Meta-analysis of regional citrate versus heparin anticoagulation for continuous renal replacement therapy

Volbeda, Meint; Franssen, Casper F M

Published in:
Therapeutic apheresis and dialysis : official peer-reviewed journal of the International Society for Apheresis, the Japanese Society for Apheresis, the Japanese Society for Dialysis Therapy

DOI:
10.1111/1744-9987.14104

Received: 30 November 2023 | Accepted: 21 December 2023

DOI: 10.1111/1744-9987.14104

Therapeutic Apheresis and Dialysis

WILEY

LETTER TO THE EDITOR

Meta-analysis of regional citrate versus heparin anticoagulation for continuous renal replacement therapy

Dear Editor,

We read with great interest the article "Regional citrate versus heparin anticoagulation for continuous renal replacement therapy in critically ill patients: A meta-analysis of randomized controlled trials" by Li et al [1]. This meta-analysis shows that the circuit survival during continuous renal replacement therapy (CRRT) is significantly longer with regional citrate anticoagulation (RCA) as compared to heparin anticoagulation, with a mean difference in CRRT circuit survival of 16.98 h in favor of RCA. We do acknowledge the superiority of RCA as compared to heparin anticoagulation. Nonetheless we would like to make two comments on the forest plot demonstrating the effect of RCA versus heparin anticoagulation (Figure 4A in the original publication by Li). First, the number of CRRT circuits from the study by Zarbock [2] included in this forest plot is incorrect. Instead of including all CRRT circuits used in this study (965 in the RCA and 1104 in the heparin group), the number of patients included in this study (300 in the RCA and 296 in the heparin group) were entered in the forest plot analysis. After correction of this inaccuracy the mean difference in CRRT circuit survival is 16.66 h in favor of RCA (Figure 1A). Second, the manufacturer recommends to routinely replace the CRRT circuit after 72 h, since the quality of the circuit is no longer guaranteed after this interval. However, in three trials included in the meta-analysis [3-5], the CRRT circuits were not routinely

