Successful stenting of all three branches in a patient with single anomalous coronary artery arising from the left sinus of valsalva: A case report

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ABSTRACT

Introduction: Single coronary artery with diffuse atherosclerotic disease is an extremely rare anomaly. The therapeutic options of these case are controversial. Case Report: We report a case of 53-year-old man with recent anterior myocardial infarction and post-infarction angina, in whom coronary angiography showed one coronary artery arising from a single ostium in the left sinus of Valsalva giving rise to all branches and severe atherosclerotic coronary disease. The patient underwent successful percutaneous transluminal coronary angioplasty and stenting of all three branches without any complication. Conclusion: Stenting, as an alternative to coronary artery bypass grafting, has become an increasingly attractive option for treatment of stenosis of anomalous coronaries because the long-term results of bypass are less than ideal. For selected cases with adequate guiding support, stenting of atherosclerotic stenosis of the anomalous coronary arteries may be preferable to surgery.

Keywords: Single coronary artery, Stenting

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INTRODUCTION

Single coronary artery (SCA) is an extremely rare anomaly and has been reported to have an incidence of 0.017% in angiographic series [1]. Stenting in an anomalous coronary artery could technically be challenging, as cannulating the anomalous vessel with the guiding catheter and proving enough support can be difficult. Accordingly, there are few reports in literature of SCA anomaly in which successful stenting of one vessel was performed [2–3]. We present here the first case of all three coronaries stented in a patient with SCA.

CASE REPORT

A 53-year-old male applied to the hospital with typical chest pain. He had anterior myocardial infarction (MI) 20 days ago and was referred to our hospital for coronary angiography due to post-MI angina. Risk factors for coronary artery disease included hypercholesterolemia and cigarette smoking. Blood pressure was 100/70 mmHg and heart rate was 90 beats/min. Physical examination was within normal limits except for a third heart sound. Electrocardiography showed sinus rhythm, previous anterior MI and 2–3 mm concave ST segment elevation on precordial leads. Transthoracic echocardiogram revealed decreased left ventricular systolic performance with a left ventricular ejection fraction of 30% and akinesia of anterolateral wall and apex.
Coronary angiography demonstrated single coronary artery which was a short left main artery and it divided into three branches: left anterior descending (LAD), left circumflex (LCx) and right coronary arteries (RCA). The SCA was originating from the left coronary sinus (CS) via single ostium, classifiable as a Lipton L-I A (Figure 1). Selective angiography did not demonstrate any vessel originating from the right CS. All the coronary branches originated from a single ostium located in the left coronary cusp and had a normal course and distribution. Both the LAD and LCx branches had a normal anterior course and gave rise to the diagonal, septal and obtuse marginal branches, respectively. RCA branch arose from left main trunk and had a normal course and distribution. All of the coronary branches had diffuse atherosclerotic disease (Figure 1). Angiography showed 100% thrombotic occlusion of LAD in the proximal region, 80% stenosis of proximal LCx and 85% stenosis of mid segment of anomalous RCA. Additionally there was a long 90% stenosis due to myocardial bridging in mid portion LAD. Left ventricular systolic function was poor. We thought that the infarct related artery was the thrombotic totally occluded LAD. No other associated cardiac anomaly was detected by cardiac catheterization or echocardiography. Thus it was decided to refer the patient for operation because of three vessel disease and decreased systolic function. The cardiology-cardiovascular surgeons decided on percutaneous interventions of the artery lesions because of high risk of surgery.

We used a 6F FL4 Judkins diagnostic catheter for the angiogram. Optimal catheter positioning was achieved with a 3.5 cm, curved left Judkins 7-F extra back-up guiding catheter (Boston Scientific, Minn). A 0.014-inch intermediate guide-wire (Boston Scientific, Minn) was selected and advanced into the LAD. Following pre-dilatation using a balloon catheter, a 3.5×20 mm Ephesos stent (Medistar, Istanbul, Turkey) was deployed at 16 atm. The procedure resulted in adequate stent expansion and excellent angiographic distal flow without any complications. The LCx lesion was crossed with a floppy wire and direct stenting was performed as per protocol of our center. The lesion was stented with a 3.5×18 mm Ephesos stent (Medistar, Istanbul, Turkey) at 14 atm pressure. There was no residual lesion following stent deployment. The immediate post-procedure stay of the patient was uneventful and he was discharged two days later on regular medicines.

