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Retrograde use of intralesional contrast injection: Carlino technique as a bailout strategy for crossing of complex chronic total occlusion

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A 56-year-old gentleman presented with stable angina despite medical therapy. Diagnostic angiography demonstrated chronic total occlusion (CTO) of the ostial RCA to the crux. There were no significant lesions in the LAD and Cx, which filled the distal RCA through epicardial collaterals (Fig. 1a and b). We planned to recanalize RCA.

The lesion could not be antegrade crossed with a Pilot 50 and an NHancer Rx Dual Lumen Microcatheter. From the epicardial Cx collaterals, the RCA distal was reached with a Sion wire. However, the lesion could not be crossed with a Pilot 200, HI Torque Progress 140T and Fielder XT. A Finecross microcatheter was advanced through the collateral and, using the Carlino technique (2), approximately 0.5 cc of contrast was forcefully injected through it into the lesion via a 3-cc syringe 3 times in succession to obtain a limited dissection plane reaching the proximal RCA, but the retrograde wire could not be externalized due to poor guide wire manipulation (Fig. 1c and d; Video 1, Supplemental digital content 1, *http://links.lww.com/MCA/A588*) so the lesion was antegrade crossed with a Pilot 50 wire and a Guidion catheter was advanced to the mid-RCA. Retrograde externalization was achieved with HI Torque Progress 140T. The microcatheter was advanced into the antegrade catheter, replaced with the RG3 guidewire and externalized from the antegrade catheter (Video 2, Supplemental digital content 2, *http://links.lww.com/MCA/A589*). After implantation of three drug-eluting stents, an excellent angiographic result was achieved (Fig. 1e and f).

This case illustrates the importance of bailout techniques in CTO PCI after attempting crossing strategies. First, in 2005, the subintimal tracking and reentry technique using a guidewire was developed [1]. Then, in 2008, Mauro Carlino modified the technique by injecting contrast into the lesion through a microcatheter that travels through the intraluminal channels of the CTO, visualizing the pathway and allowing the operator to cross [2]. It should be noted, however, that the experience and interventional skills of the operator are paramount, as the contrast injection may expand the subintimal space and hinder reentry attempts if a subintimal guidewire crossing is achieved. Perforation is a rare, potentially fatal complication, but the risk is low when small volumes of contrast are used. In addition, high restenosis may be of concern in the long term [2]. In our case, various crossing strategies (antegrade, retrograde through septal collaterals, knuckle technique, retrograde through Cx collaterals) were not successful in crossing the lesion. As a bailout strategy, plaque modification using the Carlino technique changed the course of the case.

In conclusion, the Carlino technique - the use of intralesional contrast injection - can be a valuable addition to the operator's toolkit when attempting to cross complex CTOs. However, operator experience and a thorough understanding of the limitations and potential complications of the technique are critical to achieving a successful outcome.

References

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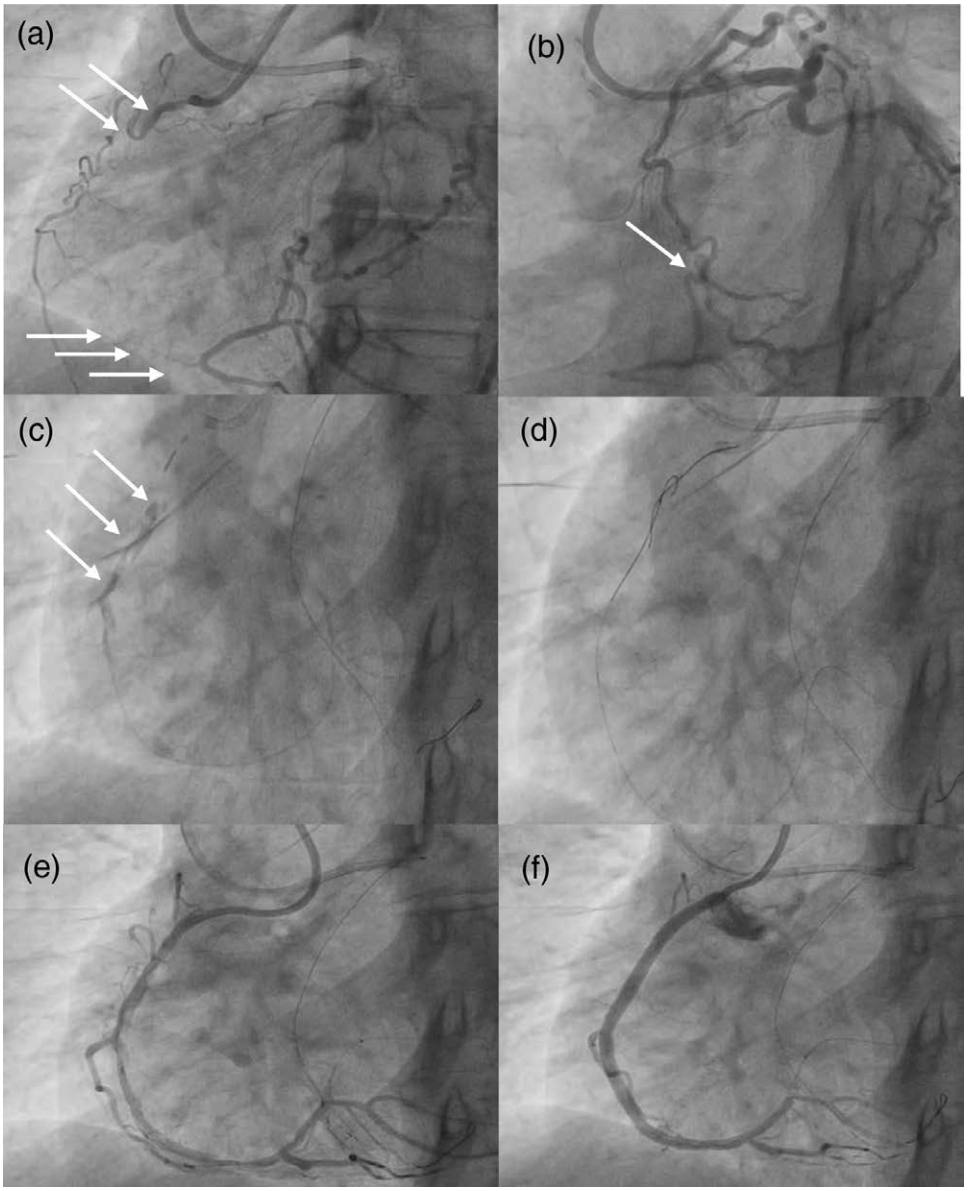
Fig. 1



(a) Diagnostic angiography demonstrating flush chronic total occlusion of the ostial RCA to the crux (arrows). (b) Left coronary angiography shows extensive collaterals from Cx to the distal RCA. The arrow indicates the loop in the collateral, which caused poor guidewire manipulation during retrograde approach. (c) Despite all attempts, the lesion could not be crossed. Carlino technique – intralesional contrast injection – was performed several times as bailout. The arrows indicate the dissection plane of the lesion. (d) After the Carlino technique, the lesion could be antegrade crossed and retrograde guidewire could be externalized to the antegrade catheter. (e and f) After applying of predilatation and implantation of three sirolimus-eluting stents, an excellent angiographic result was achieved.