

Exercise capacity in children with isolated congenital complete atrioventricular block: does pacing make a difference?

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Introduction: The management of patients with isolated congenital complete atrioventricular block (CCAVB) has changed during the last decennia. In the past a minority of patients was paced. The current policy is to pace the majority of patients based on a variety of criteria among which a limited exercise capacity.

Data regarding exercise capacity in this population stems from old publications reporting small case series of unpaced patients. Exercise capacity is an important factor in performing age-appropriate physical activities and future health. Therefore we investigated the exercise capacity of a group of contemporary children with CCAVB.

Methods: Sixteen children (mean age 11.5 ± 4 ; 7 boys, 9 girls) with CCAVB were tested. In 13 patients a median number of 3 pacemakers were implanted, while in 3 patients no pacemaker was given. All patients had an echocardiogram and completed a cardiopulmonary cycle exercise test (CPET). Exercise parameters were determined and compared with reference values of healthy Dutch peers.

Results:

Variable	CCAVB Group (n= 16)	Paced Group (n=13)	Unpaced Group (n=3)
Left ventricular end diastolic diameter % predicted	110 ± 10	108 ± 10	117 ± 11
Left ventricular dysfunction	2 patients (13%)	2 patients	0 patient
Interventricular dyssynchrony	8 patients (50%)	8 patients	0 patient
Intraventricular dyssynchrony	1 patient (6%)	1 patient	0 patient
Rest heart rate (HR) in bpm	73 ± 13	77 ± 10	53 ± 2
Peak HR in bpm (% predicted)	$135 \pm 37 (70 \pm 19)^*$	$139 \pm 35 (72 \pm 18)$	$117 \pm 48 (60 \pm 25)$
Upper rate behavior (paced patients)	4 patients (25%)	4 patients	n.a.
Peak RER	$1,13 \pm 0,11$	$1,15 \pm 0,12$	$1,06 \pm 0,01$
Peak work load/kg in W/kg (% predicted)	$2,8 \pm 0,6 (91 \pm 24)$	$2,8 \pm 0,6 (87 \pm 23)$	$3,3 \pm 0,2 (112 \pm 11)$
VO_{2peak} /kg in ml/kg/min (% predicted)	$34,4 \pm 9,5 (79 \pm 24)^*$	$33,0 \pm 9,5 (75 \pm 24)$	$40,5 \pm 8,3 (93 \pm 22)$
VAT % predicted	$78 \pm 21^*$	79 ± 22	73 ± 15
Peak O2 pulse in ml/beat (% predicted)	$10,4 \pm 5,1 (111 \pm 56)$	$10,8 \pm 5,6 (98 \pm 31)$	$8,6 \pm 1,7 (170 \pm 106)$
VE/VCO2 slope (% predicted)	$33,3 \pm 6,6 (108 \pm 17)$	$31,8 \pm 6,3 (105 \pm 18)$	$40,0 \pm 1,8 (121 \pm 2)$
OUES slope (% predicted)	$1424 \pm 510 (92 \pm 39)$	$1513 \pm 528 (81 \pm 23)$	$1034 \pm 57 (141 \pm 60)$

*significantly different from normal ($p < 0,05$)

Conclusions: Children with CCAVB have a significantly reduced exercise capacity compared to healthy peers. Interestingly paced patients did not perform better than unpaced patients. A significant percentage of paced patients showed upper rate behavior of the pacemaker. These results show that CPET can be a valuable tool in detecting suboptimal pacemaker programming.