Use of the Retrograde Approach for Preserving the Distal Bifurcation After Antegrade Crossing of a Right Coronary Artery Chronic Total Occlusion

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ABSTRACT: Percutaneous coronary intervention (PCI) of a chronic total occlusion (CTO) can be challenging when a bifurcation is present at the distal cap. We describe a case of combined use of the antegrade and retrograde approach for preserving a distal cap bifurcation during CTO PCI.

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Case Report. A 66-year-old man with type-2 diabetes mellitus, hypertension, dyslipidemia, and known coronary artery disease presented with Canadian Cardiovascular Society class II angina despite maximal medical therapy. He had undergone percutaneous coronary intervention (PCI) of the right coronary artery (RCA) 7 years prior. Coronary angiography demonstrated chronic total occlusion (CTO) of the RCA stent extending from the RCA ostium to the posterior descending artery (PDA) and posterolateral vessel (PLV) bifurcation (Figure 1A), without significant disease in the left coronary artery.

Bilateral femoral arterial access was obtained with 8 Fr sheaths. The RCA was engaged with an AL1 guide and the left main with an XB 3.5 guide. Antegrade crossing into the right PLV was achieved using a CrossBoss catheter (Boston Scientific) together with a Pilot 200 guidewire (Abbott Vascular) and a Confianza Pro 12 guidewire (Asahi Intecc) (Figure 1B). After predilation with a 2.0 x 20 mm balloon (Figure 1D), stenting of the RCA into the right PLV was performed using Xience Xpedition stents (Abbott Vascular). A Confianza Pro 12 retrograde guidewire was then advanced into the distal RCA stents followed by wire externalization (Figure 1E). A stent was placed into the PDA (Figure 1F) using the mini-crush technique with an excellent angiographic result and restoration of antegrade flow into both the PLV and PDA (Figures 1G and 1H).

The total fluoroscopy time of the procedure was 73.3 minutes and the total radiation dose 110336 Gy•cm², while the total contrast volume delivered was 360 mL. The patient had an uneventful recovery with complete symptom resolution.

Discussion. Treating CTOs with a bifurcation at the distal cap can be challenging and could result in recanalization of only one of the branches.1 Although restoring flow into one branch is better than complete failure to recanalize the vessel, restoration of antegrade flow into both branches is optimal (especially if both branches are of large caliber), but can be challenging. This is especially true when dissection/re-entry crossing strategies are used (intentionally or unintentionally) for antegrade crossing, as stenting the subintimal space hinders wire access into side branches.2 Our case demonstrates effective use of the retrograde approach for preserving a bifurcation at the distal CTO cap. Retrograde crossing into the proximal part of the occluded vessel was achieved after stenting, allowing implantation of stents in both branches. However, in similar cases antegrade crossing is preferred if possible, as use of the retrograde approach requires: (1) availability of appropriate “interventional” collaterals;3 (2) local expertise in using the retrograde approach; (3) availability of dedicated equipment, such as microcatheters and long guidewires;3 and (4) not exceeding the radiation and contrast limits during the antegrade part of the procedure. Moreover, use of the retrograde approach has inherent risks, such as donor vessel injury, ischemia, and collateral vessel perforation (which is of special concern when epicardial collaterals are used).4 All the above requirements were met in our case and no complication occurred. However, given the technical difficulty and associated risks, the above-described technique should only be employed by experienced CTO operators. Additional cases are required to establish the success and reproducibility of this technique.
and to identify its limitations. An alternative approach would have been to subintimally cross into the occluded side branch, followed by re-entry into the true lumen (yet subintimal crossing failed), or the recently described “head-to-toe” kissing balloon angioplasty.5

**Conclusion.** The retrograde approach can be used to preserve both branches of a significant bifurcation at the CTO distal cap.

**References**


