

What's New in MCS

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Journal of the American College of Cardiology

[Echocardiographic Evaluation of Hemodynamics in Patients With Systolic Heart Failure Supported by a Continuous-Flow LVAD.](#) Estep JD, Vivo RP, Krim SR, et al. Sep 23 2014; 64(12):1231-1241.

Non-invasive echocardiographic Doppler assessment of diastolic physiology has become a routine part of the imaging evaluation of heart failure. Outside of understanding diastolic properties of the myocardium, using tissue Doppler and under ECHO techniques we can estimate left ventricular end-diastolic pressure with reasonable accuracy. The utility of these diastolic / Doppler studies in CF-LVAD patients is unexplored.

The group from Houston Methodist enrolled 55 consecutive CF-LVAD patients who underwent simultaneous invasive right heart catheterization and echocardiography. They applied a variety of American Society of Echocardiography imaging techniques and divided their CF-LVAD patients into two groups based on the presence of an elevated invasive PCWP > 15mmHg or ≤ 15mmHg. The patients consisted of only Heartmate II patients with an average pump speed of 9,000rpm. Correlation analysis between echocardiographic parameters and a PCWP > 15, revealed a strong correlation for the non-invasively determined right atrial pressure, pulmonary arterial systolic pressure, left atrial volume index, E/A ratio and E/e'. Using these 5 parameters an echocardiographic screening algorithm is proposed for management of CF-LVAD patients with heart failure symptoms using echocardiography alone. The algorithm could be successfully applied to approximately 70% of their CF-LVAD patients and had an area under the curve for detecting elevated PCWP of 0.89.

Analysis:

As VAD therapy continues to grow worldwide and patients are increasingly being supported for years, not months, we are developing best practices for managing chronic VAD patients. Heart failure is one co-morbid condition that continues to affect some patients on CF-LVAD therapy. Detection of heart failure in VAD patients is often difficult and the Estep and colleague propose an algorithm using echocardiographic techniques that can be performed routinely in most ECHO labs to detect an elevated PCWP. The proposed algorithm when successfully applied had a strong predictive power for elevated PCWP, the limitation being that only ~70% of Heartmate II patients could have the imaging performed and parameters obtained to apply the algorithm to. Further, whether these imaging techniques can be

applied to centrifugal CF-LVADs like the Heartware HVAD is unclear. This HVAD has traditionally been harder to image due to Doppler artifact. Thus, while we wait for further studies to validate their findings a trip to the ECHO lab to begin to ask for these commonly performed parameters in your CF-LVAD patients seems appropriate.

ASAIO Journal

[Acoustic Spectral Analysis for Determining Pump Thrombosis in Rotary Blood Pumps](#). Kaufmann F, Hormandinger C, Stepanenko A, et al. Sep-Oct 2014;60(5):502-507.

There exists no in vivo manner to accurately detect intra-device thrombus within CF-LVADs. Clinically we use a variety of serum biomarkers, device parameters, non-invasive imaging techniques and patient exam / history findings to decide that a patient has device thrombosis. These patients are then subjected to the risk of augmented anti-coagulant and anti-platelet therapies and/or device exchange without an antecedent definitive diagnosis.

The Berlin group reports the use of an additional non-invasive modality, acoustic spectral analysis (essentially pump harmonics) to definitively diagnose device thrombosis in Heartware HVAD patients. By screening 105 patients with an acoustic recording device (essentially a stethoscope with built-in microphone attached to a PC for recording harmonics) they defined the acoustic spectrum for a normally operating HVAD. They then had an additional 8 patients with confirmed device thrombosis who also underwent acoustic spectral analysis prior to pump exchange. When comparing cases and controls they found that the device thrombosis patients had a 3rd harmonic sound which was unique and not obtained in control patients. The 3rd harmonic is hypothesized to occur due to eccentric rotation of the rotor caused by thrombus formation within pump.

Analysis:

Although the Berlin group has incorporated acoustic spectral analysis into the routine outpatient evaluation of HVAD patients, it is unclear whether this screening strategy can potentially detect early thrombus development. If this strategy is tested prospectively, perhaps it can detect a 3rd harmonic sound earlier and provide more lead-time before more critical device thrombosis ensues. How to apply this analysis to axial-flow devices will need to be studied as well.

Other Journals:

ASAIO Journal:

Ryerson LM, Bruce AK, Lequier L, Kuhle S, Massicotte MP, Bauman ME. [Administration of antithrombin concentrate in infants and children on extracorporeal life support improves anticoagulation efficacy](#). ASAIO J. Sep-Oct 2014;60(5):559-563.

Journal of Cardiac Failure:

No articles

Circulation Heart Failure:

Takayama H, Soni L, Kalesan B, et al. [Bridge-to-Decision Therapy With a Continuous-Flow External Ventricular Assist Device in Refractory Cardiogenic Shock of Various Causes](#). *Circulation. Heart failure*. Sep 2014;7(5):799-806.

The Journal of Thoracic and Cardiovascular Surgery:

Sabashnikov A, Popov AF, Bowles CT, et al. [Outcomes after implantation of partial-support left ventricular assist devices in inotropic-dependent patients: Do we still need full-support assist devices?](#) *The Journal of thoracic and cardiovascular surgery*. Sep 2014;148(3):1115-1121; discussion 1021-1112.

European Journal of Heart Failure:

No articles