

Angiographic Success and Successful Stent Delivery for Complex Lesions Using the GuideLiner™ Five-in-six System— A Case Report

Anouska Moynagh, MD,¹ Philippe Garot, MD, FESC,² Thierry Lefèvre, MD, FSCAI, FESC³
and Yves Louvard, MD, FSCAI³

In this report, we describe two cases of transradial intervention of chronic total occlusions assisted by the GuideLiner catheter when the guide catheter support was suboptimal. This novel coaxial system can provide additional support for more complex lesions and, in our cases, allowed the procedure to be completed via the transradial approach rather than having to change to transfemoral access.

The transradial approach (TRA) is emerging as a successful method for coronary intervention. It provides the additional benefits of earlier ambulation, a reduction in staff workload, and, most importantly, a reduction in the rate of access site complications, when compared with the transfemoral approach (TFA).¹⁻⁵ However, it also has limitations. Owing to the smaller size of the radial artery, the choice of guiding catheter (GC) size is limited, with the maximal acceptable diameter being 6 Fr in the majority of cases and as a result back up support is compromised.⁶ A number of techniques have been used in order to try to improve the support.⁷⁻¹¹ Recently, the 'mother-and-child' technique, using a five-in-six system, has emerged as a powerful tool to increase back-up support.¹¹

The GuideLiner™ (Vascular Solutions, Inc., Minneapolis, MN) (see *Figure 1* and *2*) catheter is a new coaxial mother-and-child guide extension. After crossing the lesion with a conventional guide wire (GW), the GuideLiner is used as an inner catheter and inserted inside the 6 Fr GC, creating a mother-and-child system, and can be used to intubate the coronary artery. This improves the back-up support and allows selective deep intubation in difficult coronary cases enabling easier balloon and/or stent crossing.¹¹⁻¹³

In this report we show our first experiences of the GuideLiner catheter in two consecutive cases of chronic total occlusions of the right coronary artery in which the device was able to solve the technical difficulties associated with these complex procedures.

Case Report

Case One

A 53-year-old man presented with class two stable angina. Cardiovascular risk factors included hypertension, dyslipidemia, and a history of smoking. Coronary angiography revealed a chronic total occlusion (CTO) of the mid right coronary artery (RCA) with collateralisation from the left system. Subsequent cardiac magnetic resonance imaging (MRI) revealed inferolateral ischemia with viability in this territory. The decision was made to proceed with percutaneous coronary intervention (PCI) of the RCA.

PCI was performed through the right TRA using a 6 Fr Judkins Right (JR4.0, Launcher) GC, with the left TRA being used for contralateral injections. The origin of the RCA was anomalous and difficult to engage with subsequent poor GC support and difficult GW manipulation (see *Figure 3*). The GuideLiner catheter was inserted into the 6 Fr GC, to obtain better back-up support. After deep intubation of the

• Correspondence: Yves Louvard, MD, FSCAI, Institut Hospitalier Jacques Cartier, 6 rue du Noyer Lambert, 91300 Massy, France. E: y.louvard@icps.com.fr

Figure 1: GuideLiner™ Catheter

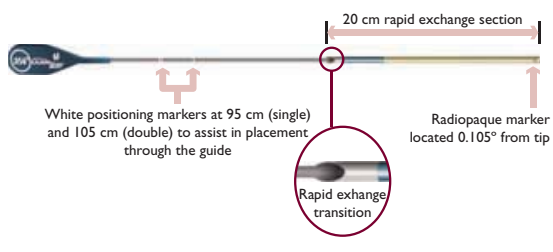


Figure 2: The GuideLiner™ Catheter Within the Guiding Catheter, Used to Intubate the Right Coronary Artery



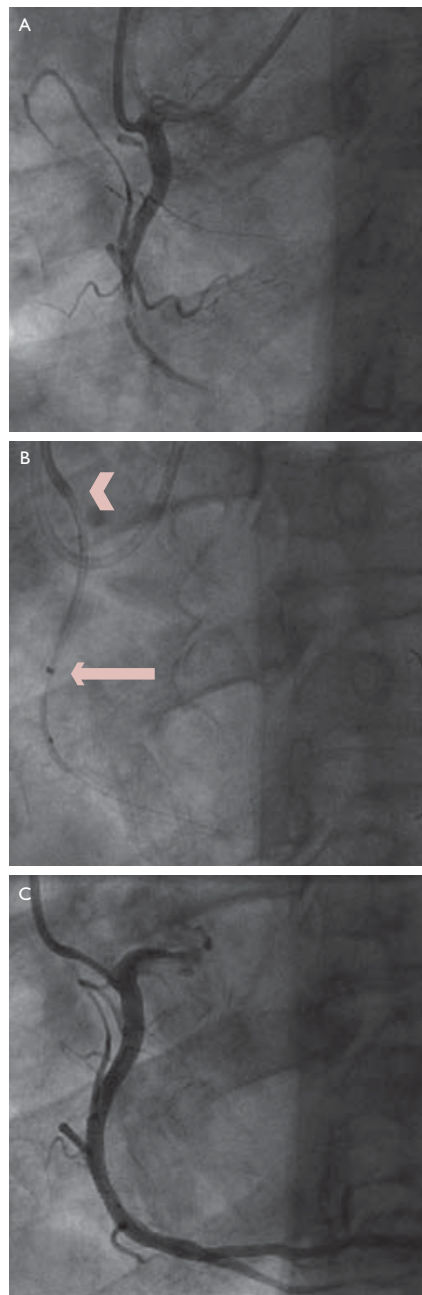
GuideLiner just proximal to the occlusion, and using a microcatheter (Finecross, Terumo, Japan), a GW (Fielder, Asahi Intecc, Japan) was successfully passed through the occlusion to the distal vessel. The lesion was predilated with a 1.5 x 15 mm balloon (see *Figure 3*). A 4 x 23 mm stent was easily passed and deployed with an excellent angiographic result (see *Figure 3*).

