

Successful use of a balloon catheter to facilitate guidewire placement in an occluded coronary artery with extreme angulations

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The present report describes the case of a 77-year-old man with unstable angina, in which the culprit vessel was extremely angulated and precluded

Despite advances in technology and operator skills, a number of anatomical situations still exist that limit the procedural success of coronary angioplasty. An extremely angulated take-off of a branch vessel may represent an anatomically challenging situation. The inability to cross-wire the severely angulated vessel precludes the necessary placement of a balloon catheter at the culprit site for subsequent coronary interventions. Several previous techniques have tackled this wiring problem. They include shaping the wire tip, use of probing or tracking catheters to help direct the wire, use of stiffer wires, use of a balloon catheter near the wire tip, the double wiring technique, and use of an inflated perfusion balloon that facilitates wire placement (1-5).

We report a novel technique using an undersized, uninflated and distally placed balloon catheter that easily enabled guidewire engagement in a branch vessel with take-off at two extreme angles.

CASE PRESENTATION

A 77-year-old man was admitted to the Jen Ai Hospital (Taichung, Taiwan) because of persistent chest tightness and shortness of breath for three days. The patient had a history of hypertension, hyperlipidemia and coronary artery disease with regular outpatient management. He smoked and consumed alcohol.

His temperature was 36°C, pulse rate was 56 beats/min and blood pressure was 120/80 mmHg. His breathing sound was coarse, heart rhythm was regular and a grade 2/6 systolic murmur was heard over the left sternal border. His abdomen was soft and his peripheral pulses were intact. There was no peripheral edema, and a neurological examination was unremarkable. A complete blood count and blood chemistry profile was normal. Chest x-ray showed cardiomegaly and pulmonary congestion.

placement of a guidewire for subsequent coronary interventions. A novel technique is reported, using an undersized, uninflated and distally placed balloon catheter, which easily facilitated guidewire placement.

Key Words: Angulated vessels; Balloon catheter; Guidewire technique

Electrocardiography showed sinus bradycardia, left ventricular hypertrophy and T wave inversion. An echocardiogram demonstrated inferior wall hypokinesis with preserved left ventricular systolic function.

Coronary angiography revealed an occluded right coronary artery, with a severe segmental stenosis at the posterior descending artery measuring 82% by quantitative coronary angiography (Figure 1A). The left coronary arteries were normal.

Despite multiple attempts to reshape the configuration of the wire tip (Choice PT floppy guidewire, Boston Scientific Corporation, USA) and the use of stiffer wire (percutaneous transluminal coronary angioplasty trackwire, Lake Region Medical, USA), after crossing the very tortuous proximal right coronary artery, the wires became difficult, if not impossible, to further manipulate toward the targeted posterior descending artery. A balloon catheter (1.5 mm × 10 mm dilation catheter, Hexacath, France) was then advanced near the wire tip to improve wire support, torque control and steerability, but the wire continued to prolapse into the unwanted posterior lateral artery. The double wiring technique was then performed, with a wire placed in the unwanted posterior lateral artery and a second wire advanced in an attempt to engage the desired posterior descending artery; this was performed in vain.

The same 1.5 mm × 10 mm balloon catheter was advanced to the unwanted posterior lateral artery just beyond the ostium of the posterior descending artery (Figure 1B). This uninflated balloon acted as a barrier to prevent the prolapse of the wire to the posterior lateral artery, which helped to deflect the tip of the second wire so that it easily entered the desired posterior descending artery. The wire and balloon at the posterior lateral artery was then removed. A 2.5 mm × 20 mm balloon (Hexacath) was then advanced to the stenosis in the posterior descending artery, and coronary angioplasty was performed

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successfully (Figures 1C and 1D). The patient's postprocedural course in hospital was uneventful, and he was discharged the following day.

DISCUSSION

Occasionally, it is difficult to manipulate a coronary wire into a side branch with extreme-angle take-off, especially when the wire persistently enters an unwanted side branch.

In our case, the culprit right coronary artery had two extreme-angle take-offs, with proximal extreme tortuosity, and the posterior descending and lateral arteries originated distally at an extreme angle. When the coronary wire passed through the proximal right coronary artery curve, the wire became difficult, if not impossible, to further manipulate across the targeted posterior descending artery. Options included shaping and curving the wires; advancing a wire and pulling it back to prolapse the wire into the intended branch; use of stiffer wires; and advancement of a balloon catheter near the wire tip to enhance wire support, torque control and steerability. These options were all unsuccessful because of repeated prolapse of the wire into the posterior lateral artery (1,2). The double wiring technique was then applied (1,2). A wire was placed in the unwanted side branch (posterior lateral artery), and a second wire was advanced in an attempt to engage the desired branch (posterior descending artery); this was performed in vain. We then decided to advance an undersized balloon catheter to the unwanted side branch just beyond the ostium of the posterior descending artery. In this situation, the uninflated balloon acted as a barrier to prevent the prolapse of the wire into the posterior lateral artery, which helped to easily deflect the tip of the second wire into the desired posterior descending artery.

We therefore suggest that, when it is difficult to engage a target coronary artery with the wire, even with the aid of a balloon catheter near the wire tip, the balloon catheter and its wire should be left in the unwanted branch, just beyond the ostium of the desired artery. A second wire can then be easily manipulated across the target coronary artery with the balloon acting as a barrier to deflect the wire toward the desired direction. Moreover, because the balloon is undersized and not inflated, it will not cause vessel ischemia or injury in the unwanted branch, compared with the previously mentioned techniques (5). However, if this simple (but safe and cost effective) technique fails, a similar technique – inflating the perfusion balloon in the unwanted side branch – may be more likely to solve the problem (5).

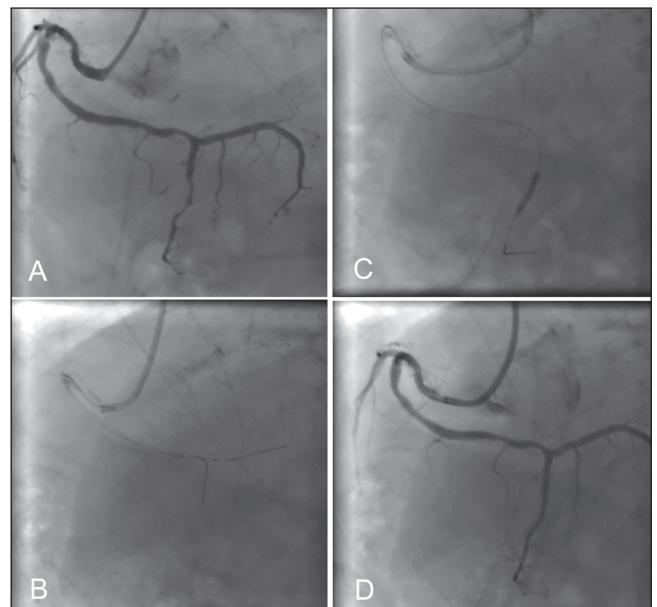


Figure 1) Coronary angiography. **A** Segmental stenosis at the posterior descending artery of the right coronary artery. **B** Balloon catheter in the posterior lateral artery just distal to the ostium of the posterior descending artery; a second wire was easily advanced to the stenosis in the posterior descending artery. **C** Balloon dilation of the culprit vessel. **D** Final angiogram

We believe that this simple, safe and cost-effective technique is a useful tool in treating patients with anatomically challenging situations when other conventional wiring techniques are unsuccessful.

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