CASE REPORT

The Entrapped and Unravelled Coronary Wire

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INTRODUCTION

Myocardial infarction is an acute emergency with thrombotic occlusion of a major epicardial coronary artery. Reperfusion strategy for the occluded vessel could be achieved with thrombolysis or percutaneous coronary intervention (PCI). Primary PCI is the preferred choice to open up the occluded vessel. However, for the centres without PCI facility, thrombolytic therapy can be equally effective, especially for the first three hours of infarction. Despite initial successful thrombolysis, there may be concern about culprit vessel reocclusion risk after the index hospitalisation episode. Coronary angiogram would be helpful to delineate the coronary artery and therapeutic coronary stenting could then be done to the culprit lesion. Most operators have their preferred workhorse coronary wire for PCI. It was unexpected for a common workhorse coronary wire to unravel and lengthen after crossing a simple lesion. A simple technique was used to salvage the ensuing entrapped and unravelled coronary wire with a coronary balloon.

CASE REPORT

A 44-year-old man presented with his first episode of acute chest pain to a peripheral hospital with no cardiac catheterisation facility and was diagnosed to have inferior ST elevation myocardial infarction (STEMI) with right ventricular involvement. He was promptly thrombolysed with streptokinase. There was good resolution of the ST elevation in the ECG and concomitant disappearance of the chest pain. Initially, he was planned for pharmacotherapy only. One month after discharge from the hospital he was still having intermittent exertional chest pain. Hence, he was referred to our hospital for coronary angiogram. The coronary angiogram was performed through the right radial artery and it revealed a normal left main stem, a large calibre and dominant right coronary artery (RCA) with a discrete 99% stenotic lesion in the distal RCA (figure 1), a small recessive left circumflex artery and a long diffuse 80% disease of the mid-distal left anterior descending artery (LAD). The infarct related vessel was the RCA and the distal RCA lesion was the culprit for the inferior STEMI.

The provisional strategy was PCI to the RCA and LAD. The same right radial approach was used for the PCI procedure. A 6F JR4 guiding catheter was used to engage the RCA. A 0.014 inch 190 cm Hi-Torque Balance Middleweight Universal II or BMW Universal II™ wire (Abbott Vascular, Santa Clara, CA, USA) was selected to track down the RCA. After passing through the distal RCA lesion with no resistance, there was unexpected difficulty in manoeuvring the distal tip of the wire. After innocuously placing the distal tip of the wire in a small branch of the posterior left ventricular (PLV) branch of the RCA, unusual lengthening of the distal BMW Universal IITM wire (Abbott Vascular, Santa Clara, CA, USA) coronary wire and the radio-opaque distal tip was discovered. Despite gentle tugging, the coronary wire still could not be pulled out from the PLV branch. A predilatation compliant Trek™ (Abbott Vascular, Santa Clara, CA, USA) 2.50x12mm balloon was advanced over the BMW Universal II™ wire (Abbott Vascular, Santa Clara, CA, USA) as far distally as possible. The balloon could only reach the non radio-opaque segment of the wire near the single marker of the wire. As a result, the entrapped coronary wire was freed from the small branch of the PLV and enabled the whole coronary wire-balloon system to be pulled out under continuous fluoroscopic guidance (figure 2-4). Paradoxically, the distal 3 cm radio-opaque segment had shortened and the radio-opaque single marker located 1.5 cm proximal to the 3 cm radio-opaque length had vanished.

A new Runthrough Normal Support™ wire (Terumo, Tokyo, Japan) was used to track down the RCA smoothly with eventual successful deployment of Multi-Link Vision™ (Abbott Vascular, Santa Clara, CA, USA) 4.0x15mm stent. The 6F JR4 guiding catheter was exchanged for a 6F EBU 3.5 guiding catheter for engagement of the left main stem. The same Runthrough Normal Support™ coronary wire (Terumo, Tokyo, Japan) was tracked down the LAD. The diffusely diseased mid-distal LAD was stented with Xience V™ (Abbott Vascular, Santa Clara, CA, USA) 2.75x33mm and 2.50x23mm stents.

DISCUSSION

The initial strategy was multivessel PCI with PCI of the RCA to be attempted first. The RCA was not a complex vessel with an unchallenging lesion. There were no tortuosity or excess calcification. As such, a normal coronary workhorse wire such as BMW Universal II™ (Abbott Vascular, Santa Clara, CA, USA) would suffice to cross the lesion and facilitate the stenting easily. There had been reported cases about coronary wire complications associated with older generation of coronary wire such as USCI Flexible Steerable wire[2] or difficult coronary lesions with more complex PCI technique [3]. A reported case of BMW™ wire (Abbott Vascular, Santa Clara, CA, USA) placed in the diagonal for side branch protection was discovered to be unravelled and was successfully removed en bloc with the stent and the other wire in the main

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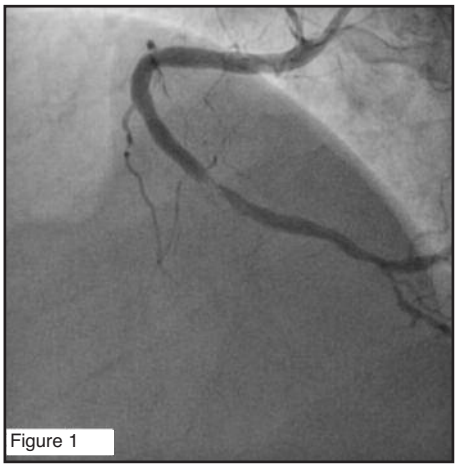

Fig. 1: Coronary angiogram showing the RCA with the distal critical stenosis.

