

# Is Low-rpm a Risk Factor for Pump Thrombosis in Pediatric Patients with HeartWare HVAD?

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## INTRODUCTION

Use of HeartWare HVAD has grown rapidly in the last few years in pediatric patients with end-stage heart failure. HVAD can be used in children as small as 0.7 m' [1]. During VAD support continuous contact between circulating blood and the foreign surface shifts to a hyper-coagulant state. The rotor diameter for centrifugal devices is larger, flow created at lower rotational speeds creating less shear stress. The shear stress can cause damage to circulating blood cells and hemostatic proteins. At low rpm rates pump thrombosis (PT) event may be encountered. There are some age related differences with regards to levels of hemostatic proteins, fibrinolysis and inhibitors of coagulation [2], anticoagulation management in pediatric patients cannot be extrapolated from adult guidelines. The optimal antithrombotic strategy for children with HVAD is unknown. Currently, the pediatric patients are treated with the same anticoagulant and antiplatelet agents used in adults.

## OBJECTIVES

In this study, the effect of pump speeds on PT at different rpm between adult and pediatric patients with HVAD was investigated.

	Group A (n=10)	Group B (n=32)	p value
<b>Age (years)</b>	9.6±3.84	42.19±13.08	<b>&lt;0.001</b>
<b>Gender (male)</b>	3/10 (30%)	28/32 (87.5%)	<b>&lt;0.001</b>
<b>rpm</b>	2200±224.5	2496.88±120.44	<b>&lt;0.001</b>

## METHODS

Sixty patients that underwent isolated LVAD implantation with HVAD between May 2013 and July 2017 were included in this study. Of these patients, 13 were excluded due to early postoperative death and five were excluded due to early successful bridging to transplant (first two months). The remaining 42 patients were divided into two groups; Group A (32/42) included adult patients with higher rpm rates, whereas group B (10/42) had patients under 18 years of age with lower rpm rates. After third month of outpatient follow-up, rpm values of all patients were recorded and the effect of these values on PT was investigated, outcomes were compared between these two groups.

## RESULTS

PT were detected in nine patients in Group A, and three in Group B, these rates were similar ( $p>0.05$ ). Pump exchange were performed only in one patient in Group A and one another in Group B. All other patients were treated medically with tPA administration. Four patients were successfully treated medically in Group A, whereas remaining four patients and all patients in Group B needed a heart transplant due to inefficient thrombolysis by tPA administration. Group A and group B had a significant difference in terms of pump speeds ( $p<0.001$ ). This significant difference in rpm was found to have no effect on PT. PT did not correlate with rpm according to Spearman test ( $r=-0.070$ ,  $p=0.659$ ). Multi-variant logistic regression tests revealed that gender, age and rpm were not a predictor for PT.

	Group A (n=10)	Group B (n=32)	p value
<b>PT</b>	3/10 (30%)	9/32 (28.1%)	0.909
<b>CVA</b>	0	5/26	0.293
<b>GI bleeding</b>	0	1/26	1

Treatment For PT	Group A (n=10)	Group B (n=32)	p value
<b>Trombolysis</b>	0	4 (44.4%)	0.329
<b>TX</b>	2 (66.7%)	4 (44.4%)	
<b>Pump exchange</b>	1 (33.3%)	1 (11.1%)	

## CONCLUSION

An optimal antithrombotic treatment regimen to minimize PT for children has not been established. It was found that lower pump speeds had no effect on the PT. We may also suggest that, pump rotating at low speeds is at least as safe as high speeds in adults.

## REFERENCES

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