

IFR and IVUS on a Middle Lesion - Case Report

Visconti Mariano^{1*}, Lopardo César² and Cafaro Germán³¹Cardiologist, Diagnostico Mediter, Sanatorio Dr Julio Mendez, Buenos Aires, Argentina²Interventional Cardiology, Diagnostico Mediter, Sanatorio Dr Julio Mendez, Buenos Aires, Argentina³Chief Interventional Cardiology, Diagnostico Mediter, Sanatorio Dr Julio Mendez, Buenos Aires, Argentina***Corresponding Author:** Visconti Mariano, Cardiologist, Diagnostico Mediter, Sanatorio Dr Julio Mendez, Buenos Aires, Argentina.**Received:** June 29, 2020**Published:** September 17, 2020© All rights are reserved by **Visconti Mariano., et al.****Abstract**

Complementary imaging methods and functional assessment of vascular lesions arises from the limitations of coronary angiography in certain scenes. We will talk about the use given to iFR, IVUS and SyncVision in a 75-year-old patient diagnosed with AMI who, after having undergone primary culprit vessel angioplasty, re-enters to the hemodynamic room for assessment of intermediate tandem injury in the anterior descending artery in proximal and medial segment. The iFR values were 0.68 distal, 0.94 between the two lesion and 0.99 proximal. IVUS and SyncVision showed an irregular and irregular calcified plaque with a luminal area of 3.5 mm² on distal injury. We decided to treat only the distal lesion with a pharmacological stent (Microport Firehawk 3.0 x 13 mm) at 12 atm. After angioplasty, the iFR control had a value of 0.93 distal to the stent. IVUS showed stent under expansion. Post dilation was performed with a 3.5x8mm balloon with successful results. These complementary methods allowed us to carry out a focused therapy specifically to the segment that presented a hemodynamically significant lesion, without compromising the remaining segments or collateral branches, thus reducing the extension covered by angioplasty and avoiding the possible need to carry out therapy in an area that involves the origin of a large caliber diagonal branch.

Keywords: Coronary Artery Disease; Intravascular Ultrasonography; Percutaneous Coronary Intervention; IVUS; iFR; Instantaneous Wave Free Ratio; SyncVision; Hemodynamics; Coronary Disease; Myocardial Infarction; Middle Lesion

Introduction

Complementary imaging methods and functional assessment of vascular lesions arise from the limitations of coronary angiography in certain scenes. The coronary angiography presents wide intra and inter observer variability. If we also add a bad selection of catheter, an inadequate projection or a poor contrast injection, we can lead to erroneous interpretations. The importance of these complementary imaging methods becomes even more relevant if we add that we often face complex injuries such as bifurcations or eccentric lesions or left main coronary injuries.

We will develop the clinical case of a patient with an ambiguous lesion in the territory of the anterior descending coronary artery, with the possible compromise of a diagonal branch. The use of iFR, IVUS and SyncVision allowed us to carry out a therapy limited specifically to the segment that presented a hemodynamically significant lesion, without compromising the remaining segments or collateral branches.

Clinical Case

We present the case of a 75-year-old male patient. Hypertensive, smoker who was admitted to our center for sepsis in post-

operative abdominal laparotomy. 24 hours after discharge, he evolved symptomatic due to class IV angor, so he consulted. Inferior dorsal AMI was diagnosed, with troponins of 75 and > 2000. An emergency coronary angiography was performed in which we evidenced co-dominant anatomical distribution, right coronary artery of medium caliber with significant lesion in the proximal segment. Left main without lesions. Anterior Descending Artery with middle lesion in the proximal and mid segment, first diagonal branch of regular caliber and diffuse disease. Finally, it was evidenced that the Circumflex artery presented acute occlusion in the proximal segment, so primary angioplasty was performed on that lesion with a Microport - Firehawk 3.0 x 18mm stent, which was successfully impacted at 12 atm. The patient progresses favorably in the coronary intensive care unit. After 48 hours, scheduled re-admission is decided for the treatment of remaining injuries. First we performed an angioplasty of the significant lesion of the right coronary artery with two stents (3.0 x 13 mm microport Firehawk rapamycin-releasing stents) covering the mid and proximal segments with an adequate angiographic result.

Next, we continued with the evaluation of the middle lesion of the anterior descending coronary artery.

Prior assessment to angioplasty - IFR - IVUS - Syncvision

After placing a XB 3.5 6 Fr therapeutic catheter, control angiographic projections were performed, in which two tandem lesions of intermediate severity were observed. The first at the level of the origin of a diagonal branch and the second radiolucent lesion prior to the ostium of a septal branch (Figure 3). Then an iFR 0.014 "Verrata Pressure" guide wire was advanced. The procedure begins with pressure equalization with the wire located in the left main ostium, then the wire is advanced until it is positioned distally to the lesions to be studied. Pullback was performed measuring iFR pressures, giving a value of 0.68 distal, 0.94 proximal to the most distal lesion (cutoff point 0.89) and 0.99 proximal to both injuries.

After iFR, IVUS was performed to assess the characteristics and area of the lesion. For this procedure, the iFR Verrata Pressure wire was removed and a new Floppy 0.014 wire was advanced to the distal segment of the anterior descending artery. Mounted on this wire, the intravascular dilatat ultrasound catether (Volcano - Eagle Eye Platinum) was advanced until a position distal to the lesions. Then a manual pull back was performed at a speed of 1

mm/second for optimal coordination of the acquisition of IVUS and SyncVision. We observed that in the same radiolucent sector (angiography), there was a highly calcified and irregular lesion with a luminal area of 3.5 mm², which was consistent with the positive result of the iFR assessment.

As for SyncVision, this software added to the ultrasound image of IVUS, allows us to find the exact segment where becomes significant the extensive tandem lesion observed from angiography, which helps the therapeutic decision of angioplasty (Figure 1 and 2).

Figure: 1

Figure: 2

Angioplasty and post-angioplasty assessment

After evidencing that the proximal lesion was not significant, we decided to treat only the distal lesion, thus reducing the extension covered by angioplasty and avoiding the possible need to carry out therapy in an area that compromises the ostium of the large caliber diagonal branch. Angioplasty was performed, implanting a pharmacological stent at 12 atmospheres (Microport Firehawk 3.0 x 13 mm), at the level of the distal injury (Figure 3).

Figure: 3

After angioplasty, control was performed with iFR, which yielded a value of 0.93 distal to the stent. we also performed an IVUS again together with SincVision, which showed sub-expansion of the stent, so we decided to perform post-dilation with a 3.5 x 8 mm balloon. The final acquisition of the IVUS shows adequate expansion of the stent, with which the procedure was successfully ended and the patient returns to the coronary ICU. He was discharged from the hospital after 24 hours without complications.

Discussion

It is a challenging case due to the complexity of the injury. The diagnostic coronary angiography performed during the first procedure in the context of acute myocardial infarction, showed a long and heterogeneous plaque that compromised the origin of large caliber collateral branches. The therapeutic strategy, prior to carrying out complementary studies, raised the possibility of angioplasty with a bifurcation technique and the use of more than 1 stent in overlapping within the lumen of the vessel [1-6].

Conclusion

The final result, after the aid provided by these complementary imaging methods, was a simplified angioplasty. Favorable results

were achieved with only 1 stent, and with the certainty that the affected vessel does not present ischemia at discharge.

Taking stock, these procedures favorably affect the economy of time and consumption of resources by the health service, this point is something that can be improved over time with the acquisition of greater skills and experiences by the professional team.

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