

Myocardial Infarction with Angiographically Normal Coronary Arteries in Young People, About One Case: Role of Cardiac Magnetic Resonance Imaging

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Abstract

Myocardial infarction (MI) of the young subject is a particular entity that resides not only in the physiopathology but also in the angiography.

Magnetic resonance imaging (MRI) is therefore unavoidable in circumstances where coronary angiography is not very contributive. Rare cases have been described.

We report the case of a 29-year-old boy without any cardiovascular risk factor who had a MI with angiographically normal coronary arteries.

At admission, the physical examination was unremarkable. Biology showed a positive troponinemia at 24 times the normal. The electrocardiogram recorded a circumferential ST segment elevation, necrosis in inferior and apico-lateral territories, and T-wave inversion in apico-lateral territories. Transthoracic echocardiography (TTE) noted segmental kinetic disorders in the anterior wall with the presence of spontaneous intra-ventricular contrast and reduced left ventricular ejection fraction (LVEF) at 40% (Simpson biplane). Coronary angiography had opacified angiographically healthy coronaries. Cardiac MRI showed late transmural enhancement throughout the apex with the presence of “no reflow” areas suggestive of myocardial infarction. The immediate evolution was favorable under conventional treatment of the MI associated with an anti-vitamin K (acenocoumarol).

The follow-up at three (3) months was unremarkable with an improvement in systolic function of the left ventricle at 45% at the Simpson biplane and the disappearance of spontaneous contrast.

Keywords: Myocardial infarction; young subject; healthy coronaries; MRI; Dakar

Introduction

Despite the recent decline in mortality from myocardial infarction (MI), it remains the leading cause of death [1]. The coronary disease of the young subject is a particular entity and has specificities with a prevalence of 0.4% in Senegal [2].

The particularity of coronary artery disease (CAD) in young subjects lies in its physiopathology, but also in the risk factors dominated by smoking, the consumption of illegal substances and the genetic predisposition [1].

In young patients, coronary artery disease (CAD) is often confined to a single artery with a high incidence of MI with angiographically normal coronary arteries [3]. In 2.8%, angiographically healthy coronaries are found. Cardiac magnetic resonance imaging (MRI) remains necessary in this circumstance where angiography is not very contributive. Rare cases have been described.

We report the case of a 29-year-old patient with no cardiovascular risk factor or pathological history who had a MI with angiographically normal coronary arteries and cardiac MRI helped to correct the diagnosis.

Observation

This patient was a 29-year-old water and forest worker with no cardiovascular risk factors or pathological history. He was referred to us by a health facility located more than 500 km from Dakar for acute chest pain, retro-sternal, constrictive, lasting more than 30 minutes, of maximum intensity with a sensation of imminent death, radiating to the shoulders and evolving since 06 days.

Hemodynamic constants were normal with blood pressure at 120/80 mmHg and heart rate at 88 beats/minute. The somatic examination was without particularity. In biology, troponinemia was positive at 14 times the normal, normal hemoglobin at 13 g/l and hematocrit at 41%.

The electrocardiogram recorded a circumferential ST segment elevation, necrosis in inferior and apico-lateral territories, and T-wave inversion in apico-lateral territories (Figure 1).

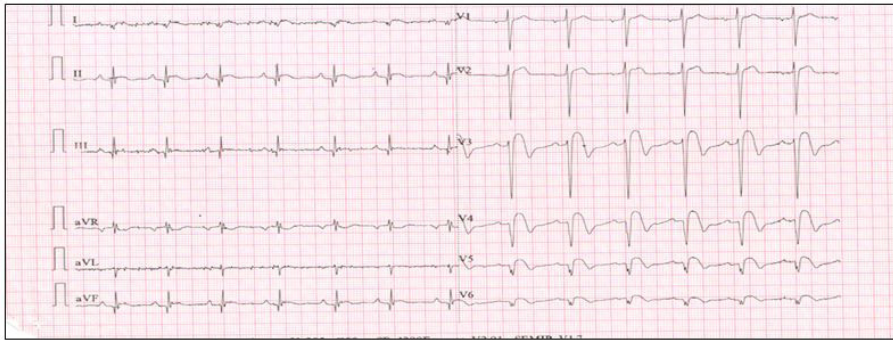


Figure 1: Electrocardiogram showing a ST segment elevation in all territories, a necrosis in apical lateral and inferior leads, T-wave inversion in apico-lateral lead

Echocardiography noted segmental kinetic disorders at the anterior wall with spontaneous contrast in the left ventricle and a reduced left ventricular ejection fraction (LVEF) at 40% (Simpson biplane). Coronary angiography showed angiographically healthy coronaries with smooth walls and the Methergin testing was not done (Figure 2).

