

A Case of Thrombus Aspiration Catheter Trapped in Coronary Artery Due To Rupture of its Main Shaft and Twisting Over the Wire

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Abstract

We report a novel complication that arose while treating a 54 year old man with acute inferior ST elevation segment myocardial infarction. It was decided to perform thrombus aspiration prior to balloon angioplasty. However, after aggressive maneuvers to cross the tight lesion in order to suck the distal thrombus, a novel complication was encountered. The Thrombus Aspiration Catheter (TAC) got stuck in the coronary artery. When the whole apparatus was pulled out, it was realized that the guidewire cut the main shaft of TAC and catheter got twisted over the wire. To the best of our knowledge, this is the first report of a complication of this type.

Keywords: Thrombus aspiration catheter; Complication; ST elevation segment myocardial infarction; Entrapment

Introduction

Due to the inherent advantages of thrombus aspiration in the treatment of ST Elevation Segment Myocardial Infarction (STEMI), there is a growing body of interest on thrombus aspiration devices [1-3]. As a result, there is a substantial increase in the utilization of Thrombus Aspiration Catheter (TAC) in catheterization clinics. This has led to the occurrence of peculiar complications in the field of percutaneous angioplasty.

Here a case of a 54-year-old male patient, presented to our hospital with acute inferolateral STEMI, is being reported. Due to high thrombus burden the use of TAC was recommended; however due to aggressive manoeuvres while attempting to cross the lesion prior to angioplasty, a novel complication was encountered. To the best of our knowledge this complication has not been reported before.

Case

A 54-year-old man was presented to the university hospital with ongoing angina pectoris for the last 2 hours. He did not have any systemic illness or a history of coronary artery disease. Physical examination was found to be normal. The subject was hemodynamically stable with clear lungs and no observable cardiac murmurs, S3 or peripheral oedema. The initial electrocardiogram showed 3 mm of ST segment elevation in the inferior leads and 2 mm of ST segment depression in the anterior leads consistent with an acute inferior wall STEMI. He was treated with 5000 units of heparin intravenously, 300 mg of aspirin and clopidogrel (600 mg loading dose) at the emergency department. He was then immediately transferred to the coronary catheterization laboratory. Coronary angiography revealed the presence of a patent LMCA stent, 50% stenosis of the proximal segment of the Left Anterior Descending artery (LAD) and a poorly developed left-to-right collaterals (Rentrop

grade 1), 30% and 75% stenosis in the proximal and middle segments respectively of the Left Circumflex Artery (LCX) and a 100% stenosis in the proximal segment of right coronary artery (RCA). Tirofiban infusion was started prior to angioplasty. The ostium of the right coronary artery was selectively cannulated by a 6 French 4.0 Judkins guide catheter. The lesion was crossed with a 0.014 non-hydrophilic PTFE coated intermediate guidewire (Alvimedical Neviguide™) and TIMI grade 2 flow was observed immediately after with a high burden of thrombus spreading from proximal lesion to the acute margin segment of RCA (Figure 1). It was decided to perform thrombus aspiration and a VMAX™ aspiration catheter was directed to the lesion. After suction of proximal thrombus, the proximal flow improved but distal embolization occluded the posterolateral branch. It was decided to perform distal suction as well, but after a few unsuccessful attempts to cross the proximal lesion, balloon angioplasty was performed with a 3.0×25 mm Maverick balloon (Boston Scientific) at a pressure of 8 atm at the proximal lesion. Another attempt was made to cross the lesion again with the thrombus aspiration catheter and it was difficult to cross the lesion due to the kink but managed to cross when pushed hard. It was also found difficult to cross the crux to distal posterolateral segment but eventually gave in when the TAC was pushed with increased pressure. After a few successful suction of the thrombus, it was decided to push it back to deploy the stent. However it was found impossible to move the guidewire in either direction. It was noticed at this point through the scope view, the separation of guidewire from the main shaft of TAC (Figure 2). It was decided to pull both the guidewire and the TAC out together, however the guiding catheter was stuck in the mid portion of RCA hence the guidewire and TAC did not move backwards. Then it was decided to pull the whole system out altogether. After a period of resistance, a sudden release occurred and the whole system was recovered successfully. The main shaft of the TAC was found ruptured from the guidewire starting from its back till its suction tip and the whole wire was twisted over the main shaft of TAC (Figure 3).

