Case Report

Successful Thrombus Removal During Angioplasty in a Patient with Acute Myocardial Infarction Using a New Aspiration Catheter

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We describe the case of a male patient, aged 62 years, with acute myocardial infarction, who underwent primary angioplasty using a new thrombus aspiration catheter in conjunction with the conventional technique. This catheter is easier to use than similar devices available to date and is extremely effective in the removal of large intracoronary thrombi, thus providing protection against distal embolism during angioplasty procedures.

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In spite of significant progress in invasive cardiology and the use of aggressive antiplatelet treatment, intracoronary thrombus is still a major problem affecting angioplasty procedures, because of the risk of distal embolism and consequent disturbances of the microcirculation. We present the case of a patient undergoing primary angioplasty for acute myocardial infarction after the successful removal of a large quantity of thrombus using a new aspiration catheter technique.

Case description

A man aged 62 years, a smoker, hypertensive and hyperlipidaemic, was admitted to the emergency department of the hospital with a clinical picture of acute inferior myocardial infarction. His symptoms had started two days before, with short-lasting episodes of retrosternal constrictive pain that stopped spontaneously, while on arrival he reported continuous pain for the last two hours. The patient was immediately transferred to the haemodynamic laboratory of the Cardiology Department where he underwent emergency coronary angiography, which revealed haemodynamically non-significant lesions in the left coronary artery and complete occlusion of the right coronary artery in its second third (Figure 1).

On the basis of these findings, we decided to proceed with right coronary angioplasty, using a new intracoronary thrombus aspiration catheter (Export Aspiration Catheter - EAC, Medtronic AVE). A 7F angioplasty catheter (Judkins R4) was used to catheterise the right coronary artery and the occlusion was approached with a 0.014″ floppy guidewire that was steered to the distal part of the vessel. The EAC was then introduced over the guidewire, distal to the occlusion, and continuous aspirations were started. This procedure took around 15 minutes, during which the EAC was moved to different points within the vessel, from the distal section to its origin. The aspirated material was collected in dry gauzes so that the removed sections of thrombus would be visible. At the end of the procedure a rather large amount of thrombus had been removed and the entire vessel began to opacify, with TIMI 3 flow (Figure 2).

A 2 x 20 mm Maverick balloon (Boston Scientific) was then used to dilate the stenoses and a 2.5 x 20 mm Tsunami stent (Terrumo) was implanted, with a very good final angiographic result (Figure 3). The patient's postoperative course was free of com-

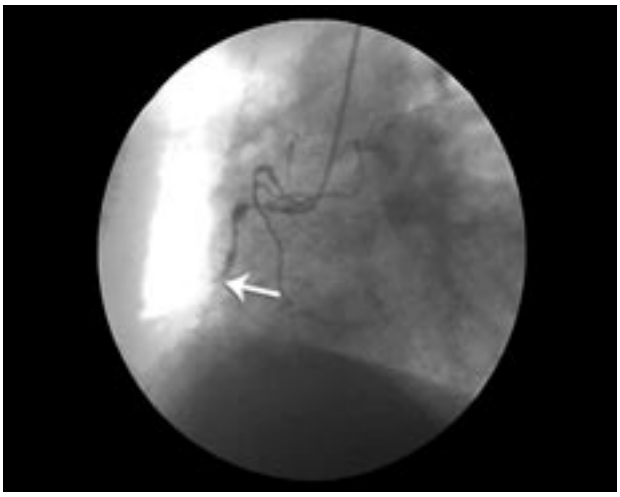

Figure 1. Right projection of the right coronary artery, showing complete occlusion of its second third (arrow).

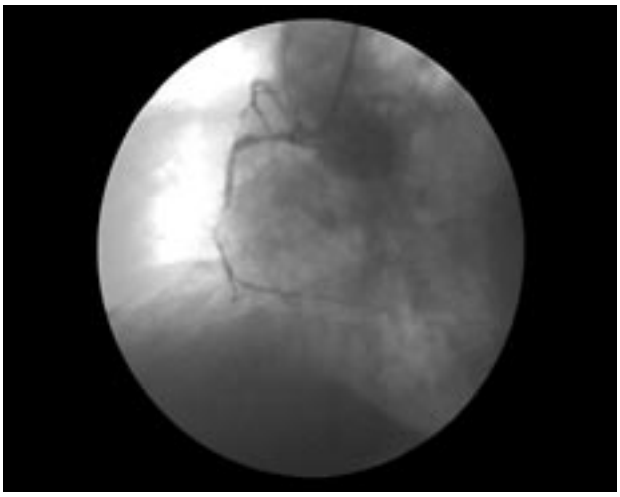

Figure 2. Immediately after the use of the aspiration catheter there is opacification of the lumen along the whole length of the right coronary artery , with TIMI 3 flow.

plications and he was discharged after six days' total hospitalisation.

