Abnormal heart rate response with vasodilator stress myocardial perfusion imaging: Relevance to clinical practice

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Myocardial perfusion imaging (MPI) is a commonly used test in the evaluation of patients with suspected or known coronary artery disease. Over the past two decades, it has emerged from a simple diagnostic test to assess the presence or absence of obstructive coronary stenosis into a much more powerful test with multiple applications. Its prognostic power in different patient populations has now been established in multiple studies.[1,2] Furthermore, it is now also commonly used to assess and quantify the efficacy of medical or invasive interventions.[3] Although the presence and extent of perfusion defects have been the standard prognostic variables in MPI, several other non-perfusion variables were also shown to add to its prognostic power. When done in conjunction with exercise, the exercise duration and associated ischemic changes become significant added prognostic variables. When done in conjunction with pharmacologic stress, other variables have also been shown to add prognostic power to the test. Just recently, Bajaj et al[4] published in the journal an extensive review on the non-perfusion prognostic variables in vasodilator stress MPI. These include left ventricular (LV) ejection fraction, LV wall motion score, LV volume, ST segment changes, lung-heart ratio, transient ischemic dilation, and heart rate response (HRR).

In this issue of the journal, Gomez et al[5] report the added prognostic power of HRR in patients with end-stage kidney disease undergoing regadenoson MPI. The authors studied 303 patients and followed them up for 4 years. They divided the population into four subgroups: Normal MPI/Normal HRR, abnormal MPI/Abnormal HRR, Normal MPI/Abnormal HRR, and Abnormal MPI/Normal HRR. They were able to show the significant discrimination in risk from the low (Normal MPI/Normal HRR) to the intermediate (Normal MPI/Abnormal HRR and Abnormal MPI/Normal HRR), and to the high risk (Abnormal MPI/Abnormal HRR). These findings are concordant with other studies that also showed an added prognostic value of an abnormal HRR in various different population sets.[6-8]

For the practicing physicians who order these tests on a regular basis, two important clinical practice questions emerge as they try to integrate these findings into their daily management of patients. The first question relates to the definition of HRR and its standardization. An abnormal HRR has been defined in different ways by different investigators.[6-8] Some used quartiles, and others used tertiles. In this paper, Gomez used a dichotomous cut-off of 28%, others used a cut-off of 15%, and some used a cut-off of 20%. Obviously, if this is to achieve a wide clinical application, a standardized definition would be strongly required. The second question that is more directly related to the clinical practice is how we can utilize these data not only in predicting future events but more importantly in changing management to improve outcomes. It is obvious that a normal MPI/Normal HRR represents a low-risk population of patients who probably does not need further invasive evaluation with coronary angiography. It is also obvious that an abnormal MPI/abnormal HRR represents a high-risk group of patients that will probably need further invasive evaluation with coronary angiography and might benefit from coronary revascularization. The difficult group of patients that will need further research are those at intermediate risk (Abnormal MPI/Normal HRR and Normal MPI/Abnormal HRR),

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who represent almost half of the studied population. How will these be managed, particularly those with a normal MPI but abnormal HRR? Is their increased risk primarily due to ischemic causes or other non-ischemic causes as well? Traditionally, these patients have been considered low risk based on their perfusion imaging results. Should we now refer them for coronary evaluation because of an abnormal HRR? Should we revascularize them if they have obstructive disease? Would revascularization improve their outcomes? All these are very important questions that the practicing physician will ponder upon whenever s/he receives these test results. Hopefully, future research and practice guidelines will help answer some of these questions to help physicians make appropriate decisions in the management of their patients.

Disclosure

The author has no conflicts of interest to disclose.

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