¹ Hospital ENCORE, Aparecida de Goiânia, GO, Brazil.

Successful treatment of lesions of multiple vessels with anomalous origin from the left coronary artery

Tratamento bem-sucedido de lesões de múltiplos vasos com origem anômala da coronária esquerda

Fernando Henrique Fernandes¹, Victor Eduardo de Almeida e França¹, Pedro Arthur Ferreira Borges¹, Adriano Gonçalves de Araújo¹, Maurício Lopes Prudente¹, Giuliano Gardenghi¹

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ABSTRACT – Anomalous coronary arteries are rare. The origin of the left main coronary artery from the right sinus of Valsalva is related to some events, such as syncope, arrhythmias, angina, among others. By and large, its diagnosis is incidentally made by coronary angiography. The presence of this type of anomaly may hinder percutaneous approach of the coronary lesions. The authors describe a case of left main coronary artery originating from the right sinus of Valsalva, associated to disease of multiple vessels. After discussing the case with the patient and family, the cath lab team performed a successful percutaneous coronary intervention.

Keywords: Coronary angiography; Coronary vessel anomalies; Drug-eluting stents

RESUMO – Artérias coronárias anômalas são raras. A origem do tronco de coronária esquerda a partir do seio de Valsalva direito relaciona-se com eventos como síncope, arritmias, angina e outros. Seu diagnóstico normalmente ocorre incidentalmente pela angiografia coronária. A presença desse tipo de anomalia pode dificultar a abordagem percutânea de lesões coronarianas. Os autores descrevem um caso de tronco de coronária esquerda originado no seio de Valsalva direito, associado a doença de múltiplos vasos. O paciente foi abordado pela equipe de hemodinâmica do serviço, por meio de intervenção coronária percutânea, com sucesso após discussão com paciente e familiares.

Descritores: Angiografia coronária; Anomalias dos vasos coronários; Stents farmacológicos

INTRODUCTION

Anomalous coronary arteries are rare and often incidentally diagnosed by coronary angiography. The origin of the left main coronary artery (LMCA) from the right sinus of Valsalva was described in 0.02% of individuals in autopsy studies,¹ and in 0.05 to 0.19% in angiographic studies.² Most coronary artery anomalies are not clinically significant, but some variants may be responsible for syncope, angina, arrhythmias or sudden death.³ In fact, it is important to underline that the coronary artery anomaly that most often causes sudden death in children and young athletes is the origin of a coronary artery from the opposite sinus of Valsalva.⁴ The multivessel disease is common in patients with acute coronary syndrome,⁵ and the percutaneous approach may be hindered due to the existing anatomical variation. We present a case of a symptomatic 82-year-old male patient, with anomalous origin of the left coronary artery from the right sinus of Valsalva. In addition, a 90% distal LMCA bifurcation lesion was detected, and was associated with his unstable angina symptoms. The present case report was approved by the local Ethics Committee, under protocol CAAE: 85497418.2.0000.0033, as per resolution 466/2012.

CASE REPORT

An 82-year-old male patient, residing in the Northern region of Brazil, presenting with unstable angina of recent onset. The patient also presented poorly controlled

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Corresponding author:

Giuliano Gardenghi
Hospital Encore
Rua Gurupi, Quadra 25, Lote 6 a 8
Vila Brasília
Zip code: 74905-350 – Aparecida de Goiânia, GO, Brazil
E-mail: ggardenghi@encore.com.br

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hypertension, dyslipidemia and a smoking history of 37.5 pack-years, who quitted 20 years ago. The electrocardiogram showed sinus rhythm, first-degree atrioventricular block, low-amplitude QRS complex, and diffuse abnormalities in ventricular repolarization. The myocardial necrosis markers were not elevated. Therefore, the initial action was invasive risk stratification.

