Transradial access for challenging procedures: preventing radial artery occlusion after complex percutaneous coronary intervention

Case provided by :

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A recent assessment by Rashid et al. investigated the incidence of radial artery occlusion (RAO) after transradial access, and highlighted some simple procedural methods with the potential to reduce the risk of this complication.[1] Minimising the diameter of the radial sheath was one factor that may help to reduce the risk of RAO.[1] The ultra-thin wall technology used in Glidesheath Slender® allows a 1Fr reduction in the outer diameter of the sheath versus a standard sheath, providing the necessary internal diameter for complex procedures whilst minimising the outer diameter. Fastidious aftercare is another important consideration for achieving patent haemostasis.[1] Ensuring good compression of the radial artery, using products such as the TR Band® (Terumo Radial Band), is an important aspect of aftercare to promote vessel recovery.

The following case provides an example of complex percutaneous coronary intervention (PCI) (the treatment of a bifurcation lesion using a two-stent 'reverse' T and small protrusion [TAP] technique) being undertaken via Glidesheath Slender®, and optimised using 3D optical frequency domain imaging (OFDI).

Introducing the patient

A 74-year-old male patient presented to clinic with typical symptoms of class II angina. The patient had previously been diagnosed with type II diabetes, and was waiting to undergo a routine urological procedure. Angiography was performed via the radial route using a 6Fr Glidesheath Slender® sheath, with the option to proceed to angioplasty if required. The left main stem (LMS) was unobstructed, and the left anterior descending (LAD) artery had moderate–severe mid disease involving a large diagonal bifurcation with extension into the side branch (Medina 1,1,1 classification). The circumflex coronary (Cx) artery also had a moderate plaque mid-vessel with an occluded non-dominant atrioventricular nodal (AV) branch. The right coronary artery (RCA) was dominant, although it had a moderate–severe proximal plaque, but this was non-flow limiting (Text Box 1).

Following positive pressure wire assessment of the LAD (iFR 0.85), angioplasty to the LAD/diagonal bifurcation was considered to be appropriate (Figure 1). No concerns were raised regarding dual antiplatelet therapy in the context of the anticipated urological procedure.

1 ***Angiographic image showing the left anterior descending artery/ diagonal bifurcation lesion***

How was the procedure performed?

Due to the nature of the lesion, an elective two-stent technique was chosen. A 'reverse' TAP technique was chosen due to the angle of the bifurcation, and to ensure complete ostial coverage.

Following wiring of both branches, the diagonal was predilated back into the LAD using a 2.5 mm cutting balloon. An Ultimaster® 2.5 mm x 15 mm stent was positioned in the diagonal to cover the entire ostium, with a small triangular protrusion into the main vessel. The stent was deployed whilst retaining a 2.75 mm balloon in the LAD, followed by a kissing balloon technique (to high pressure) using the slightly withdrawn stent balloon and the 2.75 mm LAD balloon. This optimised the ostium and the passage for the delivery of the LAD stent.

A second Ultimaster® 3.0 mm x 28 mm stent was positioned in the LAD, across the diagonal, and deployed. A proximal optimisation technique (POT) with a 3.5 mm Accuforce® non-compliant balloon was used to maximise stent expansion and optimise stent-strut side-branch access for recrossing (Figure 2).

Recrossing of the distal stent strut adjacent to the carina was straightforward and guided by 3D OFDI (Figure 3). Once optimal recrossing was confirmed, a second kissing balloon technique was completed following sequential post-dilation of the distal portion of the stent (Figure 4).

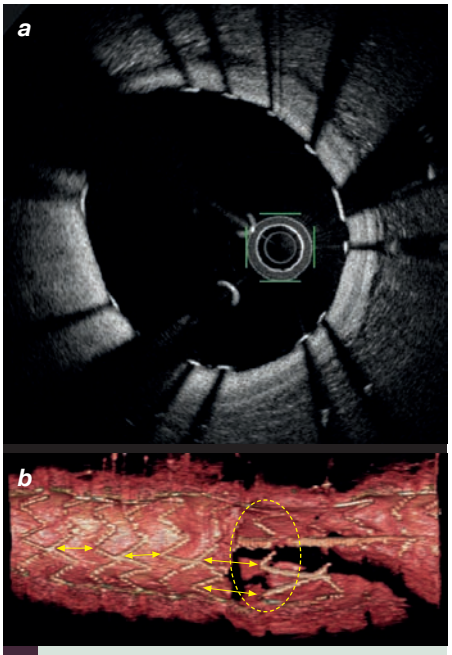
Text Box 1: Summary of case details

Patient history:

