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Bare Diagnostic Catheter Rotation: A Simple Technique to Cross Radial Tortuosity

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Abstract

Transradial approach has become the mainstay for vascular access in invasive cardiology. Despite its remarkable safety, it may entail specific technical skills, especially in case of small and tortuous vessels, which may lead to the need for multiple devices, cross-over to other access sites and/or occasional complications. We hereby report on a patient with a small and tortuous right radial artery, in whom an alternative approach was used to overcome the tortuosity after failing to reach the brachial artery with a conventional non-hydrophilic 0.035" guidewire. Specifically, we relied on the rotation, with simultaneous advancement, of a bare diagnostic JR4 6 French catheter, all under fluoroscopic guidance. This simple yet effective technical trick, which may be called bare diagnostic catheter rotation technique, may prove useful and beneficial to overcome vessel tortuosity in selected cases and experienced hands.

Keywords

access, catheter, coronary artery disease, radial, transradial, ulnar

Introduction

Transradial access has progressively become one of the leading vascular access sites because of its established risk-benefit profile, especially for patients undergoing invasive cardiac procedures with concomitant potent antithrombotic therapy [1, 2, 3]. Indeed, transradial and transulnar access significantly decrease bleeding complications and, possibly, major adverse clinical events, in comparison to transbrachial or transfemoral access [2, 3, 4].

Given the size of the radial artery, averaging 2.0-2.5 mm in diameter, transradial access is however more technically demanding than transfemoral access, the more so given the frequent occurrence of tortuosity or narrow angulations in the path toward the aorta [5, 6, 7]. The typical approach used by operators when facing radial tortuosity or angulation is to change their guidewire of choice, for instance in favor of a straight-tipped 0.035" guidewire such as the Storq (Cordis), a 0.035" hydrophilic guidewire such as the Radifocus M (Terumo, Tokyo, Japan), or smaller ones, such as the 0.018" V18 (Boston Scientific, Natick, MA, USA) or even smaller 0.014" guidewires, such as BMW (Abbott Vascular, Santa Clara, CA, USA), possibly supported by a balloon to avoid flaring [6]. Using these alternative devices may increase costs and radiation exposure, and in addition, use of small and/or hydrophilic guidewires may

lead to an increased risk of complications, such as dissection or side branch perforation [6, 7].

We hereby report on a case in which we used a different and rather simple trick to navigate a complex rather tortuosity, which may be easily and safely adopted by other experienced transradial operators, but can also prove useful in other vascular districts and for other types of procedures.

Case Presentation

A 62-year-old gentleman was admitted to our institution for suspected coronary artery disease. His risk factors included hypertension and non-insulin-dependent diabetes mellitus, and he had recently presented to his general practitioner for a long-standing complaint of exertional chest pain. Given evidence at stress ECG of significant ST-segment depression, he was referred to us for invasive coronary angiography.

As per our standard of care, after confirmation of a satisfactory right radial pulse, the right upper limb was prepared with antiseptic solution and sterile drapes. We then injected subcutaneously diluted lidocaine for analgesia, and then punctured the distal right radial artery with a 21-gauge bare needle (Cordis, Miami, FL, USA). As the matching 0.021" guidewire could not be advanced easily in its entirety, but could be felt moving freely, we decided to use the available part of the guidewire to advance only the distalmost tip of the 6 French Avanti+ sheath (total length 11 cm) in the radial artery. Angiography was then performed, showing severe tortuosity of the distal radial artery (Figure 1).

We attempted several times to cross the tortuosity with a non-hydrophilic 0.035" Emerald guidewire (Cordis), albeit unsuccessfully. Instead of using a smaller and/or hydrophilic guidewire or using a guidewire-diagnostic catheter combo, which may lead to a stiff system and thus potential complications, we instead opted for the bare diagnostic catheter rotation technique, which we have used successfully and safely several times in the past.

Specifically, we introduced and then slowly advanced a 6 French JR4 Infiniti diagnostic catheter (Cordis), without any guidewire and filled with contrast media, in the sheath, continuing then the rotation and the slow yet progressive push in the radial artery seamlessly, with continuous fluoroscopic guidance. We were thus able to safely and successfully cross the radial artery and reach the brachial artery. Once there, we introduced the 0.035" non-hydrophilic guidewire, and completed the cardiac catheterization and coronary angiography as per standard of care. As no significant coronary artery disease was disclosed, the procedure was completed with a control angiography of the right upper limb, followed by hemostasis with an elastic dressing. The patient was discharged the following day, uneventfully. Clinical examination showed no overt complication, with a persistently valid right radial pulse.

Discussion/Conclusion

Transradial access is becoming the standard of care for left cardiac catheterization, coronary angiography, and coronary intervention, thanks to its favorable safety profile, especially in acute and unstable patients [1, 6, 8, 9, 10]. Transradial access requires however specific technical skills and knowledge of the unique features of upper limb vascular anatomy. In particular, the common tortuosities of the radial, brachial and subclavian artery call for specific technical approaches. In most cases, use of small and/or hydrophilic catheters or guidewires will suffice to navigate such tortuous vessels. We

hereby report an alternative and, to the best of our knowledge, novel approach to navigate radial artery tortuosity, relying on bare diagnostic catheter rotation.

