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ABOUT COVER

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EDITORIAL

Challenging situation of coronary artery anomaly associated with ischemia and/or risk of sudden death

Shigenori Ito

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Abstract

Coronary artery anomaly is known as one of the causes of angina pectoris and sudden death and is an important clinical entity that cannot be overlooked. The incidence of coronary artery anomalies is as low as 1%-2% of the general population, even when the various types are combined. Coronary anomalies are practically challenging when the left and right coronary ostium are not found around their normal positions during coronary angiography with a catheter. If there is atherosclerotic stenosis of the coronary artery with an anomaly and percutaneous coronary intervention (PCI) is required, the suitability of the guiding catheter at the entrance and the adequate back up force of the guiding catheter are issues. The level of PCI risk itself should also be considered on a caseby-case basis. In this case, emission computed tomography in the R-1 subtype single coronary artery proved that ischemia occurred in an area where the coronary artery was not visible to the naked eye. Meticulous follow-up would be crucial, because sudden death may occur in single coronary arteries. To prevent atherosclerosis with full efforts is also important, as the authors indicated admirably.

Key Words: Coronary artery anomaly; Single coronary artery; Ischemia; Sudden death; Percutaneous coronary intervention; Coronary vessel anomalies; Myocardial ischemia; Sudden cardiac death

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Core Tip: The incidence of coronary artery anomalies is as low as 1%-2% in the general population, even when the various types are combined. Among these, the R-1 subtype in a single coronary artery is extremely rare. In this case report by Zhou *et al*, emission computed tomography showed that ischemia occurred in an area where the coronary artery was not visible to the naked eye. Meticulous follow-up is crucial because sudden death may occur owing to a single coronary artery. Furthermore, atherosclerosis prevention is important because percutaneous coronary intervention could pose a high risk when necessary for such anomaly.

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INTRODUCTION

Like many organs, the coronary arteries have congenital anomalies. Anomalous origin, course, and termination of the coronary artery are often discovered by chance. In a single coronary artery as in this case[1], the origin of either the left or right coronary artery itself may not exist. Coronary artery anomaly is known as one of the causes of angina pectoris and sudden death and is an important clinical entity that cannot be overlooked. The frequency of coronary artery anomaly is often calculated based on data from catheter-based coronary angiography. On the other hand, coronary angiography is almost always performed for some reason, so there is a possibility that the statistics are biased to some extent. In recent years, multi-row coronary computed tomography (CT) has been increasingly performed as a first-line procedure[2], which makes it easier to perform anatomical analysis of the flow site and its relationship to other structures, and the range of indications is wider than that of a catheter[3,4]. The incidence of coronary artery anomalies is as low as 1%-2% of the general population[5], even when the various types are combined, and there is a natural limit to experience many types alone. Whenever you encounter unusual coronary arteries, you should always refer to the literature on congenital anomalies to evaluate their frequency and characteristics. It is important to consider whether the anomaly alone can cause ischemia or pose a risk of sudden death[6,7].

IMPACT OF CORONARY ANOMALIES

Coronary anomalies are practically problematic when the left and right coronary ostium are not found around their normal positions during coronary angiography with a catheter. It is easy to increase the amount of contrast agent used by repeating the test images many times. Particularly in the emergency setting of acute coronary syndromes, the operator may be distracted and repeat unnecessary contrast injection. Since there are cases of coronary artery occlusion at the entrance, it is more important to differentiate between the presence or absence of congenital abnormalities. If the ostium cannot be found during normal catheterization, it is important to remember the presence of the anomaly at an early stage. Contrast imaging of the sinuses of Valsalva/aortic root should be performed as soon as possible. If there is atherosclerotic stenosis of the coronary artery with an anomaly and percutaneous coronary intervention (PCI) is required, the suitability of the guiding catheter at the entrance and the adequate back up force of the guiding catheter are issues[8-10]. The level of PCI risk itself should also be considered on a case-by-case basis. PCI of a single coronary artery, as in this case[1], is difficult[5]. Suppose there is a significant stenosis in the proximal area. In this case, the risk of PCI will be considerably higher than in the left main with normal coronary structure, since it includes the perfusion zone of all coronary arteries.

CLINICAL IMPLICATIONS

This case is very rare, and even a single case report contributed to the world "encyclopedia" of coronary anomalies as a valuable accumulation of cases[1]. Emission CT in the R-1 subtype single coronary artery proved that ischemia occurred in an area where the coronary artery was not visible to the naked eye, confirming the report of Chaikriangkrai *et al*[7]. In a 62-year-old female patient with diabetes mellitus, hypertension, and dyslipidemia presented with decreased exercise tolerance and poor blood pressure control, which began 2 wk before presentation. On a physical examination, her vital signs were as follows: body temperature, 37.3 °C; heart rate, 92 beats per minute; blood pressure, 151/86 mmHg; and body mass index, 23.4 kg/m². Laboratory tests were negative for cardiac troponin I. Blood testing revealed low-density lipoprotein, high-density lipoprotein, and total cholesterol levels of 3.16, 1.19, and 4.96 mmol/L, respectively. The patient's fasting blood glucose level was 9.49 mmol/L, while her 2-h postprandial blood glucose level was 22.54 mmol/L. Her glycosylated hemoglobin A1c level was 7.51%. Electrocardiography showed a normal sinus rhythm with mild depression in leads I, II, III, aVF, and V4-V6 (Figure 1). Coronary angiography detected no left coronary artery (Figure 2A and D) and that a single large coronary artery from the right sinus continued in the coronary sulcus (Figure 2B) and extended to the anterior base of the heart, terminating in a small vessel supplying the territory of the left anterior



Figure 1 Electrocardiography at initial presentation [1]. Normal sinus rhythm with ST-T wave changes in leads I, II, III, aVF, and V4-V6. Citation: Zhou YP, Wang LL, Qiu YG, Huang SW. R-I subtype single right coronary artery with congenital absence of left coronary system: A case report. World J Cardiol 2023; 15: 649-654. Copyright ©2023 The Authors. Published by Baishideng Publishing Group Inc.



Figure 2 Coronary angiography[1]. A: No coronary artery was found on multiple coronary projections; B and C: A single and large coronary artery originating from the right coronary sinus continued in the coronary sulcus (B), and extended to the anterior base of the heart, where it gave rise to the left anterior descending coronary artery (C); D: No coronary artery was found on a non-selective aortic root injection. Citation: Zhou YP, Wang LL, Qiu YG, Huang SW. R-I subtype single right coronary artery with congenital absence of left coronary system: A case report. World J Cardiol 2023; 15: 649-654. Copyright ©2023 The Authors. Published by Baishideng Publishing Group Inc.

descending coronary artery (Figure 2C).



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CONCLUSION

Although the presence of a single coronary artery was identified as the cause of decreased exercise tolerance only 2 wk prior, it is not easy to understand that this patient had no symptoms until she was 62 years old, because this anomaly is congenital. Thus, in addition to the ischemia associated with the anomaly, it cannot be ruled out that the increase in double products associated with increased blood pressure and/or the appearance of microcirculatory disorders[11] may have had an effect. Meticulous follow-up would be crucial, because it has been pointed out that sudden death may occur in single coronary arteries[7]. It is also mandatory to prevent atherosclerosis with their full efforts, as the authors indicated admirably.

FOOTNOTES

Author contributions: Ito S contributed to this paper; Ito S designed the overall concept and outline of the manuscript; Ito S contributed to the discussion and design of the manuscript; Ito S contributed to the writing, editing of the manuscript, and review of the literature.

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