Transseptal Coronary Angioplasty in Patients with Severe Peripheral Vascular Disease

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Introduction

It is estimated that six thousand diagnostic cardiac catheterizations and two thousand coronary angioplasties are performed per million inhabitants per year[1], all by retrograde approach. Roughly, for every six thousand procedures, one patient has diffuse injury of the arterial system, with involvement of the four extremities[2]. Despite the difficulty of arterial access, the anatomical diagnosis of coronary artery disease today is no longer a barrier. It is currently possible to conduct anatomical studies without the need for invasive study, especially due to the improved image quality of coronary CT angiography. However, coronary intervention is still a barrier, as larger profile catheters are used and anticoagulation is needed.

Case Report

Patient aged 65, with a history of severe vascular disease, diagnosed in 2005 with an abdominal aortic aneurysm and bilateral iliac occlusion. At the time, angiography of the lower limbs was attempted to schedule a surgery, unsuccessfully, due to the lack of arterial access, as the subclavian arteries were also occluded. In 2006, the patient underwent surgical repair of the aneurysm and aortobifemoral bypass surgery. Subsequently, the patient demonstrated stable development of the peripheral vascular disease.

In June 2011, the patient progressed with infarction without ST-segment elevation, with TIMI Risk of 5, admitted to another hospital, where it was decided to carry out coronary CT angiography because of a peripheral vascular disease, which revealed: moderate lesion in the medial segment of the left anterior descending artery, critical lesion of the first marginal branch, and critical lesion in the proximal segment of the right coronary artery. Due to the lack of arterial access, it was chosen to perform clinical treatment with beta-blockers, nitrates, angiotensin-converting enzyme inhibitors, statins, aspirin and clopidogrel. Patient developed recurrence of angina, with limiting pain on minor exertion. The patient was referred to our service because of a refractory condition, when it was decided to conduct percutaneous coronary artery bypass grafting by the anterograde approach, by the transseptal approach of the right coronary artery and circumflex artery.

The access way was the right femoral vein, passing a 7F sheath, with the aid of a multipurpose catheter in order to place it in the superior vena cava for transseptal puncture. However, the patient had a patent foramen ovale, which allowed access to the left atrium without need to puncture the septum. At that time, 8,000 UI of unfractionated heparin was administered intravenously. Subsequently, a 0.035″ 300 cm hydrophilic guide was passed to give access to the left ventricle and ascending aorta, placing an MP catheter in the descending aorta. After the hydrophilic guide was retrieved and the 0.035″ stiff 300 cm guide was passed, the catheter was exchanged. As described in the previous case[3,4], catheter Amplatzer Left 1 (Launcher®, Medtronic Inc.) was initially used unsuccessfully in the left coronary artery catheterization. Catheterization was possible with the catheter Amplatzer Right 2 (Launcher®, Medtronic Inc.). Coronary angiography revealed: serious injury of 70% in the left anterior descending artery in the proximal segment; diagonal artery with a 90% lesion in the middle segment, but the artery is of a fine caliper; and serious injury in the marginal branch estimated at 90% (Figure 1).

Due to the severity of the anterior descending artery injury, the strategy shifted to bypass grafting of the left anterior descending artery and first left marginal artery. Guide 0.014″ 180 cm (Fielder®, Asahi Inc., Japan) was passed through the circumflex artery and through the anterior descending artery. In the anterior descending artery, direct placement of stent Driver® 3.0 x 12 mm (Medtronic Inc, Ireland) was held. In the circumflex artery, predilatation was required because of the severity of the injury, with balloon catheter 2.0 x 15 mm (Sprinter, Meditronic), followed by placement of stent Driver® 2.75 x 14 mm (Medtronic Inc. Ireland). Control angiography with good angiographic appearance, no residual lesion. In the procedure, 200 mL of ionic contrast were used. The total procedure time was 90 minutes. Due to the volume of contrast and radiation exposure time, we chose not to study the right coronary artery.

The in-hospital period was uneventful, and there was no change in serum creatinine and cardiac enzymes. At clinical follow-up, the patient reported improvement of angina symptoms, currently in functional class I of the Canadian Cardiology Society, on control myocardial scintigraphy without myocardial ischemia (Figure 2), then opting for clinical treatment of the coronary artery.

Keywords

Acute Coronary Syndrome; Angioplasty, Balloon, Coronary; Peripheral Arterial Disease.

