

A SUCCESSFULLY TREATED IATROGENIC LEFT MAIN AND CIRCUMFLEX CORONARY ARTERY DISSECTION DURING A PRIMARY PERCUTANEOUS CORONARY INTERVENTION DUE TO A STENT THROMBOSIS: A CASE REPORT

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Stent thrombosis is one of the most dangerous complications after a percutaneous coronary intervention. Additionally, another worrisome complication is the iatrogenic left main coronary artery dissection. We present a case of an iatrogenic left main coronary artery dissection spreading toward the circumflex artery, successfully treated by a prompt bail-out stenting.

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Key words: stent thrombosis, iatrogenic dissection, left main coronary artery

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Introduction

Stent thrombosis, one of the most lethal complications after a coronary stent implantation, occurs in 0.5% to 1% of patients within the twelve months following the percutaneous coronary intervention and is usually presented as an acute myocardial infarction (MI) (1). Under these circumstances, the emergent PCI is the best approach to adopt and the treatment of stent thrombosis, with optimal reperfusion in two-thirds of patients (2, 3). The Iatrogenic left main coronary artery (LMCA) dissection remains, however, one of the most worrying complications in the catheterization laboratory, with a reported incidence of less than 0.1%.

An LMCA dissection often leads to the cessation of blood flow that supplies a large portion of the myocardium, resulting in a hemodynamic collapse. The first successful percutaneous bail-out type of an LMCA stenting was performed in 1993. Although a

CABG is the treatment of choice, many patients died before entering the operating room. An immediate percutaneous coronary intervention (PCI) seems to be the appropriate and feasible alternative if performed by an experienced interventionalist (4).

We present a case of an iatrogenic left main dissection during a percutaneous coronary intervention of an acute coronary syndrome due to a stent thrombosis.

Aims

A 69-year old man had suffered an acute ST-elevation myocardial infarction (STEMI) two months ago and was treated with a primary PCI (PPCI). Two BMS were implanted in the mid portion of the LAD (Integrity 2.75 x 12 and Integrity 3.0 x 12). The patient accidentally stopped his clopidogrel intake for two days which resulted in a severe chest pain. He was admitted to the emergency department in the local hospital and the ECG revealed ST elevation in the anterior leads and was immediately referred to our center for coronary angiography and primary PCI. He was treated with a loading dose of Ticagrelor 180 mg, Aspirin 300 mg, and Heparin 8000 IU and transported to the catheterization laboratory. A right femoral approach was performed with an insertion of a 6 F introducer sheath and an Extra Back-Up 3.75 guiding catheter. The coronary angiography revealed an in-stent thrombosis of the mid-part of the left anterior descending coronary artery (LAD) and a stenosis of the proximal LAD segment of 70% (Figure 1).

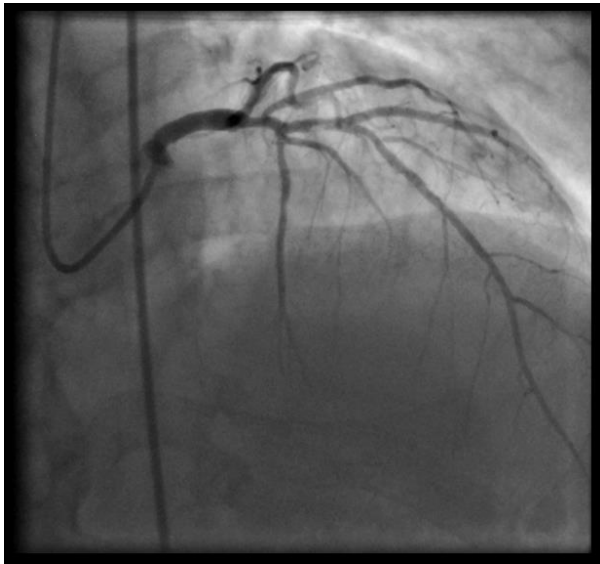


Figure 1. In-stent thrombosis in the mid-part LAD

After introducing the Sion Blue (Asahi) guidewire, a predilatation was performed using a noncompliant balloon (Maverick NC 3.0 × 20mm, Medtronic), after which a Xience V (Abbot) stent 3.5 × 28 was implanted at 13 atm. However, after the first injection of contrast dye after the stent implantation, a dissection extending from the proximal LAD to the distal LMCA was visualized (Figure 2.)



Figure 2. Left main dissection

The patient complained of a chest pain and the ST elevation reoccurred. We decided to perform a direct stenting of the LM using the Promus Premier (Boston) stent, 4.0 × 20 at 14 atm in order to prevent a LM thrombosis. After stenting, TIMI 3 flow was established, but with a compromised ostium and a dissection of the proximal part of the circumflex artery (Figure 3).

