

Effects of Acute Kidney Injury in Surgical Patients

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Abstract

Patients who develop post-operative Acute Kidney Injury (AKI) have a poor prognosis, especially when undergoing high-risk surgery. Therefore, the objective of this study was to evaluate the outcome of patients with AKI acquired after non-cardiac surgery and the possible risk factors for this complication. A multicenter, prospective cohort study with patients admitted to Intensive Care Units (ICUs) after non-cardiac surgery was conducted to assess whether they developed AKI. The patients who developed AKI were then compared to non-AKI patients.

Keywords: Acute Kidney Injury • Intensive Care Units • Glomerular Filtration Rate

Introduction

Acute kidney injury (AKI) is characterized by a rapid and significant decrease in the Glomerular Filtration Rate (GFR) and is usually of multifactorial origin. Studies that have evaluated perioperative AKI were performed mostly after cardiac and vascular surgery, and there are still major deficiencies in the literature regarding the development of AKI in patients undergoing non-cardiac surgery because most recent studies involve retrospective analyses. The development of AKI is commonly associated with sepsis, low cardiac output, and the post-operative period of major surgeries. One out of every three cases of AKI occurs during the perioperative period; such cases represent ~ 18-47% of the cases of hospital-acquired AKI.

The incidence of AKI in surgical patients varies according to the type and severity of the surgery, with reported rates of 19% after cardiac surgery and ~ 12-13% after general and thoracic surgery. In a large epidemiological study of patients undergoing major non-cardiac surgery in Intensive Care Units (ICUs) in Brazil, 30% of patients had post-operative complications, and AKI was the post-operative complication with the second-highest occurrence rate. Post-operative complications are common in high-risk patients after major surgery.

Therefore, we hypothesize that perioperative AKI is common and is associated with a worse prognosis. Since there are few prospective data on post-operative surgical patients in intensive care, assessing the incidence and characteristics of patients undergoing major non-cardiac surgery to develop post-operative AKI is relevant to adequately improve the therapeutic management of these patients. The main objective of this study was to evaluate the incidence, impact on outcomes and main risk factors for developing AKI in

patients who underwent non-cardiac surgery who developed AKI after admission to the ICU. Because of the importance of fluid balance in surgical patients, we also evaluated the association between this variable and the development of AKI.

Discussion

The main findings of this study were a high incidence of AKI (15.8%) with high mortality in non-cardiac surgery patients admitted to the ICU and the association of AKI with non-elective surgeries, infection, reoperation, circulatory shock, preoperative anemia, and inappropriate positive fluid balance.

Major surgeries account can reach 40% of cases of hospital-acquired AKI. Patients with AKI admitted to the ICU during the post-operative period in cardiovascular surgery accounted for 7.7%-40% of cases, and gastrointestinal tract surgery patients accounted for almost 22%. Specific data on surgical patients requiring intensive care are scarce.

It is important to comment that although this study does not include surgical cardiac patients, the findings of our study can be extrapolated in several aspects for these patients, because cardiac surgical patients suffer some complications and have some similar characteristics to high-risk non-cardiac surgery, thus, the risk factors for AKI can be the same.

The presence of AKI during the perioperative period in this subgroup of patients undergoing major surgery was associated with unfavorable outcomes, with a hospital mortality rate of 27.6%. In addition, the length of hospital stay of patients with AKI was higher than that of patient's non-AKI; patients with AKI spent approximately one extra week in the hospital. Similarly, a large multicenter

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observational study in European countries reported that mortality among patients with AKI was more than twice that observed in other patients. In a recent study, the occurrence and severity of AKI were strongly associated with the risk of death after surgery. However, the relationship between preoperative renal function, as assessed by serum creatinine-based estimated GFR, and the risk of death depended on patient age and whether AKI developed post-operatively.

In the current study, patients who developed AKI were more severe (higher SAPS 3), non-elective operations, had a greater need for advanced support with catecholamines, and frequently had infections.

Conclusion

AKI is a major complication in intensive care surgical patients and is associated with the risk of death, for this reason, it deserves attention in the perioperative. Patients with anemia before surgery, those with a higher SAPS 3, those requiring vasopressors during the post-operative period, and those with post-operative infection or the need for reoperation are the most likely to develop AKI, as are patients with an inappropriate higher perioperative fluid balance for a long time, therefore care should be considered in the perioperative period for these problems. The fluid type did not influence AKI development.

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