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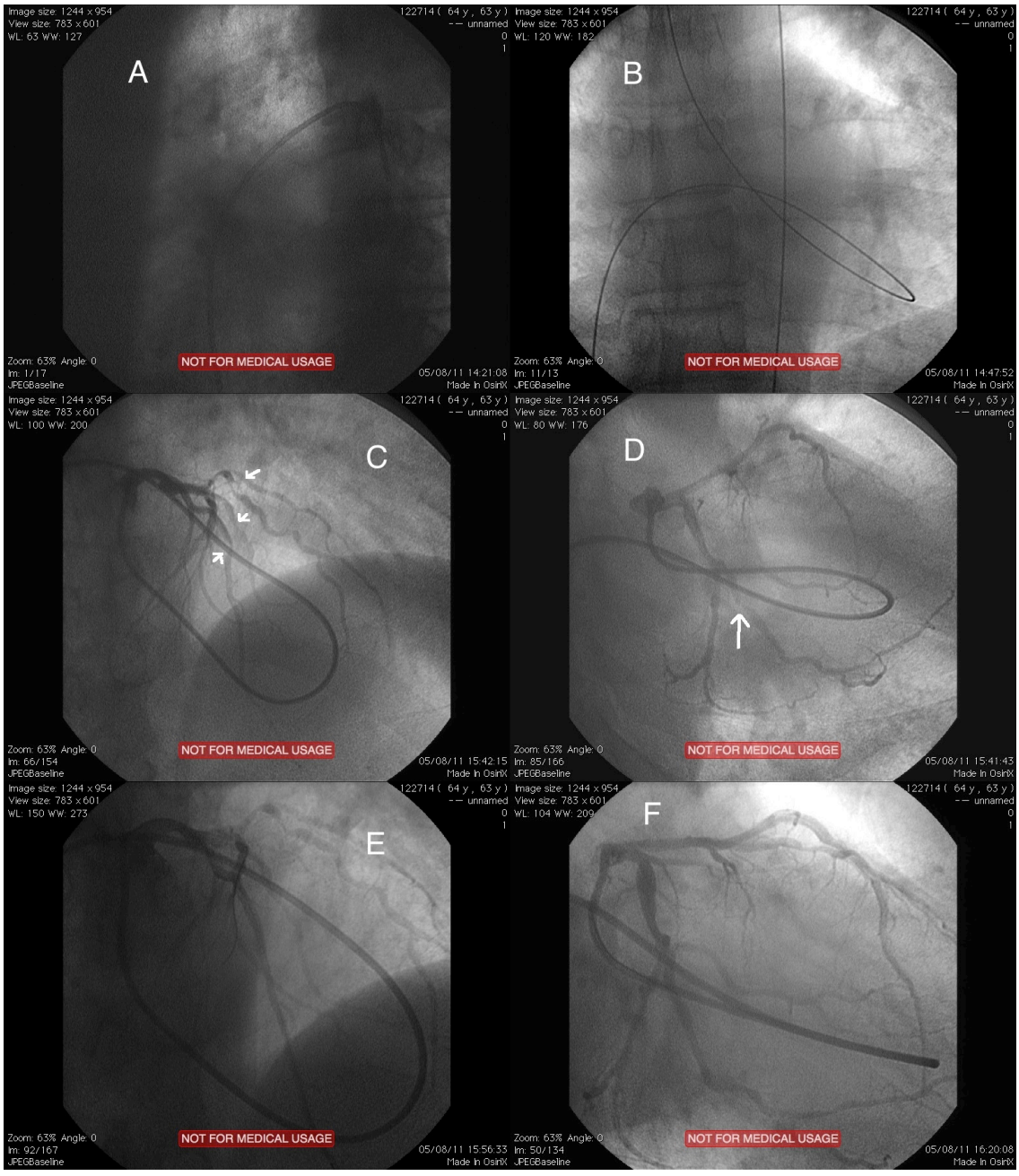

Figure 1A and B — *Passage of catheter and guide through the patent foramen ovale. C and D: Pre coronary angiography in cranial posterior-anterior (PA) projection and caudal right anterior oblique (RAO) projection, respectively (arrow points to the injuries). E and F: Final result. Cranial PA projections and caudal OAD projections.*

Discussion

Patients presenting acute coronary syndrome with high TIMI Risk (>4) are associated with higher risk and ischemic complications and death[5]. In this group of patients, the invasive strategy is associated with improved prognosis[6]. Furthermore, peripheral vascular insufficiency is also associated with a poor prognosis. Even with a poor prognosis, this patient was maintained on medical therapy only because of limited arterial access.

For this group of patients, the access alternatives are especially translumbar puncture and anterograde access through transseptal route. The translumbar route was described in 1929 by Santos and was well used in subsequent decades. From the 1960s, with the development of the brachial and femoral technique associated with improved guides and catheters, the technique was abandoned. As in our institution we have no experience with this technique, we chose the anterograde technique.

