Case Report

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From the Start to the End-using Proximal Right Coronary Artery Thrombus to seal a Distal Right Coronary Artery Guide-Wire Induced Perforation

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Abstract

Coronary artery perforation is a rare but feared complication in percutaneous coronary artery intervention. Various techniques and methods have been proposed in the management of a coronary artery guide-wire induced perforation. We present a unique case of using the thrombi aspirated from a proximal right coronary artery occlusion to seal the distal branch perforation induced by the coronary guide wire. The patient had presented with an acute coronary syndrome requiring urgent percutaneous coronary intervention. Unfortunately he developed a distal artery perforation which was did not seal despite multiple prolonged balloon inflations. In the absence of available adjunctive device such as coronary coils or gel foam, we had improvised using thrombi aspirated from the proximal occlusion to seal the distal small branch perforation with success. There was no significant pericardial effusion post-procedure and the patient recovered uneventfully. A check coronary angiography done during the staged percutaneous coronary intervention of his left anterior descending artery showed preserved flow in the distal right coronary artery. This case highlighted the successful improvised treatment of a coronary guide-wire induced perforation using thrombus injection.

Keywords: Coronary perforation; Thrombus; Embolization; Guide-wire

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Introduction

Percutaneous coronary intervention (PCI) rates have been increasing in the past two decades. Increasingly there are many centres that perform such procedures without on-site cardio-thoraic surgery support. Complications of PCI are fortunately rare. Management of complications such as coronary artery perforation is an important skill for all interventional cardiologists. Not all cardiac catheterization laboratories will have adjunctive devices for bailout situations in times of complications.

This case has demonstrated the improvised treatment of a distal coronary guide-wire induced perforation without the availability of usual devices such as coils or gel foams. Our patient who had presented with a complete right coronary artery occlusion has had thrombus aspirated from the proximal segment of the artery. There was a small distal branch coronary artery perforation induced by the guide-wire. Attempts to seal the perforation were unsuccessful despite multiple prolonged balloon inflation and reversal of anticoagulation. We then improvised and injected small thrombi through a micro-catheter and sealed the distal branch perforation successfully. There was good distal flow without any occlusion of the other side branches. The patient recovered uneventfully with no significant pericardial effusion. To our knowledge, this is the first case reporting the successful use of the thrombus from the same patient in sealing the distal perforation.

Case Report

We present a case of a 59-year-old gentleman who was treated for non ST-segment myocardial infarction (NSTEMI) presenting with non-specific giddiness and cold sweats. Mr. THC had no known prior medical illnesses and he was a non-smoker. He presented to the Emergency Department with complaints of giddiness and cold sweats. A 12 lead electrocardiogram (ECG) showed isolated T wave inversion in lead III **(Figure 1)** however his serum cardiac troponin T was significantly elevated at 996 ng/L. He was started on dual anti-platelets and subcutaneous Enoxaparin as per NSTEMI management.

Mr. THC then underwent a coronary angiogram the following morning. A diagnostic coronary angiogram performed via the right radial artery approach showed a total occlusion of the mid segment of the right coronary artery (RCA) The left anterior descending artery was diffusely diseased **(Figures 2a, 2b and 3a).**

We proceeded with PCI to the culprit lesion at the proximal-mid segment of the RCA. The initial guidewire Run-through Floppy TM (Terumo Medical Corporation, Japan) failed to cross the proximal occlusion. Hence we changed to a tapered tip wire Fielder XT-A TM (Asahi Intecc Co. Ltd, Japan). The coronary guidewire was advanced successfully to the postero-lateral branches (PLB). The proximal-mid segment was dilated with a small 1.2 × 12 mm balloon and we then attempted manual aspiration thrombectomy

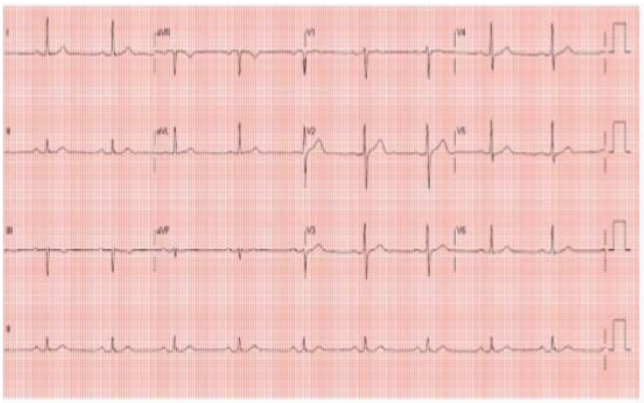

Figure 1 12 Lead ECG with T wave inversion in lead III.

