Cardiac Autonomic Neuropathy in Non-Diabetic Patients with Chronic Kidney Disease

Thesis

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In Internal Medicine

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List of Abbreviations

Abb.	Full term
ACEI	*Angiotensin converting enzyme inhibitors*
AF	*Atrial fibrillation*
AFT	*Autonomic function tests*
AN	*Autonomic neuropathy*
ANS	*Autonomic nervous system*
ARB	*Angiotensin receptor blockers*
BP	*Blood pressure*
bpm	*Beats per minute*
BRR	*Baroreceptor reflex*
CAD	*Coronary artery disease*
CAN	*Cardiac autonomic neuropathy*
CKD	*Chronic kidney disease*
CV	*Cardiovascular*
CVD	*Cardiovascular disease*
CVS	*Cardiovascular system*
DBP	*Diastolic blood pressure*
eGFR	*Estimated glomerular filtration rate*
ESRD	*End Stage Renal Disease*
GFR	*Glomerular filtration rate*
GI	*Gastrointestinal*
GU	*Genitourinary*
HR	*Heart rate*
HRV	*Heart rate variability*
HTN	*Hypertension*
LUTS	*Lower urinary tract symptoms*
LV	*Left ventricle*
LV	*Left ventricular*
MI	*Myocardial ischemia*
PNS	*Parts of the ANS-parasympathetic*

List of Abbreviations cont…

Abb.	Full term
PTH	*Parathyroid hormone*
PVR	*Postvoid residual volume*
QDIRT	*Quantitative direct and indirect reflex test*
SBP	*Systolic blood pressure*
SMI	*Silent myocardial ischemia*
SNS	*Sympathetic Nervous System*

Abstract

There were no significant correlation between type of cardiac autonomic dysfunction & demographic data. Most of the patients were males with mean age 44.78 ± 13.11 years.

There were no significant correlation between type of cardiac autonomic dysfunction & echocardiography.

There were no significant correlation between types of autonomic dysfunction regarding laboratory data, except for definite parasympathetic dysfunction which has a significant correlation with hemoglobin (anemia) & cholesterol level (hypercholesterolemia).

There were no significant correlation between types of cardiac autonomic dysfunction & decrease GFR, but the lowest GFR were detected in definite parasympathetic.

There was no significant correlation between types of CAN & protein / creatinine ratio.

Keywords: Sympathetic Nervous System- Silent myocardial ischemia- Systolic blood pressure- Parathyroid hormone

Abstract

INTRODUCTION

Cardiovascular autonomic neuropathy (CAN) is associated with high risk of sudden cardiac death. CAN is been diagnosed based on the early symptoms of neuropathy and autonomic dysfunction. These symptoms may include orthostatic dizziness, gastrointestinal (GI) and genitourinary (GU) symptoms, and hypoglycemia unawareness or unresponsiveness ***(Vinik and Ziegler, 2007).***

CAN is preceded by autonomic dysfunction. The process of aging is a factor which causes autonomic decline, which in turn leads to autonomic neuropathy. The earlier the autonomic dysfunction is detected, the greater the number of therapy options. Advanced autonomic dysfunction may be more difficult to treat. In other words, it is easier to correct early stage autonomic dysfunction compared than advanced-stage autonomic neuropathic damage ***(Vinik and Ziegler, 2007).***

The main function of the autonomic nervous system (ANS) is to maintain homeostasis, regardless of the conditions. The two main branches of the ANS, the parasympathetic and the sympathetic, can dynamically adjust their input to maintain homeostasis and apparent normal even in the face of degraded end-organ function. Often these ANS adjustments result in autonomic imbalance and begin to affect other systems within the body, including the cardiovascular system. This is the basis for the constellation of symptoms known to degrade quality of life in

many chronic diseases. By the time symptoms present as a result of end-organ dysfunction or failure, the ANS has been out of balance for considerably longer ***(Vinik and Ziegler, 2007).***

Unfortunately, early signs of autonomic dysfunction are often not recognized due to two main reasons. First, the current understanding of the effects of the ANS and its interaction with other physiological systems is incomplete. Second, a reliable clinical tool to measure and monitor the ANS did not exist until recently, when the ability to measure both ANS branches simultaneously and independently was developed commercially (ANSAR Medical Technologies, Inc., Philadelphia, PA). Prior to this, autonomic neuropathy could be clinically diagnosed (orthostatic hypotension, gastro-paresis, etc.) only at an advanced stage with dramatic symptoms. At this stage, it is usually much too late for anything but treatment of the symptoms. With simultaneous, independent measures of both ANS branches, these patients can be identified even when they are still asymptomatic, or mildly symptomatic, a fairly common situation usually accompanied by fatigue, light-headedness, palpitations, intractable hypertension, etc. Therapeutic intervention seems to improve outcomes by slowing or halting autonomic decline and the associated disease progression ***(Vinik et al., 2007).***

The history of non-invasive ANS monitoring in clinical practice is confusing. Traditionally, it has been based only on measures of heart rate variability (HRV). Measures of HRV

defined in the 1996 Circulation standards article, 3 are mixed or incomplete measures of the parasympathetic and the sympathetic. This is not surprising regardless of how much it is dissected. But, one independent measure of a system (the ANS) that contains two components: the parasympathetic and the sympathetic. From a mathematical perspective, one measure is insufficient to fully characterize a two-component system. If one measure changes, it is impossible to determine which component changed without making assumptions or without additional information. This has resulted in a very low clinical acceptance rate for this method. Except in extreme cases, HRV alone provides no additional information. The use of HRV alone merely indicates the obvious: that the patient's ANS is functioning ***(Task Force of the European Society of Cardiology, 1996).***

AIM OF THE WORK

The aim of the work is to evaluate the pattern of cardiac autonomic neuropathy (CAN) in non-diabetic chronic kidney disease (CKD) patients not on dialysis.