Outcomes Using Fluid Responsiveness to Manage Fluid Resuscitation

To the Editor:

Chaudhuri et al\(^1\) recently reviewed fluid management in early septic shock in a commentary in CHEST (April 2021). They note that the main concern is how much fluid administration is appropriate and discuss fluid resuscitation based on parameters used to determine fluid responsiveness. An increase in cardiac output by 10% to 15% after administration of a 250- to 500-mL fluid bolus over 30 minutes is a reliable indicator of a short-term response to fluid administration. An alternative approach uses passive leg raising to transiently increase central venous blood volume, which should increase preload. This maneuver requires very precise steps to ensure accuracy and requires measurement of cardiac output or stroke volume. The hemodynamic effect with leg raising reaches its maximum quickly and rapidly disappears. The gold standard for measuring stroke volume with echocardiography involves measurement of the area of the left ventricular outflow tract and the velocity time integral, which requires expertise in critical care echocardiography. The other tests reviewed can also require relatively sophisticated applications of echocardiography, and in some cases the results are jeopardized by low sensitivity, the effect of comorbidity, and the need for transesophageal echocardiography.

However, a more fundamental problem with studies on fluid responsiveness is the fact that fluid resuscitation based on fluid responsiveness does not definitely reduce mortality. Ehrman et al\(^2\) reported a meta-analysis on the mortality outcomes using fluid resuscitation based on fluid responsiveness compared with usual care in patients with sepsis.\(^2\) This study included four clinical trials with 365 patients, and patients with fluid resuscitation based on fluid responsiveness did not have decreased mortality. The OR was 0.87 (95% CI, 0.49-1.54). Three of these studies used passive leg raising to determine volume responsiveness.

An alternative approach to patient management involves the early use of vasopressors.\(^3\)\(^,\)\(^4\) Permpikul et al\(^3\) reported a randomized controlled trial with 310 patients to study the early use of norepinephrine in patients with septic shock.\(^3\) Patients receiving early norepinephrine (93 minutes after presentation) vs late norepinephrine (192 minutes) had better shock control (76.1% vs 48.4% at 6 hours). These patients also had a lower incidence of pulmonary edema and new-onset arrhythmias but no difference in mortality at 28 days.

In summary, patients with sepsis often have complex presentations, and their clinical status can change quickly over short periods. The initial trajectory is often uncertain and depends on multiple clinical factors and treatment decisions.\(^5\) Fluid responsiveness is only one characteristic of these patients.

Kenneth Nugent, MD
Gilbert Berdine, MD
Camilo Pena, MD
Lubbock, TX

AFFILIATIONS: From the Department of Internal Medicine, Texas Tech University Health Sciences Center.

FINANCIAL/NONFINANCIAL DISCLOSURES: None declared

CORRESPONDENCE TO: Kenneth Nugent, MD; email: kenneth.nugent@ttuhsc.edu

Copyright © 2021 American College of Chest Physicians. Published by Elsevier Inc. All rights reserved.

DOI: https://doi.org/10.1016/j.chest.2021.07.007

References