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Case report

Angiographic recognition and percutaneous intervention of an occluded anomalous circumflex coronary artery causing acute myocardial infarction: a case report

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Abstract: Coronary arteries with anomalous origin are unusual but can be responsible for myocardial infarction. Acute occlusion of an anomalous coronary artery is not only easily missed on angiography but also technically challenging for percutaneous intervention. In this report, we present our experience in a patient with an anomalous circumflex being the culprit vessel in acute myocardial infarction. We report a case of a 74-year-old male patient presented with sudden chest pain. The diagnosis of occluded anomalous circumflex coronary artery was made by invasive coronary angiography shortly after admission. The patient was stented with a 2.5 x 18mm bare metal stent and was discharged with intensive medical treatment and regular follow-up. Interventional cardiologists should keep in mind there are several anomalous origin, the most frequent anomaly being a circumflex artery with origin from the right coronary artery or the right sinus of Valsalva.

Keywords: anomalous; circumflex coronary artery; intervention; myocardial infarction.

1. INTRODUCTION

Coronary arteries of anomalous origins are rare and found in 0.8% - 1.2% of patients undergoing coronary angiography [1-4]. The most frequent anomaly is a circumflex artery arising from the right coronary artery or the right sinus of Valsalva, which occurs in about 50% of cases with coronary anomalies [1-5].

Although often considered benign, an anomalous circumflex artery can be a cause of myocardial ischemia or infarction [6-8]. Coronary angiography and intervention of an anomalous circumflex artery are usually challenging, especially when the anomalous artery is completely occluded. This case report describes our experience of angiographic recognition and percutaneous intervention in a case with a circumflex artery arising from a chronically occluded proximal right coronary artery and being responsible for myocardial infarction.

2. CASE REPORT

A 74-year-old male patient was admitted to the University Medical Center Ho Chi Minh City with sudden central chest

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pain at rest, lasting 3 hours prior to admission. His coronary risk factor included current cigarette smoking. He had a regular pulse of 77 beats per minute and a blood pressure of 120/70 mmHg. Other physical examinations were unremarkable. The ECG on admission showed small q wave in II, III, aVF with no ST deviation in all leads (**Figure 1**). The test results, however, revealed increased CKMB and Troponin I levels of 52 U/L (reference range: < 25 U/L) and 1.93 ng/mL (reference range: < 0.2 ng/mL), respectively. He was diagnosed as having non-ST elevation acute myocardial infarction.

