Retrograde Guidewire Trapping Technique for Total Right Coronary Occlusion with Unusual Ostial Origin

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Case Report

A 64-year-old man was admitted to our institution on November 7, 2011, complaining of chest pain upon exertion for the previous year. Prior history: hypertension for more than 10 years, highest blood pressure 215/115 mmHg, 30-year history of smoking, 10 cigarettes per day. ECG on admission showed: increased II, III, AVF leads, small electrocardiogram (EKG)'s Q waves (Q), EKG's ST segment (ST) depression 0.05 mv, T wave inversion. Admission diagnosis: 1) coronary old inferior myocardial infarction, unstable angina, New York Heart Association (NYHA) chronic heart failure (CHF) class II. 2) Hypertension class III. Cardiac catheterization, via the right radial artery: Left Main no stenosis, middle Left Anterior Descending (LAD) is 50% and distal 60% stenosis. Proximal Left Circumflex (LCx) showed 50-60 % stenosis, middle diffuse stenosis 90%. Two collateral circulation pathways were also observed: LAD to septal branch to Right Coronary Artery (RCA) with formation of limited myocardial collateral circulation; however, the LCx to left atrial branch to RCA epicardial collateral circulation showed good collateral blood supply (Figure 1 A). Selective right coronary angiography did not find the opening for the RCA, non-selective angiography suggested that the opening of the RCA could be totally occluded or the origin was abnormal (B). Because the patient refused coronary artery bypass surgery, it was decided to use a retrograde guidewire trapping technique using a "Memory-Snare" device by Shanghai Shape Memory Alloy Co. Ltd., China. A 7F EBU 3.75 guide catheter was placed via the right femoral artery, to the left coronary ostium. Super-selective angiography using a "Finecross" micro-catheter was performed. The septal branch did not show good collateral circulation to the distal right coronary (C). The Finecross was then sent into the circumflex artery to the left atrial branch over a Fielder Fc guidewire. Tip injection showed there was good collateral flow to the RCA (D, E). The Finecross was exchanged for an Abbot Vascular Pilot 150 catheter and passed by the retrograde route through the proximal right coronary occlusion, following an anomalous route into the ascending aorta, where it could be captured by the Memory-Snare device. Subsequently, a JR 4.0 guiding catheter was placed via the right radial artery and sent to the right coronary sinus; the angiography showed anomalous origin of right coronary openings (F). The same JR 4.0 guiding catheter was then used to deploy the Memory Snare device. The Pilot 150 guidewire was then connected to an extension wire. The Memory Snare device was used to capture the retrograde Pilot 150 into the JR 4.0 guiding catheter (Figure 2, Panel G), and pull it out of the body though the radial artery (Figure 2, Panel H). Antegrade along the Pilot 150 guidewire, a PTCA 2.0 × 20 mm balloon catheter was inserted and used to enlarge the stenosis of the RCA (Figure 2, Panel I); angiography identified the abnormal RCA opening on the left coronary sinus. Also visible was the stenosis throughout the length of the RCA (Figure 2, Panel J). Implantation of Partner rapamycin-eluting stents in the distal, middle and proximal right coronary, respectively (Figure 2, Panel K); postoperative angiography showed good RCA imaging with Thrombolysis In Myocardial Infarction (TIMI) 3 flow grade, without residual stenosis in the stents (Figure 2, Panel L).

Only 10~20% of percutaneous coronary intervention (PCI) involve chronic total occlusion (CTO) lesions. This is the most challenging type of coronary artery disease and has been called the "last bastion for interventional cardiologists to capture"[1,2]. The selected patient underwent non-selective aortic angiography suggesting either occlusion of the RCA or the presence of an anomalous ostial origin. Therefore, a retrograde guidewire technique was attempted. Unlike other newly developed techniques[3], there was no clear antegrade pathway available to reach the CTO. In this case, we found a way to capture the retrograde wire from the Ascending Aorta using a "Memory Snare Device" by Shanghai Shape Memory Alloy Co. Ltd., China, and establish an antegrade pathway for placement of stents to restore blood flow. To the best of our knowledge, this is the first reported case of using a retrograde guidewire trapping technique with "Memory-Snare" device in a chronic total coronary occlusion with anomalous origin.

Keywords

Coronary Angiography; Coronary Occlusion; Collateral Circulation

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Conception and design of the research: Hong L, Wang H, Wang X; Acquisition of data: Li L, Yin Q, Wang X; Analysis and interpretation of the data: Li L, Wang H, Yin Q, Wang X; Writing of the manuscript: Hong L, Li L, Wang X; Critical revision of the manuscript for intellectual content: Wang X.

