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Hole detected in goal directed fluid therapy: The challenge of fluid challenge to optimize stroke volume

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Goal directed fluid therapy (GDFT) includes augmentation of cardiac output to improve tissue perfusion that may decrease postoperative complications. GDFT is incorporated into surgical and critical care and is based on fluid responsiveness using stroke volume (SV), pulse pressure (PP), and systolic pressure (SP) variation to a fluid challenge. Dynamic parameters (SVV, PPV, and SPV) are used to replace static parameters as central venous pressure (CVP), pulmonary capillary wedge pressure (PCWP), and mean arterial pressure (MAP) to guide fluid volume therapy. GDFT is becoming part of multidisciplinary approaches to enhance recovery after surgery (ERAS). However, recent studies suggest that benefits of GDFT might be less pronounced than previously believed and there are evidences that SV optimization strategies could be harmful by increasing volume overload, and that modality does not provide the benefits previously described. If patient's position is on the steep part of the Frank-Starling curve it may benefit from a further fluid challenge; a theory which is almost an oversimplification of complex intraoperative hemodynamics as painful surgical stimuli accompanied by endogenous catecholamine levels, vasodilator effects of neuraxial blockade, and anesthesia may vary considerably such that it is impossible to be sure about optimum stroke volume at a particular moment. The presence of a hole in goal directed fluid therapy is due to the following facts; A) Dynamic monitors (derived and not measured variables) are poor at distinguishing absolute hypovolemia from apparent hypovolemia due to low systemic vascular resistance induced by anesthetic medications; B) Pharmacodynamics of crystalloids indicates that their temporary effect in circulation is limited to 20–30 minutes and redistribution to interstitial space will create tissue oedema that will be translated to post-operative complications. If we check fluid responsiveness after 45 minutes, we will be seriously misled. Anesthesia is as much an art as science; our aim is to use perioperative body weight as an important vital sign to implement "zero fluid balance" rather than the change from liberal to restrictive fluid therapy. The dynamic monitoring should be interpreted cautiously within the overall context of the hemodynamics of the patient and consider anesthetic vasodilator effect combined with surgical stimulation that change the stressed blood volume without change in total blood volume, so that vasopressor is needed rather than volume overload. We should consider the hole in goal directed fluid management as well as the limitation of stroke volume optimization so that every attempt can be made to avoid volume overload.

Recent Publications

1. R Makaryus, T E Miller and T J Gan (2018) Current concepts of fluid management in enhanced recovery pathways. British Journal of Anesthesia 120(2):376–383.
2. D A Reuter and S Kalman (2018) From 'goal-directed haemodynamic therapy' to 'individualized perioperative haemodynamic management'. British Journal of Anesthesia 120(4):615–616.
3. Javier Ripolles, Angel Espinosa, Eugenio Martines-Hurtado, et al. (2016) Intraoperative goal directed hemodynamic therapy in noncardiac surgery: a systematic review and meta-analysis. Rev Bras J Anesthesiol. 66(5):513–528.
4. L Meng and P M Heerdt (2016) Perioperative goal-directed haemodynamic therapy based on flow parameters: a concept in evolution. British Journal of Anesthesia 117(3):iii3–iii7.
5. Timothy E Miller, Anthony M Roche and Micheal Mythen (2015) Fluid management and goal-directed therapy as an adjunct to enhanced recovery after surgery (ERAS). Can J Anaesth. 62(2):158–168.

Biography

Muhammad Saleh Bahadeg has completed his MBBS, King Saud University, Riyadh, Saudi Arabia from Saudi Board of Anesthesiology, Prince Sultan Military Medical City. He is interested in Anesthesia for Transplant Surgeries and Regional Anesthesia.

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