Hôpitaux de Lyon

Université Claude Bernard Lyon 1

CARDIOLOGIE PEDIATRIQUE ET CONGENITALE DE L'ADULTE

Hôpital Cardiologique de LYON

Age impacts on Outcomes of Children on Mechanical Ventricular Support

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ABSTRACT

The aims of this study are to report the first largest French experience with ventricular assist device (VAD) in children and assess the influence of age on outcomes.

Material and methods: From 2005 to 2010, 16 patients aged <18 years, needed pulsatile ventricular mechanical support at Lyon University Medical Center. Clinical data, echocardiographic records and outcomes were reviewed.

Results: Seven females and 9 males, aged 0.3 to 16 years (med 2.3), were implanted with ulsatile VAD (≤2years: 8 and >2years: 8): 6 with left ventricular support and 10 biventricular, for either cardiogenic shock with cardiac arrest in 4, or uncontrolled low cardiac output in 12. Underlying cardiac diseases included: 14 dilated cardiomyopathies, 1 acute myocarditis and 1 post-ischemic. Median hospital stay prior to implantation was 13days. Seven of 8 patients ≤2years (87.5%) and 50% of those >2years were on mechanical ventilation prior to assistance (p= 0.10). Duration of support was 6 to 125days (med 37). Eleven patients were extubated while on support (68.7%). Five infants, all < 18 months of age, experienced stroke due to cerebral embolia (30%), 3 had an hemorragic complication. Four patients died on support (25%), at 8th, 23rd, 60th and 108th day, from sepsis, multivisceral embolia, hemorrhage and canula rupture respectively, from those 3 ranged in the youngest group. Two patients were successfully weaned off support at 19th and 37th day (12.5%), 10 underwent heart transplantation (62.5%).

Conclusion: Although the thrombo-embolic risk and mortality on support are significantly higher in patients less than 2years of age, our experience of pulsatile VAD in children shows overall survival rates of 75%.

BACKGROUND

Mechanical ventricular support (ventricular assist device : VAD) can provide hemodynamic support in children with end-stage uncontrolled heart failure due to ventricular pump dysfunction, either to wait for recovery or as a bridge to heart transplantation.

The aim of this study was to review the largest French experience with VAD in the pediatric population to assess outcomes and prognosis.

MATERIAL and METHODS

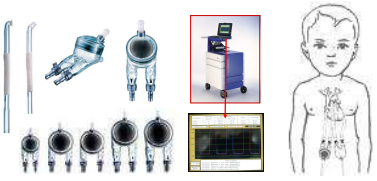
From 2005 to 2010

Patients less than 18 years of age at implantation

Pulsatile mechanical ventricular assist device with: Berlin Heart Excor® or Thoratec®

Retrospective review of: demographic, clinical, echocardiographic, biological data and outcomes

Patients were divided in 2 groups according to age at the time of VAD implantation : ≤ 2 years and > 2 years , to compare outcomes and prognosis



RESULTS

N= 16, 7F / 9M

Age : 0.3 to 16y, median 2.3y

Groups of age

≥ 2years = 8 cases
> 2years = 8 cases

Type of support

LV support (LVAD) : 6

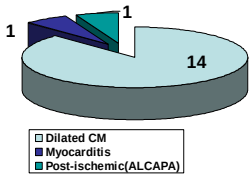
RV + LV support (BIVAD) : 10

Indication

Cardiogenic shock/arrest : 4

Uncontrolled low CO : 12

Underlying cardiac disease

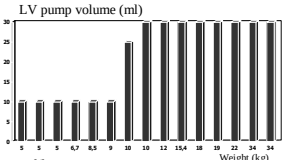


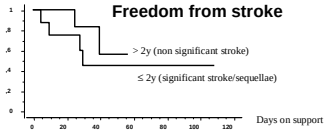
Pre-VAD status

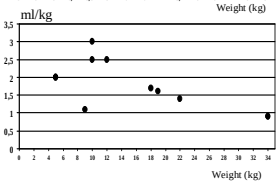
Variable	Mean	SD	Min/Max	Median
LVEF %	20.7	7	8 / 30	20.5
LVSF %	13.2	4.5	4 / 23	12.5
VTI (cm)	7.7	2.1	3 / 11	8
Creatinemia (µM/l)	69.4	28.3	35 / 119	62.5
Bilirubinemia (mM/l)	22.9	22.5	6 / 85	13
Prothrombin Time %	51.2	14.5	32 / 80	49
Factor V %	61.6	26.4	16 / 100	62
pH	7.40	0.1	7.30 / 7.50	7.40
Lactates mM/l	**3.1**	**2.9**	**0.8 / 11**	**2**
SvO2 %	**39.6**	**14.3**	**28.6 / 68**	**34.5**

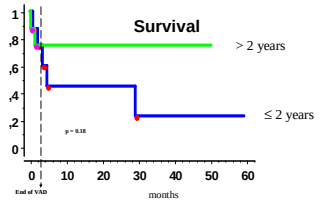
Outcomes

	Total (N= 16)	Group ≤ 2 years (N= 8)	Group > 2 years (N= 8)	p
Inotrope support on VAD	8.4 ± 8.2 d (med: 7)	8.6 ± 4.5 d (med: 7)	8.1 ± 11.3 d (med: 6)	0.92
MVS on VAD	10 ± 9.5 d (med: 7)	11.6 ± 11.1 d (med: 7)	8.5 ± 8.6 d (med: 6)	0.54
NO : 8 patients	8.5 ± 8.5 d(med 6.5)	4.7 ± 2.2 d(med 5)	12.2 ± 11.3 d(med 8)	0.24
Extubation on VAD	11 (68.7%)	4 (50%)	7 (87.5%)	0.1
Significant TE event	4 (25%)	4 (50%)	0 (0%)	0.02
Infection	10 (62.5%)	3 (37.5%)	7 (87.5%)	0.03
Weaned off	2 (12.5%)	1 (12.5%)	1 (12.5%)	0.9
Transplanted	10 (62.5%)	4 (50%)	6 (75%)	0.20
VAD change	5 (31 .2%)	4 (50%)	1 (12.5%)	0.1
Duration of VAD (days)	42.8 ± 33.4 (med: 37)	46.8 ± 34.8 (med: 37)	43.8 ± 34.3 (med: 36)	0.87
Death on VAD	4 (25%)	3 (37.5%)	1 (12.5%)	0.18
Overall outcome (death)	7 (46.7%)	5 (62.5%)	2 (25%)	0.07









CONCLUSION

Although the thrombo-embolic risk and mortality on support are significantly higher in patients less than 2 years of age, our experience of pulsatile VAD in children shows overall survival rates of 75%.

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