

Acute epicardial dissection rupture during surgical myocardial revascularization secondary to the use of cardiac stabilizer

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Abbreviations

CABG: coronary artery bypass grafting

CPB: cardiopulmonary bypass

ABSTRACT

At the end of the 1990s, off-pump myocardial revascularization surgery gained momentum. Hence, a number of cardiac surgery centers adopted it as the most frequent surgical procedure to reduce complications. To implement it, the many medical equipment companies provided the surgical community with retractable stabilizers to facilitate cardiac positioning by suction and pressure, especially for lateral and posterior wall revascularization and coronary segment stabilization. These devices have been shown to be safe and effective; however, the patient presented is a rare case, in which epicardial dissection occurred secondary to the use of stabilizers. Although complex, this complication was eventually resolved with an endomyocardial circular pericardial patch technique and ventricular repair. The patient had a satisfactory outcome.

Keywords: Myocardial revascularization, Cardiac surgery, Cardiac stabilizers, Epicardial dissection

Diseción epicárdica aguda fisurada durante revascularización miocárdica quirúrgica secundaria al uso de estabilizador cardíaco

RESUMEN

A finales de la década de los '90, la cirugía de revascularización miocárdica sin circulación extracorpórea tomó gran auge, por lo que –en muchos centros de cirugía cardíaca– pasó a ocupar la manera más frecuente de realizarla, en aras de reducir sus complicaciones. Para ejecutarla, las diferentes firmas de fabricantes de equipos médicos pusieron a disposición de la comunidad quirúrgica estabilizadores retráctiles para facilitar el posicionamiento cardíaco por succión y presión, para revascularizar, sobre todo, los sectores lateral y posterior; además, para la estabilización del segmento coronario. Estos dispositivos han mostrado seguridad y eficacia; sin embargo, el paciente que se presenta constituye un caso aislado, donde se produjo disección epicárdica secundaria al uso de estabilizadores. A pesar de su complejidad, esta complicación pudo ser solucionada con técnica de parche pericárdico circular endomiocárdico y reparación ventricular, y el paciente tuvo una evolución satisfactoria.

Palabras clave: Revascularización miocárdica, Cirugía cardíaca, Estabilizadores cardíacos, Disección epicárdica

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INTRODUCTION

The coronary artery bypass grafting (CABG), without cardiopulmonary bypass (CPB), precedes its appearance to which is accompanied by this, which emerged as an alternative for providing the cardiac surgeon a wider surgical field, manipulable, immobile and clean for the performance of vascular anastomosis¹. With the passing of time, motivated by complications related to the use of CPB in the CABG, such as cerebral hypoperfusion, hypothermia and others already known, the CABG without CPB is attempted to resume again at the beginning of the '90s.

For this reason, by the second half of this decade, a race to the creation and marketing of specific equipment for CABG began, and at the time, there emerged, among many other instruments, the epicardial stabilizers using suction¹.

Among these stabilizers, the most widely distributed are the Starfish and Octopus, from the Medtronic company^{1,2}, used in our medical center in most patients because of their high margin of safety and efficacy –at the time of the vascular anastomosis–, observed from the start of the CABG without CPB at this hospital, in 2002.

Rare are the cases included in the bibliography of significant traumatic injury of the epicardium, or other cardiac tissue, due to the use of these type of stabilizers. The one presented below is one of them.

CASE REPORT

Black man, 61 years old, ex-smoker and with a history of apparent health until about a year and a half before the surgery, when he began to present atypical precordial painful discomfort at rest and sometimes related to the effort, which was not related to ischemic heart disease until several months later, when presenting a picture of typical chest pain with neurovegetative symptoms and ischemic electrocardiographic changes, corresponding to an acute coronary syndrome with ST-segment elevation, associated, retrospectively, to the cases of atypical precordialgia with ischemic etiology. The coronary angiography showed the presence of severe disease of three main coronary arteries, with indication of surgical treatment.

