P889

Clinical significance of four-dimensional flow magnetic resonance imaging measurement of turbulent kinetic energy for hypertrophic obstructive cardiomyopathy

J. Matsuda[1], H. Takano[2], T. Sekine[3], H. Sangen[1], Y. Kubota[2], Y. Imori[2], J. Nakata[1], Y. Saiki[2], H. Miyachi[2], S. Tara[1], Y. Hosokawa[1], Y. Tokita[2], T. Yamamoto[1], S. Kumita[3], W. Shimizu[2]

[1]Nippon Medical School, Cardiovascular Intensive Care, Tokyo, Japan; [2]Nippon Medical School, Cardiovasculer medicine, Tokyo, Japan; [3]Nippon Medical School, Radiology, Tokyo, Japan

Four-dimensional flow magnetic resonance imaging (4D flow MRI) provides the detailed visualization of complex blood flow patterns and the evaluation of energy loss. Turbulent kinetic energy estimation (TKE) is reported to have good correlation with irreversible pressure loss in patients having aortic stenosis or great vessel disease. However, little is known about the usefulness of 4D flow MRI and the significance of TKE value in hypertrophic cardiomyopathy (HCM).

Purpose: The aims of this study were to investigate the relationship between TKE value and echocardiographic findings, clinical symptoms and evaluate the usefulness of 4D flow MRI to distinguish hypertrophic obstructive cardiomyopathy (HOCM) from non-obstructive HCM (HNCM).

Methods: From April 2018 to January 2019, 18 hypertrophic obstructive cardiomyopathy (HOCM) and 14 non-obstructive HCM (HNCM) patients underwent 4D flow MRI. We investigated TKE value calculated by 4D flow MRI, echocardiographic findings; left ventricular pressure gradient (LVPG), mitral regurgitation (MR) and clinical symptom.

Results: HOCM was defined by the 30 mmHg or greater of LVPG (HOCM: 87.7±47.3 mmHg, HNCM; 5.8±7.8 mmHg, $p<0.001$). TKE value in HOCM patients was significantly higher than HNCM (14.2±4.7 mJ vs. 9.0±4.6 mJ, $p<0.001$). There was a significant positive linear relationship between TKE value and LVPG ($r=0.488$, $p=0.046$). There was no significant relationship between NYHA functional class and TKE value ($p=0.47$) or LVPG ($p=0.11$). ROC curve analysis showed that optimal cut off point of TKE value between HOCM and HNCM (sensitivity=95%, specificity=62%, AUC=0.798) was 9.270 mJ. Multiple linear regression showed that there was significant association between severity of MR and combination of TKE ($p=0.015$) or LVPG ($p-=0.012$). A representative case demonstrated the significant reduction of TKE value 1 week and 3 months after alcohol septal reduction compared with that obtained before the procedure (Figure)

Conclusion: Our findings suggest that 4D Flow MRI can effectively evaluate the energy dissipation associated with LV outflow tract obstruction and TKE value is useful for identifying HOCM. TKE value also can be the novel parameter of the severity of HOCM.