronary angiography showing severe focal lesion (70%) in the proximal third of the left marginal branch.

![Figure 2](image2.png)  
**Figure 2.** Fragment of the guidewire entrapped in the left anterior descending artery, at the bifurcation with the first septal branch.

![Figure 3](image3.png)  
**Figure 3.** Removal of the guidewire fragment from the left anterior descending artery using a micro snare.

![Figure 4](image4.png)  
**Figure 4.** Caudal view of coronary angiography showing the left anterior descending artery without the fragment, and the first marginal branch after stent deployment.
with deployment of a 2.75x12mm Integrity stent. The patient was discharged asymptomatic, with specific therapy for coronary artery disease and, at the 1-year follow-up had no cardiologic complaints.

**DISCUSSION**

PCI is a very common procedure nowadays. Although advances in techniques have improved outcomes, this procedure is not free from complications. Intravascular guidewire rupture is, however, rare, occurring in 0.2 to 0.8% of procedures.\(^1,2\) The risk of wire rupture increases under some conditions, such as when it gets caught between stent struts, when there is excessive rotation, and forced manipulation in lesions of complex anatomy, such as severe calcifications or occlusions.\(^3,4\)

Treatment options depend on the patient's clinical situation, the location of the fragment, and the evaluation of possible sequelae of a retained foreign body.\(^5\) If the fragmented wire is in small and/or distal branches, or in previously occluded vessels, there is no need to remove it.\(^5,6\) However, a fragment trapped in the coronary artery lumen may predispose to endothelial injury and platelet deposition, risk of acute thrombosis, and intracoronary or systemic embolization, requiring emergency myocardial revascularization, and even causing death.\(^8\) Therefore, conservative management is not recommended when there is contraindication for anticoagulation and/or antiplatelet therapy.\(^9\)

Methods for percutaneous retrieval include looped guidewires, parallel guidewires, looped snares made with the wires, balloon devices or fragment concealment. In the case of parallel guidewires, the attempt to remove the fragment is made by rotation movements of two or three wires that capture the fragmented portion. Concealment consists of deployment of a stent over the retained fragment.\(^2,3,4\)

In this case reported, although there was no contraindication for antithrombotic therapy, the decision was for the percutaneous retrieval of the fragment, since it was located in the proximal region of the left anterior descending artery. When this site presents thrombosis, the morbidity and mortality rates increase. With the successful removal, the risks associated with anticoagulation and prolonged antiplatelet treatment were also avoided. The option of late removal with specific material (loop-tip guidewire) considered the low success rates reported in the literature with parallel guidewires. Concealing with stent was not considered, since the vessel had no significant atherosclerotic disease.

The ideal time to remove the fragment is as soon as the rupture is identified.\(^1\) In this case, the patient was subjected to late removal due to the lack of specific material at the hospital, and previous failures with the materials available. Surgical approach is recommended for cases whose best management would be fragment retrieval and the percutaneous attempts fail, those with persistent ischemia, and in those with protrusion of the guidewire in the ascending aorta.\(^2,4,6\)

Rupture and entrapment of the guidewire is an uncommon complication and requires individualized approach, according to the patient's clinical and hemodynamic conditions, and the site where the fragment is entrapped.\(^5\) In this case, we emphasize the absence of a thromboembolic event during the period the patient remained with the fragment retained, a fact attributed to the anticoagulant and the dual antiplatelet treatment, with the subsequent successful fragment retrieval using the looped guidewire.

**SOURCE OF FINANCING**

None.

**CONFLICT OF INTEREST**

The authors declare there are no conflicts of interest.

**REFERENCES**