The patient used to smoke and quit that habit 10 months prior to surgery. The physical examination showed no relevant data and many preoperative

tests were normal: hemochemical, coagulogram, serological tests and chest radiography. The respiratory functional test demonstrated a restrictive ventilatory disorder of slight intensity.

The preoperative electrocardiogram showed sinus rhythm with QS of V₁-V₃ and negative T waves of V₄-V₆. The transthoracic echocardiogram showed a left ventricle slightly dilated (59 mm in diastole), without apparent disorders of the regional motility, with a pattern of prolonged diastolic relaxation and overall boundary systolic function (left ventricular ejection fraction [LVEF] of 51%). Competent valves and normal pericardium.

A CABG without CPB was carried out, with three termino-lateral anastomosis: left internal mammary



Fig. 1. Attempt to repair the tear with the heart beating.

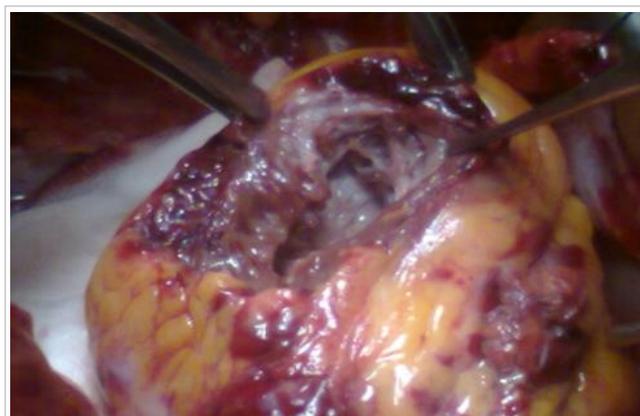


Fig. 2. Cardiac rupture caused by the stabilizer of the apex of the heart.

artery to the anterior descending and two segments of left internal saphenous vein from the aorta, one to the first and the other to the second marginal obtuse.

When retreated the Starfish stabilizer from the apex, an important bleeding in the surgical field was evidenced and there was observed an injury to that level produced by the stabilizer. A repair with the beating heart was tried first, through the technique of interleaving (sandwich) with Teflon strips (**Fig. 1**), but the result was unsuccessful with a greater tearing and bleeding of the macerated tissue. When confirming that the epicardial hematoma continued dissecting from the tip to the anterior wall of the left ventricle, with intramyocardial progression, an arterial and venous cannulation of urgency to enter CPB and to carry out a cardioplegic cardiac arrest was decided. Under anoxic arrest was carried out the resection of all lacerated tissue (edematous and friable) which included, also, an important old area of necrosis and there was observed the area of the dissecting hematoma rupture (**Fig. 2**); but actually, it was already a very extended area for resecting, and an endoventricular repair with pericardial patch as in the Dor technique (**Fig. 3**) was decided, and subsequently, the defect was closed by the interleaving technique already mentioned, reinforced with several lines of suture and employment of biological glue (**Fig. 4**).

Exiting the CPB was accomplished without difficulty, even with moderate bleeding, which forced the placement of other enforcement suture and the

use of coagulation promoting materials in this area. The next day, an echocardiogram was performed, where one small ventricular cavity and LVEF over a 60% was observed. The patient evolved favorably and was discharged on the tenth day after the surgery.

COMMENTS

In the journal “Annals of Cardiac and Vascular Surgery”, a similar case was published in 2005³, wherein the positioner of the Starfish tip, of the Octopus stabilizer, was the cause of epicardial dissection in one CABG without CPB, which caused a large hematoma that affected the entire epicardium of the left ventricle, but caused no fissure and was resolved with manual compression and the use of materials promoting clotting.

In another case, published by Mandke *et al*⁴, the use of an Octopus 3 stabilizer conditioned a subepicardial hematoma of the entire left ventricle anterolateral wall, which caused dissection and maceration of the epicardial surface, and cardiac tamponade in the immediate postoperative, hence, the use of coagulation promoter materials, besides the repair with the pericardial patch, was used. The patient died three hours after reoperation⁴.

