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Short communication

Acute myocardial infarction with single coronary artery



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Introduction

Single coronary artery is very rare among the different variations of anomalous coronary patterns. In acute myocardial infarction settings, primary angioplasty of these arteries can be challenging and is associated with the risk of complications. We report a 78-year-old female patient who presented acute high lateral wall infarction with aberrant circumflex artery arising from the right coronary artery treated by stent implantation.

Case

A 78-year-old female patient was admitted into our emergency department with a compliant feeling of pressure in her chest for approximately two hours. Her medical history revealed dyspnea and exertional angina for a couple of months with increasing severity.

On physical examination, blood pressure was 80/50 mm Hg and heart rate was 68 bpm. There was apical 2/6 mid-systolic murmur. Bilateral lung sounds and other findings were normal. On electrocardiogram sinus rhythm with 2–4 mm of ST elevation in lead I

and aVL, 2–5 mm of ST depression on leads II, III, aVF and V1–V6 were evident (Fig. 1). The diagnosis was high lateral myocardial infarction. The results of biochemical laboratory tests are summarized in Table 1.

Tigacrelor 180 mg, acetylsalicylic acid 300 mg and heparin 100 IU/Kg IV bolus were administered and the patient was urgently referred to the cardiac catheterization laboratory. A 6 French Left Judkins diagnostic catheter failed to engage the left main coronary ostium at the level of left sinus of Valsalva. Contrast injection with right Amplatz catheter showed a single coronary originated from the right coronary cusp. The left anterior descending (LAD) and circumflex (Cx) artery originated from the right coronary ostium separately. LAD was rudimentary and subtotal discrete lesion was present on the proximal segment of circumflex artery (Fig. 2). After crossing the lesion with 0.014-inch guide wire, a 2.5 × 10 mm balloon was inflated at 8 atm. Then, a 3.0 × 16 mm Taxus-Liberte Drug Eluting Stent (DES) was implanted at 12 atm. Immediately after stent implantation, localized small linear dissections were observed on the proximal edge of the stented segment. A Taxus Liberte 3.0 × 15 mm DES were implanted on the dissected segment and successfully sealed (Fig. 3). Following the procedure, the patient was transferred to Coronary care unit (CCU). Angina and hemodynamic symptoms were resolved. Blood test results were in the normal range except troponin, which was 0.043 ng/mL on admission (Fig. 1). Echocardiogram revealed posterolateral hypokinesis with left ejection fraction of 45%. Follow-up cardiac enzymes showed early peaking values (Table 2). The patient was discharged on day 4.

Discussion

Single coronary artery is a term that is used to describe left and right coronary arteries originated from one coronary ostium. It was first angiographically described in 1967 in two patients.^{1,2} Though conus artery can originate from separate ostium, it is ignored, and the term “single coronary artery” has been used. Prevalence is 0.02–0.04% and is nearly equal for the right and left coronary arteries.^{1–4} Based on the Lipton classification, single coronary artery types can be grouped into three classes. Class I contains coronaries with normal course. For example, the right coronary (R-I) is at the normal location and continues as circumflex artery after the posterolateral branch and left anterior descending after the posterior descending branch. At the left-sided single coronary (L-II), left anterior descending is normal and the circumflex artery terminally continues as the right coronary. In Class II, the single left or right coronary artery gives rise to a truncus that has a transverse course on the base of the heart to yield contralateral coronary arteries. This can be subclassified as A, B, or P according to the course of truncus.

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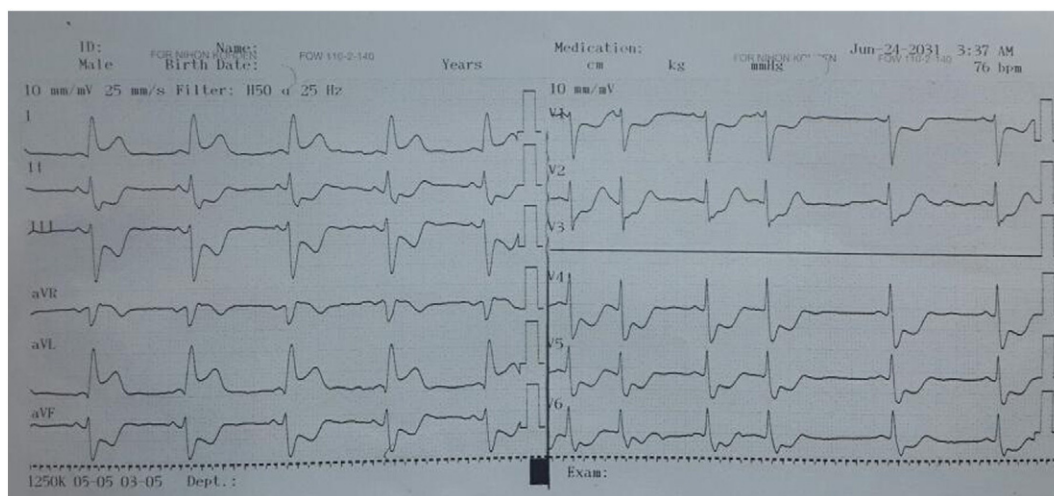


Fig. 1. ECG on admission.

