



Editorial on: “Acute kidney injury after lung cancer surgery: incidence and clinical relevance, predictors, and role of N-terminal pro B-type natriuretic peptide”

Zihao Wang, Yun Wang

Department of Thoracic Surgery, West China Hospital of Sichuan University, Chengdu 610041, China

Correspondence to: Yun Wang, No. 37, Guoxue Alley, Chengdu 610041, China. Email: yunwwang@yeah.net.

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Acute kidney injury (AKI) indicates a rapid deterioration in renal function, ranging from mild serum creatinine (sCr) elevation to the complete loss of renal function. It is a common complication in a variety of clinical settings, particularly in critically ill patients and after major surgery, and is more likely to be associated with increased postoperative morbidity, mortality, and prolonged hospital stay (1-3). In addition, postoperative AKI has also been suspected of leading to reduced long-term survival (4,5).

In recent years, a large number of studies have revealed the incidence and risk factors of AKI after cardiac and non-cardiac surgeries (1,6-8). However, postoperative AKI has attracted much less attention in the field of lung cancer, even though the routine practice of fluid restriction may increase the risk of AIK in thoracic surgical patients. Besides Dr. Cardinale's report, only a few studies have focused on the AIK development after lung cancer surgery. Licker *et al.* reported a mean incidence of AKI after lung surgery of 6.8% in a population of 1,345 patients undergoing elective surgery for lung cancer. Multivariate analysis showed that AKI was associated with American Society of Anesthesiologists classes 3 and 4, forced expiratory volume in 1 second, the use of vasopressors, and the duration of anesthesia (9). Similarly, Ishikawa *et al.* showed that hypertension, peripheral vascular disease, angiotensin receptor blocker (ARB), hydroxyethyl starch, and open thoracotomy were independent factors associated with postoperative AKI (10).

The above studies are all retrospective in their study design; meanwhile, Dr. Cardinale has conducted in-depth research in this field using a prospective study.

AKI is generally regarded as an uncommon postoperative complication in lung cancer patients, which may be one of the probable reasons for the scarcity of research in this field. In consonance with Dr. Cardinale's opinion, we suspect that the incidence of postoperative AKI has likely been underestimated. Although sCr is tested routinely before and after the lung surgery, a considerable proportion of patients are not diagnosed according to AKIN classification unless symptoms such as oliguria emerge.

We are in agreement with Dr. Cardinale's assertion that there is a causal relationship between AKI and other postoperative complications, and this relationship deserves more research focus. We further speculate that, in most cases, AKI may not be a predisposing factor for other postoperative complications; rather on the contrary, these complications may aggravate the kidney burden and lead to AKI. Taking the correlation between hypertension and AKI as an example, whose underlying mechanism may be that a higher renal perfusion pressure is required in hypertensive patients, the apparently normal blood pressure may actually lead to insufficient blood supply to the kidney during the operation.

Another concern is the prognosis of postoperative AKI: the data in Dr. Cardinale's study suggested a correlation between AKI and prolonged hospitalization. However,

because it always co-occurred with other complications, the contribution of AKI in this regard requires further assessment.

An accurate diagnosis occurring as early as possible accompanied by active therapy is the key to improving the prognosis of postoperative AKI. The current clinical diagnosis of AKI is usually based on an increased sCr relative to preoperative levels. Unfortunately, the main pathologic abnormality is tubular damage in the early stage of kidney injury, and the sCr does not increase in this stage. The increase of sCr cannot occur until the glomerular filtration rate is decreased (11,12).

Cardinale *et al.* evaluated N-terminal pro-B-type natriuretic peptide (NT-proBNP) as an early predictor of AKI developing after lung operation, and achieved promising results. Increased serum NT-proBNP levels suggest the presence of myocardial wall tension, myocardial ischemia, activation of the renin-angiotensin-aldosterone system and the sympathetic nervous system, and renal dysfunction—all which are risk factors of AKI (13,14). According to their clinical data, Cardinale *et al.* concluded that both sCr and NT-proBNP are viable independent predictors of AKI, and the combined analysis of the two indicators can greatly improve the accuracy of the prediction. However, as described in the article, the NT-proBNP was measured before and soon after the surgery in this study. The preoperative NT-proBNP can reflect the patient's preoperative renal function reserve and tolerance to the operation, while the postoperative NT-proBNP cannot provide additional information to assess the influence of intraoperative factors on AKI occurrence. Nevertheless, according to our experience, even with the similar preoperative functional reserve, the postoperative renal function may be significantly different between patients who undergo various surgical procedures. Therefore, measuring NT-proBNP repeatedly at several time points after the operation, and evaluating its predictive accuracy for AKI development and the association with surgical factors and complications, should be a useful exercise.

In summary, the authors, using newer and more objective criteria, studied the AKI after lung surgery and discovered significantly higher incidences than those commonly expected in the previous literature; this serves as a reminder that more attention needs to be paid to the occurrence of AKI. Regarding the predictive factors and the serious consequences of AKI proposed by Cardinale *et al.*, a larger sample size and better design study may be needed to demonstrate them more conclusively.

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Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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