

Effect of sodium bicarbonate infusion in off-pump coronary artery bypass grafting in patients with renal dysfunction: Cautious interpretation is required

Dear Editor,

Cardiac surgery-associated acute kidney injury (CSA-AKI) is widespread in open-heart surgeries, and even off-pump coronary artery bypass graft (OP-CABG) is not an exception.^[1,2] It also has a significant impact on mortality and morbidity.^[3] We appreciate the work of Kanchi *et al.* where the authors appraise intraoperative sodium bicarbonate (NaHCO₃) infusion for prevention of acute kidney injury (AKI) in patients with preoperative renal dysfunction undergoing

OP-CABG.^[4] However, a few concerns need to be addressed before accepting the strategy in clinical practice;

Firstly, while the authors have already taken one placebo group (i.e., NaCl) to compare the effect of NaHCO₃ infusion, the use of another control group with preoperative normal renal function is misleading or unwarranted as per the primary objective of the study which indicates that the effect needs to be evaluated in patients with preexisting renal dysfunction first. Although the new group may provide another subset of data, the comparison of the patients with preexisting renal dysfunction with normal renal function deviates away from the main objective of the study. For this, the authors should have also presented a separate comparison of only NaCl and NaHCO₃ groups in the said study. When data provided by Kanchi *et al.*^[4] in their, were analyzed using online QuickCalc (Graphpad Prism Software, Inc; La Jolla, CA, USA) and t-test was applied; the differences were mostly found as insignificant [Table 1 of the present manuscript].

Table 1: Creatinine, urine output and troponin data of study patients with preexisting renal dysfunction compared using t-test

Variables	NaCl group (n=30)	NaHCO ₃ group (n=30)	Two tailed P
Creatinine (mg%) mean±SD			
Immediate preoperative	1.56±0.43	1.48±0.41	0.463
Immediate postoperative	1.60±0.47	1.49±0.42	0.343
Postoperative 24 h	1.62±0.52	1.45±0.48	0.193
Postoperative 48 h	1.64±0.52	1.45±0.59	0.190
Postoperative 72 h	1.53±0.35	1.42±0.53	0.346
Postoperative 96 h	1.52±0.35	1.43±0.49	0.416
Troponin1 (ng/ml) (mean±SD)			
Preoperative	0.18±0.4	0.07±0.1	0.149
Immediate postoperative	5.69±12.5	8.57±16.6	0.450
Postoperative 24 h	3.69±5.6	20.74±44.4	0.041
Urine output (ml/24 hours)			
Day 1 postoperative	2066.57±629.78	2479.28±581.81	0.010
Day 2 postoperative	3299.47±405.31	2820.85±897.78	0.010
Day 3 postoperative	2664.41±792.13	2881.25±928.06	0.334

SD=Standard deviation; AKI=Acute kidney injury

Secondly, it is appreciated that the authors considered perioperative myocardial infarction as one of the safety indicators in their study. However, the study showed one interesting fact that the patients who received NaHCO₃ infusion had significantly more troponin levels on postoperative 24 hours ($P < 0.05$) despite these patients were having relatively lesser preoperative troponin compared to NaCl group [Table 1]. It is also felt that it will be better if the authors present the troponin data in range and/or median values in their study as the standard deviation is much higher than the mean value in each category [Kanchi *et al.* article]. This indicates that a good number of the values were in extremes.

Thirdly, the authors' conclusion of the study needs to be accepted cautiously. In all, 20% of the NaHCO₃ group developed stage-1 AKI compared to 33.33% of the NaCl group with 30 patients in each group. This difference is not statistically significant (P 0.381, relative risk 0.6, 95% confidence interval 0.249–1.442; by Fisher's exact test using INSTAT software from Graphpad Prism Software Inc; La Jolla, CA, USA). Therefore, the NaHCO₃ infusion in patients with preoperative renal dysfunction undergoing OP-CABG cannot be attributed to reducing postoperative CSA-AKI in such patients from this study.

Fourthly, the data on preoperative anemia and perioperative blood transfusion are worth mentioning. These can contribute to AKI, and affect the study results, as these are associated with CSA-AKI.^[5,6]

Finally, in context to the use of NaHCO₃ for prevention of AKI in perioperative and critical care settings, it is worth referring to the guideline where it is recommended (Grade 2) for not using NaHCO₃ to prevent or treat AKI with a strong agreement, and rationale based on a multi-center-randomized study.^[7] Therefore, before accepting the results of Kanchi *et al.*, the information on the aspects mentioned earlier is crucial. It will help the scientific community in making more informed decisions.

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Conflicts of interest

There are no conflicts of interest.

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