

Dual-lumen microcatheter in chronic total occlusion

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Abstract Recanalization of a chronically occluded coronary artery (CTO) is one of the most complex percutaneous coronary interventions (PCI) in the field of interventional cardiology. In addition to all available recanalization techniques, most PCI CTO failures go to the inability of the wire to pass through the occlusion. We report a CTO case successfully treated using a dual-lumen catheter after single-lumen microcatheter (MC) failure (not enough support for the guidewire to cross the occlusion).

Key words chronic occluded coronary artery, dual-lumen microcatheter

Introduction

Recanalization of a chronically occluded coronary artery (CTO) is one of the most complex percutaneous coronary interventions (PCI) in modern interventional cardiology. Recently, due to great advances in techniques, materials and the technology of PCI procedures itself, the success of these complex interventions has increased from an average of 65-70% to about 85-90%^{1,2}. In addition to all available recanalization techniques, most PCI CTO failures go to the inability of the wire to pass through the occlusion³. We report a CTO case successfully treated using a dual-lumen catheter after usual microcatheter (MC) did not give enough support for the guidewire to cross the occlusion.

Case presentation

A 70-year-old male complains of typical angina at moderate to severe physical exertion and fatigue. Echocardi-

graphic examination showed a left ventricle of normal dimensions with preserved systolic function, EF 70%. A stress echocardiography test was positive for ischaemia with hypokinesia of the inferolateral segment of the left ventricle. Laboratory analyses were within reference limits. The patient has hypertension, hyperlipidaemia, diabetes mellitus on oral therapy. He is a former smoker and has a positive family history for coronary artery disease. We was treated with oral anticoagulation therapy due to atrial fibrillation.

Diagnostic selective coronary angiography showed a single-vessel coronary artery disease (figure 1) with a tapered type of proximal cap of occlusion, about 15 mm long, in the proximal segment of the circumflex (Cx) artery with developed homocolaterals (CC1-2). The intervention was started with the right radial approach, 7 fr, with placement of the EBU 3.75 / 7Fr catheter guide in ostial segment of left main. The guidewires Rinato, Gaia first and Gaia second (Asahi Intec Co., Japan) could not engage the proximal cap supported by a Finecross MC

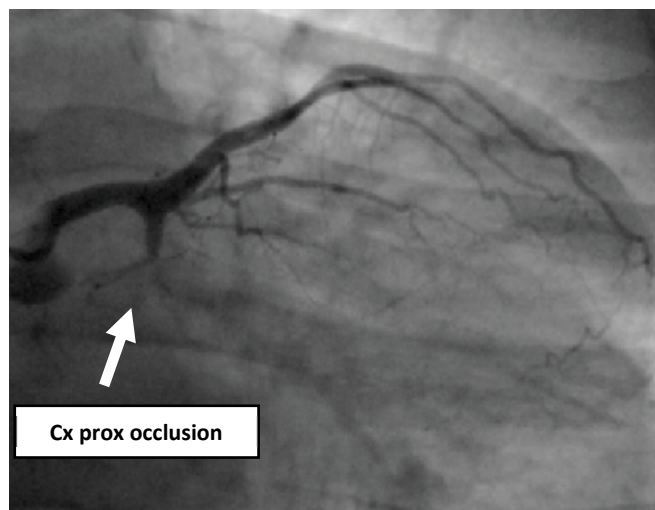


Figure 1.

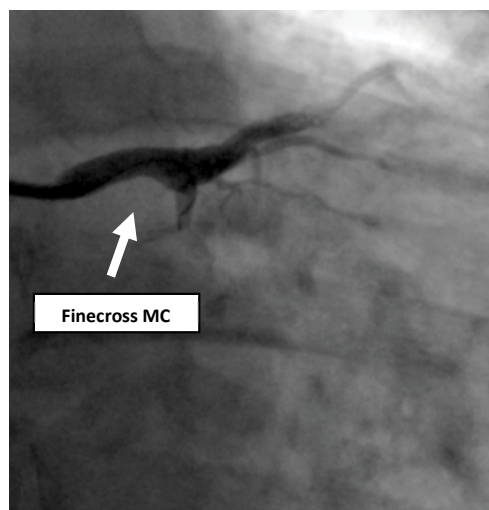


Figure 2.