While this technique may be considered unorthodox at first glance, it rests on several reasonable premises. In particular, a 5 or 6 French JR4 diagnostic catheter has a size which remarkably matches that of a radial artery and, precisely for that, is unlikely to get stuck in a small side branch. In addition, the gentle distal curve the atraumatic tip of such a diagnostic catheter is perfectly suitable for similar steering bare procedures. Finally, in comparison to a guidewire-only based approach, a catheter based approach ensures optimal tactile force transmission and torque control, while concomitantly enabling small scout injections.

Despite these favorable premises, we must caution that it is very important to perform this maneuver after preliminary angiography to establish radial anatomy and then under continuous fluoroscopic guidance, and to stop immediately in case of resistance (as felt at the proximal end of the catheter and seen by sudden stop of the distal tip of the catheter, with initial bending of the distal part of the catheter itself), and then consider other solutions [6]. Indeed, complications of and trauma to the radial artery should best be avoided given also the importance of this vessel in case of subsequent coronary bypass surgery [11, 12].

In conclusion, while we do not advocate to routinely adopt the bare diagnostic catheter rotation technique, it may prove, in carefully selected cases and in experienced hands, a nice adjunct to the interventionist's armamentarium.

Figures

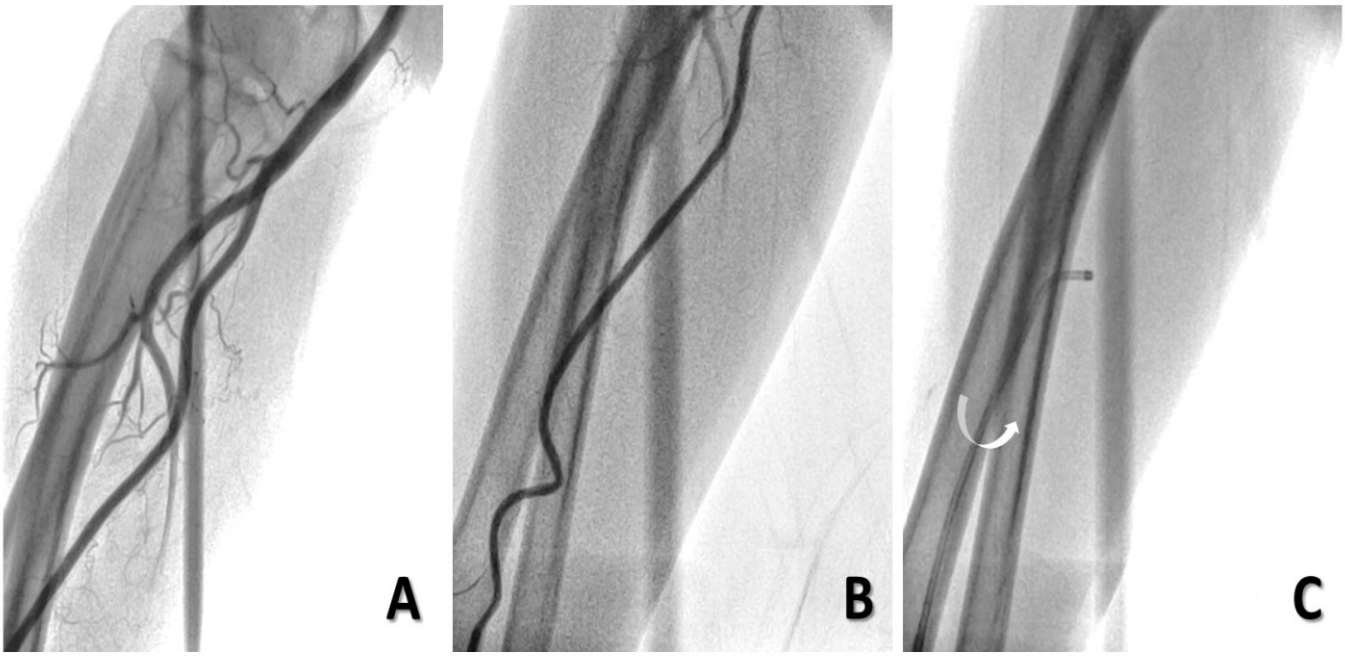

Figure 1: Navigating significant radial artery tortuosity with the bare diagnostic catheter rotation technique. Panels A and B show the results of angiography obtained with the radial sheath, inserted only in its distalmost tip, highlighting the tortuosity of the distal radial artery. Panel C shows the progressive rotational motion of the bare 6 French JR4 Infiniti diagnostic catheter (Cordis, Miami, FL, USA), slowly and gently advanced through the radial artery.

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