



Correspondence

The volume of acute normovolemic hemodilution

To the editor;

With great interest we read the pilot study regarding acute normovolemic hemodilution (ANH) for ovarian cancer patients by Tanner et al. (Tanner et al., 2018). The authors evaluated the efficacy of ANH for the reduction of the risk of perioperative allogeneic red blood cell (RBC) transfusions. They revealed that ANH had the potential of the reduction of RBC transfusion rate without increasing perioperative complication.

A concern about this article is the amount of blood withdrawal, leading hemodilutional coagulopathy and fluid overload. They determined the amount of blood withdrawal using the specific formula and the target Hb was set to 8.0 g/dL. If preoperative Hb and estimated blood volume are 12.5 g/dL and 4000 mL, respectively, the amount of blood withdrawal is calculated about 1800 mL. However, this amount of blood seems too aggressive. Shin and colleagues (Shin et al., 2015) showed that ANH could affect the clotting function which was evaluated by thromboelastometry (ROTEM™, Pentapharm GmbH, Munich, Germany). The amount of withdrawal blood was 960 mL but maximum of clot firmness (MCF) of EXTEM and FIBTEM was reduced 31.6% and 40% respectively after hemodilution. Change rate in MCF of FIBTEM was correlated with intraoperative blood loss and change rate in MCF of FIBTEM $\geq 29\%$ was associated with increase the risk of large postoperative blood loss and allogeneic blood transfusion (Shin et al., 2018). The effect of hemodilution is almost double in this study, thus coagulopathy after hemodilution should be consider to prevent increasing intraoperative blood loss.

Additionally, a large amount of withdrawal blood requires a large amount of fluid administration during surgery. This might be one of reasons why the increased risk of postoperative complications (Fischer et al., 2010), even though critical complications associated fluid administration were not observed in this study. In accordance with this protocol, fluid was administered 1.5 times of withdrawal blood before starting surgery. Indeed, median fluid administration of 7750 mL was required during surgery in this study. Since duration of surgery and body weight were not described in this article, it is difficult to evaluate fluid overload. But moderate restrictive fluid therapy during perioperative period is currently recommended to facilitate enhanced recovery after gynecological surgery (Nelson et al., 2017) and a large

amount of fluid administration might have a negative effect to the gynecological cancer patients. Taking hemodilutional coagulopathy and fluid overload into consideration, the reduction of withdrawal blood may be reasonable for the randomized trial.

ANH must be one of the best strategies to prevent perioperative RBC transfusion but the risk of large amount of fluid replacement during ANH should be consider to ensure patients' safety and benefit.

Conflict of interest

JS and KH declares no conflict and interest.

Author contribution

JS drafted the manuscript. KH extensively revised manuscript.

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