

CASE PRESENTATION

Is there an ideal antiplatelet agent for preventing stent thrombosis?

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Abstract: Introduction – Despite proper antiplatelet treatment, some patients show resistance to aspirin or clopidogrel, with important consequences in terms of morbidity or mortality. The factors which induce a high risk of in-stent thrombosis are: diabetes, obesity, dyslipidemia, severe left ventricular dysfunction or complex coronary lesions. **Material and Method** – We present a 65 years patient with high blood pressure and metabolic syndrome, with important vascular impairment, who had initially underwent angioplasty with pharmacologically active stent on the left anterior descending coronary artery for unstable angina pectoris, but later, under a proper dual antiplatelet therapy, developed subacute in-stent thrombosis with important implications on the clinical course (extensive anterior acute myocardial infarction). **Results** – Following the coronarographic confirmation of the in-stent thrombosis, thromboaspiration was performed obtaining a TIMI III flow. The clopidogrel sensitivity testing confirmed the resistance to this drug that required its replacement with ticagrelor. The subsequent evolution was favourable, but a significant myocardial contractile reserve was lost. **Conclusions** – In stent thrombosis represents a current problem in the interventional treatment of the coronary lesions with severe clinical and prognostic implications. A closer analysis of the associated prothrombotic conditions, as well as the preliminary testing of the clopidogrel resistance, could significantly decrease the risk of in-stent thrombosis.

Keywords: in stent thrombosis, antiplatelet therapy resistance, acute myocardial infarction.

Abstract: Introducere – În ciuda tratamentului antiagregant corect administrat, unii bolnavi prezintă rezistență la aspirină sau clopidogrel, cu importante consecințe în termeni de morbiditate sau mortalitate. Factorii care induc un risc crescut de tromboză intrastent sunt reprezentați de: diabetul zaharat, obezitatea, dislipidemia, disfuncția severă a ventriculului stâng precum și leziunile coronariene complexe. **Material și metodă** – Prezentăm cazul unui pacient de 65 ani, hipertensiv, cu sindrom metabolic și afectare vasculară importantă, care inițial a beneficiat de angioplastie cu stent activ farmacologic pe artera coronară descendentă anterioară pentru angină pectorală instabilă. Ulterior, în condițiile unei terapii duble antiagregante corecte pacientul prezintă tromboză subacută intrastent cu importante implicații clinico-evolutive (infarct miocardic acut anteroextensiv). **Rezultate** – După confirmarea coronarografică a trombozei intrastent s-a reintervenit și s-a practicat tromboaspirație cu obținerea unui flux TIMI III. Testarea sensibilității la clopidogrel a confirmat existența rezistenței la acest drog, ceea ce a impus înlocuirea cu ticagrelor. Ulterior, evoluția a fost favorabilă, dar cu pierderea unei importante rezerve miocardice contractile. **Concluzii** – Tromboza intrastent reprezintă o problemă de actualitate în tratamentul intervențional al leziunilor coronariene, cu implicații clinico-prognostice severe. O analiză atentă, a condițiilor asociate protrombotice, precum și testarea prealabilă a rezistenței la clopidogrel, ar putea scădea semnificativ riscul de tromboză intrastent.

Cuvinte cheie: tromboza intrastent, rezistență la terapia antiplachetară, infarct miocardic acut.

INTRODUCTION

In stent thrombosis is one of the major complications of the coronary angioplasty that requires emergency treatment. Depending on the elapsed time since stent implantation, thrombosis can be acute (in the first 24 hours), subacute (in the first 30 days), late (in the first year) or very late (after one year). The risk of deve-

loping in stent thrombosis is 1,5%, simple stents are commonly involved especially in the moment when the dual antiplatelet therapy is stopped^{1,2}.

MATERIAL AND METHOD

We present the case of a 65 years old patient, with high blood pressure, diabetes, obesity, dyslipidemia with

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important vascular impairment (obstructive arteriopathy of the lower limbs stage II A Leriche Fontaine and inferior myocardial infarction at 50 years old) who is admitted to hospital for angina pains on exertion.

