

Risk factors for heart failure-related deaths in childhood hypertrophic cardiomyopathy

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BACKGROUND A number of researchers have studied risk-factors for sudden death in paediatric hypertrophic cardiomyopathy (paedHCM), but considerably less is known about risk-factors for heart-failure related death in paedHCM.

PATIENTS AND METHODS A Swedish national cohort consisting of patients with paedCM presenting at age <19 years was assembled from all Pediatric Cardiology Centres in Sweden. There were 152 patients, mean follow-up 10.8yrs, in 26% associated with Noonan-spectrum syndrome. 15 patients who died from heart failure were identified; nine in infancy and six died in their teens or later, often with dilating left ventricle. Univariate and multivariate Cox-hazard regression have been used to identify risk-factors for heart-failure related death (CCF-death).

RESULTS Patients with CCF-death were diagnosed at a young age, 0.10 yrs [median; IQR 0.006-6.0], had generalized left ventricular (LV) hypertrophy with a high LV wall-to-cavity ratio both early (0.46 [0.31-0.57]), and at latest follow-up (0.57 [0.33-0.65]). Left atrium-to aortic (LA:ao) ratio was increased already early 1.72 [1.55-1.84]. 83% had definite or probable Noonan-spectrum syndrome, over-represented both in early and late deaths. LV outflow obstruction at rest (LVOTr) was present in 83%, and in addition in the right ventricular outflow (RVOTr) in 55%. On ECG 12-lead amplitude-times-duration product and ECG risk score were high already at diagnosis 3.51 [2.11-3.71] mV.s and 7 [6-10] points respectively. Risk factors significant on univariate analysis were: diagnosis at young age ($p=0.010$), co-existing Noonan-spectrum syndrome ($p=0.004$), left-ventricular wall-to-cavity ratio (early: $p=0.003$; late: $p<0.001$), increased posterior LV-wall thickness Z-score ($p<0.001$), LV outflow-tract obstruction at rest (LVOTOr; $p<0.001$), RVOTOr ($p<0.001$), and LA:ao ratio at late follow-up ($p<0.001$), initial 12-lead product ($p=0.005$), and initial ($p=0.025$) and final ($p=0.016$) ECG risk score. On multivariate analysis many, including Noonan-syndrome, are shown to be linked to LVOTOr, leaving as independent risk factors: RVOTr ($p=0.013$), LVOTOr ($p=0.048$) and late LA:ao ratio ($p=0.017$). Furthermore the only therapy that significantly reduced the risk for CCF-death on multivariate analysis was beta-blocker therapy ($p=0.030$), whereas calcium-blocker therapy had no significant effect ($p=0.313$).

CONCLUSIONS Patients at high risk of CCF-death can be identified early, and outflow obstruction should be treated vigorously. Treatment should include beta-blockers rather than calcium-blockers.