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A clinical case of the retroaortal course of the circumflex artery from the right coronary artery

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ABSTRACT

An anomalous course of coronary arteries is fairly rare pathology, which, however, may underlie clinical manifestations of coronary artery disease. Expanding the possibilities of diagnostic coronary angiography makes it possible to detect numerous types of congenital anomalies of the coronary arteries.

However, if earlier they were considered as angiographic findings and were characterized as benign, now this attitude has been changed due to reports of cases of syncope, angina pectoris, and sudden cardiac death associated with their presence. In this regard, a trend emerged to consider such anomalies as "potentially malignant", which explains special caution at their detection. The article presents a clinical case of an anomalous retroaortic course of the circumflex artery from the right coronary artery.

Keywords: coronary angiography, stenting, coronary artery anomaly

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Клинический случай ретроаортального хода огибающей ветви, отходящей от правой коронарной артерии

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РЕЗЮМЕ

Аномалии отхождения коронарных артерий являются достаточно редко встречающейся патологией, которая, однако, может лежать в основе клинической манифестации ишемической болезни сердца. Расширение возможностей проведения диагностической коронароангиографии позволяет обнаружить многочисленные виды врожденных аномалий коронарных артерий.

Однако если ранее они считались ангиографическими находками и характеризовались как доброкачественные, то в дальнейшем такое отношение было изменено сообщениями о случаях синкопальных состояний, стенокардии и внезапной смерти, связанных с их наличием. В связи с этим сформировалась тенденция рассматривать такого рода аномалии как «потенциально злокачественные», что диктует особую настороженность при их обнаружении. Представлен клинический случай аномалии ретроаортального хода огибающей ветви от правой коронарной артерии.

Ключевые слова: коронароангиография, стентирование, аномалия коронарной артерии

Конфликт интересов. Авторы декларируют отсутствие явных и потенциальных конфликтов интересов, связанных с публикацией настоящей статьи.

Источник финансирования. Авторы заявляют об отсутствии финансирования при проведении исследования.

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INTRODUCTION

According to various data, the frequency of congenital anomalies of the coronary arteries (CAs) ranges from 0.6 to 1.8% [1, 2]. There are various types of dispositions of the CAs: anomalous origin of the left anterior descending artery (LAD) from the right coronary artery (RCA) (absence of the left CA trunk); an increase in the number of CAs branching from the aorta (absence of the right CA trunk); anomalous origin of the circumflex artery (Cx) from the 2nd or 1st sinuses of the aorta or from the RCA.

Pathological origin of the Cx is the most common anomaly of the CA origin, that is why in 1970 D. Effler recommended to call it a 'normal variant" [3, 4]. The location of the anomalous Cx is always the same: from its origin it runs back and to the left, bending around the aorta from behind, then passes between the posterior wall of the aorta and the anterior wall of the right and left atria until it reaches the left part of the atrioventricular sulcus, where it is covered by the left atrial appendage and has the usual location [5].

Despite the fact that this anomaly is still considered to be benign, cases of its association with sudden cardiac death and angina pectoris have been reported [6]. These phenomena may be due to repeated compression of this vessel due to dilation of the aortic root or curvature following its retro-aortic position, followed by compression of the coronary ostium in the sulcus with the formation of an obstacle to the blood flow. It is also necessary to mention recent studies suggesting that the anomalous origin of the CAs may increase the risk of atherosclerotic changes due to their acute angle of inclination [7]. The anomalous origin of the Cx from the right coronary sinus with the retroaortic course has been thoroughly studied and is not considered to be malignant because in this case the artery does not pass between two arterial structures [8].

CLINICAL CASE

A female patient Ch., aged 75 years, was admitted to the Regional Vascular Disease Center for patients with acute coronary syndrome with complaints of attacks of burning sensations behind the sternum lasting 3–10 minutes, arising from habitual physical activity and at rest. The patient had had a history of angina pectoris for more than 20 years with 3–5 attacks per week. During the last month, the patient noted a decrease in exercise tolerance and the fact that anginal attacks occurred at rest.

Upon admission, troponin I, myoglobin, and creatine phosphokinase-MB were negative. Other laboratory parameters were within the reference values. The ECG showed a normal sinus rhythm, heart rate of 64 beats per minute, and disrupted repolarization of the myocardium in the anterior, septal, and apical regions of the left ventricle (Fig. 1).