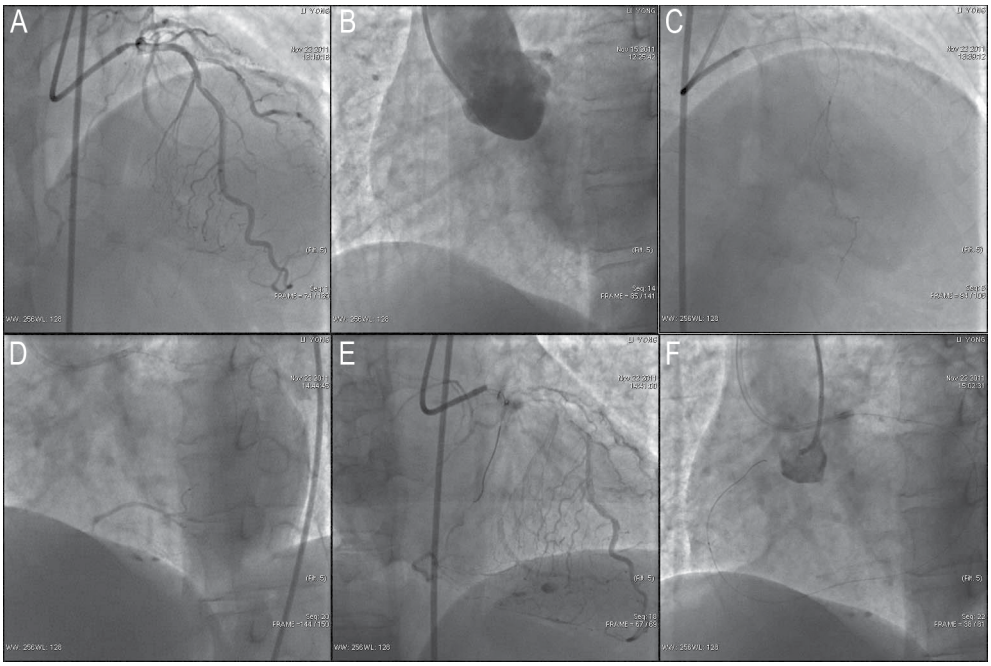

Figure 1 - *A: Good collateral circulation from left to the RCA. B: The non-selective angiography: no RCA imaging. C: Tip injection within the septal branch. D: Tip injection in circumflex artery - left atrial branch. E: There was good collateral flow from left atrial branch to the RCA. F: The right coronary sinus angiography showed RCA opening variation.*

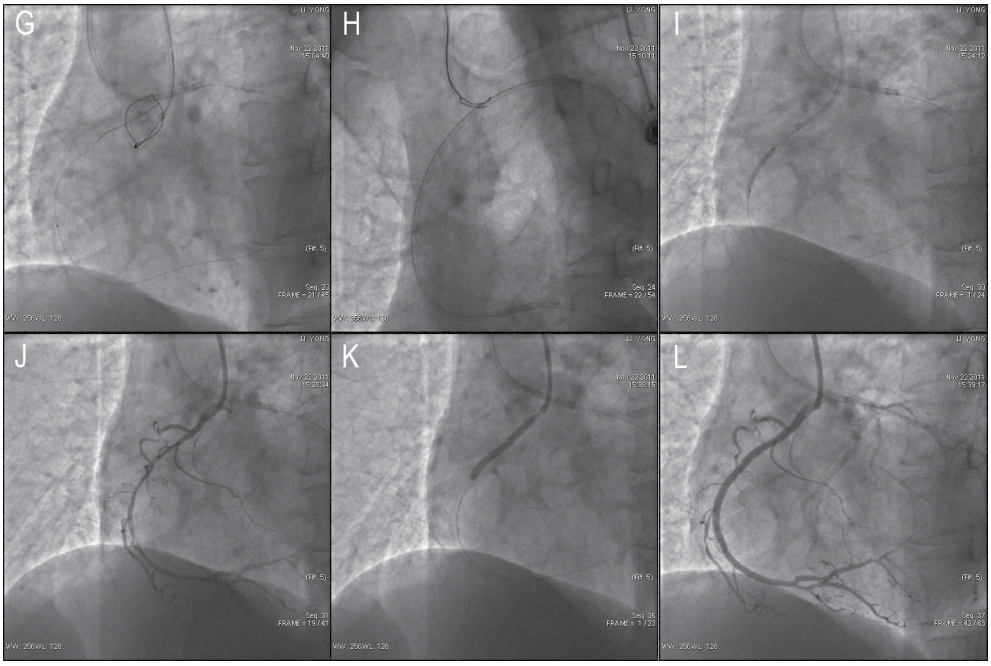

Figure 2 - *G: Catching of reverse retrograde guidewire by "Memory-Snare". H: The retrograde wire was pulled out by "Memory-Snare". I: Passing the balloon catheter forward along the guidewire to enlarge lesions. J: Ostial RCA on the left coronary sinus. K: Implantation of RCA stent. L: Postoperative angiography.*

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Video - *Seq:1: The right coronary sinus angiography showed good collateral circulation from left to the RCA. Seq:14: The non-selective angiography: no RCA imaging. Seq:5: Tip injection within the septal branch. Seq:18: Good collateral flow from left atrial branch to the RCA. Seq:20: Tip injection in circumflex artery - left atrial branch. Seq:23: Catching of reverse retrograde guidewire by "Memory-Snare". Seq:24: Catching of reverse retrograde guidewire into guiding catheter. Seq:30: Passing the balloon catheter forward along the guidewire to enlarge lesions. Seq:31: Ostial RCA on the left coronary sinus. Seq:34: Implantation of RCA stent in the middle. Seq:36: Implantation of RCA stent in the proximal. Seq:37: Postoperative angiography.*

Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

Study Association

This study is not associated with any post-graduation program.

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