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Case report

Spontaneous coronary artery dissection in a young woman: from emergency coronary artery bypass grafting to heart transplantation

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Abstract

Primary spontaneous coronary artery dissection (SCAD) as cause of acute myocardial infarction is a rare entity with complex pathophysiology. SCAD must be considered every time that a healthy young patient presents an onset of acute myocardial ischemic syndrome or sudden death. Mostly it appears in young women without traditional risk factors for coronary artery disease and a significant proportion of them are hutted during the peripartum or early postpartum period. SCAD is frequently fatal and a great number of known cases have been diagnosed at necroscopy. The quick recognition of SCAD as cause of acute myocardial ischemia in a young patient is important to establish the best medical/surgical treatment between the different therapeutic attitudes. We describe the case occurred to a young low cardiac risk woman who suffered of idiopathic SCAD and was successfully treated by heart transplantation few days after that a conventional surgical myocardial revascularization had been attempted. Waiting for cardiac transplantation the patient survived several days, thanks to a mechanical left ventricular assist device (LVAD). The following hospital course was uncomplicated. To our knowledge, this is the second case of SCAD treated successfully by LVAD and orthotopic heart transplantation reported in literature.

Keywords: Spontaneous coronary artery dissection (SCAD); Coronary artery bypass grafting (CABG); Heart transplantation; Ventricular assist device

1. Introduction

Spontaneous coronary artery dissection (SCAD) is an uncommon cause of acute coronary syndrome and sudden cardiac death. It occurs in relatively young people and particularly in females. Diagnosis of SCAD should be considered in all patients with symptoms of acute myocardial ischemia, particularly if they are young female and free of risk factors for coronary artery disease (CAD) [1]. Coronary dissection can be a consequence of coronary angiography, cardiac surgery procedures, thoracic trauma or Marfan syndrome. If those causes are excluded, the diagnosis of SCAD is achieved.

Patients with SCAD are traditionally divided into three groups: young women in peripartum, patients with CAD and an idiopathic group. To date, approximately 150 cases of SCAD have been reported in literature after the first description in 1931 [2]. The prognosis is generally poor and a great number of cases are diagnosed at necroscopy [3]. Only few cases of SCAD have been documented by coronary angiography, and only few operative cases have been reported [4]. SCAD is unpredictable and hits pathogenesis unclear [1–6]. To achieve the diagnosis and to determine the best therapeutic approach, an urgent coronary angiography is mandatory [7].

We report the case of a young woman free of traditional cardiac risk factors presented with onset of acute coronary syndrome due to SCAD of the left anterior descending coronary artery (LAD) and circumflex coronary artery (LCX). The treatment of the ongoing myocardial infarction and severe cardiogenic shock was an emergency surgical revascularization. This procedure was unsuccessful and a mechanical left ventricular assist device (LVAD) was established to treat the ventricular dysfunction. Later, the patient underwent orthotopic heart transplantation with excellent clinical results.

2. Case report

A 32-year-old Asiatic woman was admitted to our emergency care unit suffering of ongoing chest pain, dyspnea, nausea, hemodynamic instability and signs of acute antero-lateral myocardial infarction (MI) complicated by the onset of cardiogenic shock.

She had no risk factors for CAD, no prior history of chest pain and the family history was negative. She was also not affected by Marfan syndrome, connective tissue disease or recent thoracic trauma.

The physical examination showed hypotension and signs of heart failure. The thorax radiogram was positive for cardiac dilatation and pulmonary congestion.

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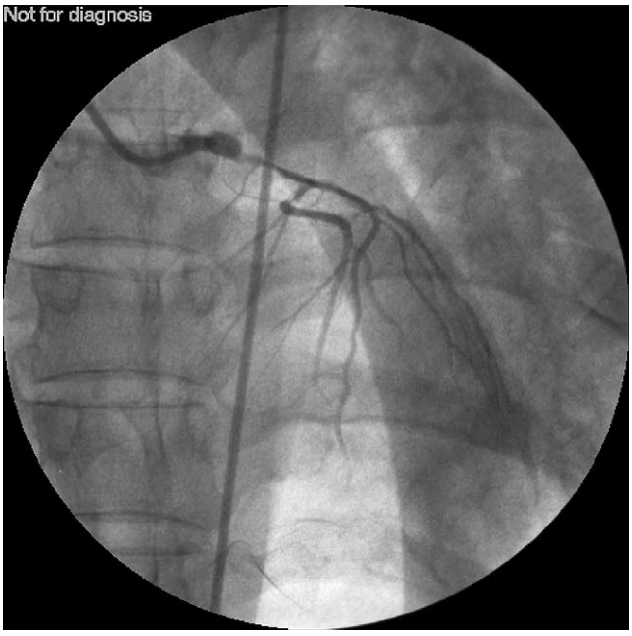

Fig. 1. Coronary angiography showing the dissection of the left main stump involving the beginning of the left anterior descending coronary artery and the proximal left circumflex coronary artery.

Electrocardiography (ECG) revealed widespread antero-lateral T-wave inversion and the blood test showed raised levels of Creatine Kinase and Troponine. The patient was immediately treated by intravenous infusion of heparin, nitrates, aspirin and an urgent cardiac catheterization was performed.

