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Case Report

Acute Chest Pain due to Single Coronary Artery: Clinical Implications for Diagnostic Work-up and Therapy

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Abstract

Single coronary artery is a rare finding in coronary angiographies. We report a case of a 65-year-old female with first time acute onset of chest pain and discuss the role of multimodality imaging in chest pain as well as diagnostic and therapeutic work-up in coronary anomalies.

Keywords: Coronary Vessel Anomaly; Chest Pain, CT coronary angiography; Congenital heart defects; single coronary artery; case report.

Abbreviations: ACAOS: anomalous origin of the coronary arteries arising from the opposite sinus of Valsalva; ACS: acute coronary syndrome; BP: blood pressure; CCTA: computer tomography coronary angiography; CT: computed tomography; Cx: left circumflex artery; Dg 1: first diagonal branch; ECG: electrocardiogram; ED: emergency department; LAD: left anterior descending; SCD: sudden cardiac death; SPECT: single photon emissions computertomography

History of Presentation

A 65-year old female was driving home to Poland after finishing her career in Germany, as she experienced a sudden episode of chest pain, radiating in her neck and jaw. On admission in our emergency department, the symptoms lasted for about 30 minutes.

Past Medical History

The patient had no history of diseases, no medication taken.

Differential diagnosis

The initial examination was significant for hypertensive blood pressure 190/100mmHg, an incomplete right bundle branch block without further repolarization abnormalities in the ECG (Figure 1). The high sensitive troponin tests ruled out an acute coronary syndrome (ACS). The echocardiography in the emergency department demonstrated a normal biventricular function without valve abnormalities. The patient was transferred to our department of cardiology for unstable (de novo) chest pain for further diagnostic work-up.

Investigations

A repeated echocardiography on the next morning confirmed the findings of normal ejection fraction without wall motion abnormalities or valvular dysfunction, a moderate left ventricular hypertrophy, but revealed a possible anomalous origin of left circumflex artery (Cx) from the right sinus of Valsalva (Figure 2, Video 1).

Video 1: Echocardiography demonstrates a suspected anomalous origin of RCX from the right sinus of Valsalva.

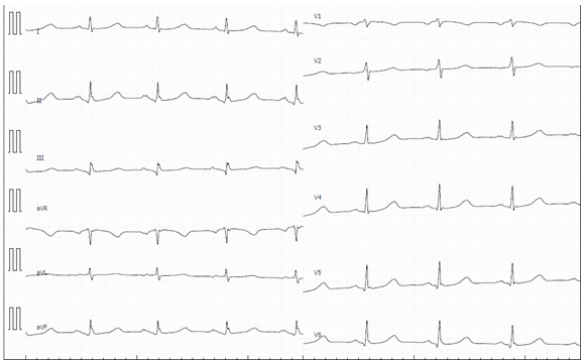

Figure 1: ECG at addmission showing no repolarisation abnormalities.

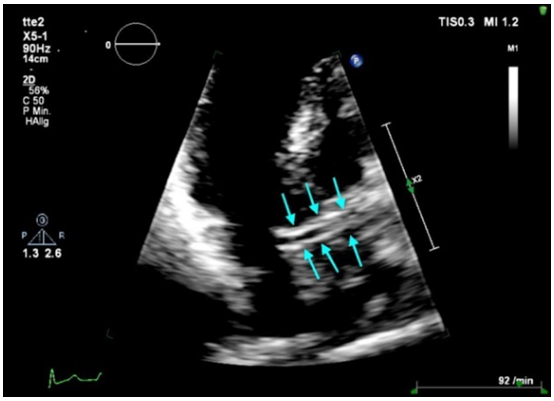

Figure 2: Echocardiography demonstrates a suspected anomalous origin of left circumflex(arrows) from the right sinus of Valsalva.

Management

In intermediate risk coronary artery disease (CAD) setting and confirmed coronary anomaly of unknown course, we performed a multi slice computer tomography coronary angiography (CCTA), which demonstrated a malignant anomaly of left coronary artery (LCA), with a rather small left anterior descending (LAD), which proceeds between the aorta and the pulmonary artery, while a dominant Cx and first diagonal branch (Dg 1) took course between the aorta and the left atrium (Figure 3, Video 2). Concomitant CAD was not present. For further risk stratification we performed adenosine stress single photon emissions computertomography (SPECT) with no signs of stress induced ischemia or minor perfusion (Figure 4). After initiation of antihypertensive therapy and confirming a regular profile in a 24h blood pressure monitoring, she reported no further symptoms.

Video 2: CT coronary angiography showing single coronary artery with a common origin of the left and right coronary artery from the right sinus of Valsalva.

