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Use of a Guide Extension Catheter in a Case of Difficult Right Coronary Artery Intubation: A Case Report

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Abstract | **Case Report**

We present the case of a 74-year-old male patient who experienced prolonged chest pain and dyspnea. During coronary angiography via the right radial approach, selective intubation of the left coronary artery (LCA) was straightforward using a Judkins Left 3.5 catheter. However, the right coronary artery (RCA) posed a significant challenge due to a high and horizontal ostial origin. Attempts using Judkins Right 4 (JR4), Amplatz Right (AR), and Amplatz Left 2 (AL2) catheters failed to achieve satisfactory engagement. A 6F GuideLiner extension catheter allowed for deep coaxial intubation and facilitated optimal contrast opacification and device delivery. This case highlights the critical role of guide extension catheters in challenging coronary anatomies.

Keywords: Guide extension catheter, coronary angiography, radial approach, right coronary artery, difficult intubation, PCI.

INTRODUCTION

Radial access has become the preferred approach for coronary angiography and percutaneous coronary intervention (PCI) due to its lower complication rates, faster ambulation, and improved patient comfort. Despite these advantages, certain anatomical variations particularly in the right coronary artery (RCA) can complicate catheter engagement. A high and horizontally oriented RCA origin can render standard diagnostic catheters ineffective, prolonging procedures and increasing both contrast volume and radiation exposure [1].

In recent years, guide extension catheters (GECs), such as the GuideLiner, have become indispensable tools for overcoming anatomical challenges. They offer enhanced coaxial alignment, selective opacification, and improved support for device delivery, making them particularly valuable in complex interventions [2].

CLINICAL CASE

A 74-year-old man with a medical history of type 2 diabetes (on metformin 1000 mg/day), essential hypertension (on amlodipine 10 mg/day), and lifestyle-controlled dyslipidemia presented with acute chest pain radiating to the left arm and neck, which began at 5:00 AM. He also reported worsening dyspnea over the previous five days. His BMI was 28 kg/m². Coronary angiography was performed via the right radial approach.

The procedure progressed as follows:

Figure 1 – Easy Left Coronary Artery Engagement (JL 3.5)

Selective engagement of the left coronary system was straightforward using a Judkins Left 3.5 catheter.

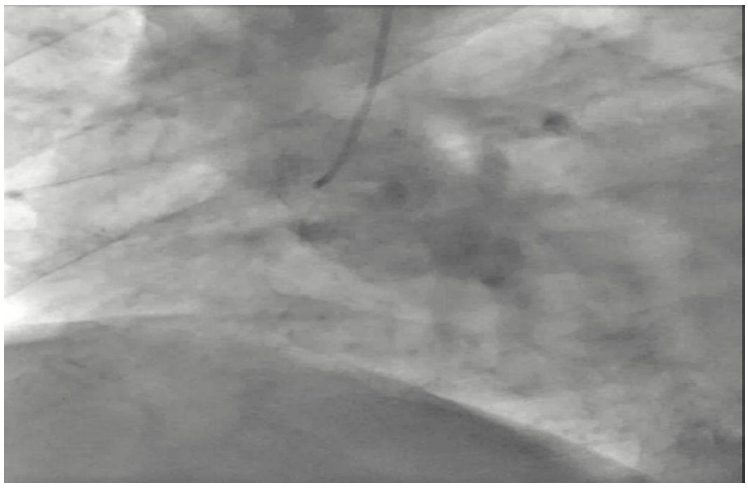

Figure 2 – Failed RCA Engagement with AL1 and AR Catheters

Attempts to engage the RCA using Amplatz Left 1 (AL1) and Amplatz Right (AR) catheters were unsuccessful.

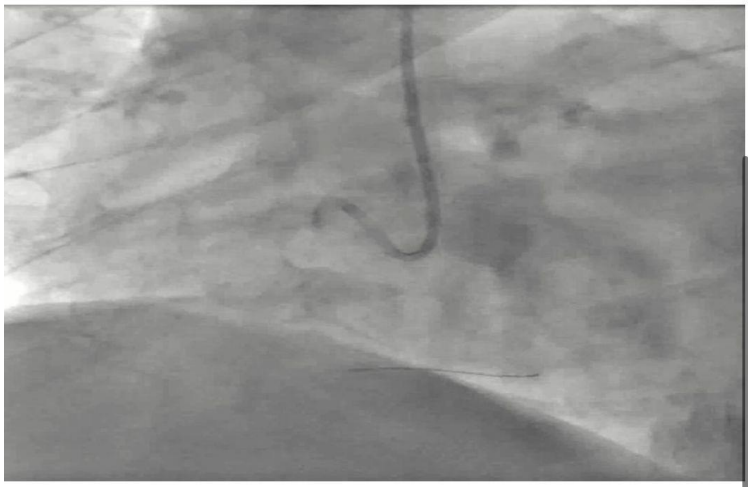

Figure 3: Partial RCA Opacification with AL2 and 0.014" Guidewire

An Amplatz Left 2 (AL2) catheter, supported by a 0.014" guidewire, achieved partial and unstable RCA opacification.

