Ventricular functional and morphologic features in heart failure patients: CMR study

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Introduction
Heart failure (HF) is a complex condition, representing the end point of many heart diseases. Cardiovascular magnetic resonance (CMR), despite gold standard ventricular function and volumetric evaluation, has a role in the non-invasive cardiac morphology assessment. In addition, some studies show that dysfunction of the left ventricle (LV) could affect function of the right ventricle (RV) and the CMR is the most robust technique to evaluate RV.

Objective
To determine interaction between RV and LV and to compare RV functional parameters with type of late gadolinium enhancement in patients with HF with reduced LV EF.

Methods
A retrospective study enrolled 50 patients with left-sided HF (severely reduced LV EF<35%) referred to CMR for HF origin evaluation form 2012 to 2017 in the Hospital of Lithuanian University of Health Sciences Kaunas Clinics. End-diastolic volume (EDV), End-systolic volume (ESV) and EF of the ventricles were calculated in standard cine images using MR analysis software system (Figure 1).

Late gadolinium enhancement (LGE) assessed. According to LGE pattern patient were divided into four groups: ischemic, non-ischemic, mixed and without LGE (Figure 2).

Results
• CMR measures were as follow: mean RVEF 34.12±14.11%, RVEDVI 81.28±21.66ml/m², RVESVI 55.42±23.39ml/m², LVEF 23.54±6.45%, LVEDVI 154.85±49.07ml/m², LVESVI 120.03±44.47ml/m².
• There were found significant correlations between CMR based RV and LV parameters (Figure 3).
• LGE was found in 39 (78%) patients (32% ischemic, 30% non-ischemic and 16% - mixed origin of LGE).
• The mean RVEF was decreased, RVEDVI and RVESVI were increased in ischemic, non-ischemic and mixed LGE pattern groups, but had no significant differences between these groups (Figure 4).

Conclusions
Evaluation of the RV performance represents that it is often affected in LV HF patients. CMR RV parameters demonstrate significant relation with LV HF.

There were no statistically significant differences of RV volumes and EF between ischemic, non-ischemic and combined types of LGE in analyzed sample, although tendency of RV larger volumes in non-ischemic LGE type was observed.

Key words
Cardiac magnetic resonance, late gadolinium enhancement, heart failure, right ventricle.