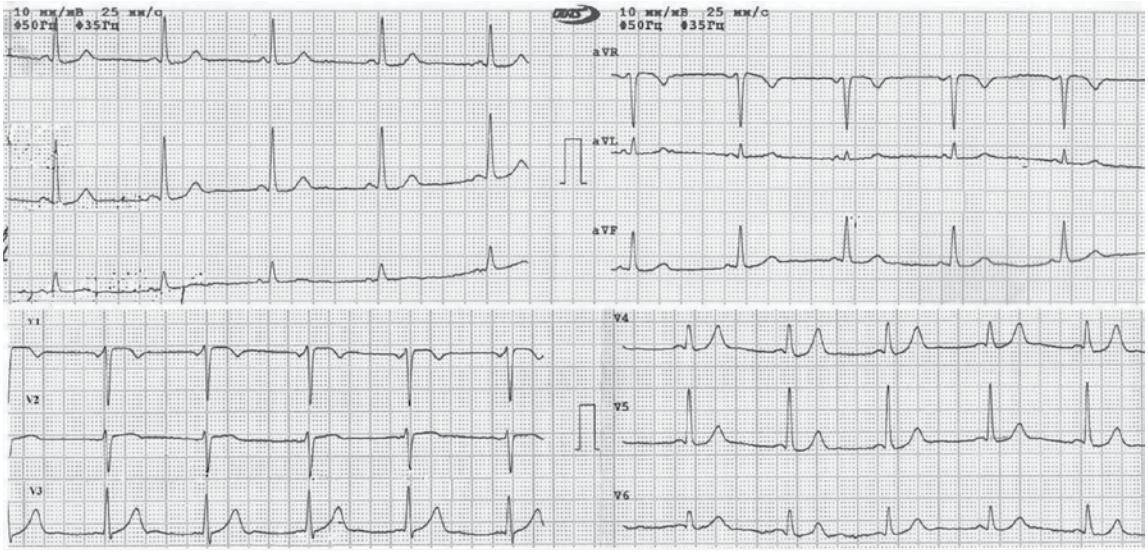

Fig. 1. Electrocardiogram before percutaneous transluminal coronary angioplasty. Speed 25 mm / s, voltage 10 mm / mV.

The results of Holter monitoring were the following: single (93) and paired (6) polytopic supraventricular extrasystoles; paroxysms (3) of unstable supraventricular tachycardia; single (97) and paired (4) polymorphic ventricular extrasystoles; paroxysms (4) of wide QRS complex tachycardia; the total duration of episodes of ischemic ST-segment displacement was 52 minutes; no significant changes in the QT interval were noted.

Echocardiography revealed type I left ventricular diastolic dysfunction (E/A= 0.7), ejection fraction (EF) 60%, slight left atrial dilatation (47 mm), and basal septal hypertrophy (12 mm). Hypokinetic and akinetic zones were not revealed.

The patient underwent coronary angiography, which revealed: atherosclerosis of the CAs, proximal LAD artery stenosis of the left CA of more than 70% with angiographic signs of plaque instability, stenosis of the middle segment of the RCA of about 50%; the origin of Cx from the RCA. At the end of the coronary angiography, percutaneous transluminal coronary angioplasty (PTCA) was performed for proximal LAD artery stenosis: a 3.0 × 20 mm REBEL stent deployed at 14 atm, optimization with a 3.5 x 12 mm balloon at 20 atm (Fig. 2–5).

The patient had no complications in the postoperative period. Positive dynamics were noted. The patient had no angina attacks, dyspnea at rest and when walking. The patient could move actively in the ward, and then she was able to walk around the department. The patient was discharged on the 9th day in a satisfactory condition for the cardiology follow-up care in a clinic at the place of residence. Confirmation Holter monitoring and echocardiography were to be performed after 6 months.

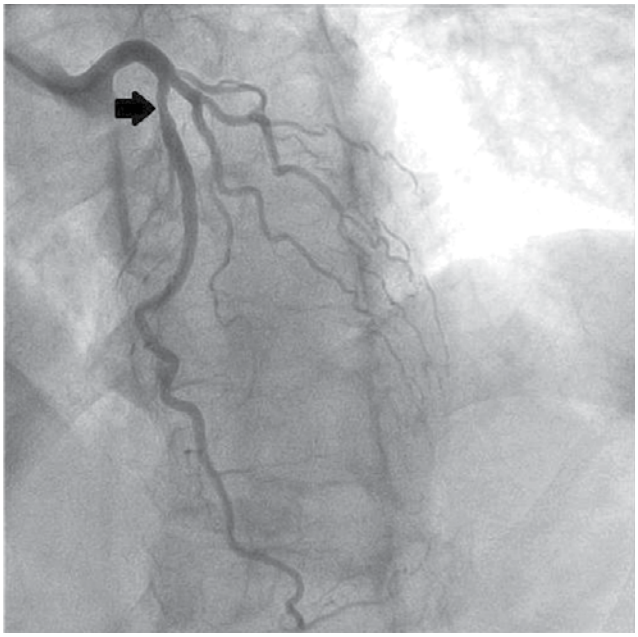

Fig. 2. Coronary angiography view of the LCA branches. The arrow marks stenosis with angiographic signs of atherosclerotic plaque instability