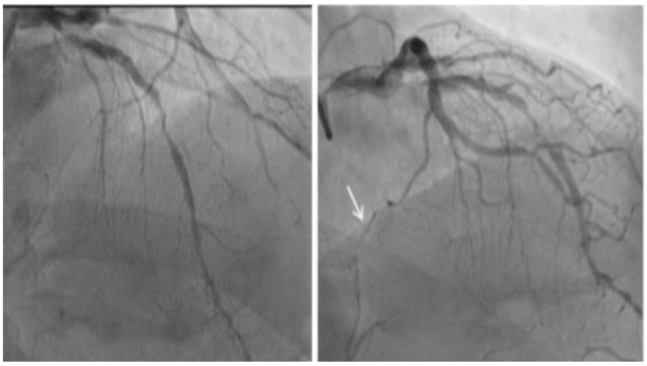

Figure 2 **(a)** Diffuse disease involving the proximal–distal left anterior descending artery (LAD);
(b) Collaterals from the distal left circumflex artery to the right postero-lateral branch (white arrow).

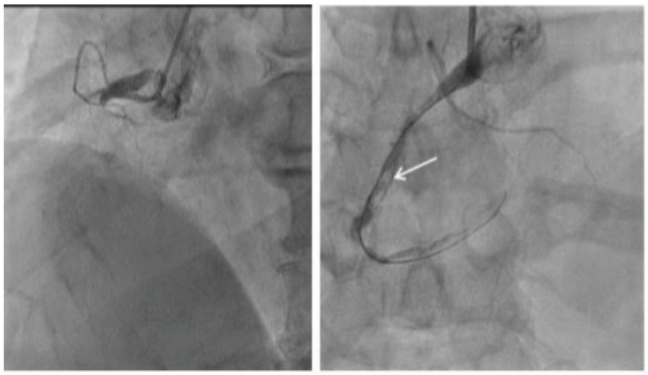

Figure 3 **(a)** Total occlusion of the proximal segment of the right coronary artery (RCA); **(b)** Thrombus in the mid segment RCA (white arrow).

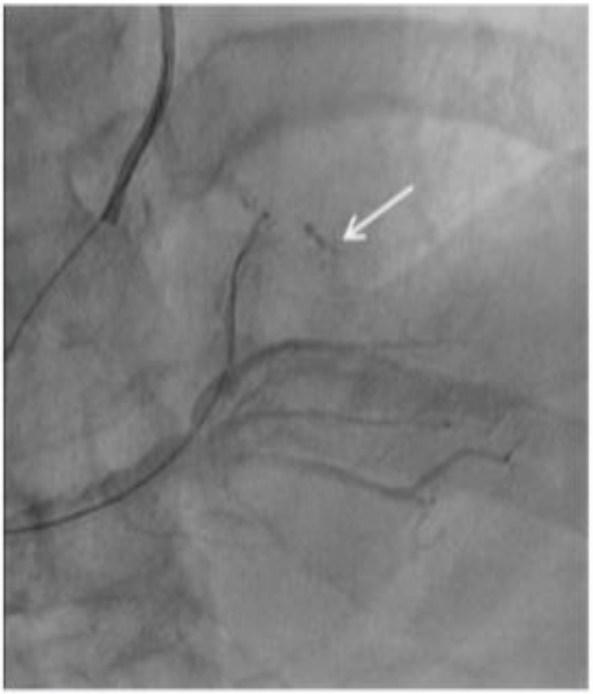

Figure 4 Puff of contrast indicating distal coronary artery perforation (white arrow).

