

# ECHOCARDIOGRAPHIC CORRELATES OF HYPER-HYDRATION IN PERITONEAL DIALYSIS PATIENTS

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## INTRODUCTION :

Chronic volume overload is a contributing factor of cardiovascular disease in peritoneal dialysis (PD) patients (pts) and volume assessment may be troublesome on a clinical basis. Bioimpedance spectroscopy (BIS) has been validated as a tool to identify fluid overload in PD pts.

Aim of the study was to evaluate echocardiographic correlates of hypervolemia assessed by BIS analysis in PD patients.

## MATERIAL AND METHODS:

We perform echocardiographic study (ECHO) at the time of BIS analysis which was performed using BCM device (body composition monitor, Fresenius Medical Care, Bad Homburg, Germany). Hydration status (HS) was expressed as absolute over-hydration (OH) or as a ratio between over-hydration and extracellular water (OH/ECW %). Severe overhydration was defined as OH/ECW > 15%. Patients with ejection fraction (EF) < 50% and with mitral regurgitation more than moderate, were excluded.

Student T test and Mann Whitney were used as appropriated for group comparisons.

## RESULTS:

Sixty-seven ECHO/BCM paired observations were recorded in 24 prevalent PD pts during 4 years follow up. Twenty-eight and 39 observations were obtained while pts were on manual and automated PD, respectively. Seven out of 24 pts were anuric when studied.

The baseline demographic, clinical data and hydration parameters of the population are provided in table 1.

Table 1: Patients characteristics

Age (ys)	54 ± 16
Gender (M/F)	16/8
Dialysis vintage (months)	21.3 ± 27.1
CAPD/APD	11/13
RRF (ml/min)	5.2 ± 4.9
OH (mean ± sd)	1.6 ± 1.4
OH > 1.1 L [N (%)]	39 (58%)
OH/ECW % (mean ± sd)	9.2 ± 7.6
OH/ECW > 15% [N(%)]	12 (17.9%)

Thirty-nine observations had OH > 1.1 L (OverHy), while the remaining 28 were in the range of normohydration (-1.1 < OH < 1.1 NormoHy).

## CONCLUSIONS:

Left ventricular dimension together with left atrium area, CO, Ci, LVM, A wave, E/Em and Sm of LV, S wave and S/D of pulmonary flow seems to be affected by hydration status in PD pats.. The variations described are mostly in normality range and the natural history of these echocardiographic findings needs to be elucidated by a longer follow-up.

Significant differences of both conventional and TDI parameters between OverHy vs NormoHy and SevereOH vs NormoOH observations are summarized in table 2 and 3 respectively.

Table 2: Conventional and TDI  
Echocardiographic variables

Variables	OverHy (N=39)	NormoHy (N=28)	p
LVTdD	53.8 ± 5.3	49.3 ± 5.1	0.002
LVTdV	139 ± 34.9	116.2 ± 28.8	0.006
LA area	19.7 ± 3.8	18 ± 5.5	0.04
CO	6.9 ± 2.5	5.4 ± 1.7	0.009
Ci	3.8 ± 1.2	3.1 ± 0.9	0.01
LVMi	108.2 ± 25.8	90.8 ± 26.8	0.01
A wave (cm/sec)	96 ± 23.8	77 ± 19.9	0.001
S wave (cm/sec)	51.9 ± 11.5	44.3 ± 11.2	0.01
LV E/Em	6.4 ± 3	4.8 ± 1.7	0.01
LV Sm	0.13 ± 0.03	0.16 ± 0.04	0.01

Table 3: Conventional and TDI  
Echocardiographic variables

Variables	Severe OverHy (OH/ECW > 15% N=12)	NormoHy (OH/ECW < 7% N=30)	p
SBP (mmHg)	157.9 ± 20	134.3 ± 16.9	0.01
EF (%)	68.5 ± 6.6	63.4 ± 7.1	0.04
LVM <sup>2.7</sup>	55.3 ± 13	41.7 ± 13.4	0.004
A wave (cm/sec)	101.8 ± 28.3	76.6 ± 19.3	0.004
S wave	55 ± 11.9	44 ± 10.8	0.01
S/D	1.4 ± 0.2	1.1 ± 0.3	0.05
LV E/Em	6.5 ± 3.1	4.7 ± 1.7	0.01
LV Sm	0.11 ± 0.01	0.15 ± 0.043	0.01
LV IVRT	83 ± 14.4	67.9 ± 16.7	0.01
RV Am	0.23 ± 0.06	0.18 ± 0.04	0.04
RV ET	310 ± 24.5	284 ± 39.7	0.03

LVTdD: left ventricular telediastolic diameter; LVTdV: left ventricular telediastolic volume, LA: left atrium, CO: cardiac output, Ci: cardiac index, LVMi: left ventricular mass index, A wave: atrial transmitral wave, S wave: systolic pulmonary wave; S/D ratio: systolic/diastolic pulmonary waves ratio, LV left ventricular, SBP: systolic blood pressure, EF: ejection fraction, LVM<sup>2.7</sup>: left ventricular mass expressed as g/h<sup>2.7</sup>. IVRT: isovolumetric relaxation time, RV: right ventricle; ET: ejection time