

Spontaneous dissection of coronary arteries in the puerperium. Case report

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Competing interests

The authors declare no competing interests

Acronym

CD: coronary dissection

ABSTRACT

The spontaneous dissection of a coronary artery during pregnancy is a rare cause of acute myocardial infarction, with a high risk of maternal death. It can be diagnosed through coronary angiography, although many cases are diagnosed during autopsy. There is presented the case of a 38-year-old white woman, smoker, multiparous, that at the fifth day postpartum presented midthoracic, oppressive and intense pain, and the electrocardiogram evidenced an extensive acute anterior myocardial infarction. The coronary angiography showed dissection of the left coronary artery including the left main, the left anterior descending and the circumflex artery. A primary angioplasty was performed and there was a hyperacute thrombosis of the implanted stent. The patient died on the fifth day in refractory cardiogenic shock. There are no standard treatment recommendations, the primary angioplasty is considered the treatment of choice. The multidisciplinary integration of cardiologist, obstetrician, cardiac surgeon and anesthesiologist is essential to decide the best treatment.

Keywords: Myocardial infarction, Coronary artery dissection, Puerperium, Percutaneous coronary intervention

Diseción espontánea de arterias coronarias en el puerperio. Presentación de caso

RESUMEN

La disección espontánea de una arteria coronaria durante el embarazo es una causa poco común de infarto agudo de miocardio, con un alto riesgo de muerte materna. El diagnóstico se realiza mediante angiografía, aunque muchos casos son diagnosticados durante la autopsia. Se presenta el caso de una mujer blanca de 38 años de edad, fumadora, multipara, que al quinto día del puerperio presentó dolor centrotorácico, opresivo e intenso, y en el electrocardiograma se evidenció un infarto agudo de miocardio anterior extenso. La coronariografía demostró disección de la arteria coronaria izquierda incluido el tronco, la descendente anterior y la circunfleja. Se realizó angioplastia primaria y se produjo trombosis hiperaguda del stent implantado. La paciente falleció al quinto día en cuadro de shock cardiogénico.

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co refractario. No hay recomendaciones de tratamiento estándar, se considera que la angioplastia primaria es el tratamiento de elección. Es esencial la integración multidisciplinaria de cardiólogo, obstetra, cardiocirujano y anestesiólogo para decidir el mejor tratamiento.

Palabras clave: Infarto de miocardio, Disección coronaria, Puerperio, Intervención coronaria percutánea

INTRODUCTION

Spontaneous coronary artery dissection was first described in 1930 by Harold Pretty¹. It may also occur secondary to thoracic trauma, cardiac surgery, coronary angiography, coronary interventions or as an extension of an aortic dissection¹.

It is well known that spontaneous coronary dissection (CD) is the most frequent cause of acute myocardial infarction during pregnancy, childbirth and the puerperium, which results in high morbidity and mortality^{2,3}. The risk increases in the elderly, multiparous, smoker, diabetic and drug user (cocaine) pregnant.

Timely diagnosis requires a high index of suspicion and multidisciplinary approach. Coronary angiography findings show the presence of a radiolucent intimal tear and the existence of a false lumen that affects the true lumen blood flow due to compression of the intramural haematoma and obstructs coronary blood flow and slow removal of contrast agent^{4,5}.

A large number of the cases described occur after childbirth or caesarean section without complications. Chest pain occurs dramatically and unexpectedly, and may be accompanied by symptoms and hemodynamic compromise that threatens the patient's life.

CASE REPORT

A 38-year-old white woman, smoker, with a history of 4 uncomplicated births who denied having abortions, with an uneventful pregnancy course, who presents a eutocic delivery with a term newborn (2850 grams).

Five days after puerperium she starts with sudden sharp central chest pain, so she presented to the emergency department at the "Hospital Militar Central Carlos J Finlay" with hemodynamic stability, blood pressure 110/70 mmHg, heart rate 87 beats per minute, respiratory rate of 16 per minute, temperature

97.7° F (36.5° C) and peripheral oxygen saturation 98% (FiO2 0.21). Her breasts were not swollen and had milk secretion through the nipple, without exco-riations; The uterus was palpated four fingers below the navel, the lochia were reddish, small and not fetid.

