What's New in MCS

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Reviews:

European Heart Journal

Schmidt M, Burrell A, Roberts L, Bailey M, Sheldrake J, Rycus PT, Hodgson C, Scheinkestel C, Cooper DJ, Thiagarajan RR, Brodie D, Pellegrino V, Pilcher D. ***Predicting survival after ECMO for refractory cardiogenic shock: the survival after veno-arterial-ECMO (SAVE)-score****. Eur Heart J. 2015 Sep 1;36(33):2246-56.*

Veno-arterial extracorporeal membrane oxygenation (VA-ECMO) provides mechanical circulatory support for patients with cardiogenic shock refractory to medical therapy waiting for cardiac function recovery, left ventricular assist device, or heart transplant. Despite advances in device quality and intensive care management, ECMO use is associated with a high risk of bleeding, infection, and short-term mortality (40–75%). Pre-ECMO factors may help predict in-hospital survival from refractory cardiogenic shock requiring ECMO.

This study included 3846 patients (mean age 54, 67% male) in the International Extracorporeal Life Support Organization registry with refractory cardiogenic shock treated by VA-ECMO between 1/2003 and 12/2013. The registry included data from 160 U. S. and 120 other international centers. Subjects' primary diagnoses were chronic heart failure (33%), acute myocardial infarction (29%), and valvular heart disease (17%). Patients with a primary diagnosis of respiratory failure and those who received ECMO during cardio-pulmonary resuscitation were excluded. After a mean of 100 hours of ECMO support, 1601 (42%) patients were alive at hospital discharge. Multivariable logistic regression was used to identify 13 variables assessed at the time of ECMO initiation and independently associated with hospital mortality, which were used to create the survival after veno-arterial ECMO (SAVE)-score. Older age, weight less than 76 kg or greater than 89 kg, congenital heart disease, chronic renal failure, longer duration of mechanical ventilation prior to ECMO initiation, pre-ECMO cardiac arrest, extracardiac organ failure, higher peak inspiratory pressure, and lower pulse pressure, diastolic pressure, or serum bicarbonate were risk factors associated with mortality. History of acute myocarditis, heart transplant, or refractory ventricular tachycardia/ fibrillation were protective. The SAVE-score (area under the receiver operating characteristics curve [AUROC] 0.68 [95% confidence interval [CI] 0.64–0.71]) was created using these risk factors. The SAVE-score was externally validated in 161 Australian patients who underwent VA-ECMO for refractory cardiogenic shock between 7/2006 and 12/2013 and showed excellent discrimination with AUROC = 0.90 (95% CI 0.85–0.95).

In conclusion, in this cohort the overall hospital mortality of cardiogenic shock patients was high, consistent with prior studies. The SAVE-score may potentially be used in cardiogenic shock patients

already receiving ECMO to predict hospital survival. This score has not been validated for predicting survival from cardiogenic shock when ECMO has not yet been initiated. Future prospective studies including cardiogenic shock patients not receiving ECMO are necessary to better assess the performance of the SAVE-score. An online calculator of the score is available at www.save-score.com with corresponding survival rates.

Journal of the American College of Cardiology: Heart Failure

Witman MA, Garten RS, Gifford JR, Groot HJ, Trinity JD, Stehlik J, Nativi JN, Selzman CH, Drakos SG, Richardson RS. ***Further Peripheral Vascular Dysfunction in Heart Failure Patients With a Continuous-Flow Left Ventricular Assist Device: The Role of Pulsatility****. JACC Heart Fail. 2015 Sep;3(9):703-11.*

Patients with heart failure with reduced ejection fraction (HFrEF) have impaired peripheral vascular function, but the effects of continuous flow left ventricular assist device (LVAD) implantation on the peripheral vasculature are not well studied. Flow-mediated vasodilation (FMD) and reactive hyperemia (RH) are techniques used to quantify changes in peripheral vascular function. An abnormally low FMD is an independent predictor of LVAD implantation, heart transplantation, and death. RH has also been associated with decreased microvascular function in heart failure. The purpose of this study was to use FMD, RH, and pulsatility index (PI) to evaluate and compare peripheral vascular function in control subjects, HFrEF patients, and LVAD patients.

Peripheral vascular function was evaluated in 20 NYHA functional class III/IV HFrEF patients following continuous flow LVAD implantation (mean 5 months post LVAD implant), 13 NYHA functional class II and 19 III/IV HFrEF patients, and 16 healthy age-matched control subjects. All patients completed FMD and RH testing in the brachial artery with blood flow velocity, artery diameters, and PI assessed by ultrasound Doppler. LVAD patients had decreased vasodilatory capacity, demonstrated by lower absolute change in brachial artery diameter and %FMD, compared to both HFrEF II patients and control subjects. When %FMD was normalized for shear rate, LVAD patients exhibited decreased vascular function compared with both the HFrEF II and III/IV patients and control subjects. PI was significantly lower in the LVAD group compared with both the HFrEF II and III/IV patients, who had a significantly lower PI than control subjects. RH was similar across groups.

The findings of this cross-sectional suggest that peripheral vascular function is further impaired following LVAD implantation. PI was lower in LVAD patients and there was also a significant positive relationship between PI and %FMD/shear across all groups. These findings suggest that worsening peripheral vascular function in LVAD patients may be partially related to reduced pulsatility and associated changes in shear stress as a consequence of continuous flow mechanical support. Future prospective studies are necessary to better understand the timing and natural history of changes in peripheral vascular function after LVAD implantation.

Other Articles:

Circulation:
Sandhu A, McCoy LA, Negi SI, Hameed I, Atri P, Al'Aref SJ, Curtis J, McNulty E, Anderson HV, Shroff A, Menegus M, Swaminathan RV, Gurm H, Messenger J, Wang T, Bradley SM. Use of Mechanical Circulatory Support in Patients Undergoing Percutaneous Coronary Intervention: Insights From the National Cardiovascular Data Registry. Circulation. 2015 Sep 29;132(13):1243-51.

European Heart Journal:
No other articles

Journal of Heart and Lung Transplantation:

Lampert BC, Teuteberg JJ. Right ventricular failure after left ventricular assist devices. J Heart Lung Transplant. 2015 Sep;34(9):1123-30.

Maly J, Netuka I, Besik J, Dorazilova Z, Pirk J, Szarszoi O. Bridge to transplantation with long-term mechanical assist device in adults after the Mustard procedure. J Heart Lung Transplant. 2015 Sep;34(9):1177-81.

Blumenthal-Barby JS, Kostick KM, Delgado ED, Volk RJ, Kaplan HM, Wilhelms LA, McCurdy SA, Estep JD, Loebe M, Bruce CR. Assessment of patients' and caregivers' informational and decisional needs for left ventricular assist device placement: Implications for informed consent and shared decision-making. J Heart LungTransplant. 2015 Sep;34(9):1182-9.

Journal of Cardiac Surgery:
No mechanical circulatory support articles in September

Journal of the American College of Cardiology: Heart Failure:
No other articles

Annals of Thoracic Surgery:
Akhter SA, Badami A, Murray M, Kohmoto T, Lozonschi L, Osaki S, Lushaj EB. Hospital Readmissions After Continuous-Flow Left Ventricular Assist Device Implantation: Incidence, Causes, and Cost Analysis. Ann Thorac Surg. 2015 Sep;100(3):884-9.