

Case-Report

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Bilateral Distal Radial Artery Access for Percutaneous Coronary Intervention for Chronic Totally Occluded Left Anterior Descending Artery

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Abstract

Despite advances in new devices, equipment and expertise, percutaneous coronary intervention (PCI) for chronic total occlusions (CTO) remains difficult and technically challenging. Arterial access is an important consideration when deciding on how to treat the lesion at hand as this has implications on catheter sizing and support as well as facilitating contralateral coronary angiography. Radial artery access has been increasingly adopted by operators with similar success rates and safety to femoral artery access. Distal radial artery access is a relatively recent concept and provides more comfort for the patient as well as for the operator. We present here a challenging case of left anterior descending artery CTO in a 63-year-old male diabetic, in which the successful PCI was achieved via bilateral distal radial access.

Keywords: Hypercholesterolaemia; Hypertension; Myocardial Infarction; Echocardiogram; Ischaemic symptoms; Ejection fraction

Abbreviations: PCI: Percutaneous Coronary Intervention; CTO: Chronic Total Occlusions; LV: Left Ventricular; LAD: Left Anterior Descending Artery; MI: Myocardial Infarction; CAD: Coronary Artery Disease; RCA: Right Coronary Artery; LMS: Left Main Stem

Introduction

Chronic total occlusion percutaneous coronary intervention still represents the most challenging settings for percutaneous coronary intervention, with recent optimal procedural success obtained thanks to advance in tools and techniques. In recent years, successful percutaneous coronary intervention (PCI) of chronic total occlusion (CTO) of the coronary arteries has been achieved through improvement of guidewires [1] and supportive devices [2,3]. In addition, successful CTO re-canalisation has been demonstrated to relieve ischaemic symptoms, improve left ventricular (LV) function and improve long-term survival. Despite these advances, PCI for CTO remains technically challenging. Scoring algorithms have been created and validated to assist the operator plan the approach based on lesion complexity.

Arterial access is an important factor for consideration as this has implications on catheter size and support. The transradial approach (TRA) for percutaneous coronary intervention (PCI) has gained widespread acceptance during the past decades. The radial artery is easily compressible, not surrounded by major venous and nervous structures, and an adequate collateral arterial network is present. As a result, the risk of vascular complications after TRA is negligible [4]. Multiple randomized trials demonstrated that a transfemoral approach (TFA) is associated with a significantly

higher risk of bleeding, pseudoaneurysm and arteriovenous fistula formation, cardiac events, and mortality after PCI [4,5]. This has been demonstrated in PCI for stable coronary artery disease and acute coronary syndromes both with and without persistent ST-segment elevation. Moreover, vascular complication rates after TFA are only modestly reduced with the use of vascular closure devices [6].

However, PCI of chronic total occlusion (CTO) is mostly performed with (bilateral) femoral access to facilitate the use of large bore guiding catheters for optimal support and freedom in technique selection. Nevertheless, previous reports suggest that TRA CTO PCI is feasible [7-12].

Distal radial artery access [13,14] is a novel method that has yet to be widely used but from anecdotal data it appears to be more comfortable for patients and operators and facilitates successful completion of complex PCI procedures. We present herein a case of bilateral distal radial PCI with antegrade approach for CTO of the left anterior descending artery (LAD).

Case Report

A 63-year old African male, a type 2 diabetic on metformin with hypercholesterolaemia and hypertension presented with

symptoms suggestive of a late presentation myocardial infarction (MI).

