

Could Fractional Flow Reserve Guide Therapeutic Strategy in Acute Coronary Syndrome?

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Fractional flow reserve, as determined with a pressure-wire, was validated in the assessment of the functional severity of intermediate lesions in a population with stable ischemic cardiopathy. The value of pressure-wire analysis in acute coronary syndrome is unknown. We report two patients with acute coronary syndrome, in which the therapeutic approach was guided by the fractional flow reserve. We discuss the utility of this tool in this context.

Key words: Angiography. Lesion. Myocardial ischemia.

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¿Puede la reserva fraccional de flujo guiar la estrategia terapéutica en el síndrome coronario agudo?

La validación de la reserva fraccional de flujo determinada con guía de presión para evaluar la intensidad funcional de lesiones intermedias se ha realizado en la población con cardiopatía isquémica estable. No sabemos si el análisis de las lesiones con guía de presión sigue teniendo validez en el síndrome coronario agudo. Presentamos la historia de dos pacientes con síndrome coronario agudo, en los que nuestra actitud terapéutica fue guiada por la reserva fraccional de flujo. Se discute la utilidad de esta herramienta en este contexto.

Palabras clave: Angiografía. Lesión. Isquemia miocárdica.

INTRODUCTION

The pressure-guidewire is a valuable instrument for assessing the ischemic significance of coronary lesions, and is widely used in catheterization laboratories nowadays.¹ This success is based on the measurement of a powerful determining index, the fractional flow reserve (FFR). The precise cut-off value (<0.75) of this index discriminates between lesions with and without ischemic potential.² FFR allows the interventional cardiologist to direct his management strategy of intermediate lesions. In those cases with a $FFR \geq 0.75$, it is known that a conservative approach is safe and will be associated with lower rate of events if revascularization is finally decided.^{3,4} However, we do not know if FFR can also be useful for guiding the therapeutic strategy in acute coronary syndromes. The two cases presented be-

low summarize how our FFR guided approach did not obtain adequate results.

CLINICAL CASES

Case 1 (Figure 1)

Male patient, 50 years old, with a single risk factor of tabaquism and without a history of previous ischemic heart disease. He was admitted due to typical chest pain at rest and subendocardial lesion electrical changes in leads II, III and aVF. Therapy with tirofiban (anti-IIb-IIIa), enoxaparin, aspirine, clopidogrel and intravenous nitroglycerin was initiated. The patient remained asymptomatic, an increase in cardiac enzymes was not detected, electrocardiographic changes reverted to normal, and after 48 h he was referred for a coronary assessment. Angiography revealed a left anterior descending artery intermediate lesion. A functional evaluation of the lesion with a pressure-guidewire (WaveWire, Endosonics, Rancho Cordova, USA) was decided. Its usage has already been described exhaustively.⁵ The hyperemic stimulus was generated by means of a 30-60 μ g adenosine intracoronary injection.

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ABBREVIATION

FFR: fractional flow reserve.

FFR determined was 0.80 repeatedly. A conservative approach was decided after this functional result, and maintaining long-term double antiaggregation with aspirine and clopidogrel was recommended.

The patient remained asymptomatic during 2 months approximately, and was after readmitted due to another unstable angina episode. Angiography revealed an evident progression of the left anterior descending artery lesion already detected. Surgical revascularization was indicated.

Case 2 (Figure 2)

Female patient, 66 years old, dyslipemic, revascularized 5 years earlier, with a left internal mammary artery graft implanted to her left anterior descending artery. Three years later, she presented an inferior acute myocardial infarction and underwent primary angioplasty with stent implantation to her right coronary artery. Later on, while she was on nitrates, beta blockers, statin and aspirin therapy, the patient complained of repeated chest pain episodes. A stress echocardiography was performed, which was negative to any stress-induced alterations in regional wall-motion. A new angiographic study was indicated due to clinical persistence of symptoms, and an intermediate degree

intra-stent restenosis of the right coronary artery was demonstrated, as well as an aneurysmatic distal portion of the artery showing a chronic dissection image. A WaveWire® pressure-guidewire study was performed, using 140 µg/kg/min doses of intravenous adenosine for this case. The pressure sensor was positioned distally to the dissected area, and after 2 min of adenosine perfusion, the pressure-guidewire was removed automatically at 0.5 mm/s while FFR was registered continuously. FFR value was 0.85 at the most distal portion. It was decided to continue conservative treatment.

After 5 days, the patient was admitted due to inferior region reinfarction and underwent another primary angioplasty of the right coronary artery, occluded at the stent area. The artery was re-opened successfully by implanting three sequential stents.