Discussion

In recent years, primary angioplasty has been steadily gaining ground in the treatment of acute myocardial infarction, since it is significantly superior to thrombolysis in achieving patency and TIMI 3 flow in the infarct artery.[1,2] However, one significant problem that occurs during primary angioplasty is the creation of distal microemboli, which often disturb the microcirculation, causing the slow-reflow or no-reflow phenomenon[3,4] and leading eventually to extensive myocardial necrosis and a poor clinical outcome for the patient,[5] despite the restoration of patency in the vessel. Neither aggressive antiplatelet treatment with clopidogrel and glycoprotein IIb/IIIa inhibitors, nor the intracoronary administration of adenosine or verapamil, which have been used as therapeutic measures, appear to reduce the frequency of occurrence of these phenomena to any notable degree.[6-8] Thus, recent years have seen an attempt to develop various techniques for the mechanical removal of thrombus during primary coronary angioplasty.[9] The techniques developed so far include atherotomy devices, the use of an excimer laser (ELCA), intracoronary thrombolysis using ultrasound (CUT), rheolytic thrombectomy, filters and devices that protect against distal emboli, and the use of catheters for aspiration of the thrombus.[10-17] All these techniques, regardless of which have proved to be more and which less useful than others, have important disadvantages and limitations in their use. These methods are not available in most haemodynamic laboratories, they are also costly, but the main limitation is that they are difficult to apply because of their complexity.

The EAC was designed as part of a system for protection against distal emboli, PercuSurge.[18,19] Since the system was designed for peripheral vessels and venous grafts it is very difficult to use in autochthonous coronary arteries, especially under conditions of myocardial infarction when time is of the essence. However, the EAC is easy to use by itself and access to the occluded artery can be gained quite quickly and without any particular technical demands. The length of the catheter is 135 cm and its diameter is 0.04″ (about 1 mm), which is sufficient to allow the aspiration of rather large quanti-

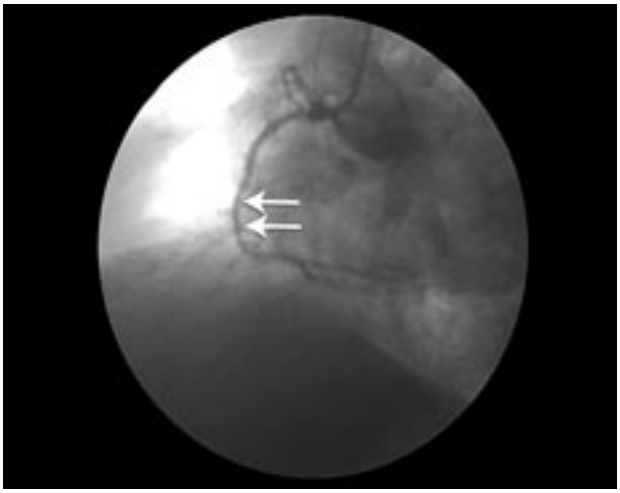

Figure 3. Final angiographic result after angioplasty and stenting (arrows).

ties of thrombus. It can be introduced via a 7F guiding catheter over any 0.014″ guidewire. Its most important advantage over older aspiration catheters is that its double lumen, which allows the guidewire to remain in place, minimises the risk of injury to the vessel during catheter manipulation.

As far as the safety of the EAC is concerned, it has been reported that in animals, after forceful aspiration, there is likely to be damage to the endothelium, without, however, damage to the other layers of the vascular wall.[20] The clinical experience from its use to date is extremely encouraging, without any particular complications.[21] Our own experience from the use of the catheter in the case described here shows it to be easy to use and effective, without prolonging the duration of the angioplasty to any great degree. Of course, much remains to be studied in relation to the use of the EAC. First of all, its long term efficacy in large series of patients has not been investigated, nor has its possible effect on restenosis rates as a result of the endothelial damage it may cause. In addition, the ideal aspiration pressure that should be used and the precise manipulations for its optimal placement and movement within the vessel lumen remain to be determined. In our opinion, which is opposed to other reports,[22] thrombus removal with the EAC should precede balloon inflation, since in this way the risk of distal emboli is reduced. Although balloon inflation allows faster opening of the lumen, if there is no distal protection filter the danger of emboli remains.

In conclusion, our experience from the use of the EAC in a patient with acute myocardial infarction shows that it is an extremely easy to use and effective device for the removal of sizeable intraluminal thrombus and could be a very good way of protecting against distal micro- and macroemboli.

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