Letters to the Editor

MRI Prediction of Precapillary Pulmonary Hypertension according to the Sixth World Symposium on Pulmonary Hypertension

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Editor:

The Sixth World Symposium on Pulmonary Hypertension recommends that precapillary pulmonary hypertension (PH) be defined by a mean pulmonary artery pressure (mPAP) of greater than 20 mm Hg as well as a pulmonary vascular resistance (PVR) of at least 3 Woods units (WU) (1). Herein, we update the results from our article published in the January 2019 issue of *Radiology* (2) to reflect this new threshold. In our study, we derived two regression models based on cardiopulmonary vascular MRI measurements to predict mPAP in a population of patients with suspected PH from the ASPIRE registry (Assessing the Spectrum of Pulmonary Hypertension Identified at a Referral Center). At repeat analysis, the specificity of these models was reduced by the inclusion of PVR as a diagnostic indicator of PH. Therefore, in the same cohort, we now propose a new model using binary logistical regression to detect precapillary PH by using the new definition of mPAP greater than 20 mm Hg and a PVR of at least 3 WU.

Of the 603 patients in our study, PVR data were not available for 52 (9%). In the derivation cohort (n = 270), 240 patients had precapillary PH. Using the derivation cohort, we generated a new cardiac MRI-based model using binary logistic regression to predict mPAP greater than 20 mm Hg and PVR of at least 3 WU. The following regression equation was identified: precapillary PH status (arbitrary units) = $-27.7 + 5.75\log_e$(interventricular septal angle [degree of arc]) $+ 1.899\log_e$(right ventricular mass/left ventricular mass) $+ 0.004$ (diastolic pulmonary artery area [in square millimeters]). A value of greater than 1 was diagnostic of precapillary PH at receiver operating characteristic analysis.

In the validation cohort (n = 281) of 260 patients with PH and 21 patients without PH, the model had an area under the receiver operating characteristic curve of 0.93 (95% confidence interval [CI]: 0.89, 0.97). From the 2 × 2 contingency table analysis, the sensitivity, specificity, positive predictive value, and negative predictive value were 80% (202 of 252 patients; 95% CI: 75%, 95%), 90% (18 of 20 patients; 95% CI: 67%, 98%), 99% (202 of 204 patients; 95% CI: 96%, 100%), and 27% (18 of 68 patients; 95% CI: 17%, 39%), respectively. Further work to validate this equation in larger populations in the tertiary referral setting and in screening populations with larger numbers of patients without PH is now necessary.

In conclusion, for identification of patients with mPAP greater than 20 mm Hg and PVR of at least 3 WU, we recommend the use of this new cardiopulmonary vascular MRI regression model.

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