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Single Coronary Artery Anomaly Causing Chest Pain

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ABSTRACT

The "single coronary artery" anomaly arises from the aortic root by a single coronary ostium and in the absence of another ostium mostly has an asymptomatic course. However, some types of this congenital anomaly may cause various clinical manifestations like chest pain and even sudden death.

In this presentation, a 51-year-old woman, who had complaints of typical chest pain increasing with hypertension was presented. Angiography was performed due to chest pain complaints, revealed that all coronary system was giving off branches from a main single coronary artery, which arose from the right sinus of valsalva. There weren't any blocking coronary lesions that might cause ischemia. Multislice computed tomography examination was performed in order to describe the symptoms and it was observed that this main coronary artery arose from right sinus of valsalva as well as it followed a retroaortic course. Because of symptoms of myocardial ischemia, further evaluation of the coronary ostium with intravascular ultrasound (IVUS) was suggested. However the patient refused further invasive examination and a medical treatment was arranged.

After a month, under a medical treatment and while her blood pressure was under control, she experienced atrial fibrillation attack that had begun after typical chest pain. Medical cardioversion with sotalol was succesfull. At that time further evaluation was again suggested but the patient refused again. The patient having Canadian Cardiovascular Society (CCS) class II angina pectoris is being followed up in our clinic for the last six months without experiencing any coronary events or arrhythmia.

Key Words: Single coronary artery; coronary anomaly; angina pectoris

Göğüs Ağrısına Yol Açan Tek Koroner Arter Anomalisi

ÖZET

Aort kökünden tek koroner ostiyumla çıkan ve başka bir ostiyumun gözlenmediği "tek koroner arter" anomalisi çoğunlukla semptomsuz seyreder. Ancak bu doğumsal anomalinin bazı tipleri göğüs ağrısına neden olup ani ölüme kadar varabilen değişik klinik tablolarla karşımıza çıkabilir. Bu sunumda hipertansiyonla birlikte artış gösteren tipik göğüs ağrısı yakınması olan 51 yaşında kadın hasta sunulmuştur. Yakınmaları nedeni ile yapılan koroner anjiyografide tüm koroner sistemin sağ sinüs valsalva'dan köken alan tek bir ana koroner arterden dallanarak yayılım gösterdiği saptandı. İskemiye yol açabilecek herhangi bir tıkayıcı koroner lezyona rastlanmadı. Semptomlarını açıklamak için yapılan çok kesitli bilgisayarlı tomografi tetkikinde, bu ana koroner arterin sağ sinüs valsalvadan çıktığı ve aynı zamanda retro-aortik bir seyir izlediği gözlendi. Miyokardiyal iskemi semptomları nedeni ile koroner ostiyumun intravasküler ultrason (IVUS) ile değerlendirilmesi önerildi. Ancak hasta daha ileri invazif tetkikleri reddetti ve medikal tedavisi düzenlendi. Bir ay sonra, medikal tedavi altında ve kan basıncı kontrol altında iken, tipik göğüs ağrısı sonrası başlayan atriyal fibrilasyon atağı yaşadı. Sotalol ile medikal kardiyoversiyon başarılı oldu. Bu sırada hastaya tekrar ileri değerlendirme önerildi ancak hasta yine kabul etmedi. Kanada sınıf iki göğüs ağrısı olan hasta, herhangi bir koroner olay veya aritmi yaşamaksızın son altı aydır polikliniğimizde takip edilmektedir.

Anahtar Kelimeler: Tek koroner arter; koroner anomali; göğüs ağrısı

INTRODUCTION

Single coronary artery anomaly (SCAA) is described as an isolated coronary artery where the whole blood that heart needed is supplied by branched coronary arteries arise from a single ostium at aortic root in the absence of another ostium[1].

Coronary artery anomalies are rare, notwithstanding the incidence is reported as 1% among patients who underwent coronary angiography.

SCAA is a rare form of coronary artery anomaly with the incidence of 0.02% in the community[2]. Most of the patients with SCAA are asymptomatic and they are incidentally diagnosed at the time of coronary angiography that is performed for some other reason. The disease may appear with different clinical manifestations such as chest pain and sudden death[3]. There are limited data regarding the most appropriate treatment for the cases with coroner artery anomaly. In this report, 51-year-old hypertensive female

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patient admitted with typical complaints of chest pain and had a SCAA which was detected with coronary angiography and MSCT examinations, was presented. The management of this anomaly was discussed in the light of literature.