An electrocardiogram on admission demonstrated ST segment elevation, indicating acute ischemia (**Figure 1**) and she was diagnosed with extensive anterior infarction. Suspecting a CD, an emergency coronary angiography was performed in the early diagnosis at the "Hermanos Ameijeiras" Hospital which showed dissection of the common trunk of the left coronary artery that extended to the circumflex and anterior descending arteries, with involvement of the diagonal branches, preservation of TIMI 3 flow in the anterior descending and circumflex occlusion (**Figure 2**). Percutaneous coronary intervention was performed and 3 overlapping drug-eluting stents were successfully placed in the entire

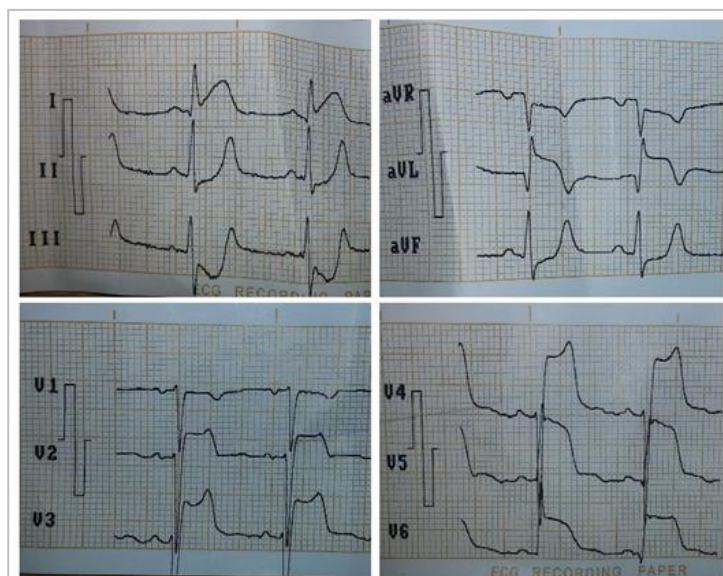


Figure 1. Initial electrocardiogram in the emergency department. Note the ST segment elevation in DI, aVL and V2-V6, with ST-depression in DII, DIII and aVF.

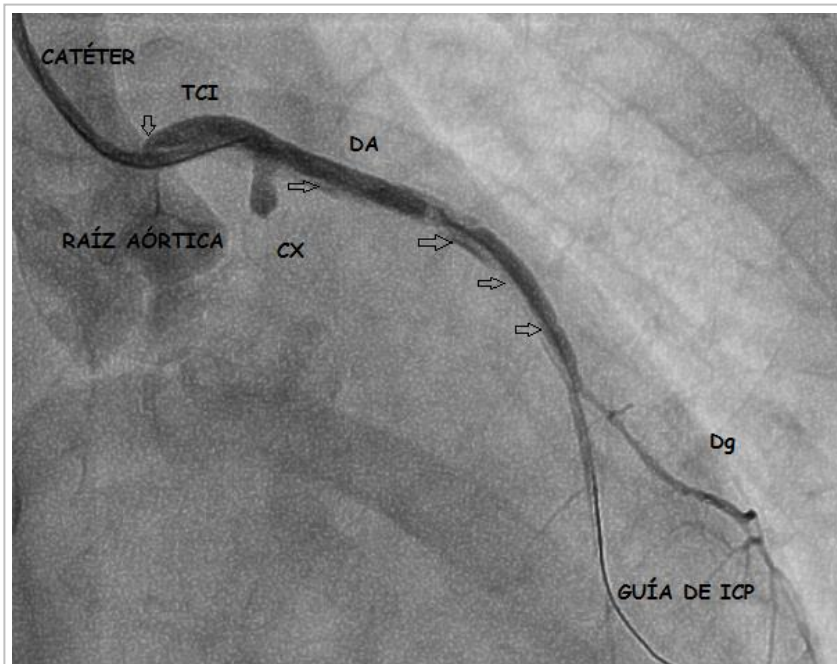


Figure 2. Left coronary angiography (right anterior oblique with caudal inclination) showing dissection from the left main coronary artery (TCI) with severe left anterior descending (DA) involvement, and occlusion of the circumflex artery (Cx) and first diagonal branches. The arrows show the extent of dissection. Dg, diagonal; *guía de ICP*, PTCA guide-wire; *raíz aórtica*, aortic root.

dissected segment to hold the circumflex artery open (**Figure 3**); obtaining acceptable angiographic results; but a few seconds later, a hyper-acute thrombosis of the intervened segment forced the use of balloons and adequate anti-thrombotic treatment to restore blood flow to the vessel. This was not entirely possible when presenting a serious non-reflux phenomenon with TIMI I-II flow (**Figure 4, A y B**).

Subsequently hemodynamic collapse occurred leading to mechanical ventilation. The patient remained in the Intensive Coronary Care Unit where an intra-aortic balloon pump was implanted; but she died five days after the interventional procedure due to a refractory cardiogenic shock.

