Case Report

Multivessel percutaneous coronary intervention in a single coronary artery

Rodrigo Vugman Wainstein\textsuperscript{a,*}, Felipe Homem Valle\textsuperscript{a}, Luiz Carlos Corsetti Bergoli\textsuperscript{a}, Márcio Mossmann\textsuperscript{b}, Sandro Cadaval Gonçalves\textsuperscript{a}, Marco Vugman Wainstein\textsuperscript{c}

\textsuperscript{a} Hospital de Clínicas de Porto Alegre, Porto Alegre, RS, Brasil.
\textsuperscript{b} Hospital Divina Providência, Porto Alegre, RS, Brasil.
\textsuperscript{c} Universidade Federal do Rio Grande do Sul, Porto Alegre, RS, Brasil.

ARTICLE INFO

Article history:
Received 3 August 2017
Accepted 27 August 2017

Keywords:
Coronary vessel anomalies
Percutaneous coronary intervention
Coronary artery disease

ABSTRACT

Single coronary artery is a rare congenital anomaly of the coronary arteries and may be associated with sudden cardiac death. We report a case of single coronary artery associated with multivessel atherosclerotic coronary disease that was successfully treated with percutaneous coronary interventions with drug-eluting stents.

© 2017 Sociedade Brasileira de Hemodinâmica e Cardiologia Intervencionista.
This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

Intervenção coronária percutânea de múltiplos vasos em artéria coronária única

RESUMO

A artéria coronária única é uma anomalia coronariana congênita rara, que pode estar associada à morte súbita. Reportamos um caso de artéria coronária única associada com doença arterial coronariana aterosclerótica multivesselar, que foi tratado de forma bem-sucedida, por meio de intervenção coronariana percutânea com implante de stents farmacológicos.

© 2017 Sociedade Brasileira de Hemodinâmica e Cardiologia Intervencionista.
Este é um artigo Open Access sob a licença de CC BY-NC-ND (http://creativecommons.org/licenses/by-nc-nd/4.0/).

Introduction

The prevalence of coronary artery anomalies ranges between 0.2 and 1.3%. In a large series of angiograms described by Yamana et al., this condition was found in 1,686 patients (1.3%).\textsuperscript{1} Of them, 81% had anomalies in the origin or distribution of coronary arteries.

Clinical implications of coronary artery anomalies are extremely variable. The majority of these anomalies are fortuitous findings and has no clinical significance. On the other hand, the minority may be life threatening, and anomalous origin of coronary artery is one of the leading causes of sudden cardiac death in athletes.\textsuperscript{2} The origin and the course of the anomalous vessel are the factors that determine an adverse or benign outcome.\textsuperscript{1} Coronary arteries originating from a single coronary ostium in the aorta are extremely rare. Single coronary artery is reported to be responsible for less than 3% of all major coronary artery anomalies.\textsuperscript{4}

We report a case of single coronary artery, originated from the right sinus of Valsalva, in which multivessel percutaneous coronary intervention (PCI) was performed with drug-eluting stents.

Case report

A 58-year-old man with episodes of class II exertional angina was submitted to exercise treadmill test that showed a 2-mm downward deviation of the ST segment. The test was interrupted for limiting angina at the Bruce II stage protocol. His past medical history included only hypertension, which was on treatment with hydrochlorothiazide 25 mg/day. Physical examination was unremarkable.

The patient was referred for an elective coronary angiogram that showed a single coronary artery originated in the right sinus of Valsalva. The left anterior descending artery was a small vessel without any significant stenosis and there were severe stenosis in

doi: 10.1160/JOTCI2017;25(1-4)A0012

Corresponding author: Serviço de Cardiologia do Hospital de Clínicas de Porto Alegre, Rua Ramiro Barcelos, 2,350, Rio Branco, CEP 90035-903, Porto Alegre, RS, Brasil
E-mail: rodrigowainstein@gmail.com (R.V. Wainstein).
Peer review under the responsibility of Sociedade Brasileira de Hemodinâmica e Cardiologia Intervencionista.