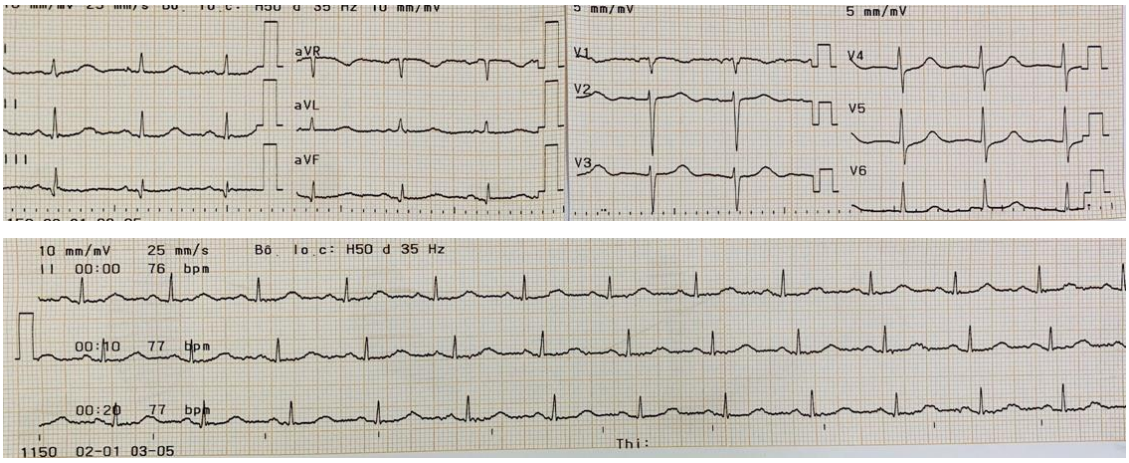

Figure 1. Electrocardiogram on admission

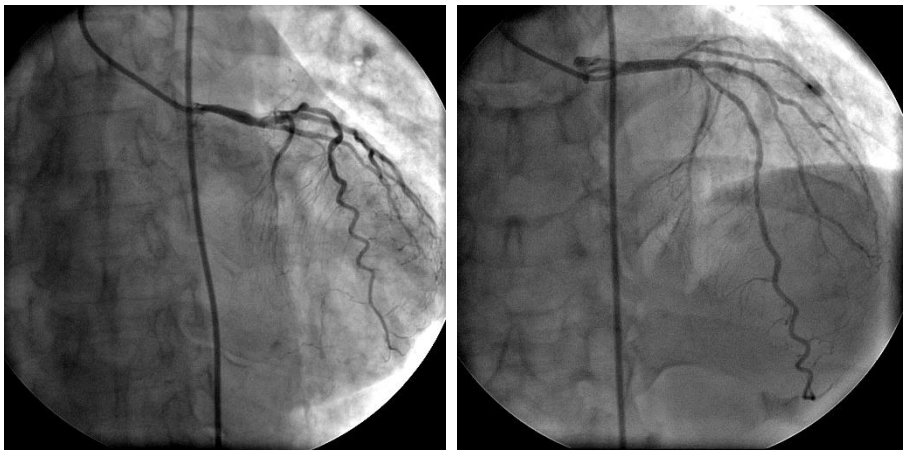

Figure 2. Left coronary angiogram. Left: RAO caudal view, Right: RAO cranial view

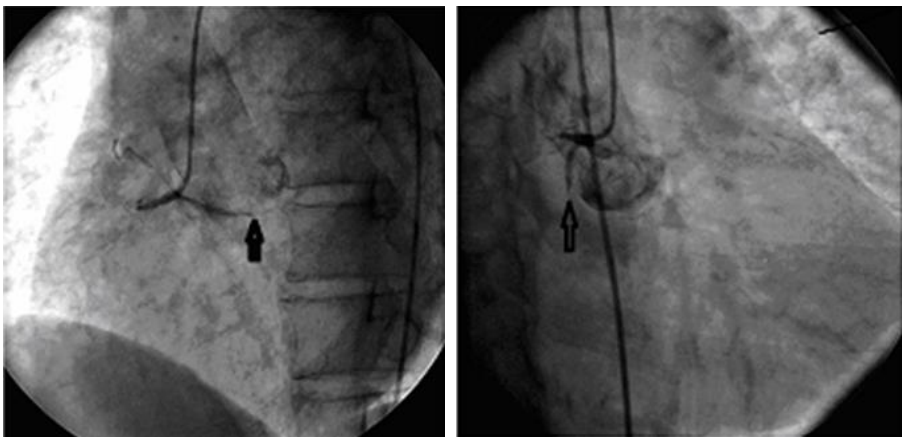

Figure 3. Right coronary angiogram showing an unusual branch following the course of a circumflex (arrow). Left: LAO view, Right: RAO caudal view

Consequently, he was urgently taken to the cardiac catheterization laboratory for percutaneous coronary angiography and intervention via the right femoral approach. The left circumflex artery was not seen in the left coronary