COMMENTS

Acute coronary syndrome related to pregnancy occurs in 3-10 x 100.000 cases with a peak incidence during the third trimester and the puerperium; its mortality varies between 48-82% in different studies, and the delay in diagnosis and therapeutic abstention explain part of the high mortality during pregnancy⁴.

The pathogenesis is due to hemodynamic changes and the decrease in connective tissue in the vascular wall. Usually the CD appears 2cm from the ostium of the coronary artery and extends distally, it is located between the middle and adventitia layers, and the resulting hematoma compresses the lumen of the artery and prevents normal blood flow⁶.

The arterial wall undergoes changes during pregnancy that makes it more vulnerable to CD, such as the breakdown of collagen and elastin, and a reduction

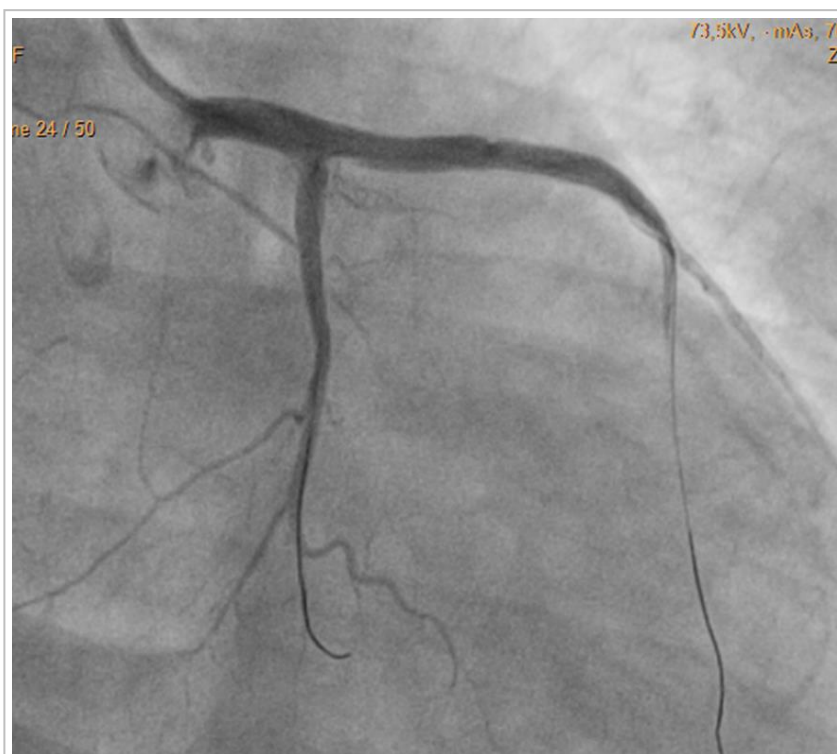


Figure 3. Opening of total occlusion of the circumflex artery.

