Local administration of abciximab using a ClearWay RX infusion catheter in a patient with acute coronary syndrome caused by late in-stent thrombosis

Lokalne podanie abciximabu przy użyciu cewnika infuzyjnego ClearWay RX u chorego z ostrym zespołem wieńcowym spowodowanym późną zakrzepicą w stencie

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Abstract

We present a case of a 43 year-old male with a diagnosis of non-ST-segment elevation acute coronary syndrome related to in-stent thrombosis successfully treated with intralesion administration of abciximab via a local drug delivery catheter and thrombectomy during primary percutaneous coronary intervention.

Key words: abciximab, angioplasty, acute myocardial infarction, local administration

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INTRODUCTION

The ClearWay RX Local Therapeutic Infusion Catheter (Atrium Medical, USA) is a rapid exchange, non-dilatation catheter with a polytetrafluoroethylene balloon used for the localised infusion or irrigation of various diagnostic, embolic and therapeutic agents into the coronary and peripheral vasculature. We report a case of acute coronary syndrome caused by late in-stent thrombosis successfully treated with a combination of intralesion administration of abciximab using a ClearWay RX infusion catheter and thrombus aspiration using a thrombectomy device.

CASE REPORT

The 43 year-old male patient was transferred directly from home to our Department by ambulance with a diagnosis of non-ST-segment elevation acute coronary syndrome. He complained of crushing retrosternal chest pain of 11 hours' duration. The initial electrocardiogram showed ST-segment depression and negative T waves in II, III, aVF leads. He was haemodynamically stable (Killip class I), with arterial blood pressure of 130/90 mm Hg and pulse rate of 60 bpm. His risk factors of coronary artery disease included arterial hypertension and smoking. Three months before admission, he had suffered an acute inferior wall ST-segment elevation myocardial infarction, and was successfully treated with primary percutaneous coronary intervention (PCI) within the right coronary artery with bare-metal stent (3.0 × 10 mm at 14 atm.) implantation. The final outcome of index PCI was good, with optimal epicardial flow. Typical pharmacotherapy, including acetylsalicylic acid (75 mg once daily), clopidogrel (75 mg once daily, for 12 months), metoprolol succinate (100 mg daily), ramipril (10 mg once daily), and atorvastatin (40 mg once daily), was prescribed on discharge. However, pharmacotherapy — including antiplatelet drugs — had been completely stopped nine days before the described event due to unknown reasons.

During the transfer by ambulance, the patient received 300 mg of acetylsalicylic acid, 600 mg of clopidogrel and

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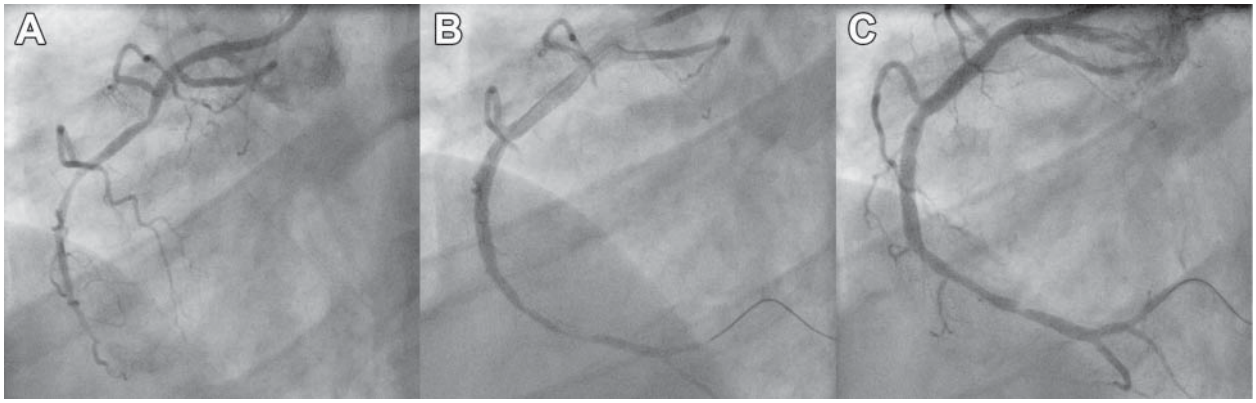