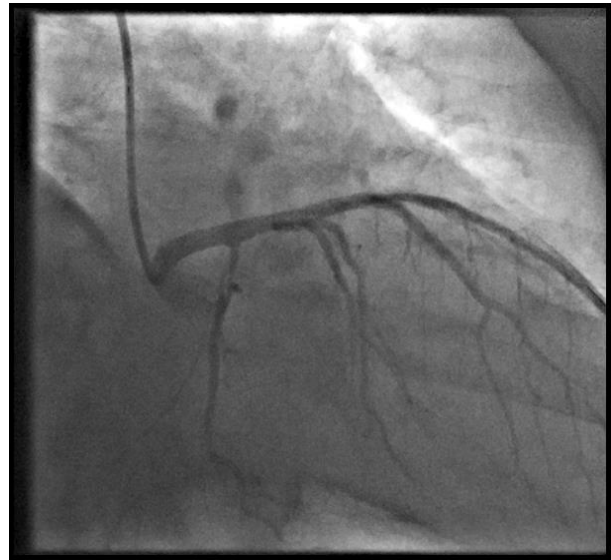


Figure 3. Dissection of the proximal part of the circumflex artery

The guidewire BMW was introduced in the circumflex artery and strut opening was performed using a balloon catheter Sprinter Legend (Medtronic) 2.0 × 10 at 13 atm. The dissection was solved using two stents Promus Element (Boston) 2.5 × 16 at 12 atm and the Promus Element (Boston) 2.75 × 16 at 12 atm (Figure 4).

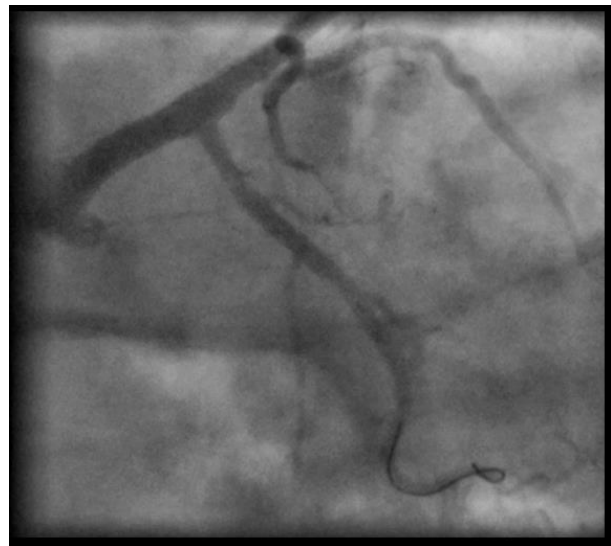


Figure 4. Stenting of the proximal and mid part of the circumflex artery

The final kissing was done using a balloon catheter Maverick (Medtronic) 3.75 × 14 in the left main at 10 atm and with a stent balloon 2.75 × 16 at 15 atm. TIMI 3 flow was established in the LM, LAD and the circumflex artery without any visual dissection or thrombosis (Figure 5).

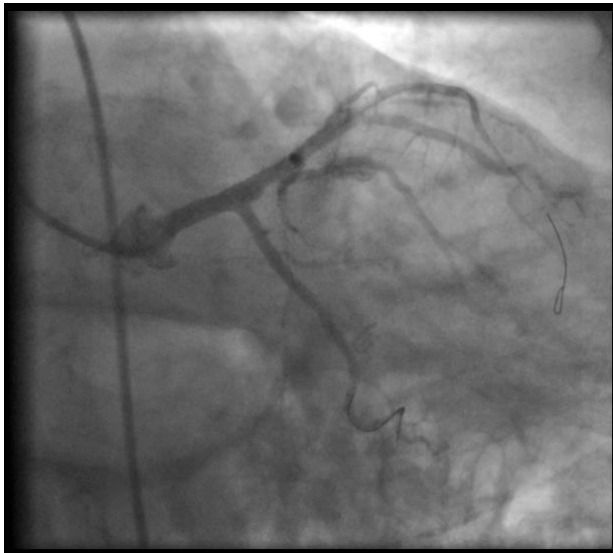


Figure 5. Final result after final kissing

Discussion

Stent thrombosis (ST) is potentially a life-threatening complication after a percutaneous coronary intervention (PCI), manifesting as an acute coronary syndrome (ACS) or a sudden cardiac death. The wide spectrum of risk factors related to a clinical presentation, the complexity of the lesion, stent type, and antiplatelet therapy may be responsible for the stent thrombosis (Table 1) (5).

