



Successful Percutaneous Coronary Intervention of an Anomalous Right Coronary Artery with High Anterior Takeoff Using TIG Catheter From Trans-Femoral Approach

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Abstract

Anomalous coronary arteries pose unique challenges in coronary interventions. Here, we report a case of use of the TIG guiding catheter for percutaneous coronary intervention of an anomalous right coronary artery (RCA) with high anterior takeoff from trans-femoral approach, after multiple failed attempts to cannulate RCA with other catheters. Unique shape of TIG guiding catheter allowed coaxial engagement of anomalous RCA, adequate lesion assessment and stent delivery.

Acronyms: **PCI:** Percutaneous coronary intervention; **RCA:** Right coronary artery; **MI:** Myocardial infarction; **DES:** Drug eluting stent; **DAPT:** Dual antiplatelet therapy; **ACEI:** Angiotensin converting enzyme inhibitor.

Key words: Anomalous right coronary artery, TIG Catheter, Transfemoral Percutaneous coronary intervention

Citation: Tyagi G., Assadi R., and Hilliard A. Successful Percutaneous Coronary Intervention of an Anomalous Right Coronary Artery with High Anterior Takeoff Using TIG Catheter From Trans-Femoral Approach. International Cardiovascular Forum Journal. 2015;4:66-68 DOI: 10.17987/icfj.v4i0.137

Introduction:

Anomalous aortic origin of coronary arteries are reported to be 0.6-1.2% in patient who are referred for coronary angiography (1). Anomalous coronaries pose unique challenges for PCI, and special consideration should be given to angiographic characteristics of these vessels, such as orifice configuration, exit angulation, the route the artery traverses and the location of the stenotic lesions (2). Guiding catheter selection is the most important step for any PCI, but more so for anomalous coronary arteries. TIG 4.0 (Heartrail III) guiding catheter, is a long tipped catheter designed specifically for trans-radial interventions. Here we describe the use of TIG 4.0 (Heartrail III) guiding catheter, from trans-femoral approach for an anomalous right coronary artery with high anterior takeoff.

Case: A 56 years old male was referred to our hospital after two prior failed attempts of PCI to ostial right coronary artery at two regional hospitals. Patient had long standing hypertension, dyslipidemia and was an active smoker. His most recent left ventricular ejection fraction was 25%. Patient had known coronary artery disease, and had an MI, one year prior to presentation. Patient presented at outside hospital with progressively worsening exertional angina (CCS Class III) for last three months on optimal medical management (including ASA, Clopidogrel, Beta blocker, ACEI, Statin). At outside hospital, selective coronary angiography revealed ostial RCA 90% stenosis, and patent mid and distal RCA stents. Several failed attempts were made there and procedure was further complicated by development of radial artery thrombosis. Therefore, we performed PCI of RCA using trans-femoral

Figure 1: Non-selective angiography revealed about 90% Ostial stenosis of Right coronary artery. 7 different guiding catheters were tried (6 Fr Judkins Right, Right Coronary Bypass Catheter, 3DRC, Left Coronary Bypass Catheter, AR 1.0, AL 0.75, and IMA), without success. Finally, a 6 Fr TIG 4.0 (Heartrail III, Terumo, Japan) guiding catheter, was used to cannulate right coronary ostium. (Figure 2)

