Myocardial tissue characterization and strain analysis in healthy pregnant women using cardiovascular magnetic resonance native T1 mapping and feature tracking technique

Background
Peripartum cardiomyopathy is a life-threatening condition that occurs during the peripartum period in previously healthy women. Cardiovascular magnetic resonance (CMR) T1 mapping permits sensitive detection of tissue edema and fibrosis, and it may be useful in identifying altered myocardial tissue characteristics in peripartum cardiomyopathy. However, left ventricular (LV) volumes and mass increase considerably even in normal pregnancy, and it is not known whether altered tissue characteristics can be found in normal pregnancy. The aim of this study was to investigate whether the LV remodeling observed in normal pregnancy is associated with altered tissue characteristics determined by CMR.

Methods
Twelve normal pregnant women and 15 non pregnant women underwent cine CMR and myocardial T1 measurement at 1.5 T. Pregnant women were scanned three times, in the 2nd and 3rd trimesters of pregnancy and at 1 month postpartum. LV volumes, LV mass (LVM), and global longitudinal strain (GLS) were analyzed by cine CMR. Native myocardial T1 was determined using modified Look-Locker inversion recovery (MOLLI) images.

Results
LV end-diastolic volume (EDV) was significantly greater in the 3rd trimester (126±22 mL) than in nonpregnant women (108±14 mL, p<0.05). LVM was significantly greater in the 3rd trimester (88.7±11.8 g) than at 1 month postpartum (70.0±9.8 g, p<0.05) and in non-pregnant women (66.3±13.9 g, p<0.05). Myocardial native T1 among the 2nd and 3rd trimesters, 1
month postpartum, and non-pregnant women were similar (1133±55 ms, 1138±86 ms, 1105±45 ms, and 1129±52 ms, respectively, p=0.59) as were GLS (-19.5±1.8, -19.7±2.2, -19.0%±2.0%, and -19.3%±1.9%, respectively, p=0.66).

Conclusions:
LV remodeling during normal pregnancy is associated with myocardial hypertrophy, but not with edema or diffuse fibrosis of the myocardium or LV contractile dysfunction. These results observed in normal pregnancy will serve as an important basis for identifying myocardial abnormalities in patients with peripartum cardiomyopathy and other pregnancy-related myocardial diseases.

以上、本論文は、正常妊娠で起きる左室心筋肥大が心筋細胞間質の浮腫やびまん性線維化ではなく心筋細胞の肥大であり、心機能低下を伴わない病理的変化と考えられることを、心臓MRIを用いて初めて明らかにした。本研究結果は、今後、妊娠期心筋症や妊娠中に起こる心筋疾患の病態解明、診断、予後予測に重要な知見として寄与するものであり、学術上極めて有益であり、学位論文として価値あるものと認めた。

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