Familial WPW and hypertrophic cardiomyopathy caused by PRKAG2 mutations: cardiac MRI and electrophysiology findings

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Introduction The rare combination of familial WPW and hypertrophic cardiomyopathy (HCM) is caused by dominantly inherited PRKAG2 gene mutations. In contrast to HCM-causing sarcomere disorders, the phenotype is caused by accumulating intracellular glycogen. Multiple accessory pathways and AV conduction problems are common electrical manifestations.

Methods Cardiac MRI was performed in two families with PRKAG2 gene carriers. Segmental analysis of left and right ventricular hypertrophy, function, and late gadolinium enhancement (LGE) was performed. The electrophysiological findings were assessed.

Results Of 8 patients, 7 had PRKAG2 mutations, R302Q or R344P. Six patients underwent cardiac MRI. Two symptomatic R302Q patients with palpitations and decreased exercise capacity had significantly elevated left ventricular (LV) mass in a symmetric pattern (picture 1). Midventricular myocardium was most frequently hypertrophied. Four (three R302Q: age 26, 24, and 19 years; one R344P, age 17 years) had normal LV mass but asymmetrical hypertrophy of mid-inferolateral or mid-inferior segments. Only the two symptomatic mutation carriers had left ventricular LGE, with 11.2% and 21.9% enhancement of total LV muscle volume.

Three patients had pacemakers, one for bradycardia due to sinus node disease at 15 years of age and two for AV block at 32 and 25 years. Two patients had WPW. They had para-His accessory pathways (APs) with benign antegrade conduction properties and in each of them left sided APs were treated with RF-ablation: a left anterolateral AP in both and a left posteroseptal AP in the other one with multiple APs. The latter had a very fast (290 bpm) SVT utilizing the two left sided APs. In addition, one patient had only retrogradely conducting left-sided AP.

Conclusions Asymptomatic PRKAG2 patients show eccentric distribution of LVH involving mid-inferolateral parts. In symptomatic patients LVH showed symmetric pattern involving the whole left ventricle myocardium, but the thickest in septum. Cardiac MRI is useful in diagnostics of rare metabolic cardiomyopathies like PRKAG2. These patients need life-long follow-up, not only for HCM, but also for various electrophysiological abnormalities.

Picture 1