Case Report

Successful Administration of Very High Doses of Adenosine Distal Coronary Administration using Export Catheter for Resistant No-reflow

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Successful Administration of Very High Doses of Adenosine Distal Coronary Administration Using Export Catheter for Resistant No-Reflow

Short title: Distal Drug Infusion via Export Catheter for No-Reflow

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Abstract: Resistant no-reflow can be difficult to treat. Unfortunately, persistent no-reflow can increase cardiac adverse events. It can be very difficult to treat. Intracoronary injections of any vasoactive substances into the proximal coronaries cannot efficiently infuse the distal coronary bed. In this case, we report distal administration of very high doses of Adenosine in a native coronary artery for a severe life-threatening resistant no-reflow. Using an export catheter, we could reverse this complication within seconds. This case elaborates on the importance of giving high doses of vasoactive drugs as distal as possible in the coronary arteries for resistant no-reflow using an export catheter.

Keywords: No-reflow; percutaneous coronary intervention; angioplasty; distal administration; slow-flow; TIMI flow; export catheter; over the balloon catheter; stenting; coronary intervention

Introduction

No-reflow occurring during the coronary intervention can be unpredictable and increase cardiovascular adverse events. Initial treatment of intracoronary vasoactive drugs in a proximal coronary artery has limited success due to the inability to reach the distal coronary bed. Furthermore, due to proximal injection, more systemic side effects can occur limiting the doses that can be administrated. Therefore, by giving active drugs very distally, we can guarantee that they will reach the distal coronary bed and at the same time markedly reduce the systemic drug effect. This can be done using an over-the-balloon or microcatheters. However, it is time-consuming as it requires docking the short wire and removal of the wire after distal advancement of the balloon or microcatheter. Further, the small lumen makes it more difficult to administer high doses of drugs. An export catheter is a monorail system with a very large lumen making it an ideal catheter for this purpose. In this case, we present the first case report of successfully treating a life-threatening resistant no-reflow in a native coronary using an export catheter.

Case Presentation

A 69-year-old white male presented to the emergency department with sudden onset of severe substernal chest pain for two hours. His EKG revealed inferior ST-elevation myocardial infarction. The patient was taken urgently to the cardiac catheterization laboratory using his right radial artery. He was found to have distal right coronary artery occlusion which was successfully stented with a resolution of his ST elevation and chest pain. His left anterior descending artery (LAD) angiogram revealed two 80-90% mid lesions (Figure 1). He remained chest pain-free with persistent normal creatinine. He was brought back to the cardiac catheterization laboratory two days later for the staged procedure on his LAD lesions using the same right radial access. A 6 French slender sheath was

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used for his radial access. The patient was on oral prasugrel, statin, and aspirin. A weight-based bolus of bivalirudin was given and continuous IV infusion was started. A 6 French EBU 3.5 catheter was used to engage the left main. A Balance Middle Weight 0.014-inch (Abbott Vascular, Santa Clara, California) wire was advanced across the lesions without any difficulty. An Emerge 2.0 mm x 12 balloons (Boston Scientific, Marlborough, Massachusetts) was advanced across both lesions inflating to 8-10 atmospheres. Next, a Synergy 2.5 x 16 stent (Boston Scientific, Marlborough, Massachusetts) was advanced across the distal lesion inflating to 18 atm. Post-stenting, severe no-reflow occurred with severe chest pain (Figure 2). Multiple doses of 80 micrograms of intracoronary adenosine administration did not cause any improvement in the flow with worsening chest pain. The patient was restless with severe chest pain and significant EKG changes. The decision was made to proceed with the distal administration of a very high dose of adenosine. An export thrombectomy catheter (Medtronic, Minneapolis, MN) was advanced into mid-LAD (Figure 3) within seconds with the administration of 500 micrograms of Adenosine distally with immediate normalization of distal flow. The patient developed transient ventricular fibrillation due to reperfusion arrhythmia which was successfully cardioverted. The patient remained chest pain-free. The patient underwent another proximal stenting using Synergy 2.75 x 20 mm stent (Boston Scientific, Marlborough, Massachusetts) deploying at 18 atm with excellent results. (Figure 4). The patient remained chest pain-free with persistent TIMI-3 flow and was discharged the next day on aspirin, statin, metoprolol, and prasugrel. His echocardiogram before discharge revealed a normal ejection fraction with mild basal inferior wall hypokinesia.