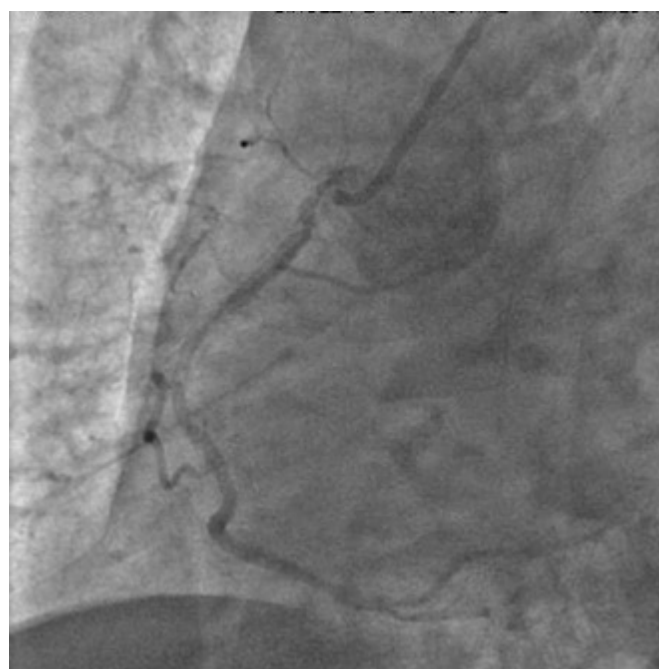


Figure 2: Selective angiography confirmed the findings. Catheter provided coaxial engagement and adequate support during intervention. A Runthrough coronary wire (Terumo, Japan) was used to cross the ostial lesion, and pre-dilation was performed using a 2.0x12 Emerge PTCA balloon (Boston Scientific, USA). Due to diffusely diseased proximal RCA, we were not able to advance the stent, so a BMW coronary wire (Abbott Vascular, USA) was used to cross the lesion to serve a “buddy wire” (Figure 3).

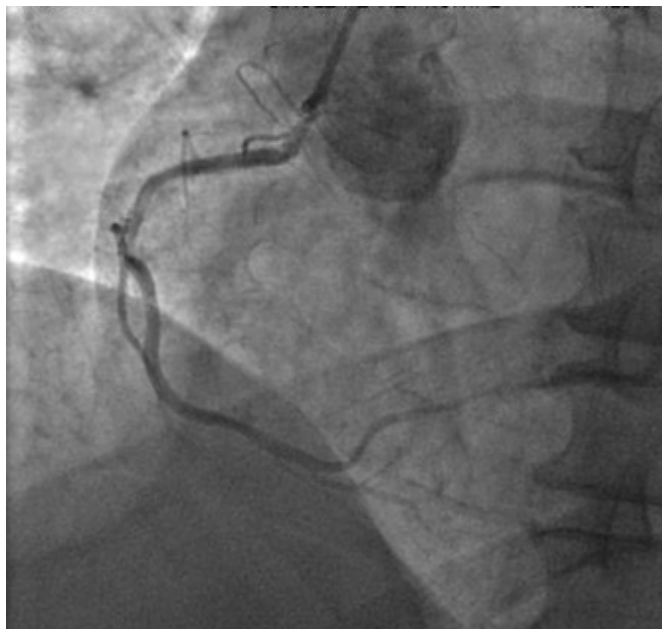
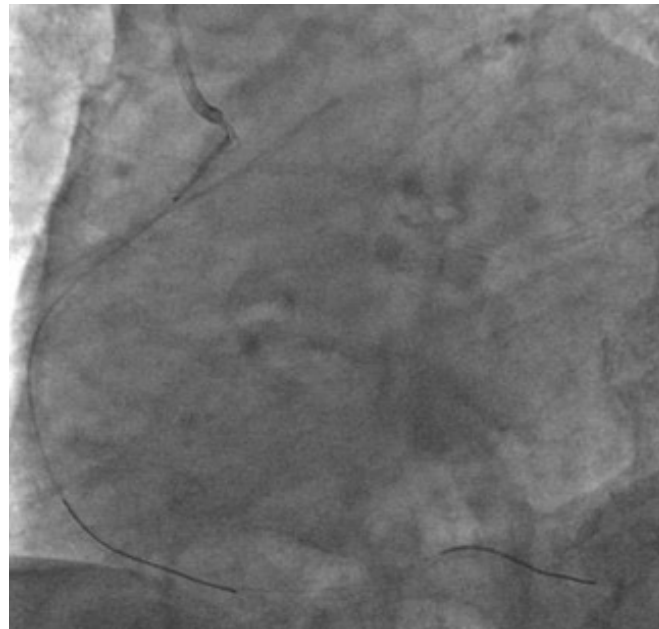


Figure 3: TIG 4.0 Guiding catheter provided adequate support during intervention. A second wire was used as Buddy-wire to gain extra support for stent delivery. At this point stenting of the ostial anomalous RCA was accomplished using a 3.0 x 16 mm Promus Premier DES (Boston Scientific, USA), which was deployed at 18 atm. Post dilation was performed using 3.5 x 20 mm Non-compliant balloon to a maximum of 22 atm. Excellent angiographic results were achieved. (Figure 4)



approach. Under local anesthesia, a 6Fr sheath was inserted into right femoral artery, using modified Seldinger technique. Non-selective contrast injection revealed RCA with anomalous origin with high anterior takeoff, with ostial 90% stenosis. (Figure 1)