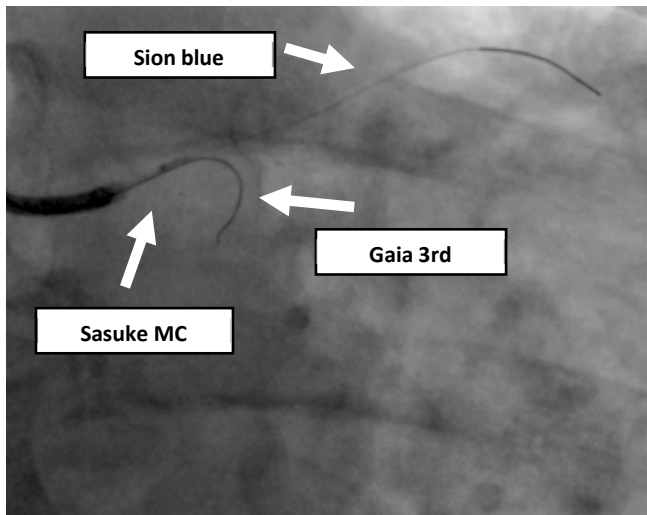


Figure 3.

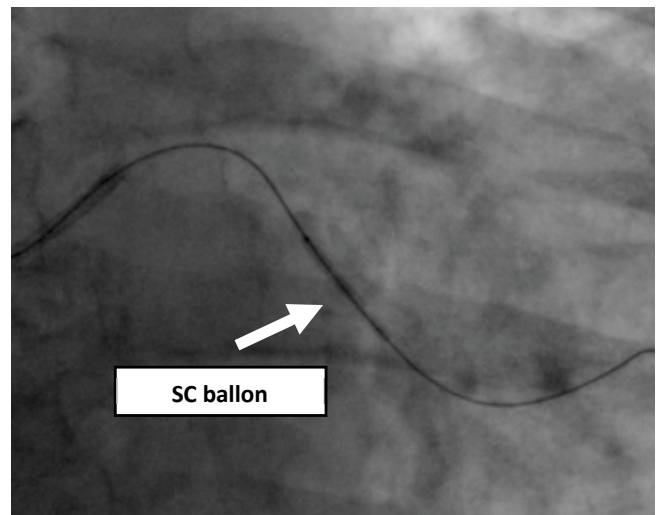


Figure 4.

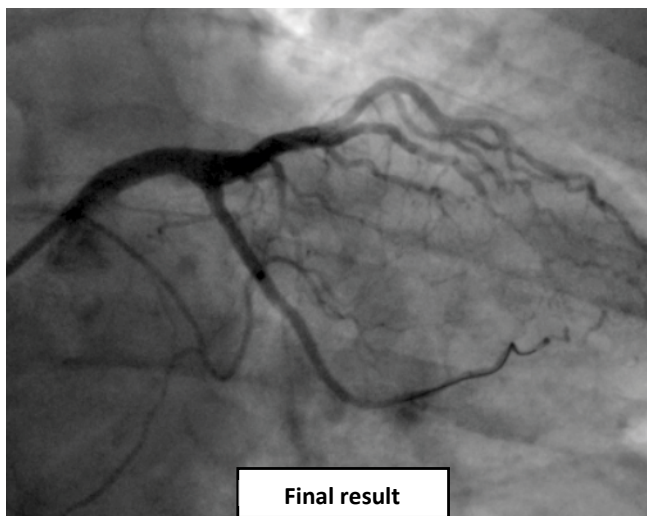


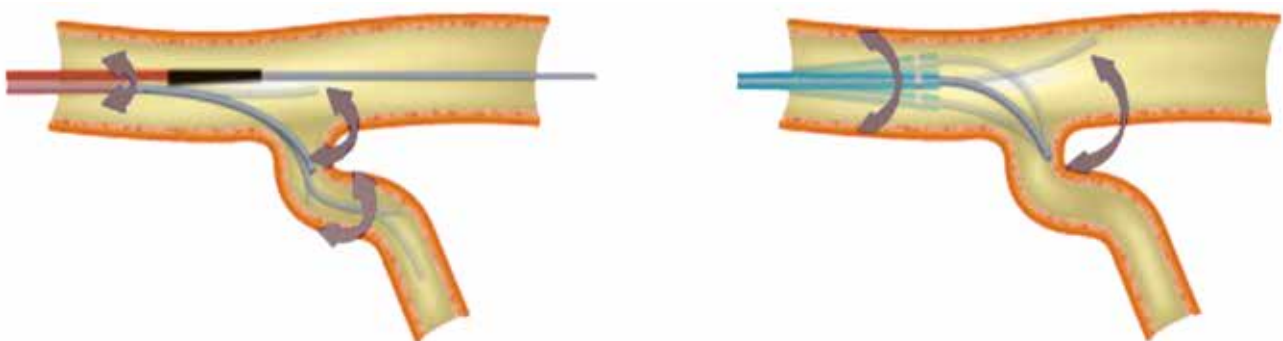
Figure 5.

