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Single access in complex angioplasty using the ventricular support system Impella CP™

Acesso arterial único em angioplastia complexa utilizando dispositivo de assistência circulatória Impella CP™

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ABSTRACT – The volume of complex coronary interventions has grown in Brazil and worldwide. Since they are performed in patients at increasingly higher risks, new techniques have been developed when interventional cardiologists are faced with uncommon situations, such as no safe arterial access for the procedure. We report a case of a patient with severe peripheral artery disease and occluded right femoral artery, in whom a single access (left femoral artery) was used for positioning the Impella™ and the guidewire for angioplasty.

Keywords: Angioplasty; Femoral artery; Cardiac catheters; Peripheral artery disease; Percutaneous coronary intervention

RESUMO – As intervenções coronarianas complexas têm volume crescente no Brasil e no mundo. Ao serem realizadas em pacientes de cada vez mais alto risco, novas técnicas são desenvolvidas quando o cardiologista intervencionista se depara com situações inusitadas, tal como a falta de acesso arterial seguro para a realização do procedimento. Relatamos o caso de um paciente com doença arterial periférica grave e artéria femoral direita ocluída, no qual utilizamos um único acesso (femoral esquerdo) para o posicionamento do Impella™ e do cateter-guia para angioplastia.

Descritores: Angioplastia; Artéria femoral; Cateteres cardíacos; Doença arterial periférica; Intervenção coronária percutânea

INTRODUCTION

Interventional Cardiology is in constant development, and procedures carried out in patients with extreme clinical and anatomical severity, who were candidates only to medical treatment a few years ago, are increasingly more frequent.

One of the instruments that enabled intervening in these patients was the Impella™ heart pump (Abiomed Inc., Danvers, MA, USA), which is positioned in the left ventricle and provides cardiac output through a microaxial pump, providing a safe procedure for the operator and patient, in case of hemodynamic instability.¹

Impella™ requires large caliber arterial access (14F) and, for this reason, the risk of bleeding related to vascular access is not negligible. The most common and safe access is the femoral artery; other approaches, such as axillary artery, can add morbidity in a patient who is already at very high risk.²

We report the case of a patient with severe peripheral artery disease and occluded right femoral artery, in whom we used a single access (left femoral artery) for positioning of Impella™, and guidewire for angioplasty.

CASE REPORT

An 80-year-old patient with severe heart failure (ejection fraction – EF of 25%), peripheral artery disease with weak radial pulses, occlusion of right femoral artery (Figure 1) and known ischemic heart disease with severe and extremely calcified

stenosis in the right coronary artery (Figure 2A), was referred for coronary angioplasty due to recent worsening of angina and non-sustained ventricular tachycardia. Due to significant coronary calcification and very high clinical risk, angioplasty with rotational atherectomy and mechanical support with Impella CP™ was planned, after discussing risks and benefits with the attending physician, patient and family.

A deep right femoral venous access was obtained to position a 6F pacemaker cable in the right ventricle and infusion of anesthetic drugs. Echography-guided left femoral arterial access was obtained, with pre-closing using two Perclose ProGlide™ (Abbott Laboratories, Chicago, IL, USA) femoral hemostasis devices, and positioning Impella™ in the left ventricle of the patient through an 14F introducer sheath. With a 5F radial introducer kit (Terumo, Tokyo, Japan), the upper left corner of the siliconized hemostatic valve of the 14F introducer was punctured and the device was introduced. After progressing the long 0.35-mm J-tip Stiff guide-wire via a 5F introducer, it was replaced by a long Terumo Destination® 45-cm 7F introducer (Figure 3). Through it, a Launcher™ AL1 7F (Medtronic, Santa Rosa, CA, USA) guidewire was positioned in the right coronary ostium, and angioplasty was conducted with rotational atherectomy using a Rotablator™ device (Boston Scientific, MA, USA) and RotaLink™ Plus 1.25 mm (Figure 2B), followed by successful deployment of an Orsiro 2.5x26mm drug-eluting stent (Figure 2C), with no complications. At the end of the procedure, the Impella CP™ was removed, and hemostasis was carried out with the two Perclose ProGlide™ previously positioned.

Figure 1. Right common femoral artery occluded at the level of the bifurcation of superficial and deep femoral arteries.

Figure 2. Right coronary artery with severe stenosis and calcification in the middle segment (A); rotational atherectomy (B) and result after stent implantation (C).

Figure 3. Use of the 14F introducer to receive the Impella™ and the long 7F introducer.

DISCUSSION

Although widely used around the world, Impella™ is still little employed by most interventional cardiologists in Brazil, largely due to the high cost of this device. In addition, its use adds non-negligible morbidity in patients who already have a high baseline risk of complications, and this is mainly due to the caliber of its introducer and the high risk of vascular complications.

Two major difficulties were faced when performing this case. The first was in the progression of the long 7F sheath inside the 14F introducer, which already contained the Impella™ 9F catheter. The Terumo Destination® 45cm sheath loses its hydrophilic coating in the final 10cm, rendering difficult to advance the first part, and impossible to advance its end. It is worth highlighting that during the advancement of the long Terumo Destination® 45cm sheath inside the 14F Impella™ sheath, a second operator must securely fix the device, due to the risk of antegrade displacement of the Impella™, resulting from the interaction with the 7F sheath, which poses a risk of ventricular perforation. The second difficulty was the manipulation of the guidewire, considering the externalization of the Terumo Destination® 7F sheath, hindering cannulation and control of system.

Recently, a series of 17 cases was published using the technique described, and almost all patients underwent intervention in the left main coronary artery due to heart failure, and atherectomy was performed in 88% of cases.³ We did not find in the literature the use of a 5F radial introducer to puncture the hemostatic valve and obtain a second channel for progression of guidewire, which is a good option for the micropuncture kit used in the already described cases.⁴

It is the first time that this technique is reported in Brazil – it has become the standard option for access in patients undergoing high-risk percutaneous coronary intervention, with hemodynamic support, in many organizations. Even in the absence of peripheral artery disease, it eliminates the need for additional arterial access, avoiding the risk of local complications in multiple accesses.⁵ One should bear in mind, however, the technique can lead to bleeding complications. Disruption of the peel away 14F introducer may cause vascular damage and the need to remove and replace this introducer. In addition, retrograde management of this complication will not be possible, for there is no second arterial access.

SOURCE OF FINANCING

None.

DECLARATION OF CONFLICTS OF INTEREST

The authors declare having no conflicts of interest.

CONTRIBUTION OF AUTHORS

Conception and design of the study: MHR; data collection: MHR and LS; data interpretation: MHR and LAPD; text writing: MHR, GNA and LAPD; approval of the final version to be published: CC and RVW.

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In the article “Single access in complex angioplasty using the ventricular support system Impella CP™” with DOI number 10.31160/JOTCI202129A202103, published in August 3, 2021 J Transcat Intervent., on page 1, where we read the author’s name “Gustavo Neves” we should read “Gustavo Neves de Araújo”.

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