Discussion

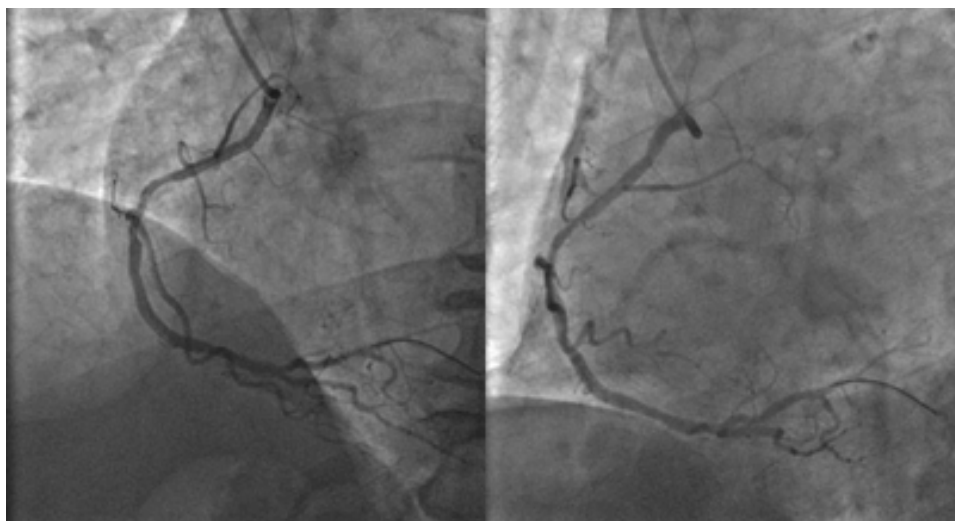
Anomalous coronary arteries pose unique challenges in coronary interventions. Anomalous RCA with high anterior takeoff, although rare, but can be technically challenging and time consuming. Selection of appropriate guiding catheter takes

time and sometimes require out of the box thinking. Coaxial engagement, adequate back-up support from a guide catheter is essential for a successful PCI.

Several case reports from balloon angioplasty era have described the use of Amplatz, El Gamal, Voda, Block and FL4-G guiding catheters. Use of Left Amplatz I, II Guiding Catheter has been described for stenting of anomalous right coronary artery.⁹ Cohen et al. described the use of oversized Left Judkins Catheters for stenting of anomalous RCA originating from left sinus of Valsalva. As they used the oversized secondary curve to prevent the tip from engaging the left main ostium as the catheter is “pushed

deep into the sinus of Valsalva, causing it to make an anterior and cephalad-pointing U-turn.” The resulting large curve of the catheter provided excellent back-up for stent delivery.¹⁰ Lee at al. reported two cases where they used standard 7 Fr Left Judkins catheters, positioned with clockwise torque in order to provide a stable platform for intervening upon complex lesions of anomalous RCA with high anterior takeoff.⁸

Figure 4: Final angiographic results, well expanded stent, without any residual ostial stenosis.



Recently Ramanathan et al. reported use of Guideliner for anomalous right coronary originating from left sinus of Valsalva.⁷ In their case, lesion was in mid-RCA, whereas in our



Figure 5: Flat portion between the second and third loop rests against the posterior wall, and long tip reaches the high anterior ostium of anomalous right coronary artery.



patient it was an ostial lesion, and use of guide extension was not feasible. Similarly Komatsu et al. also reported the use of DIO Thrombus Aspiration catheter for anomalous right coronary artery with high takeoff, however their patient also had a distal RCA lesion, and they were able to achieve stent delivery only by deeply engaging the catheter to gain extra back-up support.⁶

TIG Catheter is used for transradial interventions, has a unique shape. (Figure 5) First loop compensates for unfavorable angle between innominate artery and ascending aorta. Flat portion between second and third loop rests against the opposite side of aortic wall and provides back up support. Catheter has long tip and it points upwards. Most femoral catheters run from descending aorta and aortic arch to the right side of ascending aorta due to their “memory,” which is the tendency to return to their original configuration. Therefore, a long tipped catheter is used for left coronary artery and a short tipped catheter is used for right coronary artery.¹¹ In case of anomalous RCA with high anterior takeoff short tipped right catheters don't reach the ostium and left catheters don't provide adequate back-up, as they tend to maintain their original configuration to the right side of ascending aorta. However, TIG catheter due to its versatile design rests against the posterior wall of ascending aorta and long tip easily reaches the ostium.

Conclusion

With this case we describe the use of TIG guiding catheter for trans-femoral PCI for an ostial lesion of an anomalous right coronary artery with high anterior takeoff, adding to the armamentarium of trans-femoral guiding catheters for these difficult cases.

Statement of ethical publishing

The authors agree to abide by the requirements of the “Statement of publishing ethics of the International Cardiovascular Forum Journal.”¹³

Conflict of interest:

There is no conflict of interest for any of the authors.

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