A retrospective study of cardiomyopathy in children and adolescents: etiology and function of oxidative phosphorylation (oxphos)

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Introduction: Cardiomyopathy (CMP), a heterogeneous group of myocardial disorders, is rare in children but involves a high mortality rate. The etiology is divers and often hereditary. The main causes are isolated mutations, neuromuscular dysfunctions, malformation syndromes and metabolic disorders. The severity and familial recurrence of CMP highlights the importance of genetic knowledge and consequent prenatal diagnostics. The aim of this study is to describe patients with CMP followed at the pediatric cardiology department of Ghent University Hospital (UZG) with special attention for the clinical and laboratory characteristics of mitochondrial disease.

Methods: A retrospective study in children and adolescents with CMP, followed between 2003-2011 in the UZG, with registration of clinical presentation, diagnostic results, etiology (if known) and treatment. Based on a literature study, criteria that raise the suspicion of underlying defects in oxidative phosphorylation (oxphos), were described.

Results: Between 2003 and 2011, 66 patients with CMP were followed (40 boys, 26 girls), diagnosed with CMP between 1984 and 2011. Eighteen patients died at a median age 10 months (ranging from 6 days to 13.6 years). At the time of the study in 2011, the age of the surviving patients varied between 15 months and 29 years (median age 11.9 years). Hypertrophic cardiomyopathy (HCM) was diagnosed in 32 patients (48.5%) and dilated cardiomyopathy (DCM) in 27 (41%). The remaining 10% showed a restrictive or other non-classified form of CMP (4 left ventricular non-compaction, 1 takotsubo cardiomyopathy and 1 atypical right ventricular cardiomyopathy). Etiology was known in 50% of the patients and was divided into genetic (25/33) and non-genetic (8/33) causes. Genetic etiology consisted of isolated mutations (8/25, 32%), neuromuscular syndromes (3/25, 12%), malformation syndromes (3/25, 12%) and metabolic pathology (11/25, 44%). In 64% (7/11) of the metabolic cases, CMP was caused by was a respiratory chain defect. After implementation of the criteria for oxphos defects in the group with unknown origin, more elaborated metabolic examinations were recommended in 13 more patients.

Conclusion: Presentation and etiology of CMP in children is heterogeneous. Deficiency in oxphos-mechanism are relatively frequent. In our study population these disorders are probably under diagnosed.