Effect of an Institutional Protocol for Gastrointestinal Bleeding in Left Ventricular Assist Device Patients

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Purpose: Gastrointestinal (GI) bleeding in patients with left ventricular assist devices (LVADs) is a common problem. We implemented an institutional GI bleeding protocol for the management of these patients to determine if a systematic approach to this problem would result in improved outcomes.

Methods: We conducted a retrospective cohort study by reviewing our institutional experience with GI bleeds in LVAD patients between October 2010 and December 2014. In January 2013, an institutional GI bleeding protocol was initiated to systematically approach the diagnosis and treatment of these events. We compared the frequency of GI bleeds, the rate of interventions such as endoscopy and colonoscopy, and the use of resources such as transfusion of packed red blood cells for patients before (BP) and after (AP) the initiation of the protocol. Standard statistical methods were utilized.

Results: During the study period, 43 patients were readmitted with 90 GI bleeds. The BP group consisted of 16 patients with 38 bleeds, while the AP group consisted of 27 patients with 52 bleeds. There were no differences between the groups with regard to age, gender, device type, or history of GI bleeding prior to LVAD implantation. The BP group had 2.37 ± 1.41 bleeds/patient compared with 1.93 ± 1.49 bleeds/patient in the AP group (p = 0.336). After protocol initiation, the number of esophageagastroduodenoscopies (EGDs)/bleed increased (0.68 ± 0.66 vs. 1.10 ± 0.82, p = 0.013), while the number of colonoscopies, capsule studies, push EGDs, and units of blood transfused was not different. Tagged red blood studies/bleed decreased after the initiation of the protocol (0.32 ± 0.53 vs. 0.02 ± 0.14, p = 0.002), as did the number of angiograms/bleed (0.18 ± 0.46 vs. 0 ± 0, p = 0.017).

Conclusion: The initiation of a GI bleeding protocol led to a shift towards less resource intensive treatment modalities. Further patient accrual may lead to additional reduction in resource utilization, such as transfusion of red blood cells and patient admissions.

Severity of Hemolysis Is Associated with Death and Ischemic Stroke during Veno-Arterial Extracorporeal Membrane Support


Purpose: Hemolysis has emerged as a marker of adverse outcomes after CF LVAD placement, however, its impact during Veno-Arterial Extracorporeal Membrane (VA ECMO) support is uncertain.

Methods: A single center retrospective analysis of all adult patients placed on VA ECMO from May 2011 to September 2015 was conducted. Major demographics, ECMO characteristics and clinical outcomes including cerebrovascular accidents (CVAs) were retrieved. As a marker of hemolysis severity, the peak lactate dehydrogenase (LDH) level was collected during VA ECMO support. To analyze the impact of hemolysis on in-hospital mortality patients were categorized as survivors and non survivors.

Results: 111 patients underwent VA ECMO placement. The mean age was 57±14 years, 41 were female and 60 patients expired during VA ECMO. Both survivors and non survivors had similar distributions of major demographics and laboratory parameters except for baseline creatinine (survivors: 1.6±1.2 vs. non survivors: 2.4±1.7, p=0.003). The median peak LDH for survivors was lower at (771 (IQR: 456-1616) U/L in comparison to 1444 (IQR: 447-3080) U/L for non survivors (p=0.005, figure). Patients who eventually had an ischemic CVA (n=11) had a greater median peak LDH 1863 (IQR: 800-4014) U/L in comparison to those with no CVA 961 (IQR: 509-1710) U/L, p=0.039, figure.

Conclusion: Severity of hemolysis measured by LDH is a marker of higher mortality during VA ECMO and may predict onset of thrombotic complications such as ischemic CVA. Further studies are warranted on usage of hemolysis severity to guide VA ECMO management, including circuit exchange.

Speed Reduction Does Not Restore High Molecular Weight Von Willebrand Multimers during Heart Mate II Support: An In-Vivo Analysis

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Purpose: Acquired Von Willebrand Factor (vWF) deficiency due to the loss of high molecular weight multimers (HMMWs) has been well documented during CF LVAD support. It has been proposed that lowering pump speed in response to clinical gastrointestional bleeding (GIB) may decrease shear stress allowing for the return of HMMWs. In-vivo data supporting this practice is lacking.

Methods: Subjects at least 30 days post implantation of a Heart Mate (HM) II were prospectively recruited from the LVAD clinic. After confirming INR was >2.0, pump speed was decreased to 8000 rpm and maintained for 6 hours. Blood samples obtained at baseline and 6 hours were compared for 2 measures of acquired vWF deficiency: 1) the ristocetin cofactor activity to vWF antigen ratio (Rco:Ag) and 2) gel electrophoresis for vWF multimer distribution.

Results: Four patients agreed to participation. They were 57±15 years old, all were male and had been on HM II support for 401±199 days. All patients tolerated speed reduction without any adverse events. At baseline speed, HMMWs were reduced in all 4 patients. After 6 hours at 8000 rpm, there was no change in the HMW profile (Figure 1). Similarly, the Rco:Ag ratio was reduced (nl > 0.65) in 3 of 4 patients at baseline and did not significantly change after speed reduction (0.56 → 0.56, 0.74 → 0.67, 0.58 → 0.65, 0.47 → 0.45; p = 0.437).

Conclusion: Decreasing pump speed during HM II support does not lead to restoration of HMMW Von Willebrand multimers. These findings suggest there may be no benefit to speed reduction in response to GIB.