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Case Report

Anomalous Origin of Right Coronary Artery Complicated with Unstable Angina: A Challenging Case for Interventional Treatment -

Ahmet Karabulut*

Department of Cardiology, Acibadem University School of Medicine, Istanbul, Turkey

***Address for Correspondence:** Ahmet Karabulut, Acibadem University School of Medicine, Department of Cardiology, Acibadem Atakent Hospital, Halkali Merkez Mah. Turgut Ozal Bulvari, No:16, 34303 Istanbul, Turkey, Tel: +90-505-357-7477; Fax: +90-212-404-4445; E-mail: drkarabulut@yahoo.com

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ABSTRACT

Anomalous origin of coronary artery is a rare congenital malformation which possesses risk of various cardiac events including sudden cardiac death. Although surgery is a usual indication for anomalous origin of left coronary artery, there is not definitive management consensus for anomalous origin of right coronary artery due to relatively benign prognosis. Herein, we presented a case of anomalous high take-off origin of right coronary artery with inter arterial course and discussed the treatment strategies.

Keywords: Coronary anomaly; Coronary artery disease; Management; Coronary intervention

INTRODUCTION

Anomalous origin of coronary artery from the opposite sinus is a rare angiographic finding with 0,3-1,3% incidence in different series [1,4]. Right Coronary Artery (RCA) originating from left sinus is more common and rather than have benign prognosis comparing to left coronary system anomalies [2]. Anomalous origin of RCA with high take-off from ascending aorta is more rare situation and it may associated with angina pectoris, acute coronary syndromes, arrhythmias, syncope and sudden death especially in the inter arterial course type [5]. Although surgery was proposed as frontier management, definitive treatment approach have not been concluded [5,6]. Here in, we presented a case report of anomalous high take-off origin of RCA with inter arterial course and discussed the treatment strategies.

CASE

A 65 year-old female patient presented with unstable angina pectoris. She had diabetes mellitus, hypertension, dyslipidemia and also she was underwent coronary bypass graft with two saphenous venous graft to RCA and circumflex artery (CX) and left internal mammary artery (LIMA) to left anterior descending artery (LAD) five years ago. Left bundle branch block and atrial fibrillation was obtained in the electro cardiography and echocardiography revealed moderate mitral insufficiency with 30% left ventricular ejection fraction. Then patient transferred to catheter laboratory. Coronary angiography was showed patent LAD-LIMA and CX- Saphenous graft. RCA was originating from left side of ascending aorta above the left sinus and 20 mm upper to sinotubular junction. RCA was encircling the border of aorta and coursing between aorta and pulmonary trunk. There was consecutive 80% stenosis in the proximal RCA and subtotal occlusion before posterior descending artery. There was also moderate intermittent stenosis appear as pinching in the proximal RCA with each systole due to compressing effect of aorta (Figure 1). Bypass graft of RCA was occluded totally from the ostium. Intubation of RCA ostium could be done with 6Fr Amplatz left 1 catheter and during procedure, it supported strong back-up. Angioplasty and stent procedure was performed to proximal and distal RCA atherosclerotic lesions successively with an implantation of 3.0*30 and 2.5*26 mm stents (Figure 2). Medical follow up was preferred for proximal inter arterial segment of RCA after intracoronary pressure measurements and Fractional Flow Reserve (FFR) determination. Patient was discharged next-day without complication and she was following up three months without symptoms.

DISCUSSION

Anomalous origin of coronary arteries from opposite sinus is rare congenital malformations. Most of them are insignificant and diagnosed incidentally during angiography or autopsy [2,7]. The four recognised patterns of anomalous origin of coronary artery from opposite sinus was described as follow: RCA arising from left sinus, left main coronary artery arising from right sinus, LAD and

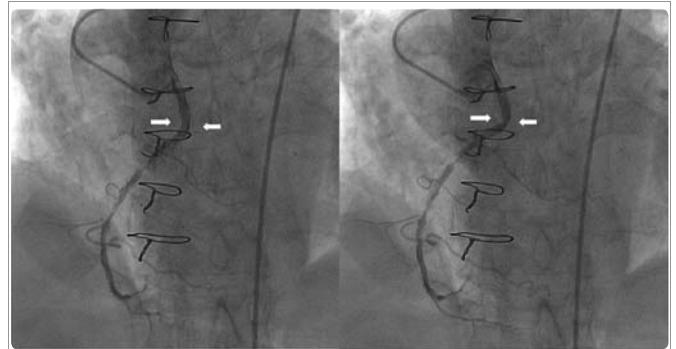


Figure 1: Right coronary artery view before and after percutaneous coronary intervention (arrow indicate level of sinotubular junction).

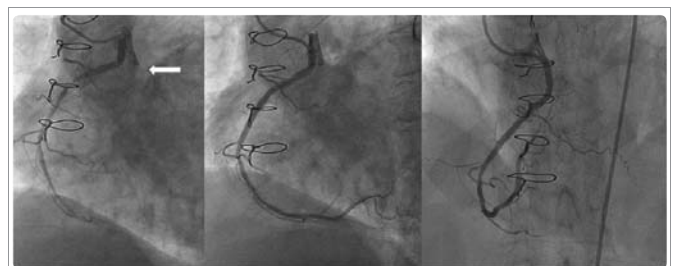


Figure 2: Right coronary artery (RCA) from anterior and cranial projection. RCA is originating from ascending aorta and coursing between aorta and pulmonary trunk. During systole, moderate stenosis appeared as a pinching in the proximal segment encircling aorta (compressed region indicated with arrow).