(Terumo Interventional Systems, Tokyo, Japan). In fact, MC did not provide stable support in the proximal segment of the circumflex artery (Figure 2). The Finecross MC was then replaced with a Sasuke (Asahi Intec Co., Japan) dual-lumen microcatheter, so that the Sion blue guide wire was placed through the distal port into the

distal segment of LAD (Figure 3). Gaia third (Asahi Intec Co., Japan) wire was placed through the proximal port of the Sasuke MC, and with a sufficient support successfully passed occlusion and was placed in the distal segment of optuse marginal branch. After adequate predilatation (Figure 4), two drug eluting stents 2.5x26mm and 2.25x18 mm were implanted. Final angiogram showed excellent angiographic result (Figure 5) with Thrombolyses in Myocardial Infarction (TIMI) 3 flow.

Discussion

Dual-lumen MC have a full-length over the wire (OTW) system and terminate at the distal end with a marker that is more proximal to the rapid exchange system output. These catheters were designed with the purpose of managing bifurcation lesions. The guidewire in the monorail lumen protruding from the end helps to stabilize the microcatheter, while the guidewire in the over-the-wire lumen protruding from the side hole can be directed toward the ostium of the intended branch. But beyond this scenario these catheters can be a useful tool in the context of CTO. The most common indications for the use of a dual-lumen microcatheter are: 1) the technique of



Dual lumen catheter vs general microcatheter. Anchor effect and better support of guidewire with dual lumen MC

Figure 6.

parallel wires in the PCI of CTO and 2) the presence of a lateral branch at the proximal drop of occlusion, 3) wiring of the side branch and 4) exchange or introducing the second wire. They are essential in the combination of CTO and bifurcation lesions within the CTO⁴.

We presented a case of recanalization of chronically occluded arteries using a dual-lumen microcatheter which is stabilized by the rapid exchange lumen wire which resulted in an anchoring effect (Figure 6). Sasuke (Asahi Intec Co., Japan) is multifunctional, dual-lumen microcatheter with a rapid exchange delivery lumen on the distal segment, and an over the wire lumen that runs the length of the catheter to the side port 6.5 mm from tip of the microcatheter. In this particular case, guidewire in the monorail lumen protruding from the end to distal LAD helps to stabilize the microcatheter, while the guidewire in the over-the-wire lumen protruding from the side hole can be directed toward the proximal cap of the CTO in the Cx artery. That kind of extra support provided by dual-lumen catheter was the only way to finish this procedure within the reasonable time and with maximum security and efficacy.

Conclusion

This device is very reliable and easy to use. In appropriate indications it is very useful especially in the field of PCI of CTO.

References

1. Azzalini L, Jolicoeur EM, Pighi M, et al. Epidemiology, management strategies, and outcomes of patients with chronic total coronary occlusion. *Am J Cardiol* 2016;118(8):1128–35.
2. Patel VG, Brayton KM, Tamayo A, et al. Angiographic success and procedural complications in patients undergoing percutaneous coronary chronic total occlusion interventions: a weighted meta-analysis of 18,061 patients from 65 studies, *JACC: Cardiovasc Interv* 2013;6;28–136.
3. Sapontis J, Christopoulos G, Grantham JA, et al. Procedural failure of chronic total occlusion percutaneous coronary intervention: insights from a multicenter US registry. *Cath Cardiovasc Interv* 2015; 85; 1115–22.
4. Oreglia JA, Garbo R, Gagnor A, et al. Dual lumen microcatheters for complex percutaneous coronary interventions. *Cardiovasc Revasc Med* 2018;19(3);298-305.

Sažetak

Dvolumenski mikrokater u lečenju hroničnih totalnih okluzija

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Ključne reči: hronična totalna okluzija, dvolumenski mikrokater