

New Study Evaluates Masimo PVI® as a Predictor of Fluid Responsiveness



Masimo has announced that a new study of patients undergoing liver transplantation evaluated the relationship of PVI® to right ventricular end-diastolic volume (RVEDVI) and concluded that PVI provided a "reliable estimate of [cardiac] preload status and may be a useful predictor of fluid responsiveness."¹ PVI measures the dynamic changes in perfusion index that occur during one or more complete respiratory cycles, using the Masimo pulse oximetry plethysmographic waveform.

Because of hemodynamic instability during orthotopic liver transplantation (OLT), estimating cardiac preload to optimize fluid management is essential. There are several methods for estimating cardiac preload. Two conventional static measurements of cardiac filling pressure are pulmonary artery occlusion pressure (PAOP) and central venous pressure (CVP). The standard invasive method is RVEDVI, obtained from thermodilution using a pulmonary artery catheter (PAC).

In the prospective study, published in *Transplantation Proceedings* and conducted at Chang Gung Memorial Hospital in Taiwan, Dr. H.-C. Lee and colleagues compared methods of estimating cardiac preload, with the aim of evaluating the relationship between a dynamic hemodynamic parameter, PVI (derived from pulse oximetry), and RVEDVI (using a PAC), as well as comparing PVI to the static measures CVP and PAOP. They measured the four hemodynamic parameters—CVP, PAOP, RVEDVI, and PVI—on 18 patients undergoing OLT at 10 defined time points before, during, and at the conclusion of surgery.

Analyzing the 180 measurements from each of the parameters, the Receiver Operating Characteristic (ROC) determined in this study to distinguish different thresholds of RVEDVI showed an area under the curve (AUC) of 0.702 for CVP, 0.748 for PAOP, and 0.762 for PVI.

The researchers concluded that "PVI may serve as a reliable estimate of cardiac preload status in patients undergoing OLT, explicitly, higher PVI values correlated with lower RVEDVI values," so that "an increase in ventricular preload status could be inferred from a decrease in PVI during OLT." They also noted that "RVEDVI was better correlated with PVI than with other static filling pressure[s], such as CVP or PAOP," therefore giving a "safer, faster, and better estimate of fluid responsiveness."

The researchers noted as a limitation that the quality of the signal from which PVI is calculated is "critically based on peripheral perfusion, which may be significantly affected by factors such as extreme low cardiac output, drug-induced vasoconstriction, and hypothermia." The researchers also noted that further studies are needed to investigate the application and effectiveness of additional dynamic hemodynamic parameters such as SVV and PPV during OLT.

Source & Image Credit : [Masimo](#)

Reference

1. Lee HC, Tsai YF, Tsai HI, Chung PC, Yu HP, Lee WC, Lin CC. Pulse Oximeter-Derived Pleth Variability Index is a Reliable Indicator of Cardiac Preload in Patients Undergoing Liver Transplantation. *Transplant Proc.* 2016 May;48(4):1055-8.

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