Manuscripts, Articles, Book Chapters and Other Papers

1-2023

Association of central venous saturation and serum lactate with outcomes in veno-arterial extracorporeal membrane oxygenation.

Rohit S. Loomba

Enrique G. Villarreal

Juan S. Farias
Children's Mercy Kansas City

Saul Flores

Recommended Citation
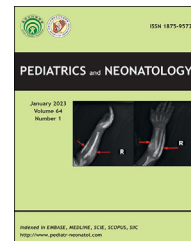
Letter to the Editor

Association of central venous saturation and serum lactate with outcomes in veno-arterial extracorporeal membrane oxygenation

We read with great interest the study by Chen et al. in which they evaluated the association of central venous saturation and serum lactate at various time points with the prognosis of patients requiring veno-arterial extracorporeal membrane oxygenation. The study concluded that serum lactate at 12—24 h after the initiation of extracorporeal membrane oxygenation.[1]

While the patient is in the intensive care unit, being able to identify whether the patient is at a higher risk or having a poor outcome is helpful at any point in time. Such identification promotes greater situational awareness and helps facilitate more efficient resource allocation. Thus, we applaud the authors for their efforts. However, this study has some major limitations.

First, the central venous saturation utilized in the study was not well described. What access point located where were venous saturations drawn from? This is important, as there are differences in the prognostic capabilities of regional venous saturations drawn from different locations.[2]

Second, regardless of where the venous saturation was drawn from, there is an inherent limitation in this study's design to investigate venous saturation's association with outcomes because the extracorporeal membrane oxygenation strategy described altered the flow to maintain a minimum venous saturation. This means that venous saturation was maintained above a lower threshold at all time points, except for perhaps the initial time point (T0). This, at the very least, decreases the range in values.

This decrease in range in venous saturation values due to the maintenance of a minimum venous saturation, while on extracorporeal membrane oxygenation, then leads to the next issue that relates to statistical power. As frequentist statistics were utilized in the study, the analyses are susceptible to the effects of the sample size in detecting the effects of various sizes. The differences in serum lactate were greater than the differences in venous saturation between the groups at most times, specifically at the initial time points. This means that the same sample size would allow for the detection of only comparatively larger effect sizes for central venous saturation than for serum lactate. For instance, in the successful versus unsuccessful weaning at T1, there is a mean difference of 0.6 between the two groups. To detect a difference with a power of 80% at p-value <0.05, approximately 2610 patients in the unsuccessful weaning group and 5220 patients in the successful weaning group would be required. The same limitation may apply to other variables of interest, particularly flow.

Finally, another issue lies in the description of the statistical analyses, specifically surrounding the multivariable regression. The regression is described as being "multivariate," which implies multiple dependent variables that do not appear to be the case. It appears that the authors utilized a "multivariable" regression in which there is a single dependent variable and multiple independent variables. Beyond saying that regression was done, there was no description of how variables were selected for entry into the regression. This is important because the entry of each serum lactate and central venous saturation for each time point would greatly restrict the power of the regression analysis to detect statistically significant differences.

Declaration of competing interest

None.

References

1. Chen TY, Chang CH, Hsu JY, Sheu JJ, Kuo HC, Cheng MC, et al. Comparison of the predictive ability of lactate and central

venous blood gas in pediatric venoarterial mode extracorporeal membrane oxygenation outcome. *Pediatr Neonatol* 2022;**63**: 474—83.

2. Law MA, Benscoter AL, Borasino S, Dewan M, Rahman AKMF, Loomba RS, et al. Inferior and superior vena cava saturation monitoring after neonatal cardiac surgery. *Pediatr Crit Care Med* 2022;**23**:e347—55.

Rohit S. Loomba
Division of Cardiology, Advocate Children's Hospital, Chicago, IL, USA

Enrique G. Villarreal*
Tecnologico de Monterrey, Escuela de Medicina y Ciencias de la Salud, Monterrey, Nuevo Leon, Mexico

Juan S. Farias
Children's Mercy Hospital, Kansas City, MO, USA

Saul Flores
Section of Critical Care, Texas Children's Hospital, Houston, TX, USA

*Corresponding author. Department of Pediatrics, Tecnologico de Monterrey, Escuela de Medicina y Ciencias de la Salud, Monterrey, Nuevo Leon, Mexico.
E-mail address: quique_villarreal93@hotmail.com (E.G. Villarreal)

1 July 2022