

Assessment of the Right Ventricular Function in Patients with Chronic Obstructive Pulmonary Disease Using MRI

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Abstract: Purpose: Assessment of the right ventricular function in patients with mild to severe chronic obstructive pulmonary disease (COPD) using MRI.

Materials and Methods: We prospectively studied 46 COPD patients determined by the pulmonary function test (PFT). Using the Global Initiative for COPD classification, the COPD patients were divided into three groups according to the severity of the disease: group I = mild (n=16), group II = moderate (n=16), group III = severe (n=14). Our study population consisted of 30 age-matched control subjects. The RV function and myocardial mass (MM) were obtained by 1.5T cardiac MRI in all of the four groups. The results were compared among the four groups using the Newman-Keuls method. Pearson's correlation was used to evaluate the relationship between the right ventricular ejection fraction (RVEF) and MM with the PFT results in COPD patients. P-values less than 0.05 were considered statistically significant.

Results: The RVEF was 51.6% in group I, 49.8% in group II, 39.4% in group III, and 53.2% in control group, respectively. The RVEF was significantly lower in group III than in other groups ($p < 0.01$). The correlation was excellent between the MRI results and forced expiratory volume in 1 sec ($r = 0.859$ for RVEF, $r = -0.839$ for RV MM) in COPD patients.

Conclusion: The RVEF and RV MM measured by MRI correlate well with the severity of disease as determined by PFT in patients with COPD.

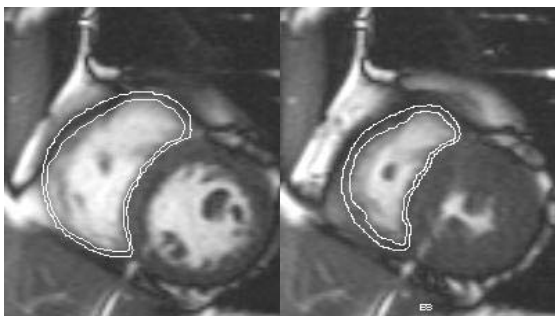


Fig. 1. Measurement of the right ventricular myocardial volume by MRI semi-automated software. Short-axis images in the end-diastolic and the end-systolic phases with markers indicate how the endocardial and the epicardial borders of these sections were traced.

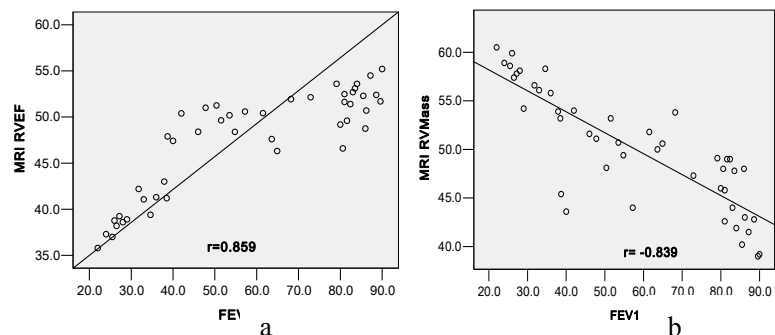


Fig. 2. (a) The relationship between the measurements of the RVEF by MRI and FEV1, with the correlation coefficient of 0.859. (b) The relationship between the measurements of the RV mass by MRI and FEV1, with the correlation coefficient of -0.839.

Table 1. Right ventricular function measurements obtained using MRI

Parameter	control group (n=30)	Group I (n=16)	Group II (n=16)	Group III (n=14)
RV EDV (ml)	148.1±12.7	139.9±11.0	130.2±10.5†	107.6±9.3*
RV ESV (ml)	69.2±5.4	67.8±6.7	66.0±6.5	65.1±5.7
RV SV (ml)	78.9±11.7*	72.2±5.8*	64.8±5.7†	42.4±4.6*
RV EF (%)	53.2±1.8	51.6±2.2	49.8±2.0†	39.4±2.1*
RV MM (g)	40.1±3.8*	44.2±3.5*	49.6±3.2*	57.1±2.2*

†: $P < 0.01$, vs control group, *: Significant differences among the four groups, One-way ANOVA was applied for multiple testing to evaluate the difference among the four groups, and the differences were considered significant at the $p < 0.05$ level.