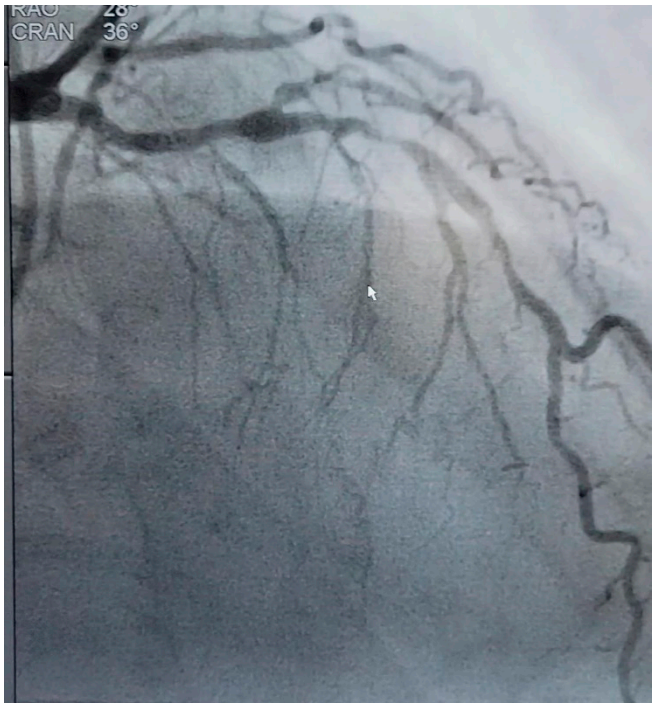

Figure 1. Coronary angiogram showing two 80-90% mid LAD lesions.

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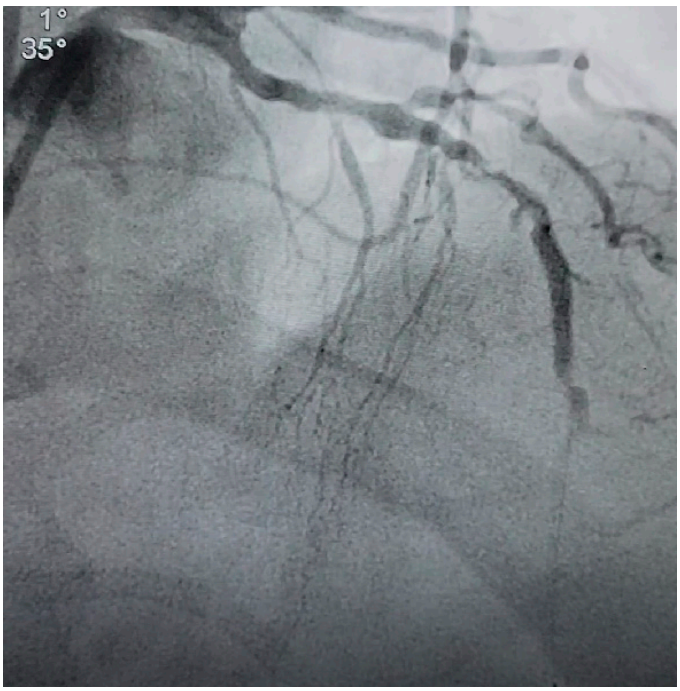

Figure 2. The occurrence of No-reflow.

