The Use of cMRI to Evaluate Patients with PAH

Section Editor
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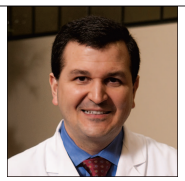

Section Editor
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The Clinical Trials Update highlights new and ongoing research trials that are evaluating therapies for PAH. In this issue, Dr Levine examines a study that is looking into an innovative technique used in the evaluation of PAH patients.

In the last few years, there has been a significant amount of literature focused on utilizing cardiac magnetic resonance (cMRI) to assess right ventricular (RV) function to predict pulmonary arterial hypertension (PAH) patient outcomes.

As part of an ongoing study assessing the value of the use of cMRI to evaluate patients with PAH, van de Veerdonk et al[1] examine the relationship between changes in pulmonary vascular resistance (PVR) on right heart catheterization (RHC) and right ventricular ejection fraction (RVEF) seen on cMRI and survival, both at baseline and after 1 year of PAH therapy.

Out of 657 patients referred to their center for PAH, 110 patients had baseline (before any PAH-specific therapy was begun) measurements performed (cMRI, RHC, 6-minute walk test [6MWT]). Of these patients, 76 underwent 1-year follow-up measurements (cMRI, RHC, 6MWT) after being started on PAH-specific therapy (prostacylcins, endothelin receptor antagonists, and phosphodiesterase-5 inhibitors, either alone or in combination).

Demographics revealed that the mean age of patients was 53, 76% were female, and 66% of patients were diagnosed as having idiopathic PAH. During a mean study period of 59 months, 30 patients died from cardiopulmonary causes, and 2 patients underwent lung transplantation.

Baseline data showed that both RVEF and PVR were associated with survival, along with baseline cardiac output and 6MWD. RVEF and PVR at a cutoff of 35% and 650 dynes/sec/cm, respectively, were indicators of survival. However, based on these values, only a low RVEF was independently associated with poor survival. Patients with a low RVEF had significantly poorer prognosis compared with patients with high RVEF, regardless of their PVR.

In the 76 patients who underwent follow-up studies, at a median period of 12 months pulmonary pressures were found to remain about the same, PVR was decreased, cardiac output was improved, and 6MW was stable. The changes in the PVR correlated somewhat with the changes in RVEF ($R=0.33$ $P=0.005$). PVR decreased in both survivors and nonsurvivors, and these changes were not associated with outcomes. RVEF differed significantly between survivors and nonsurvivors. These changes in RVEF were independently associated with mortality.

A total of 52 patients showed a significant decrease in PVR after therapy. In this group, patients with a decreased RVEF had significantly poorer survival than patients with stable RVEF ($P=0.001$). Both groups had a similar decrease in PVR. There were no other differences in baseline characteristics between these 2 groups.

The authors conclude that based on their results, the RVEF measured at baseline was a better predictor of mortality than PVR and that after 12 months, these changes in RVEF predicted long-term outcomes, whereas changes in PVR did not. They concluded further that after 1 year of therapy, RV dysfunction progressed even with a decrease in PVR on RHC.

van de Veerdonk et al demonstrate that in up to 25% of their cohort, a stable or improving PVR did not prevent deterioration of the right ventricle. Their conclusions bring many questions for the future in the evaluation and monitoring of our patients.

Is RVEF by cMRI a stronger marker of outcomes then markers we are now following? This study brings to light the fact that we have not yet established the best way to assess the right ventricle and follow changes in its function at baseline and after therapy. This study reveals the merits that make cMRI an attractive tool for assessing outcomes in our patients. There are, however, issues regarding this modality (including access at many centers, standardization, cost) which make it difficult for widespread routine application. Continuing studies by this group and others will help determine the role of cMRI in our patients, both in baseline assessment of PAH and in following the function of the right ventricle.

Reference

1. van de Veerdonk MC, Kind T, Marcus JT, et al. Progressive right ventricular dysfunction in patients with pulmonary arterial hypertension responding to therapy. *J Am Coll Cardiol.* 2011;58(24):2511-2519.

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