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Prognostic role and diagnostic accuracy of Urinary Neutrophil Gelatinase-Associated Lipocalin in the Earl Diagnosis of Acute Renal Damage After Pediatric Cardiac Surgery.

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Background: Neutrophil gelatinase-associated lipocalin (NGAL) is gaining consensus in the early diagnosis of acute renal injury (AKI) in various pathological settings in adult patients, including cardiac surgery. Conversely, the diagnostic accuracy of urinary NGAL related to AKI syndrome after pediatric cardiac surgery is still controversial.
METHODS: We prospectively enrolled 148 children (0-18 years, median 36,4±55,33 months) undergoing surgery at our Institution for correction/palliation of congenital heart defect (CHD). Urinary samples for NGAL measurement (with ARCHITECT platform, Abbott Diagnostics) were collected pre-operatively, at 2, 6 and 12-hours post cardiopulmonary bypass. Brain natriuretic peptide (BNP) was measured basally and at 12-36 hours (with Triage reagents, Access Immunoassay Systems, Beckman Coulter, Inc.). The presence of AKI was defined in accordance with both RIFLE and AKIN guidelines.
Results: The peak of urinary NGAL values (mean 183.0 }432.4 ng/L, range 0.30-3888 ng/L) occurred within 6 hours, being most common at 2 hours after surgery. The peak of NGAL occurred significantly earlier than that of serum creatinine () (P<0.001). NGAL peak values positively correlated with Aristotle score (P=0.003), body surface area (P=0.002), time of intubation (P<0.001), intensive care unit stay (P<0.001) and cardiopulmonary bypass (P<0.001). However, after multiple regression analysis only cardiopulmonary bypass time (R=0.607, P<0.001) and BNP at 12-36 hours values (R=0.312, P<0.001) were significantly related to NGAL peak values. Finally, the diagnostic accuracy of urinary NGAL peak values for AKI showed an AUC ROC curve of 0.82 with an optimal cut-off value of 80 ng/L (sensitivity 0.71, specificity 0.85, predictive positive value (PPV) 0.76, predictive negative value (NPV) 0.81). NGAL peak values tended to have better diagnostic accuracy than the NGAL values of other samples collected at 2, 6 and 12 hours after surgery, respectively (Table-1).
CONCLUSIONS: Our data suggest that urinary NGAL provides significant diagnostic and prognostic information in children undergoing surgery for CHD.

Table-1: ROC Curve for the diagnosis of AKI of U-NGAL measurements at various time intervals.

SAMPLE	***AUC***	***Specificity***	***Sensitivity***	***PPV***	***NPV***
NGAL peak	0,82	0,85	0,61	0,76	0,81
NGAL 2 hours	0,81	0,83	0,71	0,75	0,81
NGAL 6 hours	0,78	0,68	0,81	0,64	0,84
NGAL 12 hours	0,76	0,81	0,61	0,68	0,76