Balloon-Assisted Tracking: A Solution to Severe Subclavian Tortuosity Encountered During Transradial Primary PCI

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Abstract

Keywords

- radial artery access
- balloon-assisted tracking
- subclavian artery loop
- primary PCI

Radial artery access is preferred over femoral access for primary percutaneous coronary intervention (PCI) in patients with acute ST-segment elevation myocardial infarction because of the reduction in access site complications and mortality associated with the radial artery access. Successful transradial primary PCI requires knowledge of techniques to handle unexpected severe subclavian artery tortuosity. Balloon-assisted tracking (BAT) is one technique developed to negotiate the tortuosity and loops in the upper extremity. However, the use of BAT in dealing with a severe subclavian loop during a transradial primary PCI procedure has never been reported. We described a case of transradial primary PCI with severe subclavian artery loop that was negotiated successfully by the BAT technique.

Radial artery access is associated with a significant reduction of vascular access site complications and lower mortality rate compared with femoral artery access in patients with acute ST-elevation myocardial infarction (STEMI) undergoing primary percutaneous coronary intervention (PCI).^{1,2} Underlying tortuosity in the upper extremity is often unpredictable and can cause operators to avoid the otherwise favorable radial approach, or crossover to the femoral artery, to preserve the reperfusion times. Improved techniques and better understanding of how to handle tortuosity encountered in the radial, brachial, or subclavian artery are needed to overcome these frequent causes of access failure.³ Balloon-assisted tracking (BAT) is a new technique that has been recently developed to overcome tortuosity in the arteries of the upper extremity.^{4–6} However, the use of BAT during a transradial primary PCI in dealing with a severe subclavian artery loop has never been reported.

Case Report

A 56-year-old man with a history of smoking and hypertension was admitted for primary PCI with the sign and symptoms of an acute extensive anterior myocardial infarction of 4 hours duration. Vital signs showed a blood pressure of 120/80 mm Hg and heart rate of 86 bpm. There was no gallop or rales. After insertion of a 6F radial sheath (Radifocus, Terumo, Japan) into the right radial artery, attempted passage of a 0.035" J-tipped guide wire was unsuccessful in the right subclavian region. Contrast injection through the JR 3.5 5F diagnostic catheter showed a severe loop of right subclavian artery (►Fig. 1). After introduction of a 6F EBU 3.5 Launcher guide catheter (Medtronic, Inc, Danvers, MA) that was placed proximal to the loop, a 0.014" Pilot 50 PCI guide wire (Abbott Vascular, Santa Clara, CA) successfully crossed the loop (►Fig. 2). A 2.0 × 12 mm Mini trek PCI balloon catheter (Abbott Vascular, Santa Clara, CA) was then placed at the tip of

Fig. 1 The angiogram showed a severe loop at the right subclavian artery.

the guiding catheter with half of the balloon protruding outside the guiding catheter, and inflated at 6 atm. The catheter was then advanced gently with clockwise rotation and successfully crossed the loop (► **Fig. 3A, B**). The balloon was deflated and pulled out. The 0.035" J-tipped guide wire was introduced again and positioned in the aorta. The whole assembly was then slowly pulled back to straighten the loop (► **Fig. 4**). The guide catheter now could be passed down into the aortic root and subsequently cannulated the left coronary artery. Left coronary artery angiography was performed (by anchoring the guide catheter with a PCI guide wire into the left circumflex artery) and showed a thrombotic occlusion in the midleft anterior ascending artery. Primary PCI was successfully performed by a manual thrombus aspiration procedure followed by direct stenting with a 3.0×31 mm drug-eluting stent (► **Fig. 5A, B**). The door-to-device time was 70 minute. Right coronary cannulation was then

Fig. 3 (A) The percutaneous coronary intervention balloon (2.0×12 mm) was positioned in the tip of the guiding catheter and inflated at 6 atm (arrow). The guiding catheter was then advanced gently through the loop. (B) The guiding catheter has successfully crossed the loop.

Fig. 2 Pilot 50 guide wire has successfully crossed the subclavian loop and placed in the aortic root (arrow).

Fig. 4 The loop has straightened after pulling back the whole assembly (arrow). Note that the percutaneous coronary intervention guide wire was changed with a J-tipped wire before pulling back the catheter.

Fig. 5 (A) Diagnostic angiogram of left coronary artery showed total occlusion of left anterior descending artery (white arrow). Pilot 50 guide wire was advanced into the left circumflex artery as an anchor while cannulating the guide catheter (black arrow). (B) Final angiograms showed TIMI-3 flow of the culprit vessel (arrow).

performed using a 5F diagnostic Judkins right catheter (Cordis Corporation, FL). The catheter exchange was done after introduction of the 0.035" 180 cm J-tipped guide wire (Terumo, Japan). The recovery was uneventful and the patient was discharged after 4 days.

Discussion

BAT is a new technique and developed to deal with severe tortuosity (loops) of arteries in the arterial system during a transradial procedure. It is analogous to similar techniques used to manage difficult fenestrated endovascular grafts⁷ or promote passage of catheter-extension type devices down to coronary arteries.⁸ In this technique, the PCI balloon is placed across the tip of the catheter and inflated

at a low pressure (4–6 atm) while half of the balloon is protruding beyond the catheter. The main purpose of BAT is to prevent the "razor effect" of the catheter tip on the arterial endothelium.⁴ This technique reduces the resistance encountered at the tip of the catheter while negotiating through the loop. The technique can be efficiently done during a primary PCI procedure within the recommended door-to-device time. The BAT is a must know technique for all radial operators to achieve a successful transradial catheterization procedure.

Conclusion

BAT is a safe, rapid, and useful technique to overcome severe subclavian artery tortuosity during a transradial primary PCI.

Conflict of Interest

No conflict of interest.

Note

There is no external funding and this report has no relationship with any industrial company.

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