CASE REPORT

A 53-year-old female patient, who was experiencing chest pain radiating to the left arm for the last 2 to 3 months, admitted to our polyclinic. She stated that the pain, accompanied by shortness of breath, was starting after walking about 100 meters and was recovering with resting for 5 to 10 minutes. Patient also stated that her complaint especially has increased over the past month. Patient was diagnosed with hypertension for ten years and using Amlodipine 2.5 mg and Ramipril 5 mg. Other than that patient's medical history was normal. The patient's resting electrocardiogram (ECG) was in sinus rhythm and rate was 80 beats/min; there were not any other features. There was no pathological finding detected in the patient's transthoracic echocardiography. Left ventricular ejection fraction was detected as 65%. Left ventricular wall motions were normal. 160/100 mmHg of blood pressure was measured on physical examination. Pulse was 82 beats/minuteand regular, there was no murmur on cardiac auscultation, but S4 was significantly heard. Breath sounds were normal. The cardiac stress test was terminated and evaluated as symptom-positive at the end of the second stage of test (within sixth minute), because of the patient's feeling of sickness and the typical chest pain. During the test there were no changes in ECG. The patient's coronary angiogram revealed the single coronary artery anomaly arising from right ostium (Figure 1). Multislice computerized tomography examination was planned for the better evaluation of coronary artery anatomy and to determine possible risks that anomaly may cause. As a results, it was detected that both left main coronary artery (LCMA) and the right coronary artery (RCA) were originated from a single ostium arose from right sinus of valsalva and then divided into branches. After originating from the right sinus of valsalva it was observed that left main coronary artery has an retroaortic course and further, it divided into the left anterior descending artery (LAD) and the circumflex artery (CX) in front part of the heart (Figure 2). Further evaluation of coronary ostium with IVUS was recommended, however she refused. Beta-blocker was added to her treatment and the dose of Ramipril increased to 5 mg while it was combined with 25 mg of Hydrochlorothiazide. Under medical treatment, while his blood pressure was under control, he experienced atrial fibrillation attack that had begun after typical chest pain. Medical cardioversion with sotalol was succesfull. At that time further evaluation was resuggested but the patient refused again. No coronary event developed within 6 months of follow up. However, she is still complaining Canadian Cardiovascular Society (CCS) class 2 angina pectoris.

DISCUSSION

Single coronary artery anomaly (SCAA) is described as an isolated coronary artery where the whole blood need of heart is supplied by a single ostium at the aortic root in the absence of another ostium[1].

The incidence of coronary artery anomalies is reported as 1% in patients underwent coronary angiography. Single coronary artery (SCA) is a rare form of coronary artery anomaly with incidence of 0.02% in the community[2]. Although coronary artery anomalies usually have asymptotic courses, they may be associated with different clinical manifestations like chest pain, myocardial infarction, arrhythmia, heart failure, syncope and sudden death[3]. Increased tendency of atherosclerosis have also been reported in cases with single coronary artery anomalies[4].

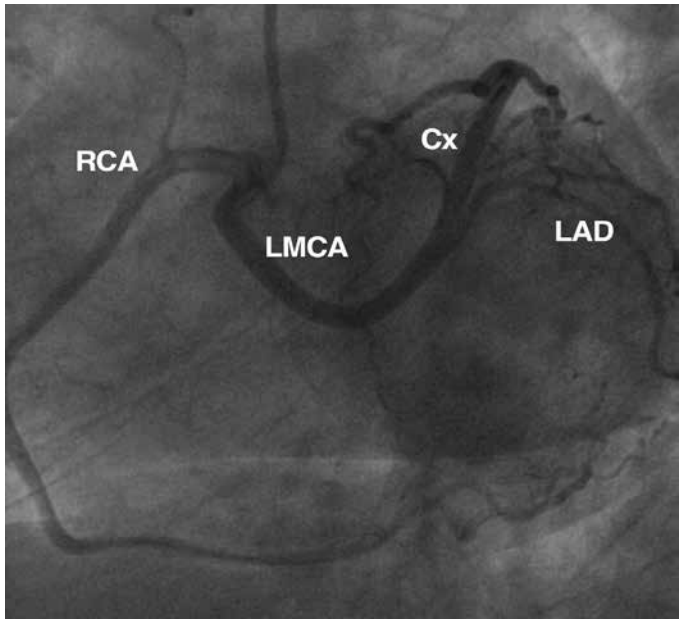

Figure 1. Coronary angiography image show all coronary artery system is originated from, single root, right sinus of valsalva