angiogram and left cusp injections, and initially presumed to be occluded at its origin (**Figure 2A**). The left anterior descending artery had moderate stenosis in the middle segment (**Figure 2B**). The right coronary artery had proximal total occlusion (Figure 3A) which was unlikely acute because there was no ST elevation in leads II, III, aVF. Looking carefully at the coronary angiography, we noted that there was an unusual branch arising from the very proximal segment of the right coronary artery (**Figure 3A**, arrow). This abnormal branch coursed towards the left side. To have an idea of what it was, we further performed right coronary angiography on the RAO caudal view and found that this branch might follow the course of a circumflex artery (**Figure 3B**, arrow). In light of these findings, we concluded that this unusual vessel was an anomalous circumflex originating from the proximal segment of the right coronary artery and being the infarct-related artery. Consequently, intervention of this anomalous circumflex was performed with a 6F JR 3.5 guide catheter. A 0.014'' floppy guidewire finally crossed the occlusion after a few attempts. The culprit lesion was predilated with a 2.0 x 15 mm balloon and then stented with a 2.5 x 18 mm bare metal stent. The final coronary angiogram showed an anomalous circumflex artery supplying the left posterolateral myocardium with TIMI 3 flow (**Figure 4**).

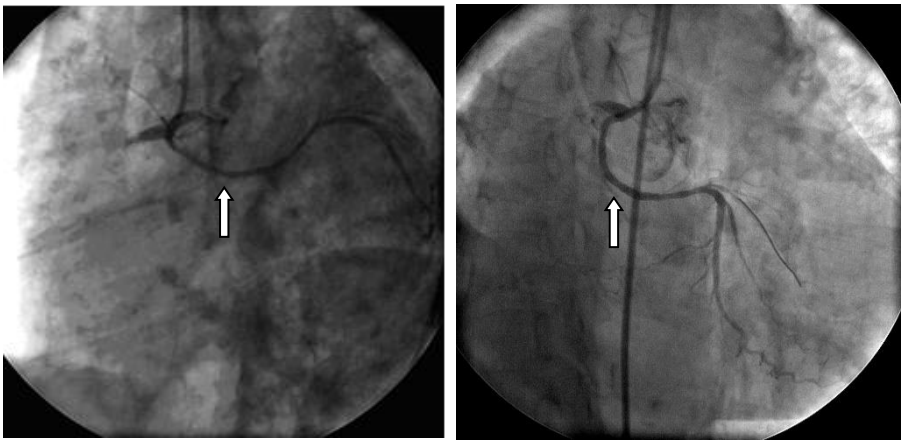

Figure 4. An anomalous circumflex originating from the right coronary artery after successful intervention (arrow). Left: LAO view, Right: RAO caudal view

The patient was scheduled for staged intervention of the total occlusion of the right coronary artery. He had uneventful hospital course and he was then discharged with intensive medical treatment including aspirin, clopidogrel, a beta blocker, an ACE inhibitor and a statin.

3. DISCUSSION

The incidence of coronary arteries with anomalous origin was about 0.8% – 1.2% [1-4]. The most frequent anomaly is a circumflex artery with origin from the right coronary artery or the right sinus of Valsalva, which occurred in nearly 50% of cases with coronary anomalies [1-5, 9]. After either origin, the anomalous circumflex artery courses behind the aortic root and enters the left atrioventricular groove to distribute as though it had originated as a proximal branch of the left coronary artery [5].

Interventional cardiologists should always suspect a circumflex artery with anomalous origin when it is not seen in left coronary angiography. Page et al. described two angiographic signs of an anomalous circumflex artery arising from the right coronary artery: a profile view of the anomalous artery posterior to the aortic root in the RAO projection during ventriculography (the "aortic root sign") and the absence of perfusion to the posterolateral region during selective left coronary angiography (the "sign of nonperfused myocardium") [5]. In our experience, we would do the following things to recognize an anomalous circumflex artery originating from the right coronary artery: (1) taking left cusp injections to rule out the possibilities of a separate origin of the left circumflex or sub-selective cannulation of the left anterior descending artery; (2) performing right coronary angiography in RAO caudal view to reveal any vessel following the usual course of a left circumflex artery.

