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Is urinary sediment the earlier marker than urinary NGAL or KIM-1 for diagnosis of AKI after open heart surgery?

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Background: Acute Kidney Injury (AKI) is common after open heart surgery (CPB). Several biomarkers have been used including urinary NGAL and KIM-1 for the early diagnosis of AKI.

Aim: This study was carried out to evaluate the role of urinary sediment scoring (USS) in comparison to NGAL and KIM-1 in the early detection of AKI after CPB.

Methods: This prospective cohort study was carried out on 45 adult patients of both sexes with a Cleveland score (CCS) (0-5) and scheduled for CPB surgery in Alexandria Main University Hospital. The renal function of the patients was assessed before and every day after surgery. Fresh urine samples were taken from every patient and centrifuged for microscopic examination of the urinary sediments and for measurement of NGAL and KIM-1 before, 2, 6, 12 and 24 hours after CPB.

Results: Eleven patients developed AKI. Patients with AKI had a higher CPB and cross clamp times (90 ± 16.2 in comparison to 60.9 ± 8.1 minutes in the non-AKI patients). Serum creatinine started to be significantly higher in the AKI group from the second postoperative day with a mean value of 1.56 ± 0.28 mg/dl compared to a mean value of 0.85 ± 0.14 mg/dl in the non AKI group. Urine sediment score (USS) 1 and 2 were higher in the AKI group 2 hours after CPB and till the end of the first day with area under the curve (AUC) average of (0.865). Urinary NGAL significantly increased in the AKI group 2 and 6 hours after CPB with corresponding AUC of (0.710 and 0.700). Urinary KIM-1 was higher in the AKI group 12 and 24 after CPB with AUC of 0.725 and 0.703, respectively. Combination of USS, NGAL and KIM-1 gives an AUC of 0.906 in predicting AKI. Multivariable binary logistic regression analysis revealed that the most powerful independent predictors of AKI were USS 24 hours (RR 4.752) and urinary NGAL 6 hours (RR 1.020) after CPB.

Conclusion: Urinary microscopic examination to detect urinary sediments, which is often neglected, was found to have a higher sensitivity and specificity for early detection of AKI in comparison to the novel biomarkers NGAL and KIM-1. They can also be used in combination to improve their performance.

Biography

Naga SS is working as Emeritus Professor of Nephrology and Internal Medicine since 2007 till date in the Alexandria Faculty of Medicine, Alexandria, Egypt. He is a past member of the board of ISPD, Board of the Egyptian Society of Nephrology and Transplantation and he is an active member of ASN, ISN, and EDTA-ERA. His main interest is in Nephrology, Dialysis, and AKI.

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