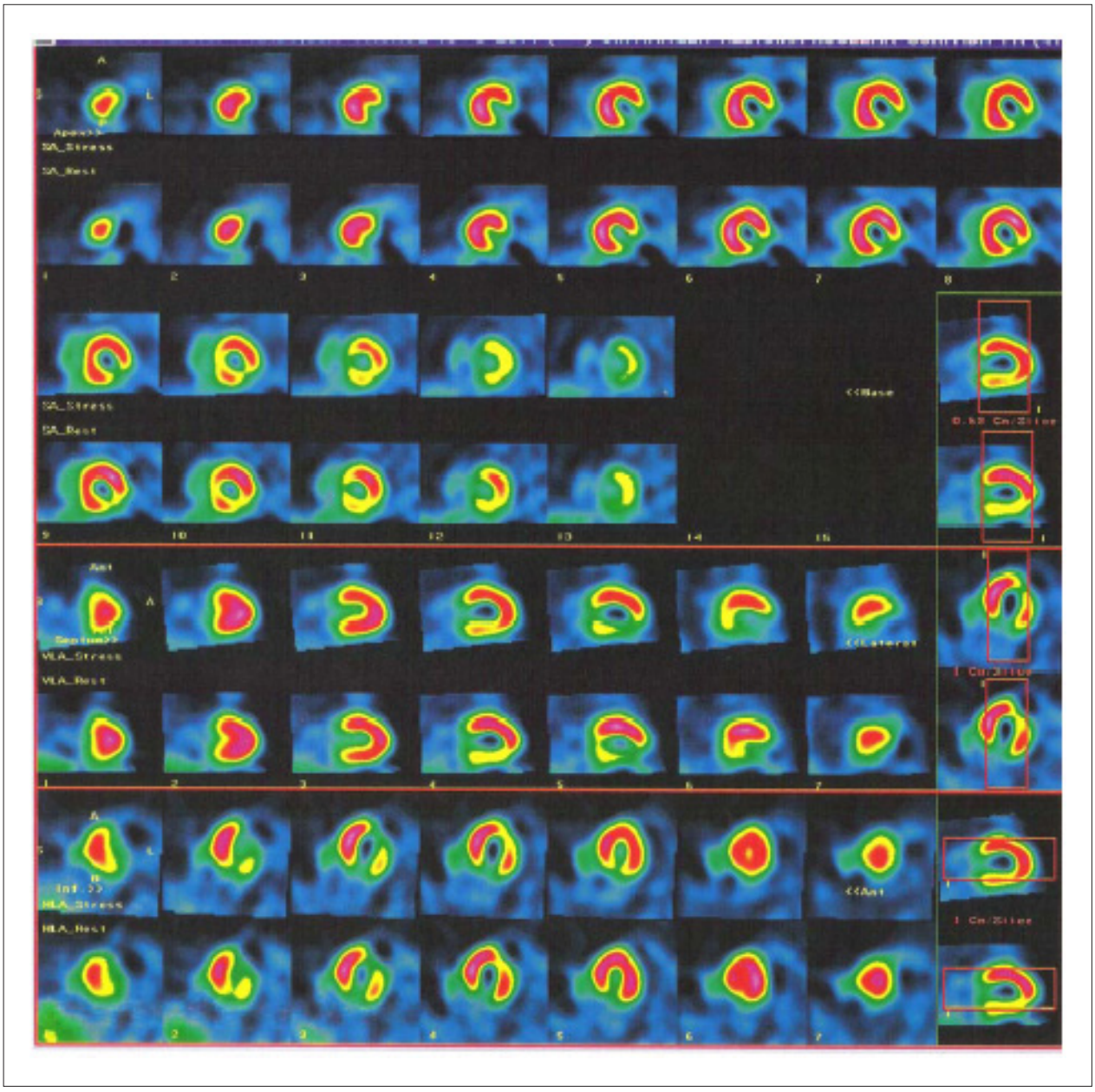

Figure 2 – *Post-intervention myocardial scintigraphy.*

Catheterization of the left coronary artery was performed with catheter Amplatz Right due to the smaller diameter of the aorta. Despite the high specificity of the coronary CT angiography, it had no sensitivity for diagnosing severe injury to the left anterior descending artery, changing the initial planning. So far, there are no reports of anterograde coronary angioplasty. The great difficulty was the coronary catheterization with higher profile catheter associated with the loop generated by the passage in the atrial septum and LV passage to the aorta; catheter fracture is likely to happen. In this case, to avoid kinking, the 0.035" guide was left until the coronary catheterization. The passage of the 0.014" guide occurred with no major difficulties. Despite the loop, the stent navigability was not harmed.

We did not perform angiography of the right coronary because of the procedure time and contrast volume. Farah et al. reported technical difficulty in the catheterization of that coronary artery, managing only to contrast with the Judkins Left catheter and injection into the coronary sinus, without selective catheterization of the coronary artery. This report contrasts with the finding of Pearce et al. and can be explained by the previous withdrawal of the right coronary artery, which allowed selective catheterization.

Author contributions

Conception and design of the research, Acquisition of data, Statistical analysis, Writing of the manuscript: Wang R; Analysis and interpretation of the data: Wang R, Souza Filho NS; Obtaining funding: Wang R, Souza Filho NS, Lima Filho A; Critical revision of the manuscript for intellectual content: Wang R, Souza Filho NS, Lima Filho A, Moreira MVF.

Potential Conflict of Interest

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

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Study Association

This study is not associated with any post-graduation program.

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