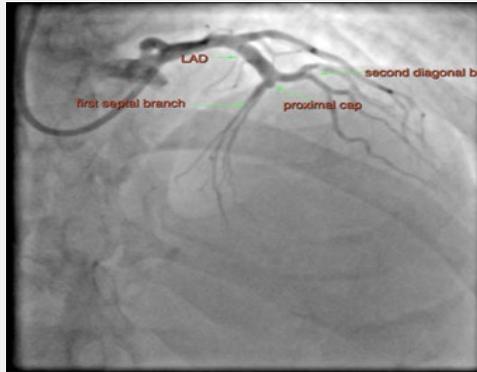


Figure 1

His index event had likely occurred 4 months previously in Gambia, for which he had not sought medical attention. He had presented to his GP, now asymptomatic and had been found to have an abnormal ECG with persisting anterior ST elevation and deep T wave inversion. He had an echocardiogram which demonstrated a left ventricular ejection fraction of 40% with a hypokinetic anterior wall and apex with preserved LV wall thickness in the LAD territories but a likely apical LV thrombus. His bloods demonstrated a normal haemoglobin, an estimated glomerular filtration rate of 52 ml/min. 1.7 m² and normal troponins. He underwent coronary angiography via a distal right radial artery approach using a 6 French Terumo Glide-sheath Slender. A 5.2 French (F) diagnostic Super Torque Plus JR4 catheter (Cordis) and 6 F 3.5 MACH 1 Guide Catheter CLS Curve (Boston Scientific, MA) were used for the diagnostic images. These demonstrated single vessel coronary artery disease (CAD) with CTO with a ambiguous proximal cap in the mid LAD which started at a trifurcation point involving the second diagonal and septal branches (Figure 1).

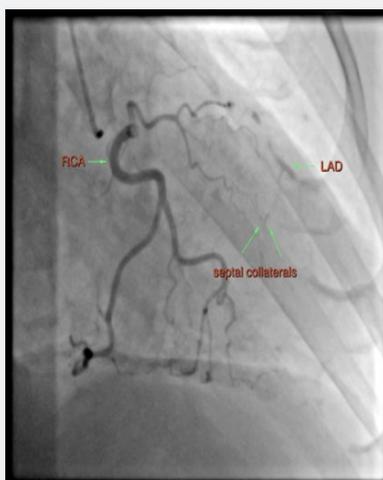


Figure 2

There was significant backfilling of the distal LAD from an extensive collateral system from the right coronary artery (RCA) (Figure 2).

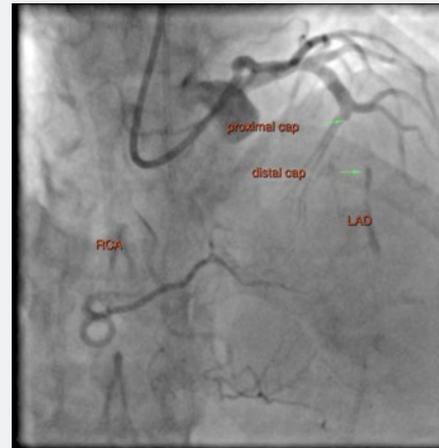


Figure 3

A second point of arterial access was obtained via the left distal radial artery with a second 6F Terumo Glide-sheath Slender and a 6 F ADROIT JR4 (Cordis) guide catheter was used to intubate the RCA to provide dual acquisition and revealed a J- CTO score 3- lesion at mid-LAD (Figure 3).

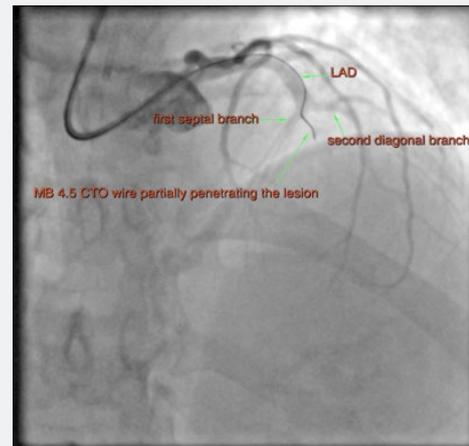


Figure 4

The 6Fr 3.5 CLS guide catheter was used to intubate the left main stem (LMS) via the distal right radial artery sheath. Anterograde wire escalation¹ was then attempted via the 6F CLS guide catheter initially using a Pilot 50 (Abbott) guide-wire with Corsair (Asahi) microcatheter support passed anterogradely down to the lesion and was then exchanged for a Pilot 200 guide-wire via the Corsair, but its tip was flipping either to first septal or second diagonal branch. Further escalation with exchange to a Gaia 3 (Asahi) and Miracle Bros (MB) 4.5 (Asahi) guide-wire was performed with the Miracle Bros 4.5 guide-wire partially penetrating the proximal cap and moving into the body of the CTO lesion (Figure 4).

The Corsair was then advanced over the MB wire and been stuck within the lesion. The MB wire was then exchanged back to the Pilot 200 guide-wire which successfully crossed through the

body of the CTO and the distal cap into the distal vessel (Figure 5 & 6).