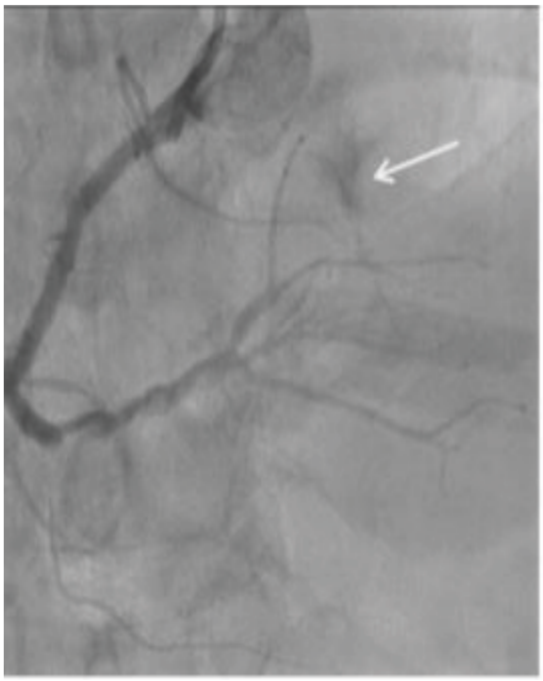

Figure 5 Sealed distal coronary artery perforation (white arrow).

Figure 6 Preserved distal branches 4 weeks later.

using a Thrombuster TM (Kaneka Medix Corp). Multiple red thrombi were aspirated successfully with restoration of TIMI 3 flow **(Figure 3b)** We then deployed 2 overlapping drug eluting coronary stents from the proximal to the distal segment of the RCA. Unfortunately we detected a distal small branch coronary perforation off the PLB **(Figure 4).**

There was no coronary coil or gel foam available in our cardiac catheterization laboratory. Multiple prolonged balloon inflations were performed for a total of 30 minutes to no avail. Heparin reversal agent was given with regular flushing of the guide catheter system to reduce any thrombus formation in the catheter system. Finally we decided on using the thrombus aspirated from the proximal RCA occlusion to seal the perforation.

A run-through Floppy TM coronary guidewire was advanced to the location of the perforation and a Finecross TM microcatheter (Terumo Medical Corporation, Japan) was advanced over the guidewire. A tiny injection of contrast confirmed the small branch was correctly selected. 2-3 tiny thrombi were obtained after agitation and dissecting of the large red thrombus. We then injected 2 tiny thrombi via the microcatheter and established a successful seal of the perforation. There was no further extravasation of contrast and there was a persistent blush indicating the perforation was contained **(Figure 5).**

Check bedside echocardiograms were performed during the PCI as well as serially after the procedure which did not reveal any significant pericardial effusion. Mr. THC was admitted for a staged PCI to the LAD 4 weeks later. The check angiography showed the RCA coronary stents were patent with good distal flow in the PLB. **(Figure 6).**

Discussion

Coronary artery perforation is a known complication of percutaneous coronary intervention (PCI). In the current era of interventional cardiology where PCI is increasingly common, it is important to learn the various methods of bailout in times of complications. PCI is also increasingly common practice in hospitals without onsite cardiothoracic surgery. The incidence of coronary artery perforation reported by Ellis et al. [1] was 0.5%, this was more common in procedures involving atherectomy or excimer laser. Perforations due to coronary guidewires accounted for over 50% of the cases, and rates of serious complications correlate with increasing severity of the coronary perforation [2].

Various techniques of securing haemostasis had been described before including the use of gel foam, microcoil embolization, subcutaneous fat tissue embolization, thrombin injection and prolonged balloon inflation [3,4] The use of coagulated thrombus injection for peripheral artery perforation was reported by Tokuda et al. with no reported complications [5]. The use of thrombus injection to seal a distal coronary guidewire-induced perforation had not really been reported. In this case, there was failure to secure haemostasis despite repeated multiple prolonged balloon inflation, and there was no ready access to microcoil or gel foam. We had improvised using the thrombi aspirated from the proximal RCA occlusion to secure haemostasis successfully. One of the reasons for failure to secure haemostasis adequately with prolonged balloon inflation could be the presence of multiple collateral blood supply from the left circumflex system. As a result, there is continuous leakage from the alternate collateral blood supply despite proximal balloon inflation.

Conclusion

Careful selection of the culprit side branch is important to allow a selective embolization of that branch without compromising vessels. The thrombus was agitated and broken into smaller bits to allow injection through the microcatheter. Care must be taken to avoid forceful injection which may worsen the small branch perforation. Adequate haemostasis was evident by the sustained myocardial blush that persisted with no further contrast extravasation. The thrombus will act as a physical seal and nidus for more thrombus aggregation whilst buying time for the reversal of anticoagulant effect. This case has highlighted the successful use of the autologous thrombus harvested from the proximal acute occlusion of the vessel to seal a distal coronary perforation. In PCI centres where coils or adjunctive devices may not be readily available, this technique may be a useful consideration.

Conflict of Interest

The authors have no conflicts of interest to declare.

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