An Unusual Case of St Elevation Myocardial Infarction in a Teenager with a Coronary Artery Fistula

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Coronary artery fistula (CAF) is an abnormal connection between a coronary artery and any of the 4 chambers of the heart or any of the great vessels (superior vena cava, pulmonary artery, pulmonary veins, or coronary sinus). This abnormality is most often congenital and, although representing the most common coronary arterial malformation, is a rare cardiac anomaly. The incidence is of 0.002% of the general population and of 0.4% of all cardiac malformations.

Fistulas originating from the right coronary artery account for 50% to 60% of cases, while those from the left anterior descending artery for 25% to 42% of cases, 18.3% from the circumflex artery, 1.9% from the diagonal branch, and 0.7% from the left main coronary artery or circumflex-marginal branch. The most common are single fistulas, with a prevalence ranging from 74% to 90%, multiple fistulas occur in 10.7% to 16%, while both coronary arteries are involved in only 5%. The right heart is the most frequent site of drainage of fistulas; in particular, the pulmonary artery is the drainage site in 15% to 43% of cases, followed by the right ventricle in 14% to 40%, the right atrium in 19% to 26%, the left ventricle in 2% to 19%, the coronary sinus in 7%, the superior vena cava in 1% and finally the left atrium in 5% to 6%. Moreover literature data show that bilateral fistulas, accounting for 5% of the total, terminate more often into the pulmonary artery (56%) than unilateral fistulas (17%).

Pathological manifestations depend on the resistance of the connection and the fistula drainage site. The resistance is determined by the characteristics (size, tortuosity, and length) of the fistula. Flow through fistulas that drain in the right chambers occurs during the whole cardiac cycle loading both ventricles, while when the drain is in the left atrium and pulmonary vein, volume overload affects only the left heart. CAFs are usually asymptomatic at a young age, unless they are of large dimensions. Symptoms can occur with the increase of age: fatigue, dyspnea, palpitations and ischemic chest pain are the most frequent clinical manifestations whereas heart failure, pulmonary hypertension, subacute bacterial endocarditis, rupture or thrombosis the extreme complications.

We report a rare case of bilateral CAF draining into the left atrium determining myocardial infarction in an 18 year old boy. A young man of 18 years, with no cardiovascular risk factors and without family history of juvenile sudden death and ischemic heart disease was hospitalized for chest pain radiating to the left arm. Medical history showed right lobar pneumonia at the age of 3 years, and a diagnosis of myopericarditis at 14 years. The patient was not taking medication.

At the first medical contact blood pressure was 130/80 mmHg, the general, cardiac and pulmonary examinations were in the normal range. The ECG showed sinus rhythm at the frequency of 68 bpm with ST-segment elevation from V3 to V6 and in D1, D2 and aVL, negative T waves in D3 and aVF. Chest X-ray showed enlargement of the cardiac silhouette, while echocardiogram hypokinesis of the apex and of mid anterior segment with moderate impairment of left ventricular ejection function (EF: 45%). Blood tests showed an increase of troponin value (34.73 ng / ml) and no sign of inflammation. Coronary angiography highlighted the presence of a CAF connecting the right coronary artery and the first tract of the anterior descending artery with the left atrium (figure 1). CT angiography confirmed the angiographic findings. CAF was percutaneously closed by using the intracoronary injection of Glubran, an adhesive compound. The coronary angiography performed after 48 hours showed the complete obliteration of CAF (figure 2). The postoperative course was not complicated by clinical and instrumental evidence of new myocardial ischemia. The patient was discharged in clinically stable condition on aspirin and beta blocker therapy. After about one month, the patient was completely asymptomatic with normalization of electrocardiographic abnormalities and left ventricular function.
To the best of our knowledge, this is the first case of CAF which manifested itself at an early age with myocardial infarction. Myocardial infarction is a rare complication of CAF, accounting for about 5% of overall manifestations. The pathological mechanism involved is the coronary steal phenomena, because the fistula, a low resistance system, in appropriate circumstances, can determine shunting of blood from coronary vessel to the left atrium, leading to myocardial ischemia. The closure with percutaneous approach shows to be an effective method, mini-invasive and safe.

Declarations of Interest

The authors declare no conflicts of interest.

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References


Figure 1. The image shows CAF connecting the first tract of the anterior descending artery (right side of the image) and the right coronary artery (left side of image) to the left atrium.

Figure 2. Coronary angiography performed after 48 hours from the closure showing the absence of CAF.