Coronary intervention of an anomalous circumflex arising from the right coronary artery is a technical challenge. A JR guide catheter is usually the catheter of choice in this setting, as in the present case. However, our case was difficult because the circumflex arose very near the ostium of the right coronary artery and coming off at an angle of 90^0, while the right coronary artery was totally occluded. In this scenario, we have found these steps useful for coronary intervention: (1) placing a 6F 3.5 JR guide catheter just outside the ostium of the right coronary artery; (2) directing the tip of the guide catheter more posteriorly because of the posterior course of the anomalous circumflex artery; (3) inserting a coronary guidewire with a secondary curve of 90^0 into the anomalous circumflex; (4) applying gentle contrast injection during advancing the guidewire to help it select the circumflex, due to flow of contrast into the vessel; (5) using a small balloon to facilitate the advancement of the guidewire down the vessel.

Conclusion

In conclusion, this study reports a case of occluded anomalous circumflex coronary artery in a patient presented with chest pain. A JR guide catheter with posteriorly directed tip and a coronary guidewire with an appropriate curve are essential for success in intervention of an anomalous circumflex artery from the right coronary artery.

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

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AUTHOR CONTRIBUTIONS

NHKN, BQT were responsible for patient diagnosis, management and collected clinical and imaging information. NHKN, BQT, KDN, HNC wrote the paper. All authors approved the final version of the manuscript.

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REFERENCES

1. Chaitman BR, Lespérance J, Saltiel J, Bourassa MG. Clinical, angiographic, and hemodynamic findings in patients with anomalous origin of the coronary arteries. Circulation. 1976;53(1):122-31. Epub 1976/01/01. PubMed PMID: 1244233.
2. Donaldson RM, Raphael M, Radley-Smith R, Yacoub MH, Ross DN. Angiographic identification of primary coronary anomalies causing impaired myocardial perfusion. Catheterization and Cardiovascular Diagnosis. 1983;9(3):237-49.
3. Engel HJ, Torres C, Page HL, Jr. Major variations in anatomical origin of the coronary arteries: angiographic observations in 4,250 patients without associated congenital heart disease. Cathet Cardiovasc Diagn. 1975;1(2):157-69. Epub 1975/01/11. PubMed PMID: 1222415.
4. Opolski MP, Pregowski J, Kruk M, Witkowski A, Kwiecinska S, Lubienska E, et al. Prevalence and characteristics of coronary anomalies originating from the opposite sinus of Valsalva in 8,522 patients referred for coronary computed tomography angiography. Am J Cardiol. 2013;111(9):1361-7. Epub 2013/02/16. PubMed PMID: 23411107.
5. Page HL, Jr., Engel HJ, Campbell WB, Thomas CS, Jr. Anomalous origin of the left circumflex coronary artery. Recognition, antiographic demonstration and clinical significance. Circulation. 1974;50(4):768-73. Epub 1974/10/01. PubMed PMID: 4417692.
6. Rivitz SM, Garratt KN. Stenotic anomalous circumflex artery causing myocardial infarction following angioplasty of a right coronary artery stenosis. Cathet Cardiovasc Diagn. 1989;17(2):105-8. Epub 1989/06/01. PubMed PMID: 2524265.
7. Samarendra P, Kumari S, Hafeez M, Vasavada BC, Sacchi TJ. Anomalous circumflex coronary artery: benign or predisposed to selective atherosclerosis. Angiology. 2001;52(8):521-6. Epub 2001/08/22. PubMed PMID: 11512690.
8. Çitaku H, Kamberi L, Gorani D, Koçinaj D, Krasniqi X. Anomalous Origin of Left Circumflex Artery. Med Arch. 2015;69(6):423-4. Epub 2016/02/05. PubMed PMID: 26843740; PubMed Central PMCID: PMCPMC4720455.
9. Verma M, Pandey NN, Ojha V, Kumar S, Yadav S. Incidentally detected anomalous origin of left circumflex artery from right pulmonary artery in an adult with aortic stenosis and coarctation. Journal of Cardiovascular Computed Tomography. 2020;14(6):e180-e1.