Table 1. Potential risk factors for early stent thrombosis from the Dutch Stent Thrombosis Registry

Risk factors for early ST	Odds ratio
Premature clopidogrel discontinuation	36.5
Stent under-sizing	13.4
Coronary dissection	6.1
Postprocedural TIMI flow	5.2
≥ 50% lesion proximal to the culprit lesion	4.1
Malignancy	3.0
No aspirin at PCI	2.8
Impaired left ventricle ejection fraction (< 30%)	2.7

The procedural factors leading to the STEMI include a stent underexpansion and malposition (especially in the proximal part), a smaller stent diameter, and a coronary dissection (6, 7). A calcified lesion should be prepared before a stent deployment using a rotational atherectomy, cutting the

balloon or the hugging balloon technique so as to avoid the stent underexpansion (8). In our case, the first PPCI was performed using direct stenting without a preparation of a calcified lesion. A proximal stenosis remained untreated, due to the operator's estimation that it was not a culprit lesion. A premature withdrawal of clopidogrel may be also an additional risk factor for an in-stent thrombosis.

Yet another complication related to the second PPCI was the LM dissection. The Iatrogenic LMCA dissection can be a result of a mechanical injury to the arterial wall during a catheter manipulation or administering of any kind of interventional devices. There is a whole range of possible causes: extensive catheter manipulation, special catheter type (e.g. Amplatz catheter or the small Judkins catheter with deep LMCA intubation), stiffer guide wires like the pressure wire, uncommon LMCA anatomy or take-off, a less experienced operator, and the atherosclerotic LMCA can be associated with an increased risk of dissection (9, 10).

In our case, the cause of the dissection spreading from the proximal LAD not only to LM but also to the unprotected circumflex artery was an expansion of the stent with a greater than usual diameter. LM stenting was a bail-out and after that, we had to rewire the circumflex artery with a great risk for entering the false lumen.

The wide spectrum of clinical presentations of the LM dissection is visible, depending on the remaining antegrade coronary flow: patients free of symptoms with a preserved TIMI 3 flow, or a patient in a refractory cardiogenic shock with a completely occluded LMCA. However, even in the case of an initial TIMI 3 flow and hemodynamic stability, rapid deterioration may suddenly occur because of an abrupt flow compromised due to a progressive dissection or superimposed thrombus formation, and a PCI or CABG should be performed immediately (4).

Different strategies have been proposed for the treatment of the LM dissection. Conservative management may be enough if its location does not compromise the coronary flow or a percutaneous intervention, if it is feasible. A coronary bypass surgery should be reserved for cases in which a percutaneous intervention cannot be successfully and safely performed promptly. 'Watchful waiting', as suggested by Alfonso et al. (2), is a reasonable option in the hemodynamically stable patient with a low-grade dissection. The hemodynamic instability is the main indication for a coronary intervention (11).

The literature review by Cheng et al. (12) of 36 patients stented due to an iatrogenic LMCA dissection showed a favorable immediate outcome with angiographic success in 32 patients (88.9%). Four patients needed an emergent CABG and two of them died. A percutaneous intervention with back-up surgery in those groups of patients resulted in an overall survival rate of 94.4%.

One-year follow-up of our patient was satisfactory. Unfortunately, we did not perform a coronary angiography, either IVUS or OCT, despite the obligation according to the guidelines of coronary

revascularization, because the patient did not accept a repeated invasive procedure. We had also suggested a prolonged dual antiplatelet therapy, lasting more than 12 months.

Conclusion

It is very important to prepare a lesion before

stenting, especially if it is calcified even during the primary PCI. An iatrogenic dissection of the left main coronary artery may be a life-threatening complication and a bail-out PCI could be the only solution.

The left circumflex artery may be an innocent victim and should be treated in order to save the endangered myocardium.

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**USPEŠNO REŠAVANJE JATROGENE DISEKCIJE
GLAVNOG STABLA I CIRKUMFLEKSNE GRANE LEVE
KORONARNE ARTERIJE TOKOM PRIMARNE
PERKUTANE INTERVENCIJE – PRIKAZ SLUČAJA**

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Tromboza stenta je jedna od najtežih komplikacija perkutane koronarne intervencije. Ne manje važna je i jatrogena disekcija glavnog stable leve koronarne arterije. Opisali smo slučaj jatrogene disekcije glavnog stabla leve koronarne arterije koja se proširila na cirkumleksnu granu i koja je uspešno tretirana brzom perkutanom intervencijom.

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Ključne reči: tromboza stenta, jatrogena disekcija, glavno stablo leve koronarne arterije