P2599

Echo color doppler evaluation of renal hemodynamic during acute heart failure

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Background: Acute heart failure (AHF) is often accompanied by impairment in renal function. A profound derangement of normal abdominal haemodynamic is always present during this clinical phase.

Methods: 14 patients (6 F – mean age 80 – mean EF 0.39) admitted for acute heart failure underwent cardiac and renal Echo Doppler examination at day 1-3-5 of Hospital stay. Parameters of arterial and venous flow within cortical right kidney were recorded. Venous Doppler Profile (VDP) was classified as: continuous (C), pulsatile (P), biphasic (B) or monophasic (M) according to the growing degree of derangement. Arterial resistive index (RI) >0.8 was considered elevated. Correlation between renal hemodynamic (and its changes) with biohumoral and echo parameters was sought.

Outcome: At day 1 VDP was M or B in 8 patients (57%) and in four (50%) of them dropped to C or P at day 5. RI was elevated in 8 patients at day 1 while only in 4 at day 5. VDP and RI were not related to EF or BNP values. One patient died before day 5, no other worsening heart failure episodes occurred. Two patients (14%) developed acute kidney injury but their VDP and RI were normal and did not change. Three patients (21%) did not improve their BNP (decrease >30%) but this was not associated with VDP or RI changes. Elevated derived pulmonary artery systolic pressure (>40 mmHg) was present in 6 out of 8 patients (75%) with M or B VDP and in all 4 patients with both elevated RI and M or B VDP.

Conclusions: This is the first study exploring changes in renal hemodynamic by echo Doppler during AHF. With respect to previous studies among stable patients, our preliminary data shows a higher proportion of deranged renal venous and/or arterial pattern. After diuretic therapy a trend towards improvement in VDP was recorded. No clear association with other clinical and hemodynamic parameters seems evident.

Venous Pattern	Day 1	Day 3	Day 5
Continous	2	8	5
Pulsatile	4	2	4
Biphasic	2	1	2
Monophasic	6	3	2
Arterial RI >0.8	8	6	4
BNP, pg/ml	1060±1180*	372±281*	424±213*
Creatinine, mg/dl	1.4±0.6	1.5±0.6	1.3±0.6
Hb, g/dl	12.1±2.3	12.3±3.6	13.2±2.3

*p>0.05.