

Can cardiac recovery in chronic myocarditis be influenced by training during LVAD support?

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Introduction (or Basis or Objectives): 6 months old patient with massively impaired left ventricular function: EF 35% [ejection fraction] LVEDD [left ventricular enddiastolic diameter] 44mm -2SD, VTI [velocity time integral] aortal <Pc 3, Speckle-tracking [ST] longitudinal strain [GLS] 4Ch -6,5%, 2Ch -6,4%). Biopsy revealed histological diagnosis of dilative cardiomyopathy, DD chronic myocarditis. Genetic testing was performed for known cardiomyopathy encoding genes. LVAD- Berlin Heart (BH, left ventricular assist device) implantation 2 days after admission. A weaning plan including cardiac muscle training was carried out over 14 weeks.

Methods: Follow up using clinical and echocardiographic data (ST, VTI and 3D-echocardiographic enddiastolic – [LVEDV], endsystolic-[LV-ESV], stroke-volumes [LV-SV] and EF). Cardiac muscle training for 2 hours/day with reduction of the BH to 55/min for 3 weeks (phase A), extension to 4 hours/day for 2 weeks (phase B) and complete reduction to 55/min for 9 weeks (phase C). In the phase D: pump stop 30 minutes once per week under additional heparin bolus.

Measurements phase D	Pump on	Pump off 15 min	Pump off 30 min
Heart Rate/min	100	118	118
VTI pulmonal (cm)	15	16	16
VTI aortal (cm)	16	20	20
LVEDV (ml/m ²)	79		76
LV-SV (ml)	18		15
EF %	44		50
GLS4CH %	-11	-10	-12
GLS2CH %	-10	-10	-15

Results: The first reduction of pump resulted in LV dilatation and increasing mitral incompetence. The training (phase A) was carried on and revealed an improvement of ST from -8% (GLS 2C) and -10%(GLS 4C) to -13% and respectively -11%. The VTI's were initially between Pc. 3-10 and increased to Pc 10. Phase B showed at the beginning an increase of the LVEDV from 55ml/m² to 57ml/m². Afterwards it remained constant with 59ml/m² as well as VTI (10.Pc) and EF (35%). During pump stop, we assessed an increase of the VTI's and EF and (last test in the attached Table). Final hemodynamic testing in the cath. lab: BH50/min: CI (cardiac index) 4,1ml/m²/min, CVS (central venous saturation) 60%, LVEDP (left ventricular enddiastolic pressure) 8mmHg, Off BH 30 minutes: CI 3,6ml/m²/min, CVS 58%, LVEDP 10mmHg. The explantation of the device was successful.

Conclusions: Training of impaired cardiac muscle under LVAD in children with not acute myocarditis may be a possibility to prevent the direct way as bridge to transplant in selected patients. New echocardiographic tools may help assess improvement of function with impact on prognosis.

