MEASURING ISCHEMIA DURING ACUTE KIDNEY INJURY WITH DOPPLER ULTRASOUND-A NEW AND RELIABLE PARAMETER

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Objectives:

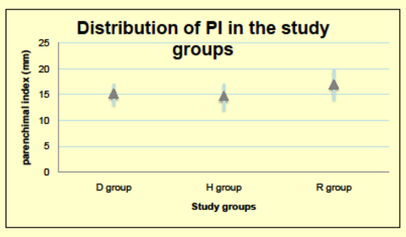
Acute kidney failure (AKF) is a life threatening condition, with a complex clinical evolution. The rapid diagnosis of this syndrome and especially of its etiology is mandatory for the recovery of the kidney function. Therefore, a series of markers are used for early diagnosis. Ultrasound Doppler examination is able to assess the intrarenal arterial vascularisation and vascoconstriction with specific parameters. The aim of our study was to evaluate the utility of this paramaters in different AKF etiologies.

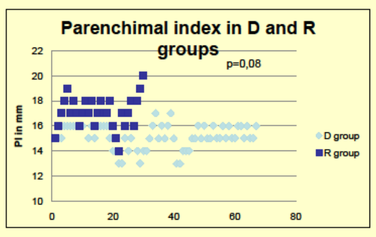
Methods:

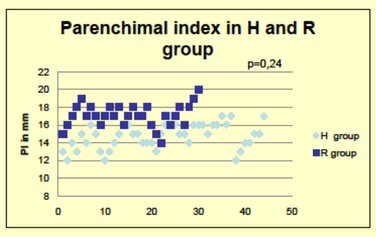
140 consecutive patients with AKF were examined with standard, Doppler and Doppler-Duplex ultrasonography (US) of both kidneys. The parameters that we studied were: parenchimal index PI, maximum systolic velocities (v max), diastolic velocity (v min) and resistivity index (RI). Measurements were made in the interlobar arteries at three levels in each kidney and the media was noticed. Mean, st dev, p significance and r corelation index were calculated using Microsoft Excel 2010 statistical package tools.

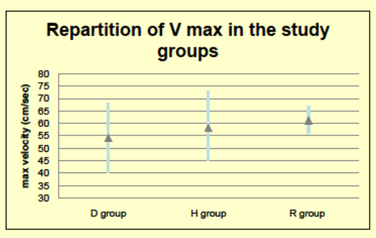
Results:

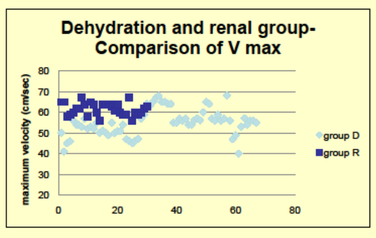
Causes of AKF were: a prerenal group with two subgroups: dehydration D (67 cases, 47,8%) and heart failure with hypotension H (43 cases, 30,7%) and a renal R group with acute toxic interstitial nephritis (30 cases, 21,5%). IP was either normal or decreased in all groups. Doppler results were: in dehydration group: v max 55±5 cm/s, v min 13±3 cm/s and RI 0,67±0,03; in heart failure group: v max 58±4 cm/s, v min 17±5cm/s and RI±0,01 and in nephritis group: v max 62±7 cm/s; v min 10 ±2; RI 0,81 ±0,02 There was a significant difference of v max and RI in the renal group compared to the ones in the group of prerenal patients (p=0,03, r=0,78 and p= 0,004; r=0,87). There was no difference in IP and Doppler parameters between the prerenal causes of AKF.

