

ELECTIVE MAJOR NON CARDIAC SURGERY AND ACUTE KIDNEY INJURY. IMPACT OF INTRAOPERATIVE EXCESS CHLORIDE LOAD. A SINGLE-CENTRE, PROSPECTIVE COHORT STUDY

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Objectives:

Acute Kidney Injury (AKI) occurs in 1% to 5% of all hospital admissions, while particularly perioperative AKI has been consistently linked with higher mortality, morbidity and a more complicated hospital course with associated cost implications. Whereas perioperative risk factors associated with AKI after cardiac surgery have been well described¹, this is not the case for major non-cardiac surgery.

Recently, the impact of a high chloride load in the pathogenesis of AKI has been observed² associating hyperchloremia due to over-zealous fluid resuscitation with 0.9% saline with decreased renal blood flow.

This study was performed in order to identify possible intra-operative risk factors linked to peri-operative AKI development in a group of non-cardiac surgery patients.

Methods:

This prospective cohort study included adults undergoing elective major abdominal surgery. Patients with chronic kidney disease (CKD) stage IV and V were excluded. AKI was defined according to Acute Kidney Injury Network criteria within 48 hours after surgery³.

Patients pre-operative demographics (sex, age, arterial hypertension, coronary artery disease, congestive heart failure, chronic obstructive pulmonary disease, diabetes mellitus, CKD stage) and intra-operative anesthetic management (type of surgery, intravenous fluids, blood products, vasopressors, mean arterial blood pressure, urine output and blood loss) were evaluated as predictors of AKI. Furthermore, chloride ion content of intra-operatively administered crystalloids and colloids was estimated.

Results:

Of 61 patients (47 males) included in the study, 10 (16.4%) developed postoperative AKI (AKI group) and 51 (73.6%) did not (non-AKI group).

Four intra-operative variables, as shown in Table 1, were identified as predictors of AKI: Intra-operative blood loss ($p=0.002$), transfusion of fresh frozen plasma ($p=0.004$) and red blood cells ($p=0.038$), as well as high chloride load ($AUC=0.715 \pm 0.095$, $p=0.033$, cut-off value >500).

The remaining pre- and intra-operative variables did not differ significantly between the two groups.

Table 1: Intraoperative variables

Intraoperative variables	Non AKI (n=51)	AKI (n=10)	t-test
	x±SD	x±SD	p-value
Blood loss (ml)	492.4±528.2	1350.0±1360.8	0.002
FFP (units)	1.29±1.44	2.90±1.97	0.004
RBC (units)	1.18±1.42	2.40±2.46	0.038
Chloride ion load (mEq)	455.7±179.2	591.3±200.1	0.036

Conclusions:

An excess chloride load caused by chloride-rich intravenous fluid administration during cardiac surgery has recently been associated with post-operative AKI. Our study's results indicate that a high intra-operatively administered chloride load is strongly associated with increased risk of post-operative AKI in patients undergoing elective major non-cardiac surgery.

References:

1. O' Neal J et al.: *Critical Care* 2016; 20 (187):2
2. Yunos Nm et al.: *Intensive Care Med* 2015; 41 (2):257
3. *Acute kidney Injury Network Group: Kidney Intern* 2012; 1-138