DISCUSSION

The anomalous origin of Cx from the RCA may be asymptomatic until adulthood, as a result it is often diagnosed accidentally or even goes unnoticed. Late diagnosis can lead to poor health and limited physical activity due to impaired myocardial perfusion.

Fig. 3. Coronary angiography view of the RCA branches. The arrow marks the origin of the Cx from the RCA

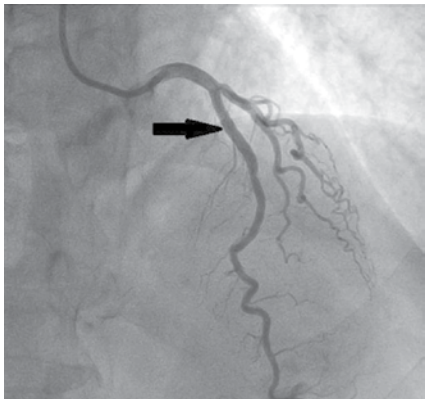

Fig. 4. Image of the LCA branches after PCI. The arrow marks the site of stent implantation

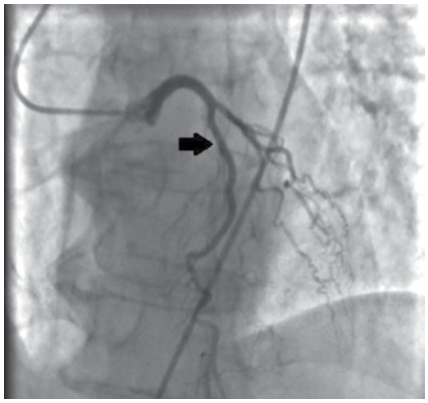

Fig. 5. Coronary angiography view of the LCA branches after 19 months. The arrow marks the site of stent implantation

This anomaly can be identified with the help of coronary angiography, which is sometimes crucial in establishing the final diagnosis. However, the presence of anomalies causes difficulties in conducting selective coronary angiography, since with conventional approaches, the results may not always have the diagnostic value. Moreover, this method is quite invasive, requires more items of specialized equipment, and cannot give an accurate spatial location of the anomalous Cx. These negative aspects can be eliminated by performing multidetector computed tomography of the CAs, which is a kind of mainstay for detecting coronary anomalies before the elective surgical intervention [9].

In this patient, the detected anomaly of the branch of the CA was an accidental finding. The severity of the stenotic lesion of the LAD artery served as an indication for endovascular intervention (stenting) with a subsequent positive clinical effect. It should be noted that the lesion localization in the ostium or proximal RCA can be a significant obstacle for the formation of an adequate blood supply to the posterior diaphragmatic surface of the heart, including the sinus node. The peculiarities of coronary blood flow depending on the cardiac cycle should also be taken into consideration: from the LCA basin – during the diastole, from the RCA basin – during the ventricular diastole and systole.

An increase in the scope of cardiac surgeries and X-ray-guided surgeries on the aortic valve also makes it necessary to focus on exclusion of anomalies in the origin of the CAs in the preoperative period. Thus, after aortic valve replacement, compression by a prosthetic valve ring or ligation of anomalous Cx are considered the main causes of myocardial ischemia; thorough and complete mobilization of the CAs is necessary to prevent this [10]. Also, a well-balanced approach to the surgical maneuver with preservation of coronary blood flow in the Cx should be considered when performing the Bentall procedure [11]. In some cases, balloon aortic valvuloplasty with subsequent transcatheter aortic valve replacement is more controlled, since it is possible to perform selective angiography of the anomalous Cx to confirm impaired blood flow in it early [12].

The presented clinical case confirms the importance of timely diagnosis of congenital anomalies of the origin of the CAs, since their presence can cause ischemia and arrhythmias and may also be associated with a risk of sudden cardiac death. Coronary angiography in combination with multidetector computed tomography of the CAs are complementary methods for diagnosing this pathology.

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