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CASE REPORT

Congenital absence of the right coronary artery: A case report

Xiao-Yong Zhu, Xin-Hu Tang

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Abstract

BACKGROUND

As a rare anomaly, congenital absence of the right coronary artery (RCA) occurs during the development of coronary artery. Patients with congenital absence of the RCA often show no clinical symptoms, and this disease is considered benign. The left coronary artery gives blood supply to the whole myocardium. The prevalence of congenital absence of the RCA is approximately 0.024%-0.066%. There are few cases reported as for this disease. In this work, a patient, with congenital absence of the RCA diagnosed by coronary angiography (CAG), was described.

CASE SUMMARY

A 41-year-old man arrived at our hospital for treatment, due to the repeated palpitations for a duration of one year. Considering the possibility of coronary heart disease, the patient underwent CAG that indicated the congenital absence of the RCA. Unfortunately, the patient refused to accept computed tomography coronary angiography (CTCA), to further confirm the congenital absence of the RCA.

CONCLUSION

Single coronary artery is a rare type of coronary artery abnormality, which usually has no obvious clinical manifestations and is considered as a benign disease. CAG is the main means by which congenital absence of the RCA can be diagnosed, and the disease can also be further confirmed by CTCA.

Key Words: Single coronary artery; Coronary atherosclerosis; Absence of right coronary artery; Coronary angiography; Case report

Core Tip: A rare case of congenital absence of the right coronary artery was identified during coronary angiography of a patient.

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INTRODUCTION

Congenital absence of the right coronary artery (RCA) is a special case of abnormal coronary anatomy. RCA gives blood supply to the right myocardium from the circumflex branch (LCX). These patients are usually found by coronary angiography (CAG) or computed tomography coronary angiography (CTCA), and the case of congenital absence of the RCA reported in this work was diagnosed by CAG.

CASE PRESENTATION

Chief complaints

On April 22, 2022, a 41-year-old man arrived at Jiujiang University Affiliated Hospital for treatment, due to the repeated palpitations with a duration of one year.

History of present illness

The patient had no obvious symptoms of palpitations one year ago, and his current symptoms were accompanied by chest tightness while without chest pain. According to the description of the patient, each attack had no obvious relation with his physical activity, the duration of each attack could be relieved after a few minutes, and no active diagnosis or treatment was accepted.

History of past illness

The patient denied the history of hypertension and diabetes.

Personal and family history

The patient denied smoking, drinking history, and family disease history.

Physical examination

The body temperature was 36.6 ºC, the breathing was 18 breaths/min, the blood pressure was 110/72 mmHg, the heart rate was 70 beats/min, and the physical examination was normal.

Laboratory examinations

No obvious abnormality was found in routine blood analysis, biochemistry, hyperthyroidism, cardiac color Doppler ultrasound, thyroid color Doppler ultrasound, routine electrocardiogram, or dynamic electrocardiogram.

Imaging examinations

No obvious abnormality was found in color doppler echocardiography. CAG revealed an absence of the RCA, with the left circumflex artery supplying the entire right myocardium. Multiple attempts were unable to locate the RCA (Videos 1-7).

FINAL DIAGNOSIS

The patient had a congenital absence of the RCA.

TREATMENT

As for the treatment of RCA, there is still no standardized guideline, so no surgical intervention was given to the patient based on the experience of others and by combining with the results of CAG. The

patient was instructed to take aspirin antiplatelet regularly, take atorvastatin for plaque stabilization, and take metoprolol for ventricular rate control. Moreover, the patient was instructed to engage in appropriate physical activity and to keep a healthy lifestyle, for the primary prevention of coronary heart disease.

OUTCOME AND FOLLOW-UP

The patient's palpitation symptoms were improved by taking the drug (Metoprolol sustained-release tablets with 47.5 mg/d), and he was discharged from the hospital with a prescription of the drug (Figure 1).

DISCUSSION

Before discussing coronary artery anomalies, it is necessary to understand the normal anatomy of the coronary arteries[1]. The aortic root consists of three coronary sinuses, namely the left coronary sinus, the right coronary sinus, and the non-coronary sinus. Among them, the left coronary sinus gives rise to the left coronary artery that is divided into the left anterior descending branch and the LCX. While, the right coronary sinus gives rise to the right coronary[2].

Congenital absence of the RCA is a rare abnormal coronary artery disease, with very low incidence in the population, at approximately 0.024%-0.066%[3-7]. Congenital absence of coronary arteries is mostly caused by the defects in coronary artery development during embryonic development[3-6]. Patients may show no symptom or present with the manifestations of myocardial ischemia, including acute coronary syndrome, syncope, ventricular fibrillation, or sudden death[8]. Many scholars have expounded on the mechanism of myocardial ischemia caused by a single coronary artery (SCA), including the abnormal vascular development and the obvious coronary vessel prolongation, which can lead to the relative insufficiency of blood supply to the myocardium corresponding to the distal end of the vessel[7].