Figure 1. Primary angioplasty in patient with ST-segment elevation myocardial infarction caused by late stent thrombosis; **A.** Coronary angiography in the left anterior oblique view showing in-stent thrombosis of the distal right coronary artery; **B.** Reduction of the thrombus load and restoration of the distal flow after abciximab administration at the site of the occlusion via a local drug delivery catheter; **C.** Control angiogram recorded after two passages of manual aspiration catheter

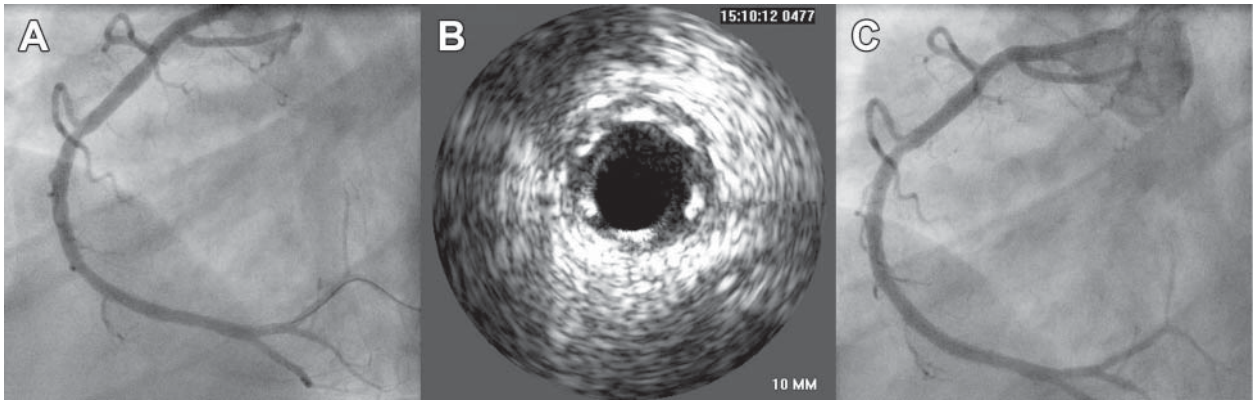

Figure 2. Primary angioplasty in patient with ST-segment elevation myocardial infarction caused by late stent thrombosis; **A.** Control angiogram recorded after additional stent implantation; **B.** An inadequate stent expansion of the previously implanted bare-metal stent confirmed by grayscale intravascular ultrasound; **C.** Final result of the procedure with optimal epicardial flow

5,000 U of unfractionated heparin. Immediate coronary angiography using the femoral approach and standard 6 French diagnostic catheters was performed showing an acute occlusion of the distal right coronary artery caused by in-stent thrombosis (Fig. 1A) and normal remaining arteries. PCI of the infarct-related artery was attempted using a Launcher (Medtronic Vascular, USA) 6 French Judkins right 4.0 guiding catheter. Additional bolus of unfractionated heparin was given to achieve an activated clotting time of 250 s. The site of occlusion was crossed with a soft 0.014-inch BMW (Abbott Vascular, USA) guidewire, but no improvement in the flow was observed. Then a 10 mg bolus of abciximab was given over 60 s using a ClearWay RX infusion catheter locally at the place of the artery occlusion. Reduction of the thrombus load and restoration of the distal flow was achieved (Fig. 1B). An additional two passages of Diver C.E. (Invatec, Italy) were performed. Aspiration success was confirmed by thrombus fragments and debris retrieval. Optimal epicardial (TIMI grade 3) flow was achieved (Fig. 1C). Due to persistent stenosis in the distal part of the artery, an additional stent (drug-eluting stent — Promus [Boston Scientific, USA] 3.0 × 18 mm at 18 atm.) was implanted overlapping the distal part of the previous one (Fig. 2A). Grayscale intravascular ultrasound was perform to check the result of the PCI. An inadequate stent expansion of the previously implanted stent was confirmed (Fig. 2B). Both stents were postdilatated with a Maverick (Boston Scientific, USA) balloon catheter 3.5 × 15 mm up to 16 atm. The final TIMI grade 3 flow without residual stenosis was achieved (Fig. 2C). Optimal expansion of both stents was confirmed by intravascular ultrasound. After PCI, the patient was symptom-free and peak levels of cardiac markers after PCI were: CK-MB 44 IU/L, and troponin I 1.84 μg/L. In the control echocardio-

