Cambridge City Publishers

Case Reports in Clinical Cardiology Journal

Case Report | Vol 2 Iss 2

Tapering by any Means!

Réza Dadkhah[1*] and Claudiu Ungureanu[2]

[1]Division of Cardiology, Tivoli University Hospital, La Louviere, Belgium

[2]Department of Cardiology, Centre hospitalier Jolimont, La Louviere, Belgium

[*]**Corresponding author:** Réza Dadkhah, Division of Cardiology, Tivoli University Hospital, Max Buset Avenue 34, 7100 La Louviere, Belgium.

Received: October 17, 2022; **Accepted:** October 26, 2022; **Published:** November 10, 2022

Abstract

The management of peripheral accesses becomes more and more crucial in coronary procedures interventions that need large-bore guiding catheters and many tools are now available to help increasing the success of the delivering materials through complex anatomies. The radial approach reduces vascular complications but leads to some limitations in the size of the catheters. The sheathless technique with the Railway (Cordis) was developed in the transradial access in order to reduce this size limitation, with the development of a specific dilator that can easily navigate through tortuous vessels. We report a case where this specific Railway dilator was used not in a transradial access but in a transfemoral access, allowing the positioning of an Arrow-Flex Sheath introducer. We describe the technical challenge encountered in the management of a difficult femoral access needing specific tools to be adapted to various situations. Our option brings together techniques and materials combined with newer tools and access that open up many more possibilities.

Introduction

The femoral approach has been the most common method of vascular access for coronary angiography with unfortunately many vascular complications such as pseudoaneurysms, arteriovenous fistulae, retroperitoneal bleeding, ischemic vascular problems or femoral arterial dissections [1]. The transradial approach was then developed and was associated with less complications for similar benefits in terms of PCI procedures [2]. It has become the standard approach for coronary angiography and PCI. A distal radial access was then developed, overcoming the radial artery occlusion [3], a remaining complication of the traditional radial access. However, the lumen of the radial artery became a limitation in the use of demanding techniques for complex PCI. The sheathless approach was imagined to overcome this problem, and the Railtracking technique that employ the Railway dilatator proved to be successful with low complication rate [4-8] in distal or conventional radial access. We will see that this option brought some very versatile and useful tools which should not be restricted to the radial approach.

Case Report

A74 years old women with refractory angina had performed an elective coronarography that showed a severe Circumflex (Cx) artery stenosis and a Right coronary chronic total occlusion (CTO). After treating the Cx artery using one single DES a second PCI procedure was proposed for the RCA CTO recanalization in the presence of large inferior myocardial viability and ongoing angina despite optimal medical treatment.

For this procedure, two accesses were needed. The right radial pulse was absent. We opted for a 7Fr Rail Tracking approach through the left distal radial artery for the left coronary artery. For the RCA CTO itself, we preferred a left femoral approach in the presence of moderate calcified lesions on the right common femoral artery. After inserting a Terumo 7F femoral sheath introducer, we encountered difficulties to advance a conventional 0,035cm guidewire due to a nodular calcification combined with mild stenosis and severe tortuosity (Figure 1 and 2). After using a coronary wire and a 5F diagnostic Judkins Right catheter, the 0,035mm stiff guidewire was placed in the ascending aorta but furthermore the advancement of the 7F 3D right (Medtronic) guiding catheter (GC) was unsuccessful.

Figure 1: Angiogram of the stenotic and calcified femoral artery.

Figure 2: Railway system (Cordis) on the Guiding Catheter (down) compared to the Arrow Flex Sheath Introducer with its dilator (up).

The GC was then charged with the Railway dilatator to create a more tapering system and was slowly advanced with a gentle rotation movement, but it was not possible to cross the calcified lesion.

Next step was an attempt to place a different femoral sheath, longer and more flexible, to increase the support for crossing the lesion. The first attempt with a 7F Super Arrow-Flex Sheath Introducer was impossible but after replacement of the original dilator with the longer one from the Railway system (Figure 3) we finally succeed crossing and positioning the sheath into the descending aorta. This strategy allowed us to finally advance easily the GC to catheterize the right coronary artery. Concerning the CTO PCI recanalization, an antegrade wire escalation technique was successful and after plaque preparation by rotational atherectomy and scoring balloon, a drug eluting stent was successfully delivered with a good angiographic final result.