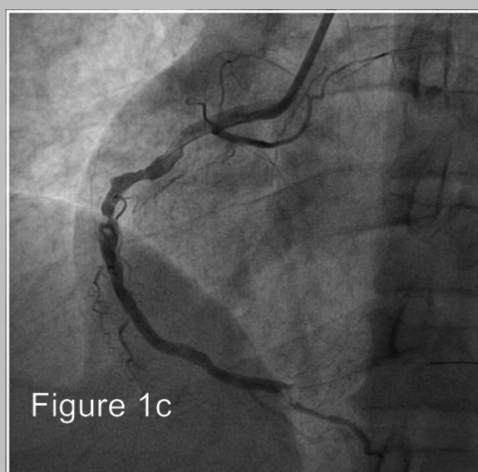
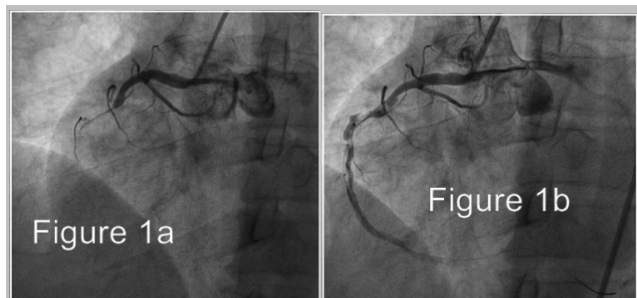


Figure 1: **A)** Left anterior oblique view of the right coronary artery (RCA) revealing 100% stenosis of the proximal artery. **B)** Left anterior oblique view of the RCA revealing the TIMI grade 1 flow restored just after crossing the proximal lesion. High thrombus burden of vessel spreading from proximal segment to the acute margine level and the slight tortuosity of the artery are clearly visible. **C)** TIMI grade 3 flow restored after the suction of proximal thrombus in RCA. Note: The distal posterolateral branch was occluded because of distal thrombus embolization.

Then, the RCA ostium was cannulated again with a guiding catheter. Subsequent angiographic views did not reveal any dissection or perforation of the coronary artery. The lesion was crossed with another intermediate guidewire (Neviguide™) and a bare-metal stent (BMS, Apollo 3.5×36mm) was deployed to the proximal lesion. The procedure concluded with the restoration of TIMI grade I flow (Figure 4). Angioplasty of Cx lesion was decided to be performed in another session. Revascularization of the Cx was performed with a BMS in another centre after a month and during the follow up period of 3 months, no further clinical events were reported. An echocardiogram at 3 months revealed an ejection fraction of 58% with hypokinesis of the posterior wall.

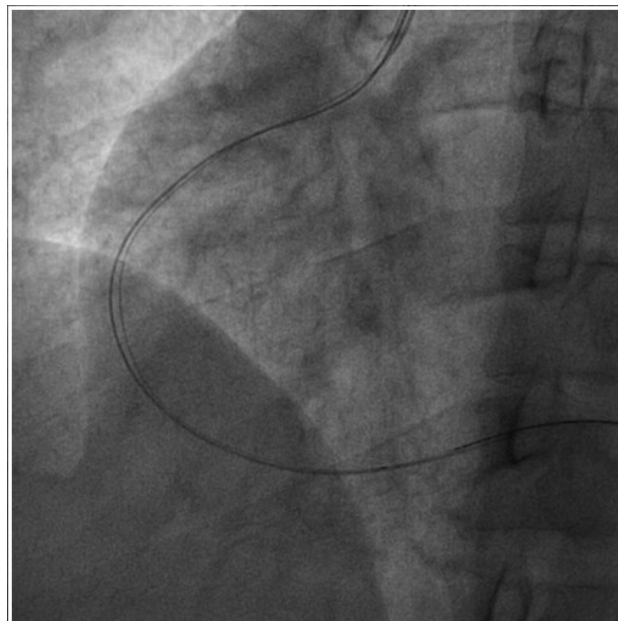


Figure 2: X-ray image revealing the broken guidewire from the main shaft of the thrombus aspiration catheter. The guidewire and the main shaft of the catheter can be seen separately through the coronary artery.



Figure 3: Image showing the ruptured shaft of the thrombus aspiration catheter. The catheter can be seen twisted on the guidewire leading to entrapment of the system in the RCA.