Case Two

A 56-year-old man with a history of previous coronary artery bypass surgery presented with new onset exertional dyspnea. His cardiac risk factors included hyperlipidemia and previous smoking. He had previously undergone PCI to the distal RCA, posterior descending artery (PDA) and posterior left ventricular (PLV) vessels 10 years prior. Coronary angiography revealed severe disease involving the left anterior descending and circumflex arteries with patency of both right and left internal mammary arteries to these vessels. The RCA was ungrafted and was occluded in its distal segment at the level of the previous bare metal stent (BMS) (see *Figure 4*).

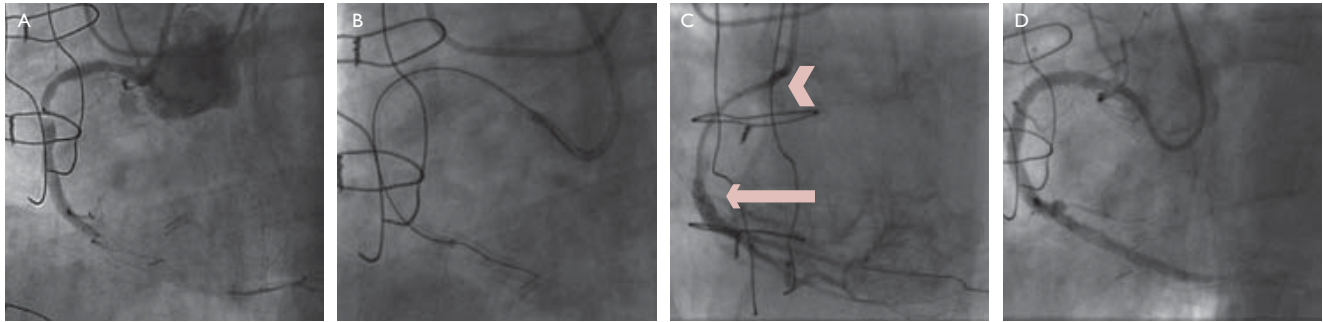
A cardiac MRI was performed and showed ischemia and viability of the inferior wall of the left ventricle.

Figure 3: Case One



A: Left anterior oblique projection showing occlusion of the mid right coronary artery and poor guiding catheter support. B: Balloon predilatation of the mid right coronary artery using deep insertion of the GuideLiner™ catheter through the 6 Fr GC. Arrow shows the distal tip of the GuideLiner catheter and arrowhead shows tip of 6 Fr guiding catheter. C: Final angiographic result.

Figure 4: Case Two



A: Left anterior oblique projection showing occlusion of the distal right coronary artery. B: Left anterior oblique view of right coronary artery poor support with the AL1 guiding catheter. C: Balloon pre-dilatation of the distal right coronary artery using deep insertion of the GuideLiner™ catheter through the 6 Fr guiding catheter. Arrow shows the distal tip of the GuideLiner catheter and arrowhead shows tip of 6 Fr guiding catheter. D: Final angiographic result.

PCI to the RCA was attempted and was unsuccessful but, owing to ongoing symptoms, the patient returned for a second procedure.

PCI was performed from the right TRA using a 6 Fr JR4 GC, with the left TRA used for contralateral injections. This provided inadequate guide support and thus it was exchanged for an Amplatz 1 (AL1) GC with additional back-up provided by the GuideLiner catheter (see Figure 4). The occlusion was successfully crossed with a guide wire (Miracle 12, Asahi Intecc, Japan) and predilated with a 1.25 x 10 mm balloon and subsequently with a 2.0 x 33 mm balloon. A 2.5 x 38 mm stent was easily passed to the distal vessel and two further stents used in the mid vessel with a good angiographic result (see Figure 4).