DISCUSSION

In both cases, a conservative strategy based on FFR results was inadequate. The value of FFR as a diagnostic and prognostic tool for guiding intervention of intermediate lesions is confirmed in several studies. It has been confirmed that dilating lesions with a $FFR \geq 0.75^{3,4}$ in a clinically stable population is inconvenient. The real scenario of the pressure-guidewire is somewhat different, as it is used nearly exclusively for unstable angina,⁶ a situation for which FFR prognostic value has not been established. Unstable angina lesions are characterized by dynamism, with the variable pressure gradient as a function of the thrombotic component and vasomotor reactivity.⁷ Also, the microvas-

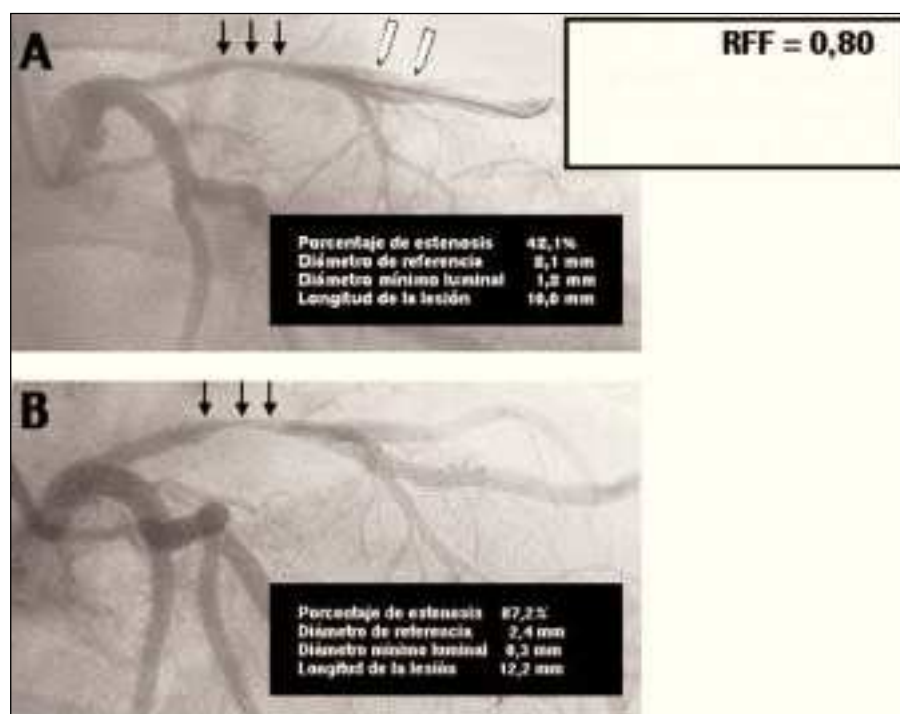


Fig. 1. Case 1 images. A: initial angiography. Intermediate lesion of proximal anterior descending artery can be seen on left (black arrows). The white arrows indicate the pressure-guidewire distal portion. FFR determination is shown on the right. B: two months later, progression of the lesion is clearly observed (black arrows).

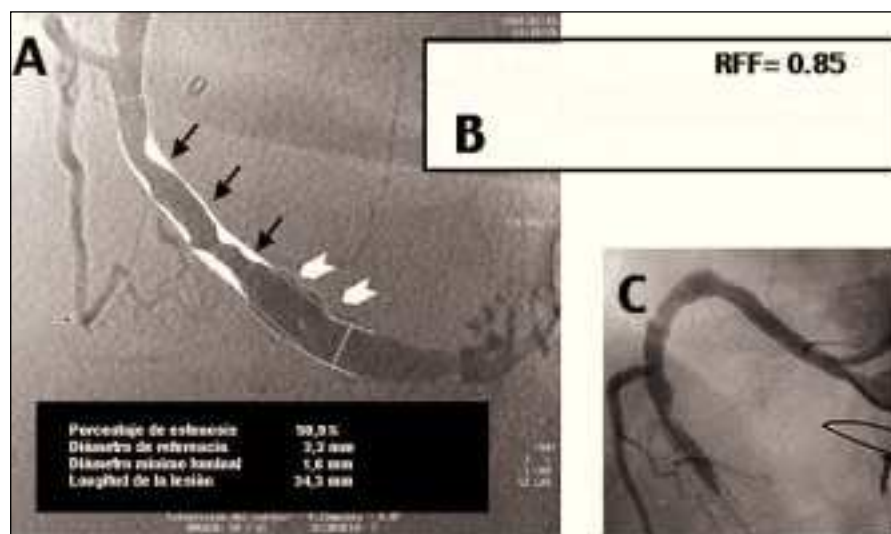


Fig. 2. Case 2 images. A: initial situation of right coronary artery; a diffuse intermediate degree intra-stent restenosis is observed (black arrows). Distal to the stent, an aneurysmic area with an inner opacification linear defect suggestive of chronic dissection can be seen (white arrows). B: FFR analysis with the pressure sensor positioned distally to the aneurysmic area. C: right coronary artery acute occlusion, five days later.

cular dysfunction present in acute coronary syndromes can limit adenosine vasomotor capacity, leading to an overestimation of the FFR value.

Both patients presented an acute coronary syndrome. In the first case, the initial angiographic and functional study was performed in the situation of a stabilized lesion that was possibly already more severe. In the second case, although the procedural influence in outcome of a lesion cannot be discarded, complexity due to the presence of an aneurysmic area and distal dissection could justify progression to acute occlusion, despite the absence of a significant translesional gradient. The FFR measurements in both cases disclosed an absence of a significant stenosis when performing the study. But the conservative approach resulted in an impaired outcome.

Before other studies for defining the acute coronary syndrome FFR appear, our conclusion about both cases is to be suspicious about FFR prognostic assessment in this context. Before deciding the therapeutical approach, other occlusive severity factors (clinical, electrocardiographic, enzymatic) not related with translesional gradient should also be considered.

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