The coronary angiography showed a dissection of the left main stump involving the beginning of the LAD and LCX (Figs. 1 and 2). The right coronary artery (RCA) was normal.

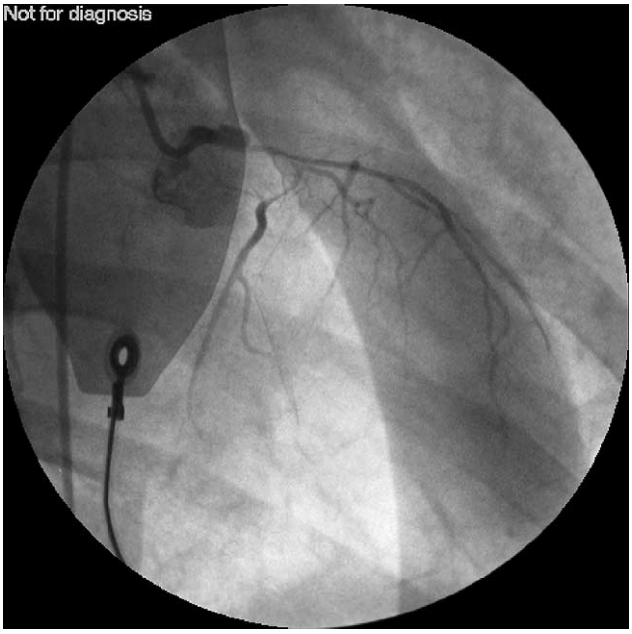

Fig. 2. A second view from the coronary angiography showing the dissection of the coronary arteries.

An intra-aortic-balloon pump (IABP) was introduced during the procedure.

The hemodynamic instability and the poor physical conditions (estimated left ventricle ejection fraction: 20%) suggested an emergency treatment by surgical revascularization. Standard on-pump procedure was carried out and a double venous coronary artery bypass grafting (CABG) to the LAD and to the LCX was performed. Surgically, the diagnosis of SCAD was confirmed: extensive bruises were found around the LAD and LCX and a false lumen with hematoma was observed after arteriotomy. The venous grafts were anastomized in routine fashion using 7.0 Prolene running suture excluding the false lumen. After the aortic de-clamping, several attempts to reduce the extracorporeal circulatory support failed. The transoesophageal echocardiogram showed a dilated left ventricle with severe and widespread hypokinesias. In addition to inotropic drugs and the open thorax chest, a Thoratec (Thoratec® VAD, Thoratec Corporation) left ventricular assist device (LVAD) was established to guarantee the patient's survival.

Treatments in intensive care unit (ICU) were pointed to prevent infections and to maintain satisfactory hemodynamic parameters. Neurologic evaluations were executed routinely with normal daily results. Transoesophageal echocardiograms were also performed to monitor the extremely poor myocardial contractility and no ameliorations were observed. Optimal medical treatments together with the LVAD were supporting the hemodynamic functions satisfactorily and there were no signs of multi-organ failure (MOF) or congestive heart disease.

As the chances for a spontaneous cardiac recovery were too poor, and in order to prevent sepsis, bleeding, MOF or death, the cardiac transplantation was evaluated to be the treatment of choice.

Twelve days later, the patient underwent a successful orthotopic cardiac transplantation and the following hospital stay was uneventful. She had a slow but progressive recovery before being discharged 4 weeks postoperatively.

3. Discussion

Spontaneous coronary artery dissection is rare and mostly diagnosed at necroscopy. Young to middle-age women, especially during peripartum or early postpartum period, are frequently hutted [2,4,5,8]. The cause of SCAD remains unknown (idiopathic cases) and the pathogenesis is unexplained even if several factors like hypertension, collagen disorders, intense physical effort and blunt chest trauma have been considered to be predisposing.

SCAD presents frequently with sudden cardiac death or acute coronary syndrome. Left ventricular failure and cardiac tamponade are other unusual models of presentation [9]. Suspicion of SCAD should lead to urgent coronary angiography followed by any sort of myocardial support and revascularization.

Despite SCAD is a serious condition with high risk of death, there are no standardized management plans. Medical

treatments are frequently considered in hemodynamically stable patients, while primary intracoronary stenting is usually provided in case of mono-vessel disease.

The surgical revascularization, with or without cardiopulmonary bypass, is the treatment of choice when the main stump or many coronary arteries are involved. Unfortunately, this procedure can fail when the largest surface of myocardium is under ischemia since many hours.

We reported the case occurred to a young woman suffering of double-vessel SCAD, presented with acute myocardial infarction and severe heart failure. The treatment of choice was the surgical coronary revascularization and an LVAD was introduced intraoperatively to assure an adequate cardiac output. Days later, the cardiac transplantation was successfully executed. The severity of the disease and the preoperative health conditions predicted a slow postoperative recovery. The patient was finally discharged after complete physical restoration 4 weeks later. To our knowledge, the LVAD as a bridge to the heart transplantation after SCAD was previously described only once [10].

In conclusion, the diagnosis of SCAD must be quick and CABG is a valid opportunity in case of multi-vessel coronary dissection. Further surgical treatments, like ventricular assist devices and/or cardiac transplantation, should be strongly considered in young patients, suffering of SCAD, previously treated inefficaciously by CABG.

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