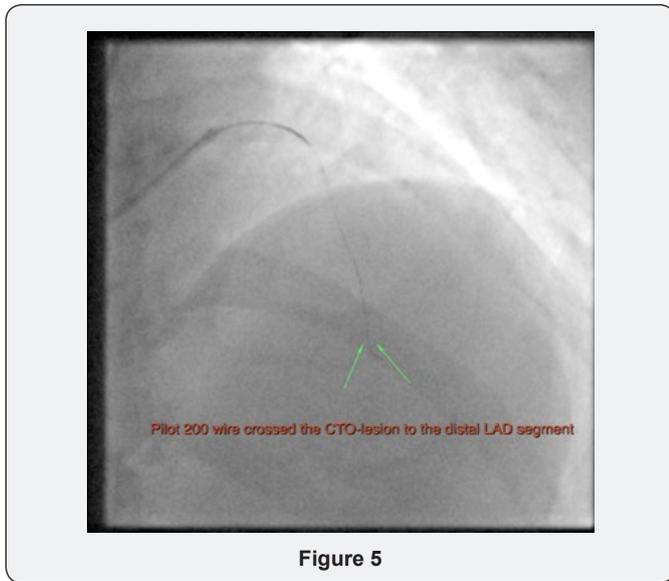


Figure 5

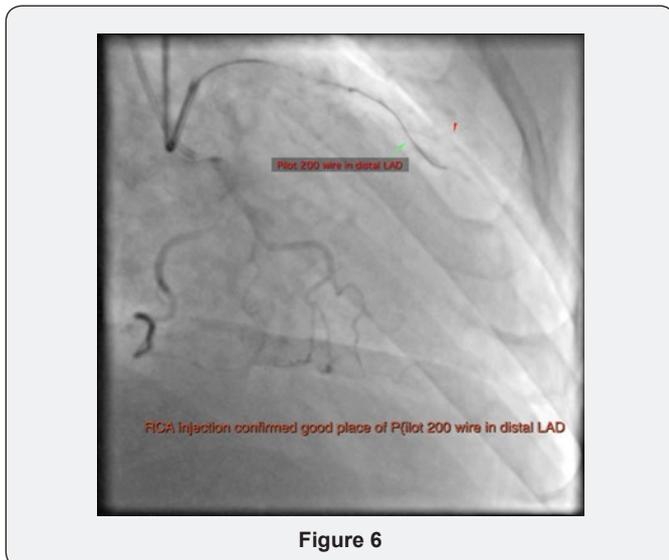


Figure 6

Unfortunately, the Corsair was not able to be passed through the proximal cap of the CTO therefore this was removed. A 6Fr Guidezilla II (Boston Scientific) was then passed over the Pilot 200 guide-wire to the proximal LAD and the vessel was predilated along the length of the CTO with a 1x10mm Sapphire II Pro (Orbus Neich) balloon to high pressures (Figure 7).

A larger 2x9mm Sprinter Legend NC (Medtronic) balloon was then passed and inflated to high pressures along the length of the CTO. Further pre-dilatation was then performed using a 2.5x30mm Sprinter Legend NC (Medtronic) balloon along the length of the CTO to high pressures. An area of significant distal LAD became more apparent on anterograde angiography and this was treated using a 2.5x10mm Sequent Please Neo drug-eluting balloon (B Braun) and a 2.25x30mm Sequent Please Neo drug-eluting balloon (B Braun) with 50 second inflations. The mid

LAD was then treated using overlapping 3x23mm and 2.5x33mm Xience Sierra evorlimus-eluting stents (Abbott) to high pressure. The stent overlap was post-dilated using the 3x23mm Xience Sierra stent balloon to high pressure. Anterograde coronary angiography post PCI demonstrated an excellent angiographic result (Figure 8).