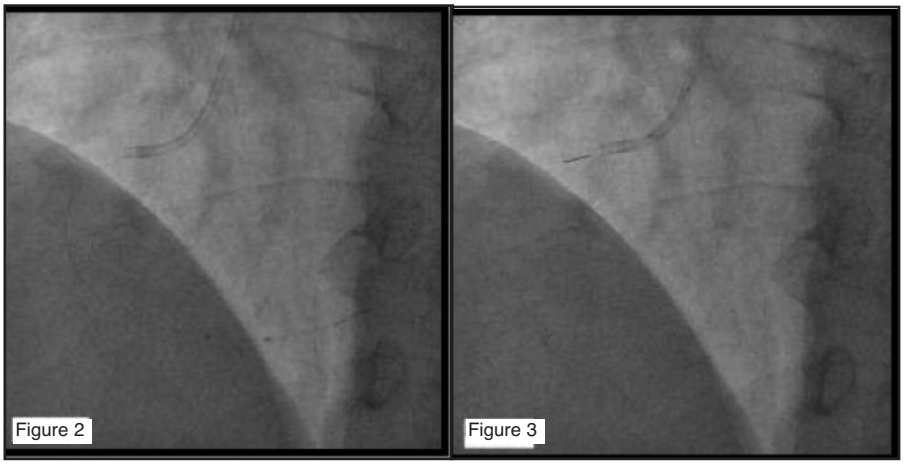

Fig. 2&3: Withdrawal of the unraveled BMW wire and coronary ballon en bloc into the guiding catheter.

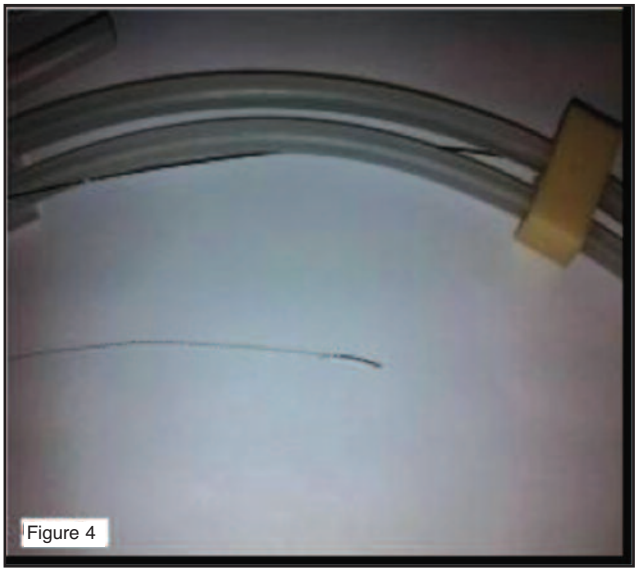

Fig. 4: The stretched out and unraveled distal BMW wire.

branch [4]. Fortunately, the wire didn't fracture and no extra special hardware was needed to retrieve any retained wire piece. To the best of the authors' knowledge, this is the second reported case of an unravelled BMW™ wire (Abbott Vascular, Santa Clara, CA, USA) but the first case report on using coronary balloon to free the unravelled and entrapped coronary wire.

Despite having difficulty in manoeuvring the BMW Universal II™ wire (Abbott Vascular, Santa Clara, CA, USA) after crossing the lesion, no excessive torque was used to advance the wire. However, the reduced tactile manoeuvring ability of the wire meant that it was inadvertently placed in a small side branch of the PLV. Overrotation and further torqueing while lodged in a small side branch had been described as possible causes for coronary wire to unravel [2]. The author did not think that the wire was excessively manipulated but rather that the BMW II Universal™ wire (Abbott Vascular, Santa Clara, CA, USA) could have begun to unravel while passing through the lesion. By that time, the distal end of the BMW Universal II™ wire (Abbott Vascular, Santa Clara, CA, USA) seemed to have lengthen and became more radio lucent. Further attempt to remove the distal coronary tip and position it in main branch was unsuccessful. The operator realised that forceful withdrawal of the wire would cause further unravelling of the wire and possibly total fracture and separation of the distal tip. Deep seating of the guiding catheter had been used to act as fulcrum to free the unravelled USCI coronary wire and coronary balloon [2]. However, this may damage the vessel wall and possibly the lesion. As the lesion would require predilatation later, the author decided to use a coronary balloon for sheathing purpose along the unravelled wire segment to provide mechanical support and straighten any kinks which may be anchored along the vessel wall. With one hand maintaining gentle traction on the coronary wire and the other hand advancing the balloon as distally as possible, the entrapped distal wire was finally liberated and the unravelled wire segment withdrawn into the balloon as much as possible. Under continuous fluoroscopic imaging, the whole wire and coronary balloon system were withdrawn into the guiding catheter and examined ex-vivo on a sterile field. The entire length of the tip coils were completely stretched out.

It is a good learning case. If the operator discovers difficulty in manoeuvring the wire or increased radio lucency of the distal BMW Universal II™ wire (Abbott Vascular, Santa Clara, CA, USA), there should be a heightened alertness to the possibility of unravelled distal coronary wire. It is advisable to avoid excessive torqueing of the wire and placing the wire in small distal branch with further wire manoeuvring. Sheathing technique with a microcatheter or a coronary balloon as proven in this case can be used successfully to overcome the problem of the entrapped and unravelled coronary wire without the added cost of extra coronary hardware.

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