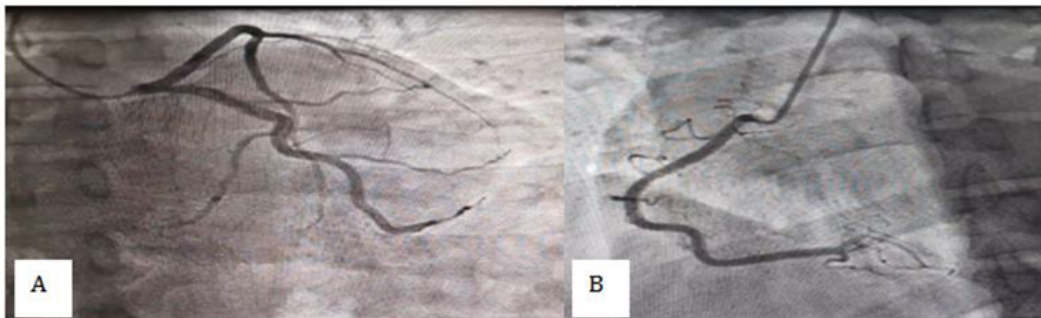


Figure 2: Images showing angiographically healthy left coronary artery (A) and right coronary artery (B)

MRI with gadolinium injection showed late transmural enhancement throughout the apex with the presence of “no reflow” areas suggestive of myocardial infarction (Figure 3).

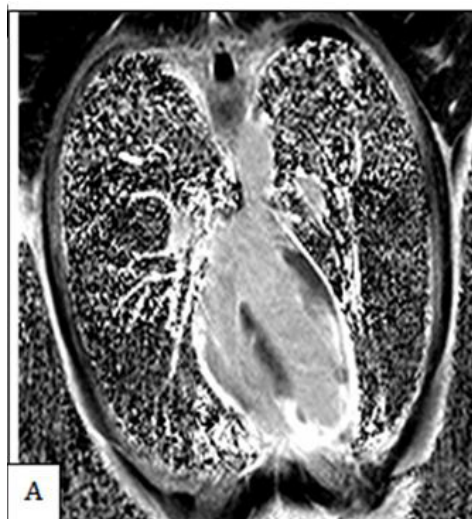




Figure 3: Cardiac MRI images with gadolinium and late-enhancement sequence showing a healthy area surrounded by an infarcted area impeding its vascularization (no reflow) (A) and a transmural delayed-enhancement sequence on apex (B)

The immediate course was favorable under conventional treatment of MI (low molecular weight heparin, aspirin, clopidogrel, beta blocker, angiotensin-converting-enzyme inhibitor, statin), then associated with anti-vitamin K (acenocoumarol).

The follow-up at three (3) months was unremarkable with an improvement in left ventricular systolic function at 45% at Simpson biplane and the disappearance of spontaneous contrast.

Discussion

Myocardial infarction in young patients is rare and there is often combined intoxication with tobacco or other illicit substances, thus multiplying pathophysiological hypotheses [4]. Our patient did not have any cardiovascular risk factor or concept of illicit substance use.

As in our context, the MI of the young subject is characterized by male predominance with an incidence of normal coronary MI oscillating between 2.6 and 12% according to the studies [2].

The main risk factors for atheroma found in young people are significant active smoking greater than 25 cigarettes/day, heredity, as well as hypercholesterolemia [3]. In our case, we did not find any risk factors for atheroma.

Apart from the vasoconstriction associated with the thrombotic phenomenon, there are many known substrates or triggers, favoring the formation and the durability of an occlusive thrombus [6]. Isolated coronary spasm is found in 2-15% of IDM and is promoted by post-exercise smoking and cocaine use [7]. To name just the United States, cocaine use is the leading cause of MI with angiographically normal coronary arteries [8]. Other triggers associate hypercoagulable states in the context of acute infectious or inflammatory diseases, thrombocytosis, thrombophilia secondary to an antiphospholipid antibody syndrome or a deficiency of coagulation proteins, hyperthyroidism and acute dehydration during an intense effort or during an extreme climatic situation [6].

In absence of reversible etiologies, the clinician remains helpless. Even in absence of validated scientific evidence recommending a systematic search for the consumption of illicit substances, it seems interesting to evoke it by interrogation or by urinary screening [9,4]. This is important, especially for young people to raise their awareness and offer withdrawal. In our patient, in the absence of a risk factor, his young age, the endemic nature of tropical infections and the coronary angiographically healthy, infectious myocarditis was mentioned. The results of cardiac MRI with gadolinium injection and late enhancement sequence, returned 1 week later, in favor of the ischemic character of myocardial involvement allowed us to retain MI with angiographically normal coronary arteries. This makes cardiac MRI a valuable diagnostic tool in these situations.

Pathophysiologically, healthy coronary MDIs, such as atherosclerotic networks, are secondary to an occlusive thrombus responsible for acute myocardial ischemia. Occlusion is also favored by vasoconstriction associated with the thrombotic phenomenon [5]. In our patient, the coronaries were angiographically healthy and the Methergin testing was not done.

Apart from the potentially fatal acute phase, these patients are not immune to severe late complications. Their medium-term prognosis is marked by a low but non-zero risk of death or recurrence, which is still dramatic in this population [3]. Our patient has evolved well under treatment without complications.

Conclusion

Infarction of the young subject is rare but not exceptional. It has its own specificities, including a high incidence of coronary angiographically healthy. In this situation, cardiac MRI remains an essential indication for the recovery of the diagnosis and the management adjustment.

The etiological investigation must, therefore, be police-like in these young patients, in search of reversible or accessible to prevention causes.

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