Case Report

Percutaneos Coronary Intervention in Single Coronary Artery in a Patient with High-Risk Unstable Angina

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In the present case, we report the performance of coronary angioplasty with stent implantation in the right coronary artery of a patient with high-risk unstable angina and single coronary artery originating from the right coronary sinus. The anterior descending and circumflex arteries originated separately from the proximal third of the right coronary artery. This is a rare coronary anomaly and few reports of percutaneous coronary intervention are found in the literature. This case illustrates the need for a detailed anatomical assessment of the course of the coronary arteries prior to the performance of a percutaneous transluminal angioplasty, with the purpose of preventing complications.

Introduction

Single coronary artery (SCA) is described as an isolated coronary artery originating in the aortic root through a single ostium and with no evidence of a second ostium, thus being responsible for supplying blood to the whole heart, regardless of its distribution[1,2].

Coronary artery anomalies may cause technical problems during angiography and transluminal coronary angioplasty (TCA), so that greater knowledge on the procedure and complete assessment of the anatomy of the coronary artery are necessary to prevent complications.

We report a case of TCA with stent implantation in a distal branch of the right coronary of a patient with SCA presenting unstable angina after assessment of the proximal course of the anterior descending artery (AD).

Case Report

Sixty-nine-year-old female patient, white, retiree, smoker, with hypertension and dyslipidemia, taking AAS and propranolol at home. She was admitted to the hospital due to unstable angina for two days. Electrocardiogram (ECG) showed sinus rhythm, heart rate of 60 bpm and T-wave inversion in the inferior wall. During the episodes of pain, the patient presented ST-segment elevation in the inferior wall with improvement of repolarization after taking sublingual nitrate (Figure 1). Laboratory tests did not show any alterations of markers of myocardial lesion.

The patient underwent coronary angiography, which showed the presence of SCA originating from the right coronary sinus. The AD and left circumflex (LCX) arteries originated separately from the proximal third of the right coronary artery (RC), which showed a significant (95%) stenotic lesion in its distal third (Figure 2). A left ventriculography showed a mild contractility deficit due to hypokinesia of the inferior wall.

After study of the proximal course of the AD artery by means of a pigtail catheter positioned in the pulmonary artery, a TCA with coronary stent implantation was chosen. The procedure was performed via the femoral approach using a JR 4 6F guiding catheter. During selection of the single coronary artery, the 0.014 floppy guidewire progressed preferably toward the AD artery. After adequate positioning of the guidewire in the distal bed of the RC and lesion predilation with a 2.0 x 2.0-mm balloon, a 2.5 x 16-mm stent was implanted with primary success and TIMI III distal coronary flow (Figures 3, 4).

Recovery was uneventful and the patient was discharged two days later with a prescription of ticlopidine (500 mg/day for 30 days), omeprazole (20mg/day), captopril (50mg/day), acetyl salicylic acid (200mg/day) and metoprolol (50 mg/day).

Discussion

With the introduction and development of new techniques of cardiac imaging, the normal anatomy, variations and anomalies of the coronary arteries have assumed new significance. The incidence of all coronary anomalies is 0.23% in necropsy series and ranges between 0.3 and 12% in angiographic series[3].

Coronary anomalies may be classified as[2]: 1) those that affect myocardial perfusion (fistulae, origin of the left coronary from the pulmonary artery, congenital coronary stenosis or atresia, origin of either coronary artery from the contralateral sinus with passage between the aorta and the right ventricular outflow tract; 2) those that do not affect myocardial perfusion (origin of the left circumflex artery from the right aortic sinus, origin of the left anterior descending from the right aortic sinus, single coronary artery, origin of the three coronary arteries from the right or left sinus through separate ostia, and high origin of the coronary arteries). In particular, the anomalous origin and course of the left coronary artery, classically considered minor malformations, have been implicated as causing myocardial

Key words

High-risk unstable angina, coronary artery disease, percutaneous coronary intervention, single coronary artery.

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Fig. 1 - *Resting electrocardiogram showing dynamic alterations of ST and T in the presence of precordial pain, with improvement of the ventricular repolarization after sublingual nitrate.*