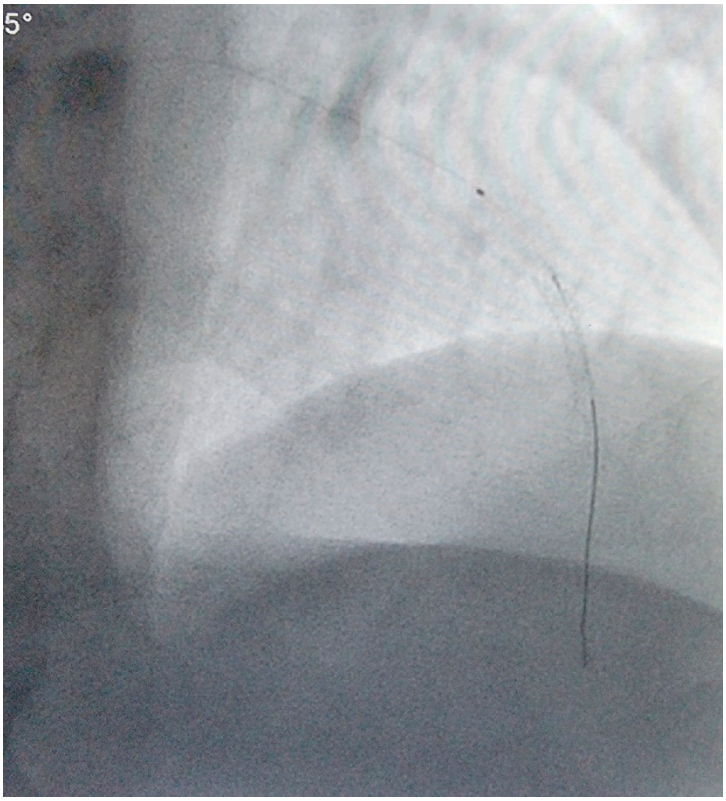

Figure 3. Export catheter is seen in mid LAD for distal adenosine administration.

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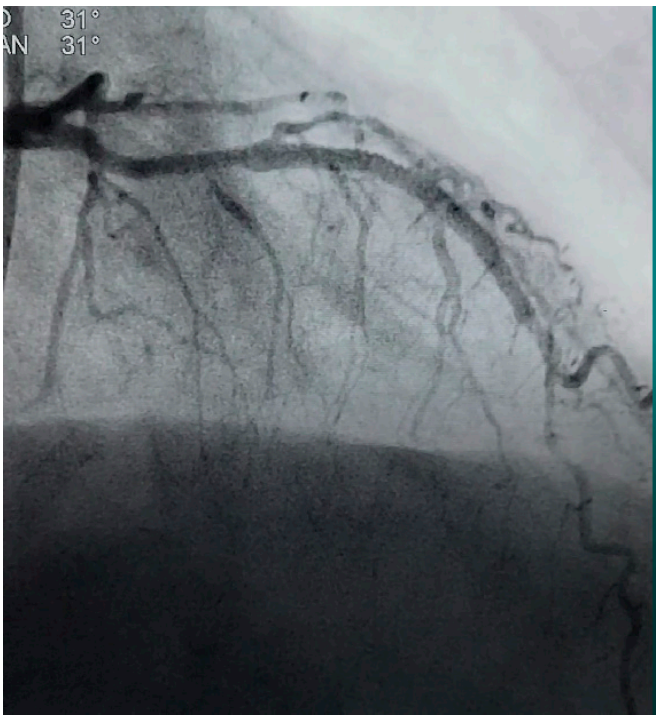

Figure 4. Final results with resolution of No-reflow.

Discussion

No-reflow is a serious condition that increases adverse outcomes. It requires immediate attention. Many therapeutic interventions are described in the literature including intracoronary administrations of adenosis, nitroprusside, verapamil, epinephrine, Glycoprotein IIbIIIa inhibitors etc with various successes. [1] Unfortunately, many of these approaches can fail to reverse persistent no-reflow. [2] However, distal administration of very high doses of adenosine with the availability of an export catheter can be performed very easily and quickly in less than 20 seconds. Distal vasoactive substance administration has been successfully reported in limited case reports but totally underutilized. We reported the first successful case in 2008 before the availability of export catheter using an over-the-balloon catheter which is more time-consuming and requires wire extension. [3] Recently, a Clearway catheter (Atrium Medical, Hudson, NH) which is a rapid exchange balloon catheter has been successfully used for this purpose. [4] This case is the first case in the literature reporting the use of an export catheter for distal adenosine administration in a native coronary. We believe that this approach should be the standard of care in resistant no reflows. [5,6] Due to the very short half-life of adenosine and distal administration of this drug, multiple very high doses can be administered safely. Other vasoactive drugs can also be given with this approach. Recent study comparing proximal vs distal administration of vasoactive drugs during coronary no-reflow occurrence revealed higher TIMI-3 flow with distal administration consistent with our report (7,8). Randomized clinical trials hopefully can assess the safety and effectiveness of this approach. With this manuscript, we hope that we can raise the awareness of our interventional community about this approach for treating resistant no-reflow. Furthermore, we emphasize that the utilization of an export catheter appears to be the easiest method for this treatment option.

Conclusion

Distal administration of vasoactive drugs in patients with resistant and persistent no-reflow is a very safe and effective way to treat resistant no-reflow. It can be best achieved using an export catheter.

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