URINARY AMINOPEPTIDASE ACTIVITIES AS EARLY AND PREDICTIVE MARKERS OF ACUTE KIDNEY INJURY IN PATIENTS UNDERGONE TO CARDIAC SURGERY

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INTRODUCTION

The aim of this work is to analyze if urinary glutamyl (Glu) and alanyl aminopeptidase (AlaAp) activities are early markers of acute kidney injury (AKI) in patients undergone to cardiac surgery.

PATIENTS AND METHODS

63 patients were selected for the study. Blood and urine samples were taken before surgery, and at 12, 24 and 48 hours after surgery. 33 patients exhibited an increase of at least 50 % in plasma creatinine concentration in the next 48 hours after surgery, and were classified as Risk (n=13), Injury (n=12) or Failure (n=8) using RIFLE scale. Proteinuria, microalbuminuria, Glu and AlaAp were measured in all urine samples. Neutrophil gelatinase-associated lipocalin (NGAL), N-acetyl-β-*D*-glucosaminidase (NAG), interleukin-18 (IL-18), kidney injury molecule-1 (KIM-1) and β_2-microglobuline (β2-MG) were determined 12 hours after surgery.

RESULTS

12 hours after surgery, Glu and AlaAp urinary activities were significatively increased in patients that developed Injury ($p<0.001$) or Failure ($p<0.05$ vs no AKI patients), and remained increased at 24 ($p<0.05$) and 48 ($p<0.01$) hours (Fig.1). Glu and AlaAp exhibited larger ROC-AUC to distinguish patients that developed Injury or Failure than other urinary markers (Fig. 2). We also found strong correlations between urinary Ap activities measured 12 hours after surgery and plasma creatinine concentrations determined 48 hours after surgery (Fig 3).

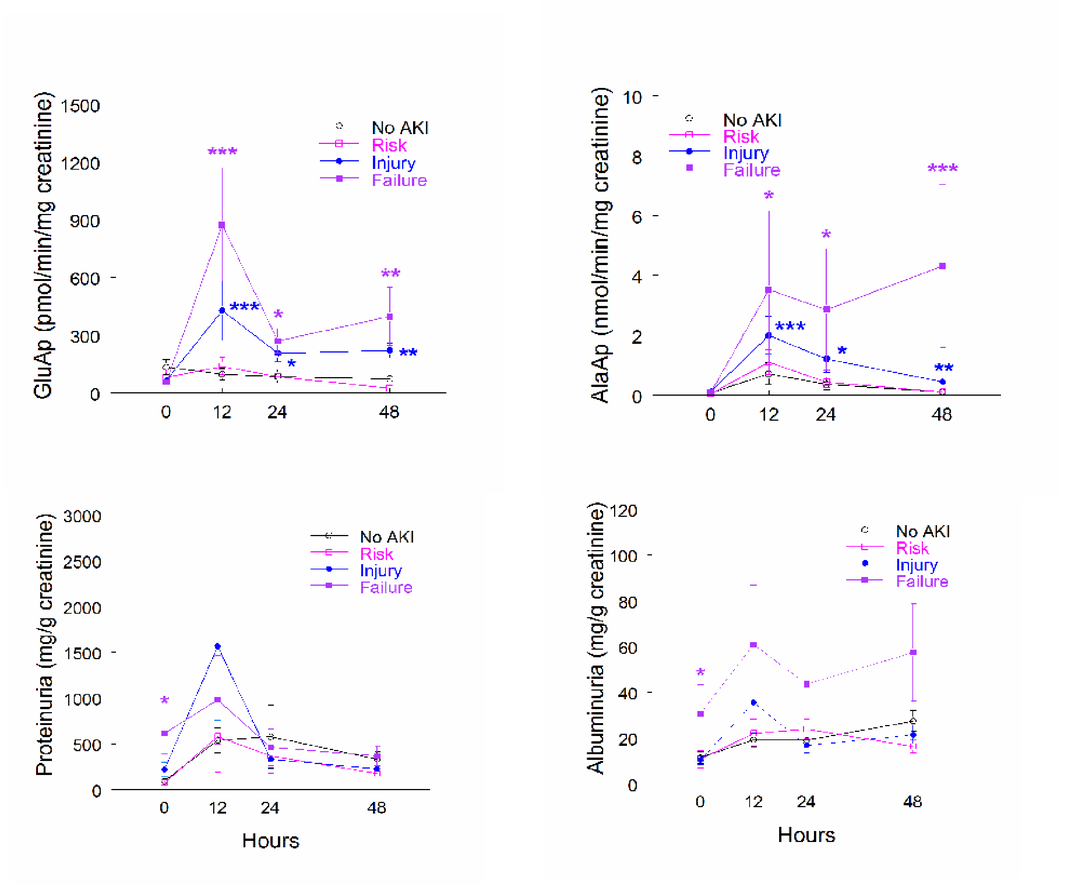

Figure 1. Urinary GluAp activity, AlaAp activity, proteinuria and microalbuminuria before surgery and at 12, 24 and 48 hours after surgery. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ vs patients that not develop AKI.