For example, if the truncus originating from the right coronary truncus (R-II) has a course on the anterior of the pulmonary artery or the anterior of the right ventricle conus, it subclassifies as R-II-A. If it has a course between the main pulmonary artery and the aorta, it subclassifies as R-II-B. Finally, if it continues posterior of the aortic root, it subclassifies as R-II-P. A similar subclassification scheme is available for the left single coronary artery (L-II-A, L-II-B, and L-II-P). In Class III, the single coronary artery originates from the right, LAD, and Cx separately originates from the right coronary contrary to the common truncus, similar to Class II. Cx takes a retroaortic course to the left atrioventricular sulcus. LAD courses between the aorta and the pulmonary artery and is directed to the left interventricular sulcus. This variation is known as Type R-III. Our case was consistent with R-III. Another classification of single coronary arteries based on origin and course has been described.¹

Exercise-induced acute myocardial infarction and sudden deaths have been described in cases in which the right coronary or left main coronary artery lay between the main pulmonary artery and the aorta.⁵ The cause is attributed to jamming of the coronary artery between two major arteries.^{5,6} In addition to this phenomenon, the slit-like ostium of the coronary artery could be a reason for sudden death from ischemic causes.⁵ Coronary anomaly can be present with subaortic or subpulmonary stenosis, ventricular septal defect, coronary artery fistula or transposition of the great arteries and tetralogy of Fallot.^{7–14} Horan PG et al.¹⁵ have also described a familial single coronary artery case.

Angioplasty of a case with single coronary artery includes risks due to osteal obstruction of catheters with large diameters and can result in chest pain, dyspnea, dizziness, hypotension and hemodynamic compromise. The medical team should be ready for any potential complication and they should be aware that small obstructions can cause ischemia.

In our case, LAD and Cx were originated from the RCA and LAD was rudimentary. Some cases in the literature have described patients with single coronary with rudimentary LAD who had undergone PCI.^{16–18} PCI of R-III type single coronary artery patients who had a culprit lesion of circumflex artery have also been reported.^{17,19} Some single coronary artery patients who have acute coronary syndrome had successfully received angioplasty via the radial approach.^{20–22} Additionally, transcatheter aortic valve implantation with Sapien XT and CoreValve have been performed on two patients with SCA.²³

Table 1
The results of biochemical laboratory tests.

Parameter	Result	Unit	Reference
Glucose	88	mg/dL	74–106
Urea	36	mg/dL	17–49
Creatinine	0.8	Mg/dL	0.5–0.9
AST	19	U/L	0–32
ALT	11	U/L	17–49
LDH	209	U/L	135–214
Sodium	141	mmol/L	136–145
Potassium	4.11	mmol/L	3.5–5.1
Chloride	100.7	mmol/L	98–107
CK	94	U/L	20–170
CK-MB	26	U/L	<25
Troponin T	0.043	ng/mL	<0.014
WBC	9.452	$10^3/\text{mm}^3$	3.9–11.7
RBC	5.21	$10^3/\text{mm}^3$	3.85–5.16
Hb	15.1	gr/dL	12–15
Hct	46.3	RU	34.8–45
PLT	220	$10^3/\text{mm}^3$	130–400

Blood tests on admission.



Fig. 2. Culprit lesion was on proximal Cx.



Fig. 3. Angiographic result were optimal after PCI of aberrant Cx.

Table 2

Follow-up cardiac enzyme values showed early peaking values.

Parameter	On admission	6th hour	12th hour
CK (U/L)	94	1871	1832
CK-MB (U/L)	26	319	275
Troponin (ng/mL)	0.043	9.13	5.43

Conclusion

The case described above is a rare instance of a patient with SCA (Lipton R-III group) with STEMI undergoing PCI to the Cx. Percutaneous coronary intervention of a single coronary artery can be difficult and susceptible to complications. Because of vessel compromise during angioplasty, this will have an impact on all three territories.¹⁷ Coronary ischemia could cause hemodynamic compromise. Operator should be aware of the potential risk of complications and the limitations of the procedure.

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