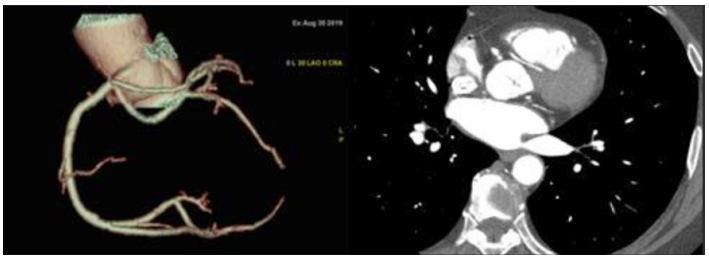

Figure 3: CT-Angiography showing a single coronary artery with a common origin of the left and right coronary artery from the right sinus of Valsalva and an interarterial course of LAD (arrow).

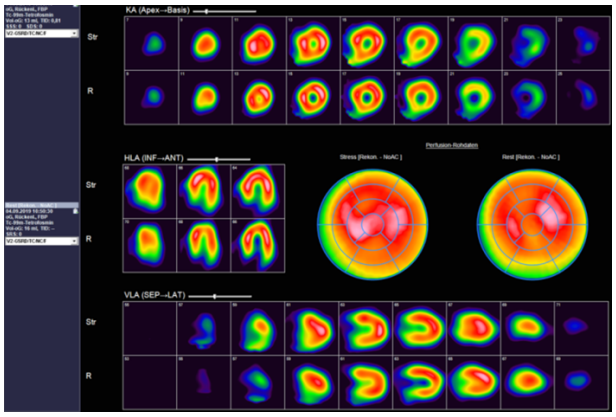

Figure 4: Adenosine stress SPECT with no signs of stress induced ischemia.

Discussion

Congenital coronary artery anomalies (CAA) are common findings with a prevalence of 0,3%-1,3% [1,2-9] in invasive or noninvasive coronary angiographies. However, in case of an anomalous origin of the coronary arteries arising from the opposite sinus of Valsalva (ACAOS) an increased risk for sudden cardiac death (SCD) has been reported [2,5,8,10-12]. A single coronary artery occurs in 0,024%-0,066% patients undergoing coronary angiography [1,5,6]. An accepted risk factor for SCD is an early manifestation in patients younger than 30 years at presentation [11]. Furthermore, when the left main coronary artery arises from the right sinus or the right coronary artery arises from left sinus, especially with a concomitant interarterial course between the aorta and the pulmonary artery, it is believed that these patients are at higher risk of SCD during exercise. Therefore, patients with untreated ACAOS have been excluded from competitive athletics. Our patient presented with a 30 minutes episode of unstable angina at rest. On admission, she presented with hypertensive blood regulation, but had no history of CAD or other cardiac risk factors (CRF). After excluding an acute coronary syndrome (ACS) we decided to perform echocardiography which demonstrated a

congenital anomaly. Further investigation including multi slice CT coronary angiography revealed a single coronary artery R III-C (Lipton et al.), with an ectopic entire left coronary artery arising from right coronary sinus and taking a combined course with LAD as a smallest vessel lying between the aorta and the pulmonary artery, while the Cx and the Dg1 were taking course between the aorta and the left atrium. A cardiac SPECT with combined exercise and adenosine ruled out ischemia. During the course of the entire hospital stay the patient remained free of symptoms and continuous telemetric monitoring ruled out heart rhythm abnormalities. Our case demonstrates the benefit of multimodality imaging in patients with intermediate risk according to current chest pain guidelines [13]. A single center trial has shown excellent results with no perioperative deaths in 28 patients with ACAOS and IAC [10] undergoing surgical repair, yet a positive impact on long term survival could not be observed. Single reports have also demonstrated a safe approach with interventional therapy [14]. In older patients with no stress induced ischemia and combined course of coronary arteries by ACAOS, a conservative strategy is preferred. Further studies are needed to assemble a safe model for risk stratification in these patients.

Follow-up

In a six months follow up, our patient reported no further episodes of chest pain under antihypertensive medication.

Conclusion

For selected intermediate-risk patients with acute chestpain, CCTA is reasonablefor diagnosing obstructive CAD as well as accompanying anatomical aspects in order to obtain an evidence-based approach to risk stratification and the diagnostic workup for the evaluation of chest pain.

Learning Objectives

1. To demonstrate diagnostic options in acute chest pain patients after ruling out acute coronary syndrome

2. To discuss treatment options in symptomatic coronary anomalies in order to asses and improve the risk of sudden cardiac death

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