

Argatroban versus heparin for the treatment of pump thrombosis in patients with ventricular assist device

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Background/Introduction: Pump thrombosis (PT) is a major complication from ventricular assist device (VAD) and the best therapy remains unknown. The diagnosis of PT is challenging and, based on the ISHLT (International Society of Heart and Lung Transplantation) guidelines, consists of signs of hemolysis and impaired pump function.

Purpose: We aimed to compare the outcomes of PT treated with continuous infusion of argatroban (ARG) versus heparin.

Methods: This is a retrospective cohort study including patients >15 years-old with VAD implanted between 2009 and 2017 and who developed PT during follow up. PT events were managed with ARG or heparin based on physician preference at our institution, and patients were grouped based on the anticoagulation treatment received. Variables of interest were survival at 1, 3 and 5 years, stroke, right heart failure (RHF), infection, laboratory data and VAD parameters before and after anticoagulation treatment, baseline characteristics and comorbidities. We used Chi-square test to analyze categorical data and the Wilcoxon signed rank test for continuous data in related samples to compare laboratory and VAD parameters pre and post anticoagulation in both groups. Kaplan Meier survival analysis was performed using the log rank statistics. Non-parametric results were reported as median and interquartile range (IQR). A 95% confidence interval (CI) was adopted.

Results: There were 193 VADs implanted in 170 patients. Of those, 30

patients had 47 episodes of PT, 34 treated with ARG and 13 with heparin. Of patients with PT, 73% had a HeartMate II and 27% had a HeartWare device, the median age at implantation was 48 years old (IQR 40.2, 60.2) and 90% were males; African Americans were 50%, followed by Hispanics (30%) and Caucasians (20%). The median follow-up was 2.5 years (IQR 1, 3.4). In the ARG group, there was a statistically significant reduction at the time of discharge in LDH ($p<0.001$), AST ($p<0.001$), total bilirubin ($p=0.001$), platelet count ($p=0.046$), VAD flow ($p=0.011$) and VAD power ($p=0.004$) compared with admission parameters, while no statistically significant change was present in the heparin group. ARG led to a numerically higher, but not statistically significant, survival when compared with heparin (53% vs 38%, $p=0.237$). One-year, 3-year and 5-year survival were not significantly different between anticoagulation strategies ($p=0.23$, $p=0.9$ and $p=0.89$, respectively). There was no difference in the number of VAD re-implants, RHF, stroke or infection between groups.

Conclusions: ARG therapy led to a statistically significant improvement in hemolysis parameters and pump function when compared to heparin therapy for PT in VAD recipients, but no survival benefit was demonstrated, which could be due to the small sample size. Other limitations were the retrospective and non-randomized data. ARG therapy must be tested in larger trials to confirm its benefits for PT.