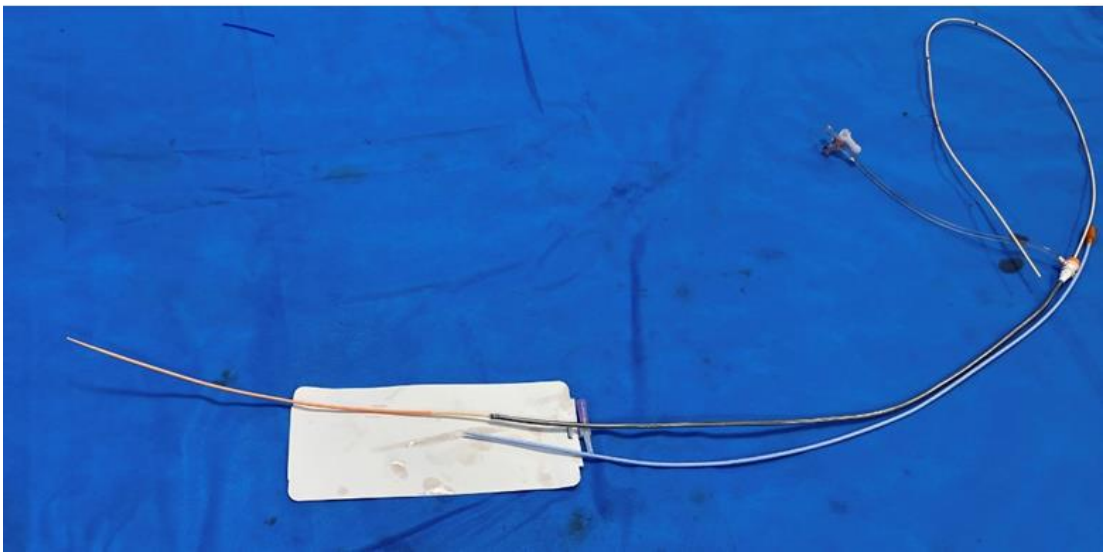

Figure 3: Railway dilator mounted on the Arrow Flex Sheath Introducer (the orignal Arrow Flex dilator just under the Arrow Flex for comparison).

Discussion

We are facing more and more complex accesses to deliver material for percutaneous treatment of coronary disease and finding solutions for patients becomes challenging. We have to face peripheral vascular disease before accessing coronary arteries, and sometimes we need tools to overcome calcified and tortuous vessels. With the development of CTO treatment, to be able to work in good conditions, we need more vascular accesses, and navigating through 2 vessels can become difficult. Transradial access route has become a very popular option since it reduces complications such as bleeding and allows sooner mobilization of the patient. However, the size of the radial artery may be a limitation for the size of the catheter needed. 6F catheter are sometimes limiting and we would be more comfortable working with 7F catheter, a size that become difficult for a radial access, with average radial artery diameter of 2.4mm +/- 0.5mm. The outer diameter of 6F sheaths most commonly used is 2,61mm. Here is where the sheathless approach can be successful, knowing that the sheath outer diameter being 2F larger than the corresponding guiding catheter. In this idea, the Railway device (Cordis) works on a direct catheter access with a sheathless methodology [6]. This system uses a Railway dilator, a very useful tracking device with a flexible, tapered and hydrophilic tip. This device allows navigation of the guiding catheter through tortuous and calcified vessels. This sheathless approach was developed specifically for the radial access, however, in particularly difficult situations, this specific technique has been used successfully in transfemoral access. Zeev Israeli describes the use of this method on an 83 years old patient. Different accesses were tried, radial and ulnar approach, but severe calcifications prevented full insertion of a sheath or the use of no other catheter than a diagnostic 4F right Judkin. Sheathless approach was tried also in the radial access, with no success. Similar issues were encountered when trying to advance multiple guiding catheter trough femoral artery. Finally, a 7.5F Sheath Less Eaucath (Asahi Intec, Japan) was used also trough the femoral artery, with success, allowing for the planned coronary angioplasty [9].

The use of a Railway dilator other than in the transradial sheathless approach has been described in only one other publication, not in a coronary intervention but in the case of a percutaneous endovascular repair of prosthetic paravalvular leaks (PVL). A main challenge of that technique is to cross the PVL first with a wire and then with a guide catheter or guide sheath. After failing to use the traditional technique, consisting of telescoping a 5F diagnostic catheter and 6F guiding catheter trough the wired PFL, the author had the idea to use the Railway dilator, assembled to the guiding catheter in order to advance over the wire through the PVL. This manipulation was successful and after removal of the wire and dilator, allowed the positioning and deployment of the Amplatzer plug [10]. Our case is the second one using this Railway dilator in a femoral approach, but, to the best of our knowledge, was the first time applied to allow the positioning of an Arrow-Flex Sheath introducer. We are dealing more and more with tortuous calcified stenotic arteries and it is important to keep our peripheral accesses safe and functional. The Super Arrow Flex Sheath introducer is a known tool that allows a safe femoral approach in these situations. It presents a coil-wire design which allows to flex at any point and in any direction, without kinking. The coil is sealed between layers of flexible polymer and then coated at the tip with a hydrophilic surface. This design allows the successful negotiation of tortuous vessels such as the iliac artery. It is provided with a one-piece dilator, that should help for the sheath insertion. However, this dilator has its limitations in some particularly complex situation mostly due to calcium, like the one we just described. This is where the dilator of the Railway can play a role, with its flexible, tapered, hydrophilic tip, making a perfect replacement to the Arrow dilator. In our case, this strategy brought a very elegant solution to the safe positioning of the Arrow Sheath introducer, allowing us to proceed to the coronary PCI.

Conclusion

We report a new approach to the use of a dilator from the Railway system (Cordis), designed at first for a radial sheathless access. Its particular properties allows effective navigation through tortuous and calcified vessels, very helpful of course in transradial approach, but also in femoral access. This dilator was used for the first time in combination with the Super Arrow Flex Sheath femoral introducer, allowing its safe positioning, after the failure of the dedicated dilator. We believe that the combination of this well-known older device with a new material brings a fresh approach to the classical femoral access.

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