CX arising from right sinus with separate ostium and both coronaries arising from non coronary sinus [8]. The involved arteries, especially RCA may have high take-off and originate from ascending aorta. Course of anomalous originating vessel could be inter arterial (between aorta and pulmonary artery), retroaortic, prepulmonic and septal (subpulmonic). Proximal part of anomalous originating vessel could show intramural course also [8,9]. Coronary artery with inter arterial and intramural course carries high risk for cardiac events including Sudden Cardiac Death (SCD) [8,9]. Anomalous origin of RCA from left sinus is more common than left coronary system (approximately 4:1) with an incidence of 0,03 - 0,9% and 18% of the cases show inter arterial course [1,8,10]. The mechanism of coronary event could be secondary to acute angulations and slit-like ostium especially in the high-take off vessel, the stretch of the intramural segment, compression between commensure of aortic cusp, and also compression between aorta and pulmonary artery particularly during exercise [1,7,9]. The final step is progression of ischemia which leads to various clinical pictures from angina pectoris to SCD. Anomalous originating coronary artery also prone to accelerated atherosclerotic process. Acute angulations or tortuous course of coronary artery with



intermittent fall of intracoronary pressure could lead to accelerated atherosclerosis [10]. Segment that encircles the aortic border is also more susceptible to lipid accumulation [10]. Thus, obstructive lesion more commonly seen in anomalous originating coronary vessels. Presentation of disease before the age of 30 is a major accepted risk factor for SCD [1]. In the no traumatic SCD of young adults, coronary artery abnormalities were found as one of the major aetiology [11]. SCD risk is 79 fold higher in athletes with anomalous origin of coronary artery and competitive sports is prohibited in such groups [1]. Surgical intervention is often recommended for anomalous originating coronary artery as a first line therapy [6,12]. Left coronary arteries arising from right sinus show worse progression and surgery is indicated in the all patients especially patients with single left coronary ostium and inter arterial or intramural course [12]. There was no consensus for approach to anomalous origin of RCA from left sinus. Some authors recommend direct surgery whereas others suggest surgery in the evident of ischemia even inter arterial course is present [1,5,6,9]. Krasuski and colleagues [1] showed that surgery in older patient did not change mortality rate. So, it is logical to perform surgery with evident of ischemia in RCA originating from opposite sinus. Surgical strategies are usually concerning with correction of morphological aspect and composed of venous or arterial bypass graft with/without proximal ligation of vessel, translocation of ostium and unroofing of intramural coursing segment [1,9]. Competitive flow is leading cause of bypass graft failure [13]. Bypass graft implantation without significant atherosclerotic disease would not be enough in the surgical approach. In the moderate compression of coronary vessel, competitive flow in the vessel may result with graft failure and earlier occlusion of the graft may occur in the early period. So, proximal ligation of vessel is important in the bypass surgery and in this condition, reimplantation of the vessel to right sinus could be more beneficial in the long-term prognosis. Our case was operated 5 years ago and although bypass graft to CX and LAD was patent, graft to RCA was occluded. The earlier occlusion could be due to competitive flow hence, we found stenosis secondary to aortic compression insignificant with FFR study. Diffuse and consecutive stenosis in the RCA could be also related to accelerate atherosclerotic event due to anomalous origin with inter arterial course and intermittent pinching of proximal segment beside effects of conventional risk factors. Reimplantation of RCA ostium to right sinus had would be better choice in the operation for our patient. Moreover, we observed discrete and concentric compression in proximal part of RCA and in such condition, implantation of shorter stent with high radial force could be a treatment alternative although there was not reported case in the literature. Reported cases about interventional therapy only included the stent implantation to atherosclerotic stenosis but not to compressed segment [8,14]. However, stent implantation of compressed segment even without ischemic event could be preferred to slow down atherosclerotic process also. We proposed follow up strategy for our patient according to future patency of implanted stents. If we will obtain earlier stent restenosis, we will intervene also compressed segment although FFR results was normal. Surgery only could be reasonable in the occurrence of SCD and/or in the necessity of mitral valve surgery for our case.

CONCLUSION

Anomalous origin of coronary artery from contra lateral sinus is rare congenital anomaly which could yield various cardiac events including SCD. Anomalous origin of left coronary artery usually managed with surgery. Anomalous origin of RCA should be managed in the evident of ischemia and they could be followed up with medical treatment especially in the elderly. Interventional approach may be

the first-line management for atherosclerotic lesion and even for compressed segment of anomalous originating RCA. Surgery should be indicated in the SCD or necessity of operation for accompanied cardiac diseases in the anomalous origin of RCA lesions. Moreover, due rarity of the disease, most of the data was collected from small series and large prospective investigation was needed to propose certain management strategy for anomalous originating coronary artery.

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