Successful Retrograde Recanalization of a Very Rare Anomalous Origin Right Coronary Artery Chronic Total Occlusion

Gasparini GL*, Oreglia JA, and Reimers B

1Department of Invasive Cardiology, Istituto Clinico Humanitas, Rozzano (Milan), Italy
2Department of Invasive Cardiology, Niguarda Hospital, Milan, Italy

Abstract

Chronic total coronary occlusions (CTO) still remain one of the most technically challenging clinical scenarios in which to perform interventions. Although the antegrade approach is the most common method of CTO recanalization, a retrograde attempt improves the success rate and its usage has been increasingly adopted in the recent years. Furthermore, abnormalities such as anomalous origin coronary arteries represent other important technically challenging cases for interventional cardiologist. In this case, we describe a rare case of a CTO in the mid portion of an anomalous right coronary artery (RCA), that originated from a high anterior takeoff and progressed in the downward direction, where retrograde approach has been used to overcome the absence of antegrade guiding catheter support.

Introduction

Treatment of CTO lesions remains a major challenge for interventional cardiology and is a frequent reason for a patient’s referral to coronary artery bypass surgery (CABG) [1]. Among CTO’s angiographic characteristics, anomalous origin is another important angiographic feature that may negatively affect procedural success, due to prevention of guiding catheter engagement into coronary artery, essential to obtain optimal support [2]. Coronary artery anomalies have been found in 1% of the general population who underwent diagnostic coronary angiography [3]. Coronary intervention for an anomalous coronary artery is a technically challenging and extremely complicated procedure, especially in case of transradial approach for CTOs without a stump [4,5]. In the presence of a proximal take off side branch, the anchor technique which uses balloon inflation in a non-target side branch, could be employed to improve guiding catheter support and complete the procedure by antegrade approach [6]. Moreover, when anchoring technique is not feasible, retrograde approach via septal or epicardial collateral channels (CC) may be used to increase rate of PCI success [7]. We describe a rare case of a CTO in the mid portion of an anomalous right coronary artery (RCA), that originated from a high anterior takeoff and progressed in the downward direction, where retrograde approach has been used to overcome the absence of antegrade guiding catheter support.

Figure 1: (A) Coronary angiography revealed the RCA originated from a high anterior takeoff and progressed in the downward direction and a CTO without stump just after a small acute marginal branch, in the mid portion of RCA. (B) The circumflex artery (that originated from proximal portion of the RCA) and the LAD did not exhibit significant stenosis. The PDA filled from CC1 epicardial channel from distal LAD.

Figure 2: (A) Retrograde approach attempted through the epicardial CC from distal LAD. (B) After successful guidewire CC crossing, a Corsair microcatheter was advanced into PDA and positioned near the distal end of the occlusion. (C) Advancement of an antegrade guidewire close to the proximal cap of the occlusion as a landmark for the retrograde guidewire. (D) After successful CTO crossing, the retrograde guidewire was advanced and trapped into the antegrade guiding catheter.

*Corresponding author: Gasparini GL, Department of Invasive Cardiology, Istituto Clinico Humanitas, Via Manzoni 56, 20089 Rozzano (Milan), Italy, Tel: +390232245996; Fax: +390282243690; E-mail: gabriele_luigi.gasparini@humanitas.it

Received February 16, 2017; Accepted March 16, 2017; Published March 21, 2017


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with no guide wire support. Once the Corsair crossed the CTO body and advanced into the antegrade guiding catheter, retrograde Ultimate Bros 3 guidewire was exchanged with a 330 cm long RG3 wire that was successfully externalized through the opposite hemostatic valve. After externalization of RG3 guidewire, multiple dilatations by antegrade balloons with 1.5 × 20 mm, 2.0 × 20 mm were performed. Finally, implantation of three drug eluting stents by overlapping from the distal part of RCA to the proximal part respectively 3.0 × 12 mm, 3.0 × 31 mm and 3.5 × 31 mm was accomplished and post-dilatation executed by 3.5 × 12 mm NC balloon with excellent angiographic result (Figure 3). The patient was discharged two days after the procedure.

**Discussion**

Coronary CTO remains one of the most challenging lesion subsets in interventional cardiology, even with the development of medical devices and operator expertise. Anomalous origin is an important angiographic feature that may negatively affect procedural success, due to prevention of guiding catheter engagement into coronary artery. Retrograde approach via septal or epicardial branches may be used to increase rate of PCI success. Knowledge of the specialized devices and techniques and awareness for possible complications could allow successful implementation of these techniques with high procedural success and low complication rates. Operators should be proficient in antegrade CTO PCI before performing a retrograde approach. Retrograde wiring through epicardial collaterals should be reserved until after enough experience has been gained with septal collaterals.

**Conclusion**

This case of successful PCI CTO of a very rare anomalous origin RCA underlines how the retrograde approach is a safe and effective alternative in the treatment of CTO, above all in those cases where an anomalous origin of the coronary artery could cause a poor support of the antegrade guiding catheter and the anchoring balloon technique is not feasible.

**References**