Bayer and Reinhart *Critical Care* (2015) 19:209
DOI 10.1186/s13054-015-0859-z

CRITICAL CARE

LETTER Open Access

Acute kidney injury in cardiac surgery patients receiving hydroxyethyl starch solutions

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In a retrospective study by a Canadian team [1], pentastarch infusion was a dose-related independent risk factor for acute kidney injury (AKI) after cardiac surgery. In a new retrospective cardiac surgery study by that team [2], 83% of patients received hydroxyethyl starch (HES) 130/0.4. For unexplained reasons, 25 to 43% of patients received both HES 130/0.4 and pentastarch.

The team 'hypothesized that both synthetic starches and albumin-containing solutions are independently associated with AKI following cardiac surgery in a dose-dependent fashion'. However, they focused on albumin and never thoroughly evaluated HES-related AKI. Although univariate analyses were reported, propensity matching according to either HES 130/0.4 or pentastarch administration was omitted. Systematic allocation of low-risk patients to HES could have masked an association with AKI in the univariate analyses. Consequently, the study is misleading, since it suggests that albumin is associated with AKI while HES is not.

We described a prospective study in 6,478 consecutive cardiac surgery patients [3]. With propensity matching, predominant use of HES 130/0.4 was associated with increased utilization of renal replacement therapy: odds ratio 1.46 and 95% confidence interval (CI) 1.08 to 1.97. Furthermore, in a meta-analysis of 15 randomized trials evaluating perioperative HES administration, including five in cardiac surgery, renal replacement therapy was increased by HES solutions as a class with relative risk 1.44 and CI 1.04 to 2.01 and by HES 130/0.4 in particular (relative risk 1.47, CI 1.02 to 2.12) [4]. Based on these results and other currently available data, complete avoidance of HES solutions such as HES 130/0.4 has been recommended [5].

Authors' response

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We agree with Bayer and Reinhart that the administration of HES solutions should be avoided, based on results from randomized trials [6,7]. Indeed, we had acknowledged in the article that HES solutions are an independent risk factor for AKI [2]. In contrast to what the authors mentioned, our propensity score included the percentage and dose of HES administered [2]. In our study, the risk of AKI appeared higher with albumin than with HES (Figure three in [2]). Given a recent increase in albumin use in our institution in light of recent HES publications, we felt prudent to test whether this finding was artifactual.

Over the past decade, several studies have been published on the timing [8], duration, type [6], and amount of fluid [9] to be given in critically ill patients. However, the best approach regarding fluid resuscitation is still uncertain and many other questions remain unanswered. When, how much, how fast, and how long should we administer which type of fluid to optimize cardiac output, while minimizing potential resultant fluid accumulation, tissue edema and consequent organ dysfunction? As critically ill patients are a heterogeneous population, a treatment may be beneficial to one subgroup of patients but harmful to another. Our study results do not suggest that albumin should never be administered in cardiac surgery patients. Further studies are needed to define the best type of fluid (balanced crystalloids, isotonic saline and albumin), optimal amount, timing and duration in *a priori* defined critically and non-critically ill populations.

Abbreviations

AKI: Acute kidney injury; CI: Confidence interval; HES: Hydroxyethyl starch.

Competing interests

OB received speaker's fees from CSL Behring, Germany. KR has received an unrestricted research grant for the conduct of the VISEP trial and consultancy fees from B Braun Melsungen.

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Authors' contributions
Both authors conceptualized, composed and revised the letter and read and approved the final version.

Acknowledgments
This letter is the composition of the authors who take sole responsibility for its content.

Published online: 05 May 2015

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