What's New in MCS

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Review:

Heart Mate II Left Ventricular Assist Device Geometry on Chest Radiograph Does Not Correlate with Risk of Pump Thrombosis. Han JJ1, Gaffey AC, Sooppan R, Hung G, Venkataraman C, Phillips E, Howard J, McLean R, Acker MA, Atluri P. ASAIO J. 2016 Mar-Apr;62(2):128-32. doi: 10.1097/MAT.0000000000000326.

Pump thrombosis is a well-known complication of continuous flow LVAD, which has been noted to be increasing in incidence in recent times. Previous studies, mainly single center experiences have noted that there is increased incidence of pump thrombosis related to the acute inflow cannula angles (ICA <55). This study evaluates the correlation between device geometry and incidence of Pump thrombosis at large volume center.

This study is retrospective analysis of patients with HMII LVAD implantation from 2011 to 2014 at University of Pennsylvania. Inflow cannula angle and Pump pocket depth were recorded at two time frames immediate postoperative period and prior to pump thrombosis. Inflow cannula angle was measured from inner margin of inflow cannula to inner margin of rotor. Pump pocket depth was defined as vertical distance from highest point of the diaphragm to the inner margin of the rotor.

A total of 90 patients were included in the study, out of which 16 patient (17.8%) patients developed pump thrombosis. Preoperative characteristics of the population were similar in both groups with mean age being 54-56 years of age, 75-78% male patients, approximately half of them were Caucasians and majority of them were non ischemic cardiomyopathy. The only differences were pump thrombosis cohort were higher hemoglobin and lower blood urea nitrogen levels. There was no statistical difference between pump thrombosis and non-pump thrombosis group patients in their initial inflow cannula angles (56.0° ± 10.1 vs. 54.6° ± 10.8, p = 0.63) and Pump pocket depth (86.7 ± 24.9 mm vs. 81.1 ± 32.2 mm, p = 0.46). Prediction of pump thrombosis using Inflow cannula angle and pump pocket depth by receiving operating characteristic was negative (area under curve (AUC) = 0.54 and 0.55, respectively). Changes in Heart Mate II geometry were measured over 112.5 (interquartile range = 34.3–337.3) days. A decrease in pump pocket depth was observed (p = 0.0001). Initial Inflow cannula angle was a significant predictor of future angle change and suggested a convergence toward the mean (55.4°) (analysis of variance p = 0.002). This however did not correlate with pump thrombosis. Also in patients with pump thrombosis – 25% of patients experienced a second episode of pump thrombosis after device exchange. Interestingly postoperative inflow cannula angle on second device was even more acute than baseline inflow cannula angle. Therefore the conclusion of the study was device geometry does not play a role in pump thrombosis.

Analysis: This study is first and largest study provides valuable insight in changes in device geometry through the course of VAD implantation and its impact on pump thrombosis. Of course as previously described pump thrombosis is usually multifactorial and it may be hard to pinpoint a sole reason for pump thrombosis in most patients. Main study limitations are it is a retrospective review of single center data in Heart Mate II patients. Its noteworthy the inflow cannula angle is lower compared to the prior

studies evaluating device geometry. Authors attribute this to the way inflow cannula angle is measured on the radiographs. The rate of pump thrombosis is much higher in this study cohort (17%) compared to anywhere from 2-8% in other studies. Also the rate of recurrent pump thrombosis was also higher in this cohort. More information regarding other factors contributing to prothrombotic state in these patients like time in therapeutic range for INR, any pump stoppage, infection, bleeding etc. would be helpful in characterizing other factors that may contribute to pump thrombosis. Nevertheless, further multicenter studies are required to evaluate the impact of change in device geometry on incidence of pump thrombosis.

Other articles of interest:

Journal of Cardiac Failure:

Impact of Annual Hospital Volume on Outcomes after Left Ventricular Assist Device (LVAD) Implantation in the Contemporary Era
Shah, Neeraj et al. Journal of Cardiac Failure, Volume 22, Issue 3, 232 – 237

AASIO:

Initial Experience of Transaortic Catheter Venting in Patients with Venoarterial Extracorporeal Membrane Oxygenation for Cardiogenic Shock
Hong, T. H., J. H. Byun, et al. (2016) ASAIO Journal 62(2): 117-122.

Surgical Technique to Facilitate Explantation of Mechanical Circulatory Support Devices: LVADs, BiVADs, and TAHs Before Heart Transplantation
Ihnken, K. A., D. Ramzy, et al. (2016) ASAIO Journal 62(2): 211-213.

Comparison of Anticoagulation Strategies After Left Ventricular Assist Device Implantation
Kantorovich, A., J. M. Fink, et al. (2016) ASAIO Journal 62(2): 123-127.

Journal of American College of Cardiology:
No articles.

Circulation:
No articles.

European Journal of Heart Failure:
No articles.