

SERUM AND URINARY MARKERS OF ACUTE KIDNEY INJURY AFTER COMPLEX HEPATIC SURGERY

C. Donadio, E. Baronti, A. Bottai, L. Bozzoli, G. Fumagalli, D. Giannese, E. Giglio, E. Mangione, G. Pasquariello, V. Vigo, A. Lucacchini, L. Giusti, E. Donadio, F. Forfori, C. Leoni, G. Licitra, P. Bucciatti, L. Urbani.

Scuola di Specializzazione in Nefrologia, Università di Pisa; Dipartimento di Farmacia, Università di Pisa, UO Rianimazione 4, AOUP, Pisa; UO Chirurgia Colo-rettale, AOUP, Pisa, Italy.

OBJECTIVES

Background

Acute kidney injury (AKI) is an important post operative complication with an incidence ranging from 8% to 16% after complex hepatic surgery. Serum creatinine (sCr) is the most common clinical marker of AKI. Other plasma and urinary markers have been proposed as early markers of AKI and to highlight sub-clinical AKI.

Aim of the Study

To determine the effect of complex hepatic surgery on classical and sub-clinical markers of AKI.

METHODS

Patients and methods

Elective complex hepatic surgery (hepatocellular carcinoma or liver metastases from other primary cancers).

Thirty-seven patients (28 males),
36-84 years (mean 64.6 years)
sCr 0.58-1.53 mg/dL (mean 0.90 mg/dL)

Observation period

The day before, during surgery and the following 4 days of Intensive Care

Parameters

Plasma and/or urinary concentrations of creatinine, cystatin C, β 2microglobulin (β 2M), β trace protein (β TTP), NGAL, Heat Shock Protein 70 (HSP 70),
Urine albumin, urine gamma-glutamyl-transferase (GGT) and lactate dehydrogenase (LDH).

RESULTS

Table 1. Serum creatinine versus urinary markers of sub-clinical AKI (mean values)

	-1	SURGERY	+1	+2	+3	+4
sCreatinine, mg/dl	0.90	0.80	0.89	0.92	0.91	0.96
uAlbumin, mg/dl	1.6	14.1	4.2	2.8	4.6	5.4
uB2M, μ /L	153.4	1868.7	10811.2	9888.4	7530.5	4271.1
uBTP, mg/L	3.1	2.9	11	6.5	5.7	4.5
uCystatinC, mg/L	0.03	0.09	0.24	0.31	0.25	0.26
uNGAL, ng/ml	21.2	10.3	85	62.7	57.6	42.6
uGGT, U/L	24.9	41.3	168	96	85	91.6
uLDH, U/L	30.9	38	78.7	59.5	55.9	59.4
uHSP70, ng/mL	0.27	0.20	0.41	0.23	0.23	0.27

Surgical time 135-1380 min (mean 610 min)
Liver ischemia time 33-396 min (mean 112 min).
Clinical AKI (increase in sCr > 0.3 mg/dL) at 3 days

Five patients (13.5%); 2 patients (5.4%) required dialysis.

Serum markers of AKI (mean values): a slight not significant increase in HSP 70 on the first post-operative day. Cystatin C, β 2M, β TTP, NGAL) were unchanged, similarly to sCr.

Urinary Markers of Glomerular damage: albumin excretion (4x) during the surgery, alteration in glomerular permeability. (Table 1)

Tubular dysfunction and/or damage: a significant increase in the excretion of small proteins cystatin C (10x), β 2M (150x), β TTP (3x) and of tubular enzymes GGT (6x) and LDH (3x). Urinary NGAL and HSP70 showed a similar trend (3x increase).

CONCLUSIONS

After complex hepatic surgery, 5 patients (13.5%) showed a clinical AKI, with an incidence similar to literature data.

Other functional changes at different levels of the nephron were frequently observed starting already from the first post-operative day.

These alterations, which are undetectable by clinical criteria of AKI, may lead to the diagnosis of sub-clinical AKI and provide information on the patho-physiology of acute renal damage.