In a second session scheduled one week later, the lesion of the RCA was treated by primary stenting (Figure 2). The RCA was cannulated by the same type of catheter as used previously and the lesion was crossed through with the same type of floppy wire and a 4.0×13 mm Ephesos stent (Medistar, Istanbul, Turkey) was implanted at 16 atm. The patient tolerated the procedure well and was discharged one day after the procedure.

We followed the patient for six months during which he was on medical therapy (aspirin, clopidogrel, carvedilol, statin and standard heart failure therapy). In this period the patient was pain-free and control stress test results revealed no inducible ischemia.

**DISCUSSION**

An isolated SCA is considered potentially dangerous because it can cause cardiac ischemia, congestive heart
failure, and sudden cardiac death [4–5]. Although several researchers in the past believed that aberrancy predisposes this vessel to accelerated atherosclerosis, this could not get wide acceptance owing to lack of convincing data [6]. Even without atherosclerosis, ischemia can be a consequence of anatomical malformations, including the acute angle take-off of the anomalous vessel, with a narrowed slit-like orifice that collapses in a valve-like manner, thereby limiting the blood flow in these patients. Other anatomical features responsible for ischemia are the proximal intramural course of the anomalous vessel, which is squeezed within the aortic wall and the compression of the anomalous vessel along its course between the aorta and the pulmonary artery, particularly during exercise [1, 4].

Stenting, as an alternative to coronary artery bypass grafting, has become an increasingly attractive option for treatment of stenosis of anomalous coronary arteries because the long-term results of bypass are less than ideal [7]. The selective cannulation of anomalous arteries is a challenge because a good point of support is needed for vascular interventions. Other aspects to be considered are the configuration of the ostium, angle, initial trajectory, location of the lesion, and device to be used [8]. Thus, there are only a few reports in literature because of rarity of such lesions and technical difficulty of the procedure. In our case we rejected the option of bypass surgery and decided to do the percutaneous intervention due to high risk of surgery.

When the SCA arises from left CS, only RCA has anomalous origin and course as in our case. The small curved left Judkins and left Amplatz catheters are the most frequently used ones to provide the best support in this type RCA [9]. A Voda or hockey stick guide may be appropriate in some cases [10]. Appropriate guiding catheter selection decreases procedure time in stenting and thus increases the success rate. A Boston Scientific 6F-FL4-XB guiding catheter obtained good support for intervention in our case. This catheter is superior to others in point of view back-up support. It provided the maximum support required for the smooth passage of stents. In the present case we used the same type of catheter to perform stenting of all three arteries.

In patients with complex lesions and inadequate guiding support for the femoral approach, radial root approach may be required as an alternative [5]. In our case, we selected femoral approach because procedure time directly relates to the post-procedure complication rate and procedure time using femoral root is shorter than radial root.

CONCLUSION

To conclude, in selected cases with adequate guiding support, stenting of the atherosclerotic stenosis of the anomalous coronary arteries is preferable to bypass surgery if the anomalous orifice of the artery and the atherosclerotic lesion is reachable.

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Author Contributions
Ali Ozeren – Substantial contributions to conception and design, acquisition of data, drafting the article, revising it critically for important intellectual content, final approval of the version to be published.

Ismail Ates – Substantial contributions to conception and design, acquisition of data, drafting the article, revising it critically for important intellectual content, final approval of the version to be published.

Turgut Karabağ – Substantial contributions to conception and design, acquisition of data, drafting the article, revising it critically for important intellectual content, final approval of the version to be published.

Guarantor
The corresponding author is the guarantor of submission.

Conflict of Interest
Authors declare no conflict of interest.

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