


Steam-deformed Judkins-left guiding catheter with use of the GuideLiner[®] catheter to deliver stents for anomalous right coronary artery

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Abstract

Objective: Percutaneous coronary intervention for anomalous right coronary artery (RCA) originating from the left coronary cusp is challenging because of our current inability to coaxially engage the guiding catheter.

Methods: We report a case of an 88-year-old woman with non-ST segment elevation myocardial infarction, with an anomalous RCA origin. Using either the Judkins-Left catheter or Amplatz-Left catheter was difficult because of RCA ostium tortuosity. Thus, we used steam to deform the Judkins-Left catheter, but back-up support was insufficient to deliver the stent.

Results: We used GuideLiner[®], a novel pediatric catheter with rapid exchange/monorail systems, to enhance back-up support.

Conclusions: We were able to successfully stent with both the deformed Judkins-Left guiding catheter and GuideLiner[®] for an anomalous RCA origin.

Keywords

Anomaly, myocardial infarction, percutaneous coronary intervention

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Introduction

The abnormal origin of the right coronary artery (RCA) from the left aortic sinus of Valsalva is a rare congenital anomaly and is found in 0.15%–0.28% of coronary angiography cases. Of all cases, an estimated 0.06% cases undergo percutaneous coronary intervention (PCI).^{1,2} Performing PCI for an anomalous origin of the RCA from the left coronary cusp is challenging because of the difficulty in engaging the guiding catheter and delivering the stent. Adequate guiding support during PCI for an anomalous origin is crucial for successful stent insertions. Previous case reports suggested that the Amplatz-left catheter is an option for PCI,³ whereas other reports supported the use of the Judkins-left catheter.⁴ We have found it difficult in most cases; however, to engage the guiding catheter and have needed to deform the catheters to accommodate the patients' coronary origins.

GuideLiner (Japan Lifeline, Tokyo, Japan) is a novel child catheter that consists of a coaxial guiding catheter extension delivered through the catheter on a monorail shaft. GuideLiner permits deep intubation to the culprit artery, thus providing back-up support. We report a case of non-ST elevation

myocardial infarction with an anomalous RCA origin, in which the patient underwent successful PCI with a deformed Judkins-left guiding catheter and GuideLiner.

Case description

An 88-year-old woman was admitted because of non ST-elevation myocardial infarction and pulmonary edema. She had a history of hypertension and type 2 diabetes mellitus. The electrocardiogram showed ST depression in V4-6 leads. Her creatine kinase level was 960 IU/L, and the MB isozyme level was 120 IU/L. Echocardiography revealed diffuse hypokinesia and a 40% ejection fraction. After

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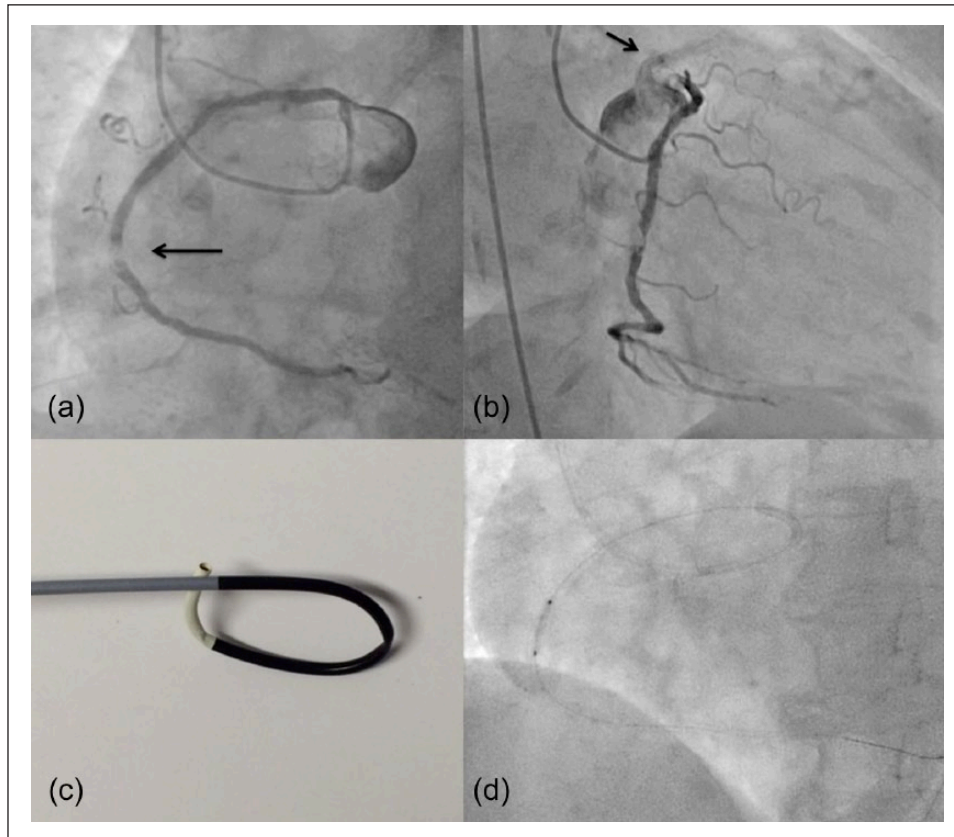


