Ambulatory Blood Pressure Monitoring and Lung Ultrasound as New Predictors of Cardiovascular Morbidity in End Stage Renal Disease Patients

Thesis

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Finally, I appreciate the cooperation of our dear patients, I hope this work offers a chance for a better health which they deserve after their long pains and suffering

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Dedication

I dedicate this work to my beloved family especially my mother and my wife who always shows so much care, aid, support and patience.

Abstract

Introduction:

Pulmonary congestion is highly prevalent and often asymptomatic among patients with ESRD treated with hemodialysis, our work aimed to find relation between ABPM, lung congestion as evident by lung ultrasound B- lines and coronary artery disease

Patients and methods:.

Our study included 50 Hemodialysis patients who were divided into 2 groups according to IDWG (group 1 more than 4 kg and group 2 less than 4 kg) each group was subjected to lung ultrasound (counting B-Lines), ABPM, ECG.

Results: .

The sleep systolic dip was higher among group of higher IDWG with statistically significant differing ($P<0.05$) between both studied groups as regard ABPM findings.

Statistically significant positive correlation between lung B-lines and BP readings (systolic and diastolic) in the group (IDWG less than 4 kg) $r= 0.4$ ($p<0.05$) while the correlation still preserved only with diastolic blood pressure with the group of higher IDWG.

Ischemic heart disease prevalence in a group (IDWG less than 4 kg) showed a strong positive correlation with the systolic BP with statistically significant difference ($p <0.001$)

The positive ECG for CAD of the two groups strongly correlate with the number of B-lines by lung US (mean + SD) 4.8 + 2.5 ($p < 0.05$) for the IDWG less than 4 kg and (mean + SD) 4.6 + 2.9 with ($p < 0.001$)

80 % the positive ECG for CAD were non dipper as evident by ABPM ($p < 0.001$) And most of them were females (66.7 %)!!

Conclusion:

Early installation of anti hypertensive medications and judicious ultrafiltration for proper early control of hypertension

Ambulatory blood pressure monitoring is preferred as investigation of choice every 3 months in hemodialysis patient to unmask the extremes of blood pressure and select the non-dippers for more meticulous cardiac assessment and follow up.

Lung ultrasound as a bed side test for assessment of lung congestion and prediction of ischemic heart disease

Key words:

ESRD, Haemodialysis, IDWG, ABPM, Lung Ultrasound, B-Lines

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ABPM	Ambulatory Blood Pressure Monitoring
ACE	angiotensin-converting enzyme
ADMA	Asymmetrical dimethylarginine
AF	with atrial fibrillation
AHA	American Heart Association
AMI	myocardial infarction
ANP	A trial natriuretic peptide
ARBs	angiotensin II receptor blockers
BMI	Body mass index
BNP	Brain natriuretic peptide
CABG	coronary artery bypass grafting
CAD	Coronary artery disease
CHD	coronary heart disease
CKD	Chronic Kidney Disease
CPAP	Continuous positive airway pressure
CRF	chronic renal failure
CVD	cardiovascular disease
EF	ejection fraction
EGF	Epidermal growth factor
EGIR	The European Group for the Study of Insulin Resistance
ESRD	End-Stage Renal Disease
FSGS	focal and segmental glomerular sclerosis
GFR	Glomerular filtration rate

HbA1c	Glycated hemoglobin
HD	haemodialysis
HDL	high-density lipoprotein
HGF	Hepatocyte growth factor
HF	heart failure
Hs-CRP	highly sensitive C-reactive protein
ICDs	of implantable defibrillators
IDF	International Diabetes Federation
IDWG	inter dialytic weight gain
IGF-1	Insulin-like growth factor
JNC 7	The Seventh Report of the Joint National Committee
LDL	low density lipoprotein
LVH	Left ventricular hypertrophy
MCP-1	monocyte chemo-attractant protein 1
MetS	metabolic syndrome
MMIF	macrophage migration inhibiting factor
MW	Molecular weight
NASH	nonalcoholic steatohepatitis
NCEP ATP III	the National Cholesterol Education Program - Third Adult Treatment Panel
NHANES	National Health and Nutrition Examination Survey
NHANES III	Third National Health and Nutrition Examination Survey

NIDDK	National Institute of Diabetes and Digestive and Kidney Diseases
NKF	National Kidney Foundation
NO	nitric oxide
NT-pro-BNP	N-terminal pro-BNP
OSA	Obstructive Sleep Apnea
PAI	plasminogen activator inhibitor
PCI	percutaneous coronary intervention
PCOS	Polycystic Ovary Syndrome
PDGF	Platelet-derived growth factor
RRT	renal replacement therapy
SDMA	Symmetric dimethylarginine
SNGFR	single nephron GFR
TG	triglyceride (TG)
TGF-B	Transforming growth factor-β
TLC	Therapeutic lifestyle changes
TNF- α	Tumor necrosis factor
USRDS	U.S. Renal Disease Registry
USRDS	United States Renal Data System
VLDL	very low density lipoproteins
WHO	World Health Organization

Introduction

& Aim of Work

Introduction

Pulmonary congestion is highly prevalent and often asymptomatic among patients with ESRD treated with hemodialysis (HD) , but whether its presence predicts clinical outcomes is unknown **(zoccali C ; et al., 2013)**

Volume expansion is perhaps the most insidious and common modifiable risk factor for the exceedingly high death risk of patients with kidney failure on dialysis (CKD stage 5D) **(zoccali C; et al ., 2013)**

Measures of a critical component of fluid volume like extravascular lung water may provide useful information for risk stratification and ultrafiltration prescription in this high-risk population **(zoccali C; et al ., 2013)**

Extravascular lung water is related to the ventricular filling pressure of the left ventricle (LV; i.e., an established biomarker for risk stratification and prescribing and monitoring fluids therapy in highrisk patients). **(McGee WT; et al., 2006)**

Lung ultrasound (US) is a novel, validated technique that has been increasingly applied to estimate lung water in patients with heart disease and patients with acute respiratory failure treated in intensive care units **(picano E; et al .,2010)**

Lung ultrasound can detect asymptomatic pulmonary congestion in hemodialysis patients, and the resulting BL-US score (Number of B lines as evident by lung ultrasound) is a strong, independent predictor of death and cardiac events in this population **(zoccali C; et al . , 2013)**

The high morbidity and mortality rates in (HD) patients are due, at least in part, to their increased risk for cardiovascular diseases (CVD **(kober L; et al., 2010)**

Visit-to-visit BP variability was extremely high in hemodialysis patients compared with other populations and a major determinant of cardiovascular events **(Rossignol P; et al., 2012)**

Out-of-dialysis unit blood pressure among hemodialysis patients is prognostically more informative than that recorded just before and after dialysis. Therefore, the management of hypertension among these patients should focus on blood pressure recordings outside the dialysis unit **(Agarwal R. 2010)**

NICE hypertension guidlines, states that ambulatory blood pressure monitoring (ABPM) reduces misdiagnosis and allows better targeted treatment. **(lovibond k; et al .,2011)**

KDOQI practice guidelines recommend predialysis blood pressure <140/90 mm Hg; however, most prior studies had found elevated mortality with low, not high, systolic blood pressure **(Robinson BM ;et al., 2012)**