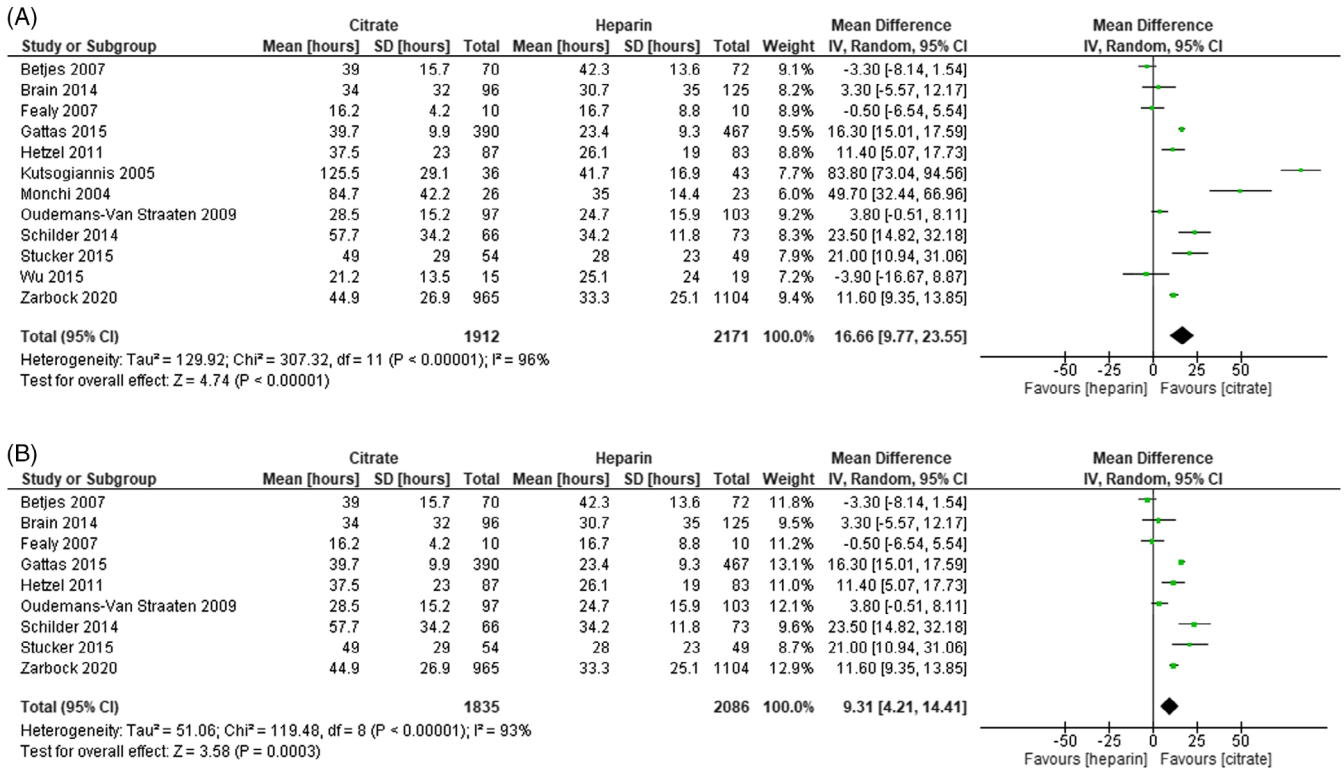

FIGURE 1 Meta-analysis on the effect of regional citrate anticoagulation (RCA) versusheparin anticoagulation on continuous renal replacement therapy (CRRT) circuit life span. (A) All trials, with correction of the inaccuracy in the original publication regarding the number of CRRT circuits in the trial by Zarbock [2]. (B) All trials, except trials in which CRRT circuits were not routinely replaced after 72 h [3-5].

replaced after 72 h and in two of these trials the mean CRRT circuit survival was considerably higher than 72 h in the RCA group; the mean CRRT circuit survival in the studies by Monchi and Kutsogiannis was 84.7 and 125.5 h in the RCA group, respectively [3,4]. Since the vast majority of centers follow the manufacturer's recommendation to change the circuit after 72 h, the inclusion of studies that did not follow this recommendation not only induces bias in favor of RCA but also results in unrealistic expectations regarding the utilization of filters and associated costs. Ideally, this meta-analysis should be repeated with censoring of CRRT circuit life at 72 h.

After excluding these three trials [3-5] from the analysis the mean difference in CRRT circuit survival in favor of RCA declines to 9.31 h (Figure 1B).

In conclusion, we agree with Li et al. that CRRT circuit survival is significantly higher with RCA as compared to heparin, however when CRRT circuits are routinely replaced after 72 h according to the recommendations of the manufacturer the effect size is smaller than described in their meta-analysis [1].

FUNDING INFORMATION

The authors received a research grant from Baxter Spa, Italy that is unrelated to the current Letter to the Editor.

CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflict of interest.

Meint Volbeda[1]
Casper F. M. Franssen[2]

[1]*Department of Critical Care, University of Groningen, University Medical Center Groningen, Groningen, The Netherlands*

[2]*Department of Nephrology, University of Groningen, University Medical Center Groningen, Groningen, The Netherlands*

Correspondence
Meint Volbeda, Department of Critical Care, University of Groningen, University Medical Center Groningen, P.O. Box 30.001, EB70, 9700 RB Groningen, The Netherlands.
Email: m.volbeda@umcg.nl

ORCID

Meint Volbeda https://orcid.org/0000-0001-7641-1330

REFERENCES

1. Li R, Gao X, Zhou T, Li Y, Wang J, Zhang P. Regional citrate versus heparin anticoagulation for continuous renal replacement therapy in critically ill patients: a meta-analysis of randomized controlled trials. Ther Apher Dial. 2022;26(6):1086–97.
2. Zarbock A, Kullmar M, Kindgen-Milles D, Wempe C, Gerss J, Brandenburger T, et al. Effect of regional citrate anticoagulation vs systemic heparin anticoagulation during continuous kidney replacement therapy on dialysis filter life span and mortality among critically ill patients with acute kidney injury: a randomized clinical trial. JAMA. 2020;324(16):1629–39.
3. Kutsogiannis DJ, Gibney RT, Stollery D, Gao J. Regional citrate versus systemic heparin anticoagulation for continuous renal replacement in critically ill patients. Kidney Int. 2005;67(6):2361–7.
4. Monchi M, Berghmans D, Ledoux D, Canivet JL, Dubois B, Damas P. Citrate vs. heparin for anticoagulation in continuous venovenous hemofiltration: a prospective randomized study. Intensive Care Med. 2004;30(2):260–5.
5. Wu B, Zhang K, Xu B, Ji D, Liu Z, Gong D. Randomized controlled trial to evaluate regional citrate anticoagulation plus low-dose of dalteparin in continuous veno-venous hemofiltration. Blood Purif. 2015;39(4):306–12.