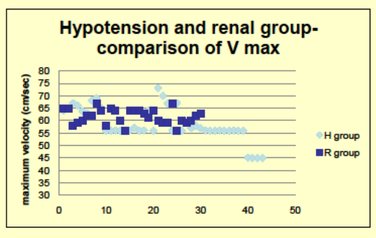


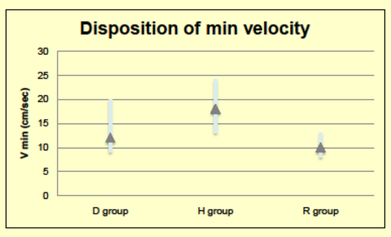


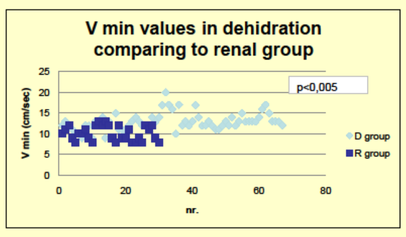


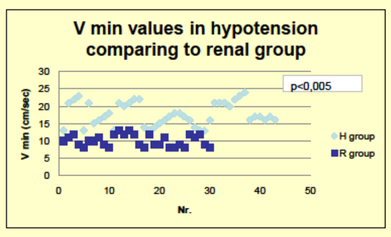


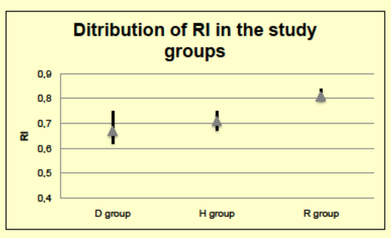


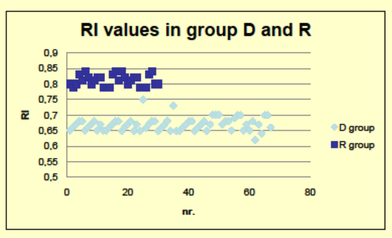


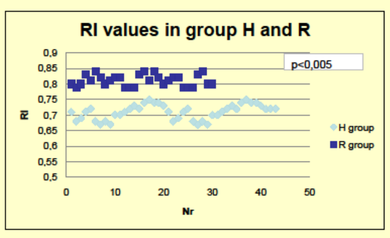




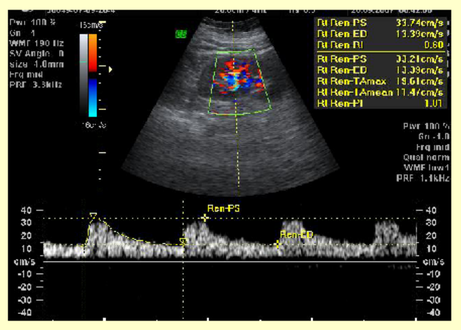




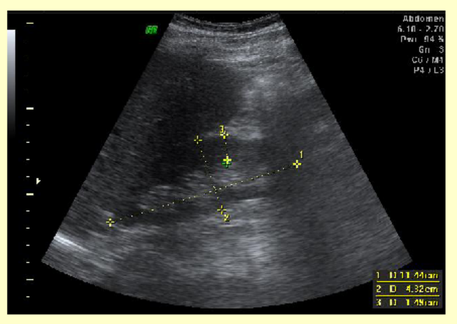


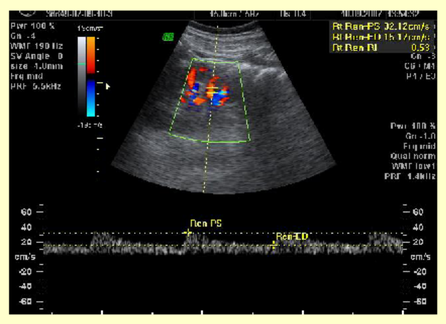


Grey scale and Doppler-Duplex Ultrasound of kidney in the dehidration group.

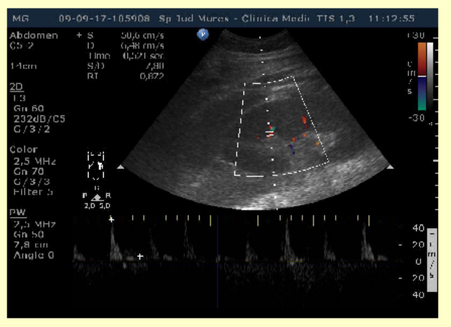


Kidney parameters (parenchimal index, maximum velocity, minim velocity and RI)in hypotension group





Acute kidney failure due to ischemia: enlarged kidneys, high RI, low V min



Conclusions:

In prerenal causes of AKF there was no involvement of the small intrarenal arteries and rehydration treatment rapidly ameliorated the kidney condition. Increased Doppler parameters were present in interstitial nephritis due to inflammation and hypoxia-induced vasoconstriction. Early diagnosis of the cause of AKF can lead to a rapid and correct therapeutic decision. Increased systolic velocity, decreased diastolic velocity and increased resistivity index are characteristic patterns in cases of acute interstitial nephritis. We recommend ultrasonography in all cases of acute kidney injury, grey scale and Doppler.

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G) Acute Renal Failure. G2) Human studies.

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