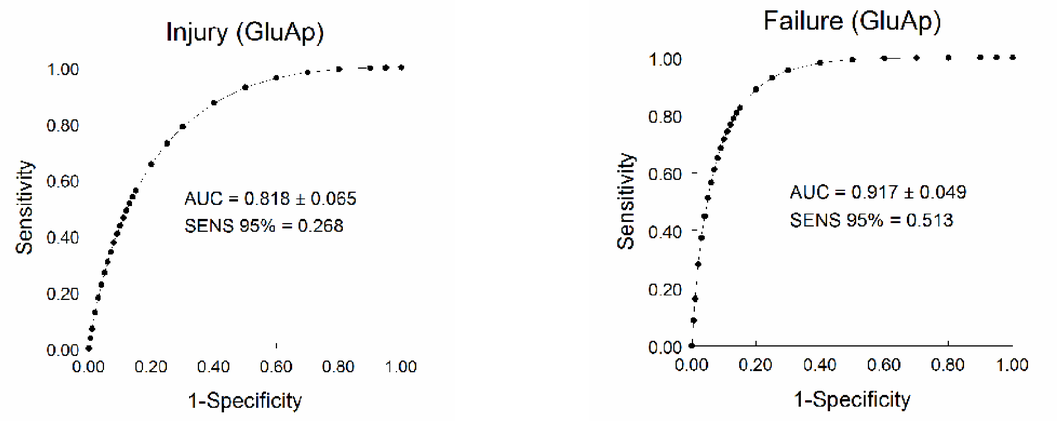

Figure 2. ROC-AUC of GluAp 12 hours after surgery, taking patients that develop injury (left) or failure (right) as true positive and the rest of patients as true negative.

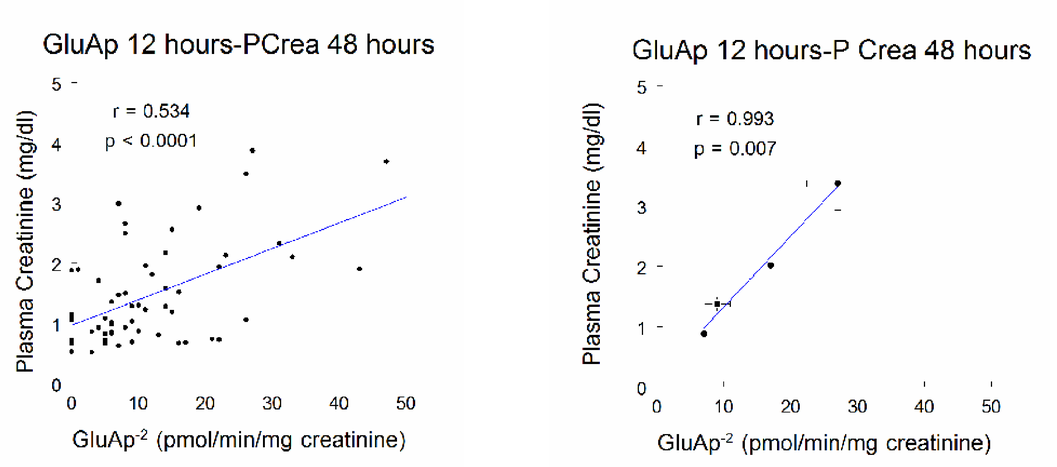

Figure 3. Linear regression between urinary GluAp activity measured 12 hours after surgery and plasma creatinine determined 48 hours after surgery (left) and when data were pooled in no AKI, Risk, Injury and Failure with RIFLE scale (right). P-value and correlation coefficient (r) are displayed on each graph.

CONCLUSION

Glu and AlaAp urinary activities are early markers of the AKI developed after cardiac surgery, indicating the extent of the AKI and exhibiting a high predictive value over plasma creatinine concentration. These markers can be of great usefulness in early diagnosis and prognosis of these patients.

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