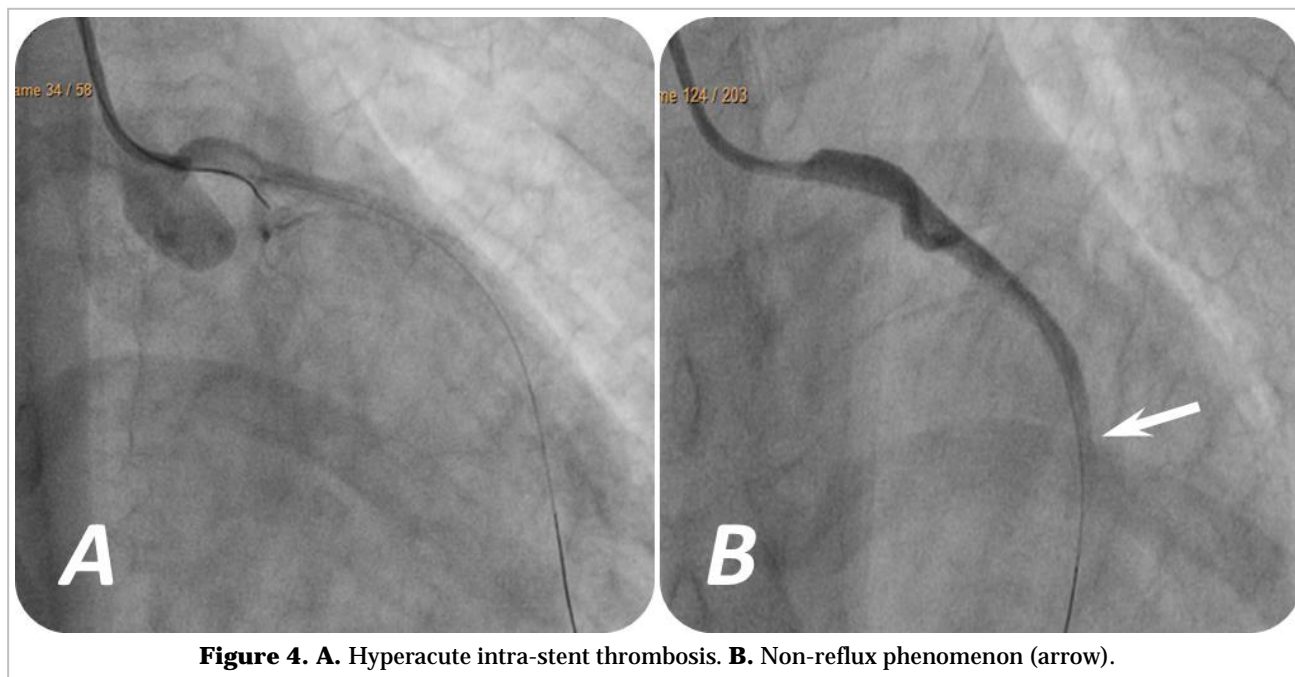


Figure 4. A. Hyperacute intra-stent thrombosis. B. Non-reflux phenomenon (arrow).

in proteoglycans, probably as a result of increased expression of metalloproteinases and hypertrophy and hyperplasia of smooth muscle fibers⁷. These changes are attributable to the special hormonal environment of pregnancy and, especially, to the increase in estrogen and relaxin levels; while there are indications that these return to normal three months after delivery. In addition to such morphological changes, the increase in cardiac output (up to 50% in the third trimester and up to 80% during childbirth), produces forces that can cause rupture and bleeding in the vascular wall^{8,9}.

This CD affects the anterior descending artery in 80% of cases and causes extensive acute anterior myocardial infarction, with a mortality of 30 to 40%. Recurrence occurs around 50% after the second month of the first event, patients who survive this first event have a survival ranging almost up to 80% between 25 and 30 months, although there is disparity between the series published by different authors^{6,7}.

Havakuk et al⁷ conducted a study between 2000 and 2015 that included 120 cases with CD, with an average age of 34 years –40% of women over 35 years– and found that 72.5% of the events were presented in the puerperium and 17% in the third trimester of pregnancy, without identifying cases in the first trimester. The anterior descending coronary artery was affected in 72% of cases, 36% in the mid-

dle segment, and 40% had spontaneous CD in multiple vessels. The ejection fraction was decreased (<40%) by 44%, percutaneous coronary intervention was successful in 50% of the patients, and the aorto-coronary bypass was performed in 44 cases due to anatomical complexity, hemodynamic instability or failed angioplasty. Maternal complications were cardiogenic shock (24.5%), need for mechanical circulatory support (28%), emergency surgical revascularization (27.5%), maternal mortality (4%), fetal mortality (5%), urgent coronary angiography (28%) and heart transplantation in 5 women^{7,8}.

According to Shahzad *et al*⁹, Elkayam reported the presence of precordial pain in 94% of the cases, 75.5% presented acute infarction with ST-segment elevation (62% of the anterior wall and 72% with involvement of the anterior descending), 60% showed lesion in a single vessel, 22.5% in two vessels and 17.5% had three-vessel or multivessel disease⁹.

Fibrinolytics have been used, although the risk of maternal hemorrhage is important, especially if administered near delivery. Its use is controversial as it can increase the flow in the false lumen and extend dissection, and is probably associated with worse clinical outcomes. Conservatively treated CDs also carry a risk of progression to the formation of pseudoaneurysms and a subsequent increased risk of vessel rupture. If urgent coronary angiography is not available, they should be used with the same

criteria as outside of pregnancy. There are no recommendations for standard treatment, primary angioplasty is considered to be the treatment of choice during pregnancy^{3,6,10}.

Stent implantation is the only effective treatment to limit the extent of CD, it is not clear whether the use of drug-eluting stents would be of greater benefit in these patients than the use of bare metal stent. Coronary artery bypass surgery is preferred in severe cases with multiple vessel disease, hemodynamic instability or failure of percutaneous coronary intervention^{3,9,10}. The intra-aortic balloon counterpulsation, the left ventricular assistance or the use of an artificial heart are considered as circulatory support pending cardiac transplantation¹⁰, which is indicated in cases of coronary artery bypass failure and severe left ventricular dysfunction.

The multidisciplinary integration of cardiologist, obstetrician, cardiac surgeon and anesthesiologist is essential to decide the best treatment.

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