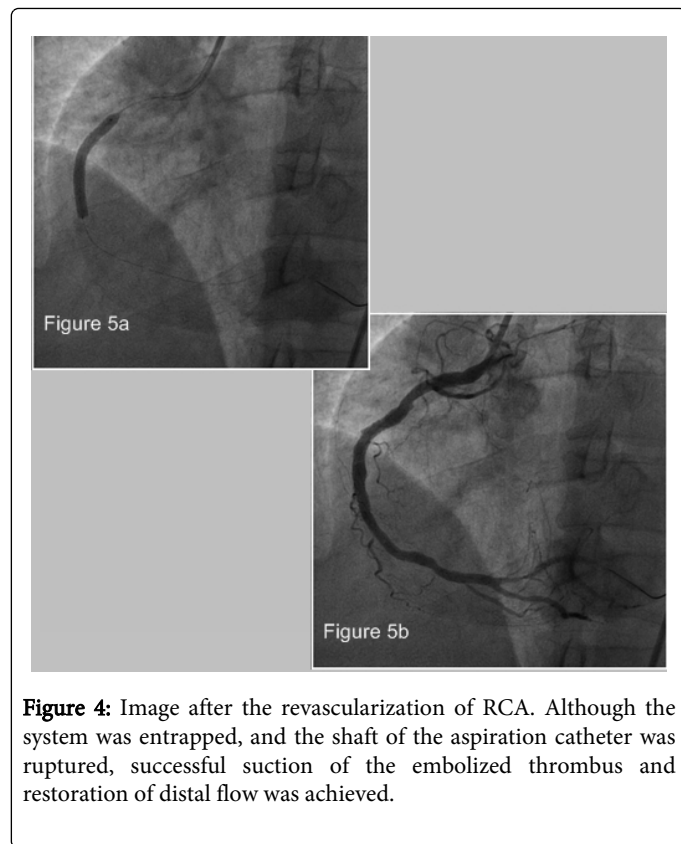


Figure 4: Image after the revascularization of RCA. Although the system was entrapped, and the shaft of the aspiration catheter was ruptured, successful suction of the embolized thrombus and restoration of distal flow was achieved.

Discussion

Thrombus aspiration has become an important tool for the removal of thrombi that lead to STEMI. Several studies like TAPAS and EXPIRA have confirmed that aspiration thrombectomy may improve Thrombolysis In Myocardial Infarction (TIMI) flow, myocardial blush scores, and ST-Segment Resolution (STR) and less myocardial longitudinal deformation [1-3]. However, there is still much debate about the utility of routine usage of thrombus aspiration catheters in STEMI patients. Some recent studies demonstrated that routine usage of this device may not improve mortality or bring any advantages in that field [4,5].

Due to increasing usage of TAC in the catheterization laboratories, operators have begun to face complications peculiar to these devices. In this particular case a novel complication was encountered—thrombus aspiration catheter getting stuck in RCA due to rupture of its main shaft and twisting of the wire, due to aggressive manoeuvre of the device. Fortunately, there was no dissection or perforation of the coronary artery. Operators should be aware of the potential complications that arise while handling these devices, which include stroke, air embolization, distal embolization of thrombus and vessel dissection and perforation.

Recently, Alazzoni et al. reported a left main thrombus as a complication of thrombectomy during primary percutaneous coronary intervention [6]. There is a meta-analysis data taking into consideration the rate of complications that arises on the usage of these devices. This meta-analysis of randomized trials has revealed possible reduction in mortality but with a trend for possible increased

rate of stroke with the routine use of coronary thrombus aspiration in STEMI [7].

If entrapment of TAC occurs during any invasive procedure, there are only few possible maneuvers to perform. Operator may pull only the TAC back over the wire, while taking care that the guiding catheter not to be sucked deep into the coronary artery. However, aggressive maneuvers may result in the breaking of TAC into pieces. Another possibility is to pull back the TAC and wire together while considering the stability of guiding catheter. However, in an identical scenario as reported here, if the pulling process causes the suction of the guiding catheter, there are only two more maneuvers possible to be performed. The whole system can be pulled out along with the guiding catheter, wire and the TAC, with a mild application of power. However, in the event of failure of this maneuver, or in order to avoid the accidental dissection or rupture of coronary artery with the application of increased force, balloon dilatation of the entrapped segment through a new wire crossed beside the TAC may be considered before opting the surgery. However, before re-wiring the system, operator should try to push the entrapped TAC and the first wire slightly further to open a space for the second wire.

In conclusion, in this report, a new, very rare complication associated with invasive cardiology is being presented. Interventional cardiologists are required to be aware of the complications arising with the use of these thrombus aspirating devices and should be trained to handle these complications. If entrapment of TAC occurs, the operator should weigh the risks and benefits of any manoeuvre. While attempting to cross tight lesions, operators should avoid aggressive manoeuvres and ascertain the integrity of the guidewire and the shaft of the thrombus aspiration catheter. Thrombus suction of the proximal part may be enough, especially if the lesion is tight enough to block the TAC to push forward. If further distal suction is required, it may be logical to perform it after balloon angioplasty to avoid these complications. In this particular case, we were fortunate enough to remove the whole system successfully out without needing surgery or balloon dilatation and without causing dissection or rupture of the right coronary artery.

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