0104-1843/© 2017 Sociedade Brasileira de Hemodinâmica e Cardiologia Intervencionista. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).
the proximal circumflex and the mid-segment of the right coronary artery (RCA), which was the dominant coronary artery. Also, there was a severe lesion in the mid-segment of the posterior descending branch (PDA) (Figure 1). After coronary angiogram, computed tomography coronary angiography (CT angiogram) was performed in order to evaluate the origin and course of the anomalous coronary artery. The CT angiogram confirmed a single coronary artery originating in the right sinus of Valsalva, and we also observed that the vessel’s course was anterior to the pulmonary trunk (Figure 2). Once these features portend good prognosis, we decided to undergo PCI of the left circumflex and RCA arteries with drug-eluting stents.

PCI was performed through femoral approach. The single coronary artery was cannulated with a JR 4.0-6 F guiding-catheter. Severe stenosis of PDA and RCA were crossed with a BMW (Abbott Vascular, Abbott Park, Illinois, USA) guidewire and pre-dilated with a 2.0 x 10 mm balloon. The PDA lesion was treated with a Promus Element™ (Boston Scientific, Natick, USA) 2.25 x 12 mm stent and the mid-RCA was treated with Xience Prime™ (Abbott Vascular, Abbott Park, Illinois, USA) 2.75 x 38 mm stent. The mid-RCA stent was post-dilated with a 3.0 x 20-mm non-compliant balloon. The proximal left circumflex artery lesion was crossed with another BMW guidewire and a Promus Element™ 2.25 x 24 mm stent was deployed at the lesion. Final angiograms showed a good result and no immediate complications (Figures 3 and 4).

Discussion

The three most common types of coronary artery anomalies described in the literature are: anomalous origin of a coronary artery from the opposite or non-coronary sinus; separate ostia of the left anterior descending and left circumflex arteries; and a single coronary artery.5-7

Single coronary artery is a rare type of coronary anomaly in which the right and left coronary arteries arise at the same sinus of Valsalva. In a series of 50,000 angiograms, reported by Desmet et al., the incidence of single coronary artery was 0.066% (33 cases).8 Yamanaka described a series of 126,595 patients that had undergone coronary angiography.1 In this report, only 24 (0.019%) patients had a single coronary artery, arising from the right sinus of Valsalva. Among single coronary arteries, 49% have origin in the right sinus of Valsalva.14

With the development of new images modalities, the coronary artery anomaly diagnosis is becoming more frequent. In the majority of the cases, those findings have no clinical relevance, since coronary arteries with anomalous course anterior to pulmonary outflow, posterior to the aorta, or intraseptal are rarely associated with complications.3 However, some coronary artery anomalies may be life threatening and are considered as one of the leading causes of sudden cardiac death in athletes. In a large registry over a period of 27 years, Maron et al. observed that in 1,866 young athletes who died suddenly (or survived cardiac arrest), congenital coronary artery anomalies were the second most common cause of sudden cardiac death, accounting for 17% of the cases.2

The mechanisms proposed to explain the development of sudden cardiac death in people with coronary artery anomalies are: direct compression during exercise between the pulmonary artery and aorta when these vessels dilate; inadequate flow through a narrow slit-like orifice of the anomalous vessel, which can collapse during exercise; acute kinking or spasm of an elongated left main coronary artery.3

As mentioned above, understanding the course of the anomalous coronary artery is crucial to estimate the clinical risk of adverse events and also to plan subsequent management. In this scenario, CT angiogram adds valuable information to coronary angiography in
Optimal revascularization strategy in a patient with single coronary artery and multivessel coronary artery disease is unclear, since there is paucity of large studies and most of literature on this theme comes from case reports. Beyond PCI, coronary artery bypass graft may be considered a revascularization strategy, as previously reported. Individualized decisions with a Heart Team approach should be strongly encouraged in such cases.

PCI in anomalous coronary arteries are a therapeutic challenge for interventional cardiologists. This kind of procedure requires proper angiographic recognition of anatomical details, such as the orifice configuration, the exit angulation from the aorta, the route of the anomalous artery, and the location of the atherosclerotic lesion. Also, the selection of the guiding catheter is critical in this scenario. In the setting of multivessel PCI in a single coronary artery, guiding-catheter’s selection should offer adequate support and also good access to all the target vessels.

**Sources of funding**

None declared.

**Conflicts de interest**

The authors declare no conflicts of interest.

**References**