The coronarography revealed bicoronary lesions: old occlusion of the right coronary artery and 95% lesion of the anterior descending coronary artery on which there was performed a transluminal angioplasty with the insertion of the pharmacologically active stent. After selective intubation of the left anterior descending coronary artery with a VODA 3.5 guide catheter, we cross the stenosis area with 0.014 guide wire. We directly implant a drug eluting 3.0/19 mm stent at 20 atm, yielding the regression of the lesion from 95% to 0%. (Figure 1) The patient received 300 mg loading dose of clopidogrel, followed by 75 mg/day.

Three days after the angioplasty, the patient is again admitted to the hospital for a big crisis of angina of 7 hours. The electrocardiogram reveals the presence of the sinus rhythm with 80/min frequency with newly appeared changes suggestive for acute anterior myocardial infarction with ST elevation segment. The biochemical tests confirm the infarction hypothesis (CK-MB 256 UI, AST 94 UI, LDH 500 UI). A nonspecific inflammatory syndrome is also confirmed (fibrinogen 718 mg/dl, CRP 20 mg /dl, WBC 15000/mm with neutrophilia (69%)).

The transthoracic echocardiogram shows a non-dilated left ventricle with moderate systolic dysfunction (35% ejection fraction), with significant kinetic disorders in the anterior region (apex, medioapical septum and anterior wall dyskinesia).

A new coronarography was carried out and it confirmed the acute thrombotic occlusion at the level of

the stent located on the anterior descending coronary artery. Thromboaspiration was carried out, leading to the repermeabilisation of the vessel (TIMI III flow) (Figure 2).

Treatment with the glycoprotein IIb/IIIa inhibitor (Eptifibatide) and unfractionated heparin was initiated. The clopidogrel sensitivity testing confirmed the resistance to this drug, which required its replacement with ticagrelor 180 mg/day.

DISCUSSIONS

In stent thrombosis is a major problem with current prognostic implications. The main causes of stent thrombosis, whether we are talking about bare metal stents (BMS) or drug-eluting stents (DES), are: stent under expansion; strut fracture, stent deformation or other mechanical complications and drug resistance³.

Uren NG et al in a study in 2002 have reported that stent malapposition is a predictor of early or very late stent thrombosis⁴.

Another important mechanism is the resistance to antiplatelet therapy. Despite proper antiplatelet treatment, some patients show resistance to aspirin or clopidogrel. The resistance to the antiplatelet agent could be defined as an inhibiting deficiency of the platelets function, followed by the inefficiency of the prevention of the atherothrombotic ischemic events⁵.

Clopidogrel inhibits the ADP mediated platelet aggregation in a percentage of 30-50% by blocking the ADP-P2Y₁₂ receptor in the platelet membrane. If there is an increased release of ADP or an alternative way of platelet activation is stimulated, then its antiplatelet action is insufficient, increasing the risk of coronary events. CREST study mentions that an incomplete in-

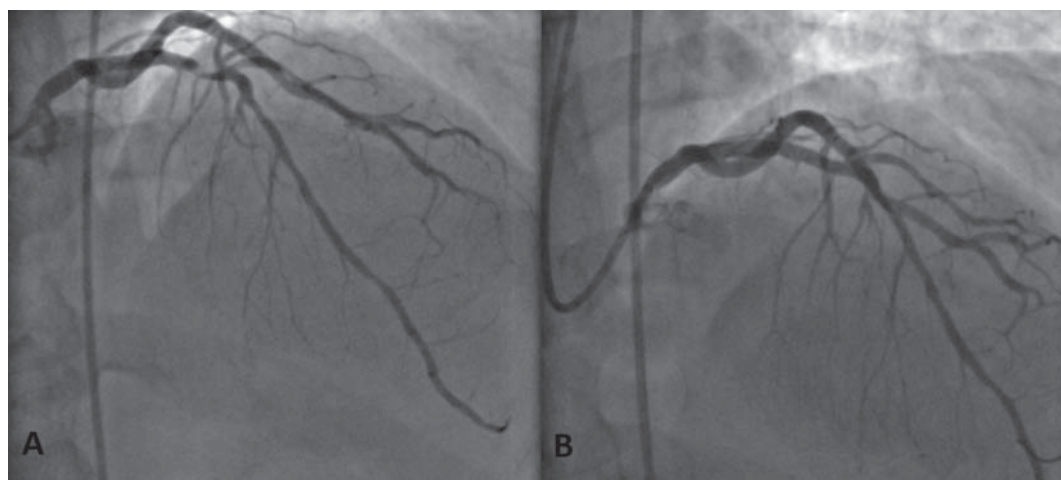


Figure 1. A. 95% stenosis of the anterior descending coronary artery B. Angioplasty with pharmacologically active stent on the left anterior descending coronary.