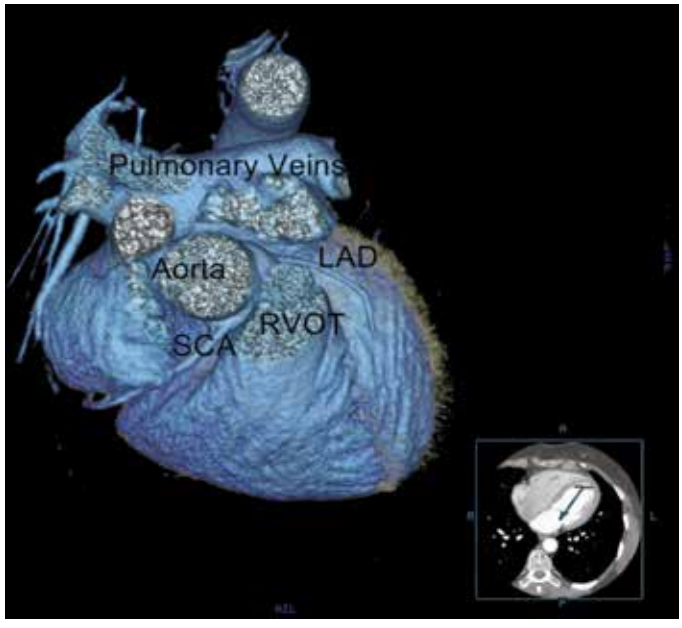

Figure 2. Multislice CT demonstrating the retroaortic take off single coronary artery

Lipton et.al., classified single coronary artery anomalies angiographically according to the origin whether being right or left coronary artery, the anatomical distributions on ventricular surface and the relationship with the ascending aorta and the pulmonary artery[5]. Consistent with this classification, in SCA anomalies arose from right sinus of valsalva (that gives anomaly the first letter R), left system may originate from its distal after the natural course of RCA (R-1 type) or may arise from the proximal root as an another artery (left main coronary artery R-2 type) or may bifurcate from proximal root as two different arteries, LAD and Cx (R-3 type).

The abnormal output of left main coronary artery from right aortic sinus can be divided into four main groups based on the distance it covered through the left of the heart compared to aorta and pulmonary artery. The most common form is known as intramyocardial, which has septal course and a short form of LAD. Another form indicates an anterior free wall course. In this form, LAD is short as well. In retroaortic form, LAD has normal length. In the intra-arterial form, which is considered the most dangerous form, the left main coronary artery courses between the aorta and the pulmonary artery. LAD usually has normal length in this form[6].

In SCA anomalies, it is very important and difficult to reveal the ostial anatomical disorders that could lead to sudden death, especially in conjunction with anomalous origin. Intravascular ultrasound (IVUS) is very useful to use for this purpose. A sharp angle output and the presence of ellipsoid ostium, the presence or the absence of ostial protuberance, intussusception of proximal coronary artery to aorta wall, flattening of the proximal cross-section of aberrant coronary artery in aorta, phasic and sistolo-diastolic compression of aberrant proximal segment of the coronary trunk, reduced wall thickness of the aorta at the level of the coronary segment suffered from intussusception, detection of spasmogenic trend are considered as high-risk in IVUS[7].

After the assesmant of individual risks, there is an indication and requirement for surgical treatment in symptomatic and high-risk patients. Coronary artery anomalies are divided into seven subgroups and investigated by "The Society of Thoracic Surgeons-Congenital Heart Surgery Database Committee"[8]. There are several recommended surgical approaches when left main coronary artery is originated from right sinus valsalva. Coronary artery with abnormal course can be incised and implanted to ipsilateral sinus, however there is a risk of neo-ostial stenosis development with this approach[9]. Sometimes, after arising from contralateral sinus, the abnormal coronary artery can follow intramural course between the aorta and pulmonary artery then arise from proper spot of the aorta wall. In this case surgical treatment can be performed by removal of the roof of intramural part (unroofing)[9]. Short and middle term results of this treatment are quite good. Another treatment option, which can be performed successfully, is coronary bypass surgery. Ono et al. identified LAD, which takes intra-arterial course in two cases and reported that left internal mammary artery-LAD bypass treatment was effective[10]. Current guidelines do not have sufficient information about single coronary artery anomalies. The long-term bypass therapy results are still not known in the literature.

For the assessment of risk, we suggested further evaluation with IVUS to our patient. But she refused further invasive examinations. A single daily dose of 50 mg metoprolol was added to the patient's medical treatment and the dose of Ramipril was increased to 5 mg in combination with 25 mg Hydrochlorothiazide. Sixty mg isosorbid-5-mononitrat was also added. Patient's blood pressure was taken under control after the medical treatment; chest pain was regressed from Canada class 3 to 2. Under medical treatment, while her blood pressure was under control, she experienced atrial fibrillation attack that had begun after typical chest pain. We did not discover any other etiologic reason for the atrial fibrillation and performed successful medical cardioversion with sotalol. At that time further invasive evaluation was resuggested but the patient refused again. Later on, she did not experience any coronary event during the six-month follow-up.

In conclusion, single coronary artery anomaly is a rarely seen disease, which may cause chest pain with or without atherosclerosis. Individual assessment with tools like IVUS may be helpful to establish the patients who are under high risk. In high risk SCA anomalies, the treatment strategy is still controversial and there are no studies comparing surgical with medical treatment and long-term follow-up studies are needed.

CONFLICT of INTEREST

The authors reported no conflict of interest related to this article.

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