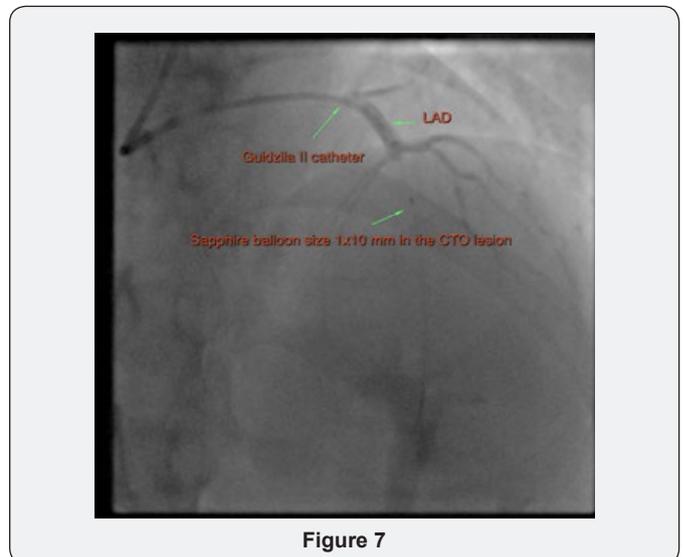


Figure 7

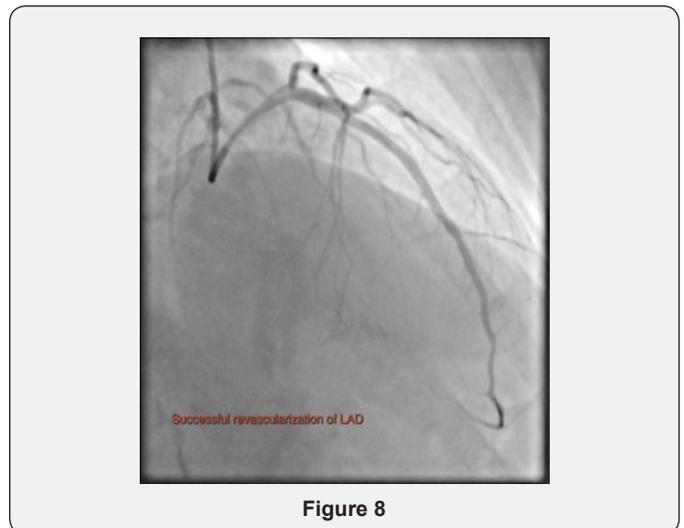


Figure 8



Figure 9

Haemostasis was achieved using bilateral Tracelet compression devices (Medtronic) to the left and right distal radial puncture sites (Figure 9).

Discussion

The radial artery (RA) access has been used to perform chronic total occlusion percutaneous coronary intervention (CTO PCI) with similar success and safety to CTO PCI using the common femoral artery (CFA) access. Distal radial access in the anatomical snuffbox is a challenging new access with much comfort for the patient and operator, reliable for complex PCI after adequate training. There are only scarce publications [13,14] reporting the use of distal radial artery approach in performing PCI to CTO lesions. Herewith, we report a case of successful PCI to LAD with JCTO score 3 using bilateral distal radial artery approach.

Michael Megaly et al. [15] in their meta-analysis of 9 observational studies included 10,590 patients underwent CTO PCI, reported that CTO lesions attempted using radial artery had lower Japan-CTO score (2.3 ± 1.2 versus 2.5 ± 1.3 ; $P < 0.001$). Use of RA was associated with similar technical success (78.7% versus 78.5%; odds ratio, 1.11; 95% CI, 0.94-1.31; $P = 0.24$; $I^2 = 23\%$), lower risk of access-site complications (0.73% versus 1.79%; odds ratio, 0.34; 95% CI, 0.22-0.51; $P < 0.001$; $I^2 = 0\%$) and major bleeding (0.18% versus 0.9%; odds ratio, 0.22; 95% CI, 0.10-0.45; $P < 0.001$; $I^2 = 0\%$), and similar risk of in-hospital adverse events and in-hospital mortality (odds ratio, 0.36; 95% CI, 0.12-1.07; $P = 0.07$; $I^2 = 0\%$) as compared to femoral access. Results were similar when analyzing radial-only versus any femoral access and when excluding the largest study.

When the radial approach for CTO intervention is attempted, availability of sufficient guiding support becomes a major concern since it is generally not feasible to use a guiding catheter larger than 7 Fr. Accordingly, transfemoral coronary intervention is often preferred over transradial PCI for CTO because 7 or 8 Fr guiding catheters may be used to obtain greater back-up support, as compared to the 6 Fr guiding catheters frequently used in the transradial approach. However, because catheter materials have improved a great deal, and because special curvature is available to increase support, we were able to achieve sufficient guiding support with a 6 F MACH 1 Guide Catheter CLS Curve (Boston Scientific, MA) as well as using a child catheter (Guidezilla II Guide Extension Catheter-Boston Scientific) in this case.

Conclusion

Bilateral distal radial access is a viable option for CTO PCI. It is safe and effective and adding more convenience to both the patient and operator especially in complex PCI when it takes longer time than simple PCI.

Declaration

All authors have no conflict of interest to declare.

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