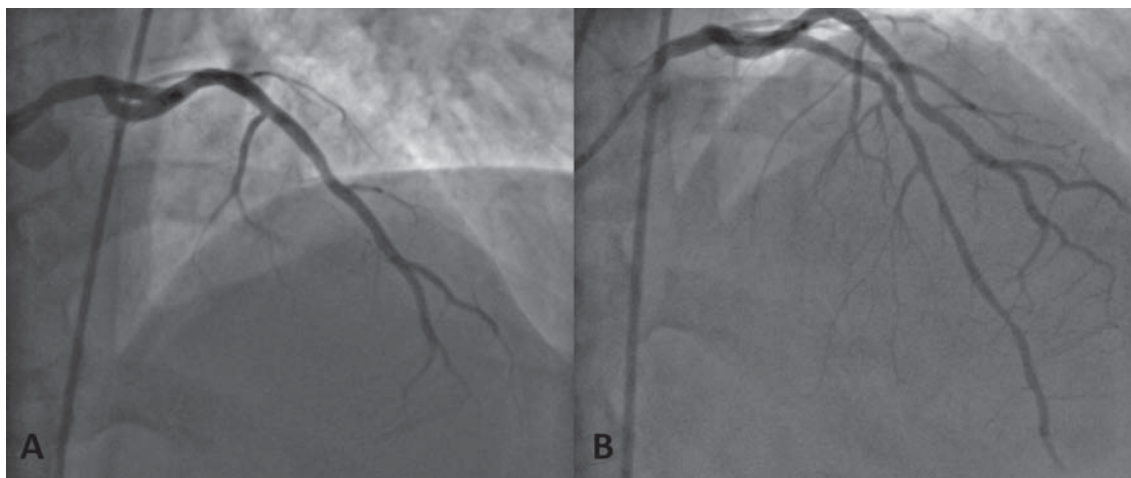


Figure 2. A. Thrombotic occlusion at the level of the stent located on the anterior descending coronary artery. B. Left anterior descending coronary artery after thromboaspiration.

hibition of the P2Y₁₂ receptors represents a risk factor for the subacute stent thrombosis^{6,7}.

RECLOSE I study carried out by Buonamici et al. in 2007 mentions a number of comorbidities associated with a weak response to clopidogrel, such as diabetes, insulin resistance, obesity, hypercholesterolemia, left ventricular systolic dysfunction and congestive heart failure⁸⁻¹⁰. Of all these, the high body mass index has been identified as an important predictor of body resistance to clopidogrel¹¹. Another study carried out on patients with coronary angioplasty who initially underwent intravascular ultrasound and later received dual antiplatelet treatment associates the weak response to clopidogrel with long coronary stenosis, highly calcified, bifurcation stenosis or stenosis on small caliber vessels, with slow flow or accompanied by coronary dissection¹².

Under these circumstances, the new antiplatelet agents offer a good alternative, decreasing significantly the risk of stent thrombosis. Prasugrel or ticagrelor are new treatment options, clinical studies showing their superiority compared to clopidogrel in inhibiting the platelet aggregation^{13,14}.

The presented case of subacute thrombosis in pharmacologically active stent meets many conditions that can cause the resistance to clopidogrel. The patient has diabetes, is overweight and dyslipidemic. At the same time, the performed treatment with atorvastatine and omeprazol could have interfered with the clopidogrel metabolization process, limiting the prodrug turning into its active component. After the acute coronary event, clopidogrel was replaced with ticagrelor. The subsequent evolution of the patient was good, without

other ischemic events, but with the loss of a significant myocardial contractile reserve.

CONCLUSIONS

In the patient with coronary angioplasty with stent, the antiplatelet dual therapy should be chosen depending on the individual risk of in-stent thrombosis that can be assessed based on the clopidogrel sensitivity testing and on the presence or absence of certain associated prothrombotic conditions (comorbidities such as diabetes, obesity, insulin resistance, dyslipidemia, as well as the presence of severe ventricular dysfunction or complex coronary lesions). It seems that the use of the new platelet antiagregants (ticagrelor, prasugrel) could significantly reduce the risk of in-stent thrombosis.

Conflict de interest: none declared.

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