Discussion

In this report, we describe two cases of transradial intervention of chronic total occlusions assisted by the GuideLiner catheter. For RCA lesions, the optimal choice of catheter is one that can be deeply intubated in order to provide good backup support, but the use is limited, owing to the tendency towards causing dissections of the proximal vessel, especially when this segment of the RCA is severely diseased. To solve this problem, many

techniques have been developed such as anchoring balloons⁶ the buddy wire technique⁹ and deep intubation using a Judkins Right GC.⁷ This device employs a straight tip inner GC which has a softer, more flexible straight tip and is of smaller caliber than a conventional GC. As such, it allowed us to deeply intubate the coronary artery. Good back-up support was provided with a low risk of coronary injury, enabling stent delivery in these complex cases.

In our center, our approach for PCI is via the transradial route in >90 % of cases and recent data have shown our success rates for CTOs via this approach to be equivalent to transfemoral.¹⁴

Previous studies have shown bilateral internal thoracic grafting to be more reliable than radial arterial grafting therefore we performed the procedure via a double radial approach in order to reduce vascular complications and also to allow earlier ambulation.¹⁵ In our experience, deep intubation of the GuideLiner catheter has provided improved back up in difficult lesions and led to successful opening of the CTOs and passage of the stents with safety. This novel coaxial system has wider application for complex lesions especially in the era of contemporary PCI where operators are approaching more difficult lesions. ■

1. Brueck M, Bandorski D, Kramer W, et al., A randomized comparison of transradial versus transfemoral approach for coronary angiography and angioplasty, *JACC Cardiovasc Interv*, 2009;2(11):1047–54.
2. De Carlo M, Borelli G, Gistri R, et al., Effectiveness of the transradial approach to reduce bleedings in patients undergoing urgent coronary angioplasty with GPIIb/IIIa inhibitors for acute coronary syndromes, *Catheter Cardiovasc Interv*, 2009;74(3):408–15.
3. Helft G, Dambrin G, Zaman A, et al., Percutaneous coronary intervention in anticoagulated patients via radial artery access,

Catheter Cardiovasc Interv, 2009;73(1):44–7.

4. Vorobcsuk A, Konyi A, Aradi D, et al., Transradial versus transfemoral percutaneous coronary intervention in acute myocardial infarction Systematic overview and meta-analysis, *Am Heart J*, 2009;158(5):814–21.
5. Chase AJ, Fretz EB, Warburton WP, et al., Association of the arterial access site at angioplasty with transfusion and mortality: the M.O.R.T.A.L study (Mortality benefit Of Reduced Transfusion after percutaneous coronary intervention via the Arm or Leg),

- Heart*, 2008;94:1019–25.
6. Dehghani P, Mohammad A, Bajaj R, et al., Mechanism and predictors of failed transradial approach for percutaneous coronary interventions, *JACC Cardiovasc Interv*, 2009;2(11):1057–64.
 7. Fujita S, Tamai H, Kyo E, et al., New technique for superior guiding catheter support during advancement of a balloon in coronary angioplasty: the anchor technique, *Catheter Cardiovasc Interv*, 2003;59(4):482–8.
 8. Abhaichand RK, Lefevre T, Louvard Y, Morice MC, Amplatizing a 6 Fr Judkins right guiding catheter for increased success in complex right coronary artery anatomy, *Catheter Cardiovasc Interv*, 2001;53(3):405–9.
 9. Ikari Y, Nagaoka M, Kim JY, et al., The physics of guiding catheters for the left coronary artery in transfemoral and transradial interventions, *J Invasive Cardiol*, 2005;17(12):636–41.
 10. Rigattieri S, Hamon M, Grollier G, The buddy wire technique is useful in transradial coronary stenting of complex, calcified lesions: report of three cases, *J Invasive Cardiol*, 2005;17(7):376–7.
 11. Hayashida K, Louvard Y, Lefèvre T, Transradial complex coronary interventions using a five-in-six system, *Catheter Cardiovasc Interv*, 2011;77(1):63–8.
 12. Takahashi S, Saito S, Tanaka S, et al., New method to increase a backup support of a 6 French guiding coronary catheter, *Catheter Cardiovasc Interv*, 2004;63(4):452–6.
 13. Shaukat A, Al-Bustami M, Ong PJ, Chronic total occlusion—use of a 5 French guiding catheter in a 6 French guiding catheter, *J Invasive Cardiol*, 2008;20(6):317–8.
 14. Moynagh, A, Benamer H, Louvard Y, et al., A comparison of the success rates of transradial and transfemoral approaches for percutaneous coronary intervention of chronic total occlusions, Presented at Transcatheter Therapeutics 2010, Washington, DC. September 21–25, 2010.
 15. Fukui T, Tabata M, Manabe S, et al., Graft selection and one-year patency rates in patients undergoing coronary artery bypass grafting, *Ann Thorac Surg*, 2010;89(6):1901–5.