gram a left ventricular ejection fraction of 60% with hypokinesia of inferior wall was noted. The patient was discharged home after five days. Upon discharge, his antiplatelet therapy consisted of acetylsalicylic acid (75 mg once daily), and clopidogrel (75 mg once daily, for 12 months).

DISCUSSION

The present case illustrates that the local administration of abciximab via a local drug delivery catheter (ClearWay RX) is feasible in patients with acute coronary syndrome caused by in-stent thrombosis.

In most cases, glycoprotein (GP) IIb/IIIa inhibitors, including abciximab, are used as intravenous bolus and infusion during primary PCI. There was a suggestion from a small study that intracoronary administration of abciximab during primary PCI may improve reperfusion parameters and reduce infarct size in comparison with intravenous use [1]. On the other hand, no clinical benefit of intracoronary administration of abciximab was confirmed in a large, randomised study [2]. In a recent meta-analysis of eight studies, intracoronary administration of abciximab was associated with a significant improvement in myocardial perfusion, without significant benefits in terms of mortality, reinfarction, or major bleeding complications [3]. However, a significant relationship was observed between the patient's risk profile and mortality benefits from intracoronary abciximab administration. Importantly, there is no data to confirm the efficacy of intracoronary abciximab in the treatment of in-stent thrombosis. Erden et al. [4] reported a case of acute in-stent thrombosis successfully treated with intracoronary administration of tirofiban.

Another possibility, as described here, is to use a dedicated therapeutic perfusion catheter for intralesion infusion of abciximab. Local administration may increase concentrations of abciximab at the culprit lesion and in the distal vascular bed, and allow optimisation of the diffusion of abciximab to platelets within flow-limiting thrombi. Also the non-GP IIb/IIIa properties of abciximab mediated through inhibition of the vibronectin and Mac-1 receptors may be greater at higher local concentrations. By potentiating the local anti-inflammatory effects of abciximab, reperfusion injury may be minimised, resulting in greater myocardial salvage. Data from the COCTAIL study has shown that administration of abciximab by local intracoronary infusion through the ClearWay RX catheter can reduce thrombus burden and improve coronary microcirculation [5]. In the recently reported INFUSE AMI trial, local administration of abciximab was associated with significant, although modest, reduction of the infarct size assessed by cardiac magnetic resonance at 30 days after first, anterior wall ST elevation myocardial infarction in comparison with no abciximab administration [6]. The greatest benefit was observed when local infusion of abciximab was combined with prior thrombus aspiration. However, limited data is available regarding the utility of that approach for in-stent thrombosis treatment.

In the present case, an occurrence of in-stent thrombosis was probably triggered by termination of dual antiplatelet therapy. On the other hand, late and very late in-stent thrombosis after bare-metal stent implantation is a rather rare entity, even in patients who stopped antiplatelet treatment, and it may suggest a suboptimal result of the index procedure — an inadequate stent expansion as presented here. If possible, intravascular ultrasound should be performed in each case of stent thrombosis to confirm stent apposition and expansion. In patients after in-stent thrombosis, more potent P2Y12 inhibitors, i.e. prasugrel and ticagrelor, should be considered especially in the case of clopidogrel treatment failure [7].

CONCLUSIONS

In conclusion, both intracoronary and intralesion abciximab administration may be considered in high-risk patients. However, long-term follow-up results and additional randomised trials are needed to confirm the clinical benefits of such an approach.

Conflict of interest: *Drs Dziewierz, Rakowski, and Dudek — participation in the INFUSE AMI study; Dr Brzeziński — no financial conflicts regarding the content of this manuscript.*

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