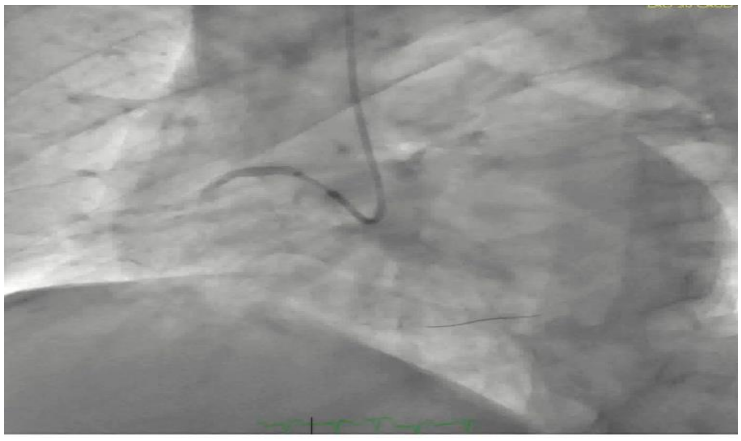

Figure 4: Guide Extension Catheter Insertion and Selective RCA Opacification

A 6F GuideLiner was advanced, resulting in improved coaxial alignment and complete Selective RCA opacification.

Figure 5: Final Angiographic Result Post-PCI

Successful angioplasty was performed on mid and distal RCA lesions with optimal final angiographic outcome.

DISCUSSION

Selective intubation of the right coronary artery (RCA) remains technically challenging, especially in cases of high, horizontal, or anomalous origins. Multiple catheter types are often required to achieve proper engagement. When standard catheters fail to ensure a stable and coaxial position, the use of guide extension catheters becomes highly beneficial.[3]

Guide extension catheters (GECs) like the GuideLiner offer a number of clinical advantages [4]:

- Enhanced coaxial alignment and deeper intubation.
- Improved contrast delivery for selective coronary opacification.
- Better support for device tracking in tortuous or calcified arteries.
- Reduced need for catheter exchanges, minimizing contrast use and procedural duration.

Several studies support the use of GECs in complex coronary interventions. Rinfret *et al.,*[1] described the wide utility of guide catheter extensions for enhancing coaxiality and facilitating device delivery in tortuous anatomy. Patel *et al.,* emphasized the role of GuideLiner in radial access PCI, improving success rates in complex lesion subsets. Other applications include interventions in anomalous coronary arteries [5], chronic total occlusions, and heavily calcified lesions. Safety profiles have been shown to be favorable, with low incidence of vessel dissection or injury when used properly.[6]

Guide extension catheters such as **GuideLiner** and **Guidezilla** are particularly effective tools when engaging the right coronary artery (RCA), especially in cases of high take-off, horizontal or anomalous origin where standard guide catheters (e.g. Judkins Right, Amplatz) cannot achieve coaxial alignment or sufficient backup support. Operators often struggle to advance devices in these anatomies due to angulated ostia, tortuosity, or calcification. GECs act as an extension of the mother guide catheter, enabling deeper intubation, superior coaxial alignment, and more selective contrast delivery.

Across diverse cohorts, the overall observational success rate for GEC-facilitated PCI typically falls between 87 % and 99 %, depending on lesion complexity. Complication rates are reported between 2 % and 6 %, primarily comprised of dissections, stent deformation or loss, catheter shaft issues, or waveform damping. Importantly, many of these adverse events occurred in earlier-generation devices or less-experienced operators; newer designs (e.g. Guidezilla II, tapered Expressman, hydrophilic coatings) and operator familiarity have driven complication rates downward

In anomalous RCA cases where standard catheters fail entirely, individual case reports highlight successful use of GuideLiner to deliver stents after failed engagement. For instance, a case involving transfemoral coronary angiography of an anomalous RCA from the left coronary sinus was accomplished using a balloon-anchored, mother-in-child GuideLiner technique that allowed lesion visualization and stent placement where no other catheter had succeeded

Clinical rationale in difficult RCA anatomy centers on the improvement of backup support and coaxial alignment. In anatomies such as “shepherd’s crook” RCA, high or horizontal take-off, or RCA originating from the opposite sinus, deep intubation with GEC over a wire or anchoring balloon transforms procedural feasibility: providing trackability for stent delivery, enabling selective contrast injection in an ostium that cannot be coaxially cannulated by the mother catheter, and avoiding the need for catheter exchanges and excessive contrast. Safety hinges on technique monitoring pressure waveforms closely, withdrawing if

damping occurs, minimizing injection force, avoiding over-advancement past resistance, and using newer generation, smoother-catheter designs.

Safety remains excellent when these devices are used with proper technique. Optimizing coaxial alignment, monitoring pressure waveform damping, and avoiding forceful advancement are key to minimizing risks such as vessel dissection, air embolism, or equipment detachment. Most complications decrease with improved device iterations (e.g., GuideLiner V3) and operator proficiency. [7]

In summary, when standard guiding catheters cannot reliably engage the RCA especially in high, horizontal, or anomalous origins the introduction of a guide extension catheter transforms procedural feasibility. GECs enhance backup support, improve imaging and device delivery, limit contrast, and raise overall success rates across a spectrum of complex anatomies. Their low complication rates and favorable learning curve position them as essential tools in modern interventional cardiology.[8]

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