Figure 1. (a) Diagnostic coronary angiogram of right coronary artery and midportion stenosis site (arrow), left anterior oblique view, (b) left coronary artery and right coronary artery originated from left coronary cusp (arrow), right anterior oblique view, (c) steam-deformed Judkins-left catheter and (d) anchoring to coaxially engage Judkins-left guiding catheter, left anterior oblique view.

stabilizing heart failure with noninvasive positive pressure ventilation and intravenous nitrate and furosemide, we performed coronary angiography. Since neither radial artery's diameter appeared sufficient for a standard 6-F sheath, we applied a 6-F sheath via a transfemoral approach. Coronary angiogram with 4Fr diagnostic catheter, Heartcath® (Terumo, Tokyo, Japan) for both right and left coronary artery revealed an anomalous RCA origin from the left coronary cusp with 99% stenosis in the midportion of the RCA (Figure 1(a) and (b); Online Video 1). Since we could not engage using either the Amplatz-left or Judkins-left diagnostic catheter, we proceeded to PCI with a 6-F Profit® Judkins-left guiding catheter (Goodman, Gifu, Japan), deformed by hot steam (Figure 1(c)). After bending it with hot steam, I put it in normal saline to cool for fixing the shape in the blood with the temperature around 37°. We inserted a guidewire (Sionblue® (Asahi Intecc, Nagoya, Japan)) with a microcatheter (Caravel® (Asahi Intecc, Nagoya, Japan)) and crossed the lesion. Then, we anchored a predilatation 2.0 × 12-mm² balloon (Lifespear HP® (Japan Lifeline, Tokyo, Japan)) to engage coaxially (Figure 1(d); Online Video 2). We thought that the GuideLiner (Japan Lifeline) would effectively overcome the problem of incorrect guiding a coaxial catheter due to the anomalous origin

and inserted the GuideLiner with an anchoring balloon (Online Video 3). We then delivered a 2.5 × 20 mm² drug-eluting stent (Promus Premier® (Boston Scientific, Boston, MA, USA)) (Online Video 4) through the GuideLiner. Next, we deeply seated GuideLiner to successfully implant the stent (Figure 2(a) and (b); Online Video 5). After stenting, however, angiography revealed that the GuideLiner had induced injury in the proximal portion of the RCA (Figure 2(b), arrow; Online Video 6). Therefore, we considered it necessary to implant within the proximal portion of the RCA, and we inserted a 2.5 mm × 20 mm drug-eluting stent, Promus Premier (Boston Scientific) (Figure 2(c); Online Video 7). The patient's final coronary angiogram showed successful stenting in the proximal and midportion of the RCA (Figure 2(d); Online Video 8). The patient was discharged after optimizing medicine and remained asymptomatic at the 1-month follow-up.

Discussion

An anomalous origin of the RCA is a rare congenital condition. Performing PCI in these patients is challenging due to the difficulty of coaxially guiding catheters.³ In this case, we were unable to engage either of two commonly used catheters;