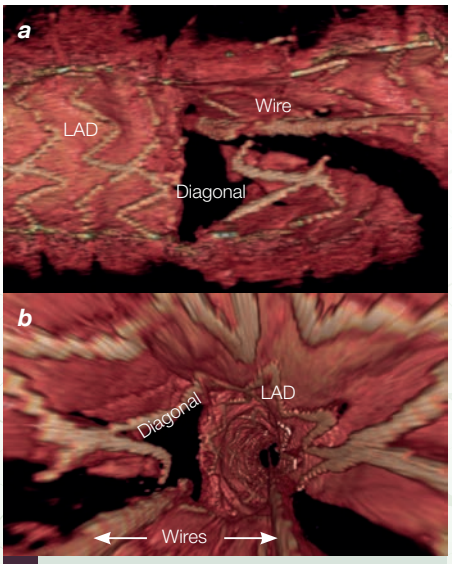
- 74-year-old male
- Typical class II angina
- Awaiting a urological procedure: suitable candidate for dual antiplatelet therapy
- Type II diabetes

Presentation:

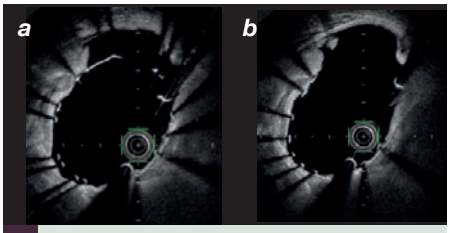
- LMS – unobstructed
- LAD artery – moderate–severe mid disease; large diagonal bifurcation with extension into the side branch (Medina 1,1,1 classification)
- Cx artery – moderate plaque mid-vessel with an occluded non-dominant AV branch
- RCA – dominant with moderate–severe proximal plaque; non-flow limiting (pressure wire)



2 ***Optical frequency domain imaging after a POT technique showing stent struts are apposed and cells expanded to optimise recrossing***



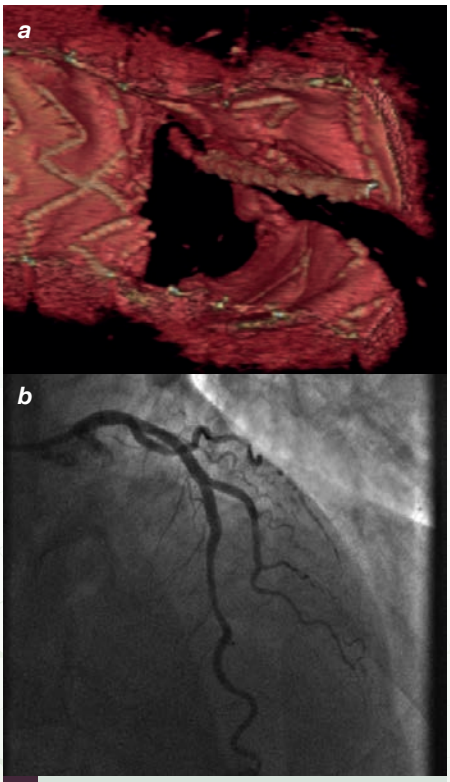
3 ***3D optical frequency domain imaging confirming recrossing of the wire at the distal cell adjacent to the carina***



4 ***Before (a) and after (b) kissing balloon inflation, showing the improvement in expansion and apposition***

Final angiographic images and OFDI confirmed good expansion and coverage throughout without the need for further optimisation (Figure 5).

The procedure was completed by achieving patent radial haemostasis via a TR Band®.



5 ***Final 3D optical frequency domain (a) and angiographic (b) imaging confirming the good result***

What happened to the patient?

The patient recovered well from the complex PCI procedure, and was discharged. However, 8 months later, he returned with atypical chest pain. He underwent equivocal stress testing, and an angiogram was performed via the patent right radial artery to check the status of the original intervention. This confirmed the stented segment remained healthy, and the patient was reassured.

What have we learnt?

This case highlights the utility of a slender approach to transradial access for performing complex procedures that require multiple, large tools. Glidesheath Slender® provides a simple option to upgrade to 7Fr transradial access in most patients.

The case demonstrates the importance of POT and final kissing balloon inflation in bifurcation cases as illustrated through OFDI.

The case showcases the use of 3D OFDI to guide optimal side-branch recrossing in bifurcation angioplasty.

This case also supports the utility of minimising sheath size with Glidesheath Slender®, and the importance of a considered approach to post-procedure compression using the TR Band®, in clinical practice.

Terumo tool checklist

- Glidesheath Slender®
- OFDI – Lunawave® monitor and FastView® catheter
- Ultimaster® stents
- Accuforce® – non-compliant PTCA balloon catheter
- TR Band®

Tips for achieving patent haemostasis

- Ensure the TR Band® is not applied too tightly – haemostasis is achieved through compression, not a tourniquet effect
- Position the green marker slightly above (proximal) the puncture site – the arteriotomy will be 1–2 mm proximal to the skin incision based on the angle of puncture and depth of the artery
- Use minimal inflation pressure to achieve haemostasis, clinically assess for non-occlusive radial compression via distal radial pulse palpation, assess colour and refill in the hand after ipsilateral ulnar compression
- In patients at high risk, use a pulse oximeter to demonstrate a patent waveform following ulnar compression

Reference: 1. Rashid M et al. J Am Heart Assoc 2016; doi:10.1161/JAHA.115.002686.