According to a report written by Yan *et al*[8], the electrocardiogram of patients with a SCA can be normal ST-T changes and supraventricular arrhythmias. The supposed underlying mechanism is as follows. First, the blood supply of the myocardium is given by the left coronary, which causes a relative lack of myocardial supply. Second, there is ischemia, especially to the sinus node and/or the atrioventricular node, and this is accompanied by various abnormal ECG manifestations[8]. The relationship, between the congenital absence of the RCA and the symptoms of myocardial ischemia (such as chest tightness, chest pain, and palpitations), is still unclear. As speculated currently, patients, who suffer no coronary heart disease risk factor and coronary atherosclerosis, generally have no apparent clinical manifestations. When developing to a certain extent, atherosclerosis may be manifested by myocardial ischemia. CAG is the gold standard for diagnosing the coronary artery disease, including the congenital absence of the coronary artery. However, in case of the absence of RCA, the catheterist may attempt to anastomose the right coronary stoma by taking a long time, and eventually cannot be completed, thereby increasing the number of patients. In addition, there is a radiation exposure dose that the operator is exposed to[7]. Therefore, CTCA examination can be used in checking the patients suspected of congenital absence of coronary arteries, to determine whether the coronary artery has lesions and anatomical abnormalities[9,10]. As for the patient in this case, CAG could clearly reveal that the left coronary artery gave blood supply to the right myocardium. However, multiple attempts were given to locate the right coronary at the sinus floor, but were unsuccessful. Also, repeated communications were given to the patient and his family about the patient's condition, and the patient was advised to undergo CTCA. But unfortunately, the patient and his family adamantly refused.

Lipton Yamanaka classifies SCA into the following two main types, namely the left type that originates in the left coronary sinus and the right type that originates in the right coronary sinus[11-13]. Moreover, it is divided into the three subtypes below based on the distribution, namely Type I, Type II, and Type III[11-14]. The patient in this work is classified as SCA Type I Variants according to this classification.

At present, there is no unified conclusion on how to give treatment to such patients. Patients generally have no obvious clinical manifestations before coronary atherosclerosis, and cannot undergo surgical intervention. Therefore, primary prevention of coronary heart disease is primarily used in the treatment plan, including antiplatelets, blood lipid control, blood pressure control, and blood sugar control. As for a series of myocardial ischemia following the appearance of coronary atherosclerosis, the treatments, such as percutaneous coronary intervention and coronary artery bypass grafting, can be given to the patients[8,15,16].

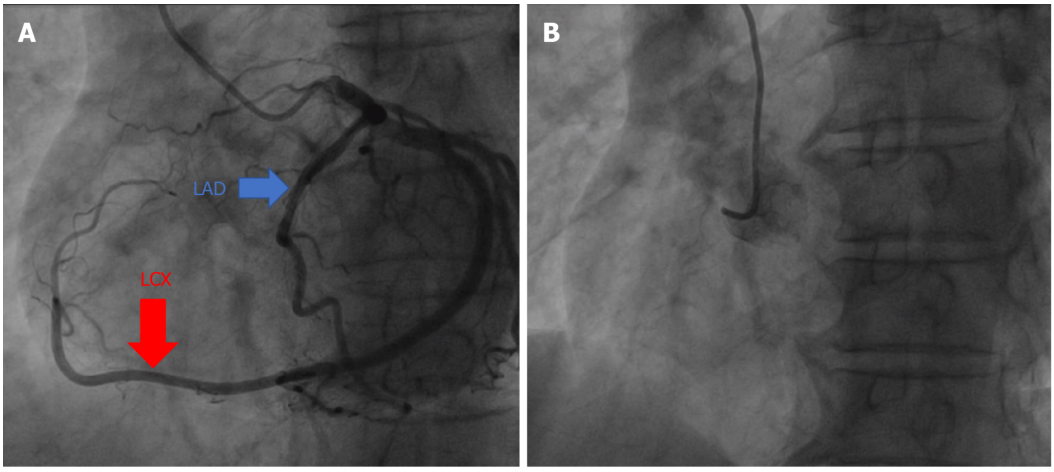

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Figure 1 RAO30°. A: The left main trunk originates from the left coronary sinus, and the left anterior descending artery runs normally. The left circumflex artery gives blood supply to the left myocardium, and then to the right myocardium through the right coronary sulcus; B: No right coronary artery was found after repeated attempts. LAD: Left anterior descending artery; LCX: Left circumflex artery.

CONCLUSION

CAG is considered as the gold standard for diagnosing the coronary lesions and the anatomical abnormalities. If the presence of the condition is uncertain, patients can be recommended to use CTCA to diagnose congenital absence of the RCA.

FOOTNOTES

Author contributions: Zhu XY reviewed the literature and contributed to manuscript drafting and revising, was the patient's doctors and contributed to collecting the patient's medical data and making a revision to the manuscript; Tang XH was responsible for the revision of the manuscript for important intellectual content; all authors issued final approval for the version to be submitted.

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