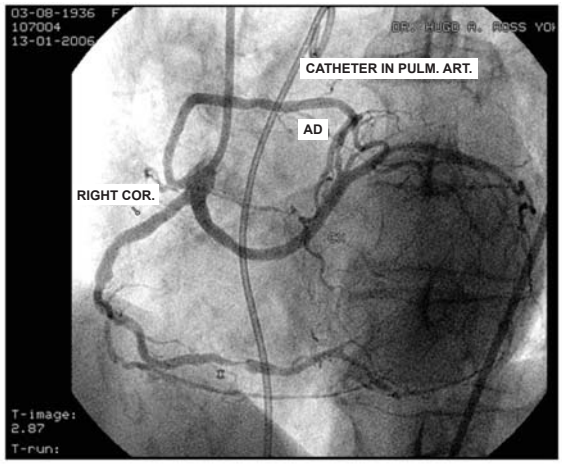

Fig. 2 - *Angiography in single coronary artery - projection.*

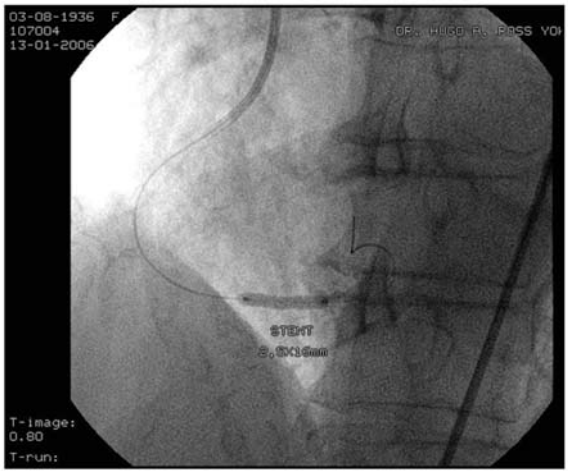

Fig. 3 - *Release of the 2.5 x 16mm stent on the target lesion.*

Fig. 4 - *Final outcome.*

ischemia and sudden death[1,2]. The incidence of SCA is 0.024% when isolated and from 0.03 to 0.04% when associated with other cardiac anomalies.

Prognosis in cases of SCA as an isolated anomaly ranges from excellent to guarded according to its anatomic distribution, including risk of sudden death, and 15% of the patients present severe heart problems before 40 years of age. This risk is justified by the course of the anomalous coronary through the base of the heart until it reaches its territory of distribution, which can lead to compression by other structures or to bend/kink of its origin[1,2]. Patients with the left coronary artery originating from the right coronary sinus have a high mortality rate before 20 years of age (59%). Deaths occur usually during or after strenuous physical activity[1]. Thus, the evaluation of the course of the aberrant vessel is of the utmost importance to determine the prognosis, since the course between the right ventricular outflow tract and the aorta has a guarded prognosis if not surgically treated. Proper evaluation consists of positioning a catheter in the pulmonary artery and then performing the coronary angiography to determine whether the course of the anomalous coronary is anterior or posterior to the pulmonary artery. In cases with anterior course, the prognosis is favorable.

In patients with SCA the mechanisms of sudden death are not fully known, since the majority of the data come from necropsy findings. The main mechanisms of sudden death pointed in the literature include: 1) compression of the anomalous course between the aorta and the pulmonary artery; 2) the SCA would originate from the aorta in an oblique position, thus enabling a kink close to the ostium, which could obstruct the coronary ostium during aortic expansion; 3) presence of an uncommon bend of the SCA, and a sinuous proximal course determining a pattern of turbulent flow and accelerated atherosclerosis[1,4].

Case Report

In a review of 178 cases of coronary anomalies undergoing surgical treatment, Reul et al[5] reported that 15 patients had anomalous origin of the right or left coronary arising from the contralateral coronary sinus. The surgical techniques used were reimplantation of the anomalous coronary artery, coronary ligation followed by saphenous vein graft and anastomosis with internal mammary artery. Questions regarding the best technique to be used generally arise, since the majority of these patients is young and saphenous vein grafts present more degeneration than mammary anastomoses.

In this report, the coronary anomaly observed is in accordance with Shirani and Roberts' classification.[6] Following this classification, this would be a IID1 case in which we have a single ostium in the right coronary sinus, with the CX artery originating from the proximal portion of the RC going to the left posteriorly to the aorta, and the AD artery also arising from the proximal RC and going to the left anteriorly to the pulmonary artery[7].

Topaz et al[8] reported the treatment of five cases of coronary atherosclerotic lesions with angioplasty in patients with coronary anomalies. In those cases, careful assessment of the coronary orifice configuration, proximal angulation, vessel course and location of the stenotic lesion were fundamental for the procedural success; the adequate guiding catheter selection and advancement of the balloon to the proximal portion of the anomalous vessel were the major determinants of success. Praharaj[1] reported the treatment of two cases of anomalous right coronary from the left coronary sinus. In our case, after careful assessment of the course of the anomalous coronary, intervention using a JR guiding catheter was chosen. There was some difficulty in the beginning of the procedure, because the catheter chosen had a tendency to deviate from the origin of the anomalous AD artery in the proximal portion of the RC artery and thus the 0.014 guidewire would not reach the right coronary branch. Positioning of the catheter tip toward the CX artery enabled the manipulation of the 0.014 guidewire up to the distal bed of the RC artery. From then on, no technical difficulties were faced during the procedure.

We should point out that in cases of atherosclerotic obstruction associated with coronary anomalies, the adequate study of the course of the anomalous vessel is fundamental, since if a course between the pulmonary artery and the aorta is diagnosed, surgical treatment is the option of choice for elective cases.

Praharaj and Ray[9] reported two cases of coronary angioplasty with stent implantation in an anomalous right coronary artery originating from the left coronary sinus. In that report, they pointed out the need for a complete assessment of the coronary anatomy prior to the intervention, so as to prevent complications.

In the guidelines for TCA of the European Society of Cardiology, in the item analyzing TCA in special situations, no guidance is given as regards the management of patients with coronary anomalies[10]. However, a definitive standardization is difficult, given the low frequency and anatomical variations of these anomalies. Presently, we believe that each case should be analyzed and treated individually, according to the anatomical variations observed.

Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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