It is easy to understand that, in the field of general surgery, most of the possible traumas that may complicate a surgery may have an early solution;

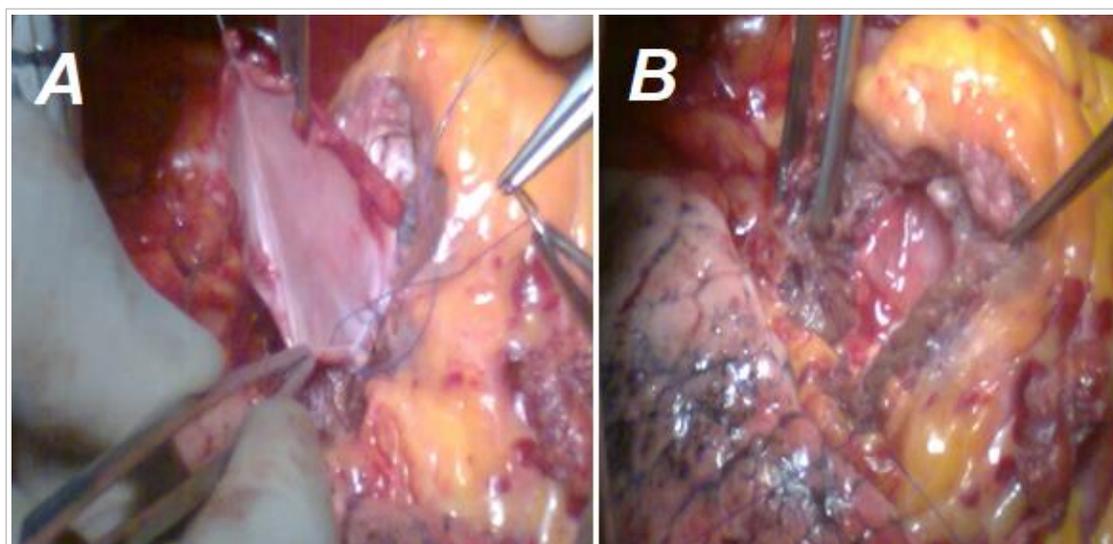


Fig. 3. Endoventricular repair with pericardium patch. **A.** Suture of the patch to the endocardium. **B.** Fully implanted patch.



Fig. 4. Final closure of the defect through sandwich technique.

but in cardiovascular surgery the picture is totally different. Almost all of the processes involve cuts and sutures on thin structures, millimeters away from the bloodstream, and most of the surgery is performed in a surgical field in constant motion and on tissues generally sick (calcified, fibrous, weak), with a great tendency to tear easily and to the bleeding difficult to control.

In which, undoubtedly, is the second leading cause of death in the cardiovascular surgery, second only to low cardiac output, influence, primarily, the maneuvers performed by the hands of the surgeon, but sometimes are the devices indispensable to surgery, those that assume the disastrous prominence, as in the case described above, where a tip of the Starfish stabilizer caused an important tear of the heart that led to the only endoventricular repair with pericardium patch that has been performed to the date in the Cardiocentro Ernesto Che Guevara. If this technique had not been performed, the patient would have died due to uncontrollable bleeding. The major epicardial dissection with rapid expansion and rupture, more intense bleeding and the maceration of a great part of the myocardium com-

plicate the possibility of sutures on this tissue and involve even the removal of part of the myocardium, thus, the repair with the endoventricular patch of pericardium, similar to the technique described by Dor, necessarily became a sole alternative to this situation, what made possible to save the life of this patient.

Regardless of the fact that many coronary surgeries are carried out with the use CPB, yet many centers practice them without it, thus, these devices of cardiac stabilization and positioning become a tool of vital importance; hence, the publication of this case report, far from being a report of the complication of the device is to provide a possibility for solving the problems it caused. There are few reports related to this type of accident, among so many thousands of patients in whom these stabilizers are used. We, the authors, believe that rather due to the use of the device, complications occur by the misuse or by problems with the suction system to which it is connected.

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