

## Effect of Chloride Liberal Fluids on Renal and Metabolic Profiles of Patients Undergoing Off-pump CABGs

Sir,

In their prospective randomized study on 600 patients, Dr. Bhaskaran and colleagues investigated the effect of chloride restricted intravenous (IV) solutions on the incidence and development of postoperative acute kidney injury (AKI) in patients undergoing off-pump coronary artery bypass (OPCAB) surgeries.<sup>[1]</sup> The authors found that perioperative use of chloride restricted (IV) fluids decreased the incidence of postoperative AKI, while use of chloride liberal IV fluids caused greater hyperchloremic metabolic acidosis. Based on the Acute Kidney Injury Network (AKIN) criteria, they have reported an incidence of Stage I AKI in the chloride-liberal group of 9.2%, while in the chloride-restricted group it was 4.6%. However, the authors have not provided comparisons of the volumes of IV fluids that were infused in the two groups, which is extremely unusual for a study that purportedly compares metabolic effects of two different fluid regimens. In recommending chloride restricted IV fluids as the maintenance fluid of choice, the authors have based their selection on comparison with 0.9% normal saline, lactated Ringer's solution (a supposedly "balanced" salt solution), and hydroxyethyl starch (HES 130/0.4) in 0.9% normal saline. It must be remembered that there is scientific evidence suggesting that use of chloride liberal solutions as maintenance fluid is associated with hyperchloremic metabolic acidosis, which is a regular feature if large volumes of normal saline are infused intraoperatively.<sup>[2,3]</sup> It is our understanding that the acidosis is due to associated increase in chloride ion concentration and alteration in the strong ion difference. The large chloride load and associated acidosis may be deleterious for both cardiac and renal function in the perioperative phase, especially in patients undergoing cardiac surgery or in those with renal disease. It can also make differentiating the cause of an increasing base deficit difficult in procedures associated with significant blood loss and fluid replacement when periods of hypotension and/or hypoperfusion may occur, as could be the case during performance of an OPCAB surgery. Alternative isotonic, isosmotic "balanced" salt solutions like Plasma-Lyte 148 have been commercially available and widely used as intraoperative replacement fluid for >20 years now. However, despite all such preceding evidence, although the authors mention their inability to record the amount of IV fluids infused perioperatively as a limitation of the study, it would, in the context of this manuscript, be difficult to accept their conclusions regarding the obvious benefits of chloride restricted fluids, without attributing the changes to, maybe a difference in the relative volumes infused in the two groups.

Secondly, although the authors calculated a sample size of 180 in each group, they have ended up recruiting a total

of 300 patients into each individual arm. Unnecessarily larger samples not only require more resources than could be justified by the gain in precision or power to detect the difference, but could actually be ethically unacceptable since it involves subjecting patients to interventions without purpose.

Finally, although the authors claim that there were statistically significant differences in the pH and base excess (BE) values between the two groups, it appears that the mean pH as well as BE values in both groups were actually within normally acceptable clinical ranges (pH between 7.38 to 7.44 and BE - 1 to 2), thus begging the question, whether these findings are clinically significant. It is important to realize that large studies, with more precision, such as the one under discussion, with a sample size far in excess of what was projected at initial analysis, may give small *P* values even if the difference is not clinically important.<sup>[4]</sup> More information, e.g., biological plausibility, is needed to declare causation.

In summary, this study does not provide convincing evidence for potential harm of chloride liberal solutions in OPCAB surgeries, but only supports the potential risk of their administration in patients with unknown cardiac performance and volume status.

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### Conflicts of interest

There are no conflicts of interest.

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Chief Editor states that the authors of the reference No. 1 did not respond to this letter

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