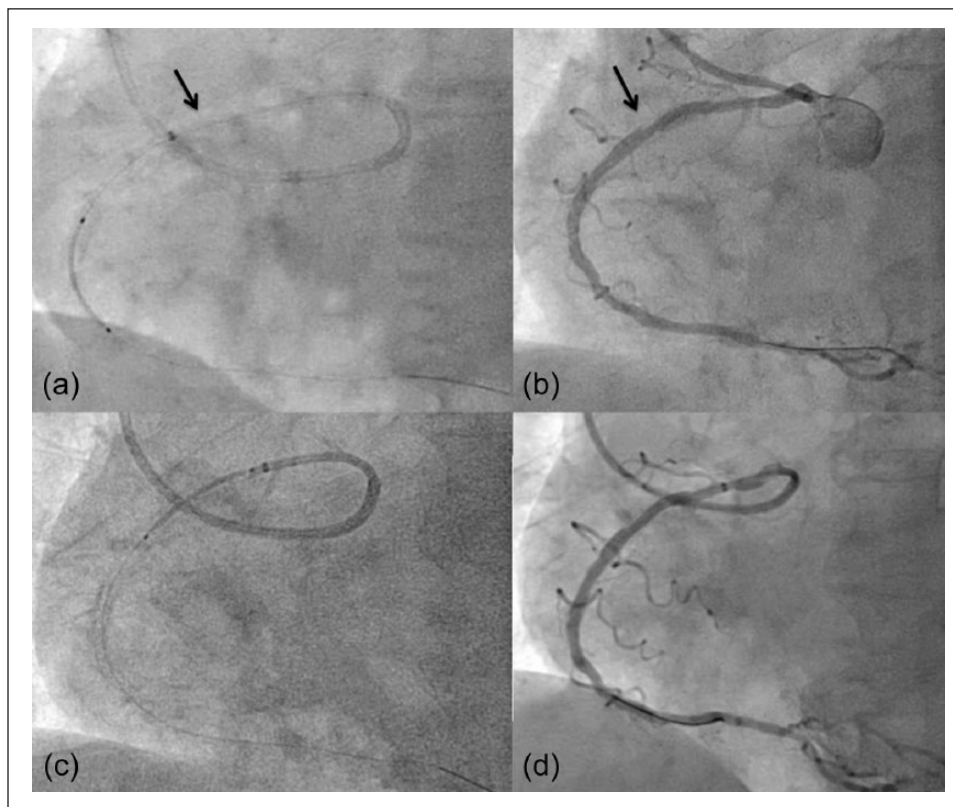


Figure 2. (a) Delivering stent with deeply seated GuideLiner (arrow), left anterior oblique view, (b) coronary angiogram with suspected coronary injury (arrow) after stenting, left anterior oblique view, (c) delivering the second stent in the proximal lesion, left anterior oblique view and (d) final angiogram after successfully stenting.

therefore, we used hot steam to deform a Judkins-left guiding catheter and successfully engage coaxially. Previous report showed the benefit of right radial approach for an anomalous origin of the RCA;⁵ however, our case could not tolerate trans-radial approach because of the diameter of the radial artery. Despite improvement, guiding the catheter to deliver the balloon and stent was still challenging, and we used GuideLiner to strengthen back-up support.⁶

GuideLiner, a novel child catheter, is a 25-cm, silicon-coated, and straight-guide extension connected to a stainless steel push-tube that extends into the culprit artery. In Japan, the 5-F Guideliner version 3 has been available since November 2014. This newer version has a 17-cm half-pipe next to the 25-cm silicon-coated straight-guide extension to help overcome the tortuosity of the subclavian artery, descending aorta, and/or aortic arch. The half-pipe could prevent balloon rupture or stent damage, both of which have been previously reported.^{6,7} Mamas et al.⁶ observed traumatic stent damage as the device's catheter entered at the transition section. Even with the half-pipe version available, we chose to use the Promus Premier stent. This stent had a low profile and no associated damage had been previously reported.⁶

GuideLiner permits deep intubation to the culprit artery, providing back-up support especially in cases of coronary artery anomalies.⁸ It could also be useful for delivering

rotational atherectomy burrs, minimizing contrast use for chronic kidney disease, and overcoming chronic total occlusion;⁹⁻¹¹ however, GuideLiner may cause coronary artery dissection¹² or proximal coronary artery injury, as seen in our case. Because of the risk of injury, Mamas et al.⁶ has suggested proximal-to-distal stenting when using the GuideLiner that is opposite of conventional stenting, which is an important new technique that may aid in stenting highly complex proximal and distal diseases.

Conclusion

We recommend caution when using GuideLiner although it proved effective in our case of anomalous RCA origin. We described a successful case of treating anomalous RCA with GuideLiner and a steam-deformed Judkins-left guiding catheter to enhance back-up support.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical approval

Information on hospital approval: our hospital does not need ethics approval for reporting individual cases.

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Informed consent

We obtained the informed consent to publish this paper from the patient's family because of the patient's mildly cognitive dysfunction due to her age.

Supplemental material

The online videos are available at <http://sco.sagepub.com/supplemental>.

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