Coronary angiography was performed and showed dominant right coronary artery (RCA) with no obstructive lesions; posterior descending (PD) branch with 80% lesion (type B1) in its origin; LMCA with anomalous origin from the right sinus of Valsalva; course anterior to the pulmonary trunk, bifurcating into left anterior descending (LAD) artery branch at the anterobasal interventricular septum, with a lesion (type C) in this bifurcation of 90% (Medina 1.1.1), with no signs of extrinsic compression, continuing in the atrioventricular sulcus posteriorly, creating anterolateral (diagonal) branches, involved in this same lesion, and posterolateral (obtuse marginal) branches, with (type B2) lesions of 90% in the left circumflex (LCx) artery (Figure 1).

The type of revascularization was discussed by the heart team, since the patient was elderly, in good health conditions, with a Society of Thoracic Surgeons (STS) score of 1.35% for mortality, and of 10.70% for morbidity or mortality at 30 days. The SYNTAX score was also calculated, adding up 14, and corresponding to low risk for major adverse cardiac events. SYNTAX II score was calculated to guide the decision between percutaneous coronary intervention (PCI) or coronary artery bypass graft (CABG). It was favorable to the least invasive procedure, considering mortality related to PCI and CABG (7.4% versus 21.4%, respectively). After individual analysis of the case, together

with the patient and family, it was decided to perform the percutaneous approach of the lesions, despite the anatomical peculiarities and difficulties.

Through right femoral access, a XB Cordis 7F catheter with 3.5 loop was introduced, and the lesions were crossed using two 0.014" guidewires – one Whisper MS, and one PT2. The lesions were pre-dilated with a 2.0×20mm balloon. First, LCx was treated with a 3.0×20mm stent. Next, the distal LMCA bifurcation was treated with T and Protrusion (TAP) technique. One 3.5×24mm stent was placed in the LMCA, towards the atrioventricular sulcus (LCx), followed by proximal optimization technique (POT) with a 3.5×8mm balloon, at 18 atm. After repositioning the guidewire in the LAD, a 2.5×12mm stent was placed towards this artery, and a kissing balloon was used at the end of the procedure (Figure 2). Three everolimus-eluting stents with durable polymer were placed. Despite greater technical difficulty due to anomalous origin of the left coronary artery, the appropriate choice of materials and techniques enabled carrying out the procedure with 150mL of nonionic contrast media, followed by clinical and angiographic success (Figure 3).

Patient was asymptomatic in the postoperative period, with no electrocardiographic or marker abnormalities. He required no inotropic or anti-anginal drugs in the postoperative period. The post-procedural echocardiography showed preserved systolic function, concentric hypertrophy and mild diastolic dysfunction of the left ventricle. He stayed 24 hours at the intensive care unit (ICU), and then at inpatient unit for 24 hours, and was discharged afterwards. In the return visit, one week later, he was asymptomatic, on regular medications, including dual antiplatelet therapy, and was active working.

Figure 1. Pre-intervention coronary angiography. (A) Anomalous origin of the left main coronary artery (LMCA). Lesions at the bifurcation of the LMCA. (B) Circumflex (LCx) lesion. LAD: left anterior descending artery; RAO: right anterior oblique.

Figure 2. Perioperative angiography. (A) Kissing balloon technique. (B) Implanted stents. LMCA: left main coronary artery; LAD: left anterior descending; LCx: circumflex.

Figure 3. Result in anteroposterior (A) and right anterior oblique (B) projections. LMCA: left main coronary artery; LAD: left anterior descending; LCx: circumflex.

