Cardiac Magnetic Resonance After an Acute Myocardial Infarction: a Rising Technique
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In Spain,1 the well-established practice of introducing interventionist techniques in acute myocardial infarction (AMI) has promoted interest in determining the status of myocardial segments in which successful angioplasty should prevent irreversible necrosis as this informs prognosis. Simple, though indirect and somewhat crude signs exist that indicate post-primary angioplasty prospects for AMI-affected myocardium: for example, the persistence or not of ST-segment elevation in the electrocardiogram.2 However, given the profusion of imaging techniques available, we should logically try to determine the contribution each of these can make to a more precise study of the situation. The role played by radioactive isotope studies3 is well known but more recent techniques, such as contrast echocardiography (ECO) or cardiac magnetic resonance imaging (MRI), are still being evaluated and it is these we focus on in the present text.

The physiopathologic processes involved in early AMI revascularization, whether by pharmacologic therapy or angioplasty, can be considered on various levels. Firstly, we have restoration of repermeabilization patency to a previously occluded epicardial coronary artery, easily identified after angioplasty and judged successful in terms of TIMI flow grade. Secondly, we have restoration of regional myocardial flow, also evaluated by angiographic techniques such as contrast echocardiography (ECO) or cardiac magnetic resonance imaging (MRI), are still being evaluated and it is these we focus on in the present text.

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hand, most (two thirds) segments with perfusion defects in ECO images do not achieve functional recovery. At the same time, these authors also performed first pass gadolinium perfusion MRI followed by delayed myocardial enhancement (DME). This technique is very reliable in detecting irreversible myocardial necrosis with results similar to those of ECO in MRI perfusion studies and a better correlation with functional recovery. We have to remember that following successful primary angioplasty only one third of myocardial segments finally recover functionality. That is, as we have commented earlier. Petito et al confirm that maintaining an artery open following angioplasty does not guarantee recovery of myocardial function, and that post-angioplasty myocardial perfusion contrast ECO and first pass MRI perfusion studies, are only moderate predictors of recovery, although their predictive value improves if DME by MRI is used.

López Lereu et al analyze various options offered by MRI in the study of perfusion and myocardial viability in a group of patients similar to those in Petito et al’s series. Impeccable research methods place López Lereu et al on a par with current clinical research in MRI. As in the previous study, results for this series highlight the fact that functional recovery of myocardial segments occurs in only one third of patients. The authors endorse gadolinium DME as an outstanding predictor of long-term functional recovery, with positive and negative predictive values approaching 90%. Curiously, first pass gadolinium myocardial perfusion shows conserved perfusion in almost half of the patients, as does contrast ECO. However, its predictive value here is only moderate.

One interpretation of these interesting results would lead us to consider that analysis of myocardial perfusion after reperfused AMI with restored patency is of limited value in the prognosis of recovery of myocardial function. At least, this is the case of studies such as these, in which perfusion is evaluated by contrast ECO or resting first pass MRI, and qualitative assessment of perfusion is visual only. Myocardial perfusion constitutes a substantial challenge for intravenous contrast agent imaging techniques because of the reduced volume of coronary flow and still limited spatial resolution it entails. This is evident when these limitations are countered by using techniques such as immediate post-primary angioplasty intracoronary injection of ECO contrast agents. Using this method, Bodi et al report good correlation between perfusion and global long-term left ventricular systolic function. In truth, we probably need to introduce MRI protocols that are more complex than the analysis of baseline first pass studies. These could take the form of post-pharmacologic stimulation studies, which have been shown to increase the diagnostic value in detecting perfusion defects secondary to obstructive coronary artery lesions. Or, we could await the definitive introduction of the semiquantitative methods of MRI perfusion analysis that have yet to be standardized but which have given good results in this field. It is not a question of undervaluing the knowledge of regional myocardial perfusion as an indicator of the state of microcirculation after primary angioplasty but of improving analytical method for ECO and MRI.

However, it is fortunate that MRI offers an alternative that has proven more valid in the prognosis of myocardial segment functionality following revascularization by primary angioplasty. The high reliability of gadolinium DME to detect areas of irreversible myocardial necrosis and delimit the scale of transmural extension has, when combined with the study of ventricular segment function in the same MRI sessions, become standard practice in determining myocardial viability, and identifying as potentially recoverable hibernating or stunned myocardium, those segments with contractile dysfunction, without DME, or limited in extension to the subendocardium. Findings of the two studies presented here confirm the value of this technique, recognizing its high diagnostic value in determining recovery of myocardial function.

The other great advantage of DME by MRI is its relative simplicity and innocuousness. It requires up-to-date magnetic resonance equipment—widely used today—and technical care and precision in performing the study. Despite this, DME by MRI has become an essential part of basic protocols for any MRI study in patients with ischemic heart disease.

Consequently, it is no great surprise that this technique should be favored by scientific society study groups in their most recent recommendations. Nor is it out of place to affirm that in the near future obtaining a study of function, extension of necrosis and viability may well become standard practice in attending all AMI survivors, with or without primary revascularization, given that it provides valuable information for a full evaluation of each patient, with highly reliable implications for prognosis, therapy and with reference to follow-up. It is satisfying to be able to affirm that the articles presented here make a decisive contribution to the process of incorporating this technique into the arsenal of diagnostic imaging resources in cardiology.

REFERENCES

2. Pomar Domingo F, Albero Martínez JV, Peris Domingo E, Echano Errasti I, Villar Herrero JV, Pérez Fernández E, et al. Valor pronóstico de la persistencia del segmento ST elevado después de...