DISCUSSION

Anomalous coronary arteries do not seem to be associated to increased risk of developing atherosclerotic disease.⁶ Considering the anatomical structures, it is important to emphasize that a LMCA originating from the right sinus of Valsalva has four possible anatomical courses:

1. Anterior course: anterior presentation in front of the right ventricle outflow track, as in the case herein reported.
2. Interarterial course: among the great vessels, aorta and pulmonary artery.
3. Septal course: continuation of the intramyocardial septum.
4. Posterior course: posteriorly to the aortic root.⁷

Most anomalies related to LMCA originating from the right sinus of Valsalva have no clinical significance. In such anomalies, the clinical relevance is mainly determined by the course of the artery. Cases of sudden death, particularly in young individuals while exercising, are mainly related to

the course between the aorta and the pulmonary artery. The symptoms of this kind of anomaly are rhythm disorders, exercise-induced angina, syncope and sudden death, even as first manifestation.⁷ In a study of autopsies of 249 patients with coronary artery anomalies, 142 (59%) died from apparent cardiac causes. Forty-nine deaths were associated to origin of LMCA in the right sinus of Valsalva. In that, 57% were sudden deaths, and 64% of deaths occurred during or immediately after exercise.⁸

The presence of abnormality herein described, associated to atherosclerotic disease of multiple coronary vessels, led to a discussion on how to address such lesions. When calculating the SYNTAX II score, which was favorable to PCI, it was decided - together with the patient and family - to perform the percutaneous approach of the lesions, despite the anatomical peculiarities and difficulties. The literature reported a similar situation treated by PCI, in India. Jariwala et al.⁹ described the case of a diabetic and hyper-

tensive patient, who presented with effort angina and was submitted to coronary angiography. He had an anomalous origin of LMCA, from the right sinus of Valsalva. There was 80% eccentric stenosis in LMCA, before the origin of the first obtuse marginal artery. RCA had no signs of lesions, and the PD branch showed 99% stenosis in its proximal segment. PCI was performed with two drug-eluting stents for LMCA and PD, which were successfully implanted. It is worth underlying the different approaches in both groups. Before treating the lesions, the Indian authors performed a coronary computed tomography angiography (CCTA) to plan their revascularization strategy and better outline the anatomy of coronary arteries. Our group did not performed this imaging examination.

CCTA is important to more efficiently establish the relation of the coronary artery with other mediastinal structures. Since this patient already had a coronary angiography and the identified problem was coronary atherosclerotic disease in a vessel with anomalous origin, we considered unnecessary to submit an elderly patient to a contrast-enhanced procedure, which would not change our management. It is worth mentioning that even with no CCTA performed before percutaneous approach of the lesions, the procedure was successful, because angiography enabled good visualization of the anatomical course and of the lesions to be treated. Another important issue is that only 150mL of non-ionic contrast were used, with clinical and angiographic success. No specific measure, except the operator care, was taken to reduce the contrast medium volume used. Intracoronary ultrasound was not considered because of possible technical difficulty due to anomalous anatomy. The use of a more radiopaque stent, associated to an image-enhancing software, enables positioning and improves visualization of stents in case of bifurcations,¹⁰ and probably reduces the total amount of contrast medium required.

In this present case, it is worth mentioning that one challenge faced in coronary angiography was to have catheter support to perform PCI. Instead of using a specific catheter for the RCA, a left coronary catheter was employed. It provided the necessary support, with selective catheterization of the coronary artery, making easier the use of materials for such a complex procedure. This selective catheterization requires extra care because of possible proximal dissection of the RCA. A 0.035" guidewire was used to handle the catheter for its appropriate positioning. The choice of the femoral access also enabled selective catheterization of the vessel. The technique used in the LMCA bifurcation was performed according to the current trends, and the distal LAD was considered a side branch, protected by the guidewire since the beginning of the procedure. We

tried to use only one stent, but due to the suboptimal result in the origin of the LAD, it was necessary to implant a second stent, as previously described. The TAP technique was utilized with the lesser possible protrusion of the second stent, avoiding major deformations in the new carina. By choosing the appropriate catheter, materials and approach, we could minimize the consequences of anatomical variation, enabling a successful procedure. Another crucial factor during the procedure was venous sedation, which avoided unexpected movements by the patient, refraining the guide catheter from falling down, and allowing enough time to calmly perform the intervention.

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None.

CONFLICTS OF INTEREST

The authors declare they have no conflicts of interest.

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