CIRCADIAN VARIABILITY OF BLOOD PRESSURE IN PATIENTS WITH SYSTOLIC HEART FAILURE AND IMPACT OF MEDICAL TREATMENT

A Thesis Submitted for partial fulfillment of Master Degree In cardiovascular Medicine

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بسم الله الرحمن الرحيم

قالُوا سُبْحَانَكَ لاَ عِلْمَ لَنَا
إِلاَّ مَا عَلَّمْتَنَا إِنَّكَ أَنتَ الْعَلِيمُ
الْحَكِيمُ

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ABSTRACT

CIRCADIAN VARIABILITY OF BLOOD PRESSURE IN PATIENTS WITH SYSTOLIC HEART FAILURE AND IMPACT OF MEDICAL TREATMENT

Background: Ambulatory Blood Pressure Monitoring may improve the risk/benefit ratio of treatments in advanced systolic heart failure by detecting impact of medical treatment on circadian variability of BP.

OBJECTIVE: To evaluate the circadian variability of blood pressure in patients with advanced systolic heart failure and impact of medical treatment.

METHODS: Prospective controlled study. We studied 28 patients with NYHA functional class IV congestive heart failure. Twenty four hour AMBPM was performed twice (at decompensation stage NYHA class IV and compensation stage NYHA class II) and data of both readings were analyzed and detection of LV contractility by ECHO.

RESULTS*:* .Three deaths occurred after the 1st reading and four deaths occurred after the 2nd reading. Twenty two patients (78.6%) are male. Mean age of the patients was 55.3±13.2 years, 15 patients (53.6%) are hypertensive, 12patients (42.9%) are diabetic, 18 patients (64.3%) are smoker and 10 patients (35%) have positive family history of idiopathic cardiomyopathy. Systolic BP dipping (SBP dipping) improved and became after medical treatment (1%-9%) in10 patients (55.5%) , (>9%) in 3 patients (16.6%) and became (<1%) in 5 patients(27.7%) with improvement . Diastolic BP dipping(DBP dipping) improved and became after medical treatment (1%-9%) in10 patients (55.5%) , (>9%) in 4 patients (22%) and became (<1%) in 3 patients(16.6%) with improvement.SBP dipping and DBP dipping improved after medical treatment by statistically significant p value (P value=0.001and P value=0.019) respectively. Pt with SBP dipping -3.00 ± 4.97% related strongly to survival by significant P value (0.02).

CONCLUSION*:* Medical treatment restored some degree of autonomic control in patients with CHF, as reflected by improvement of circadian patterns of blood pressure and reaching to a near normal variability of circadian patterns of blood pressure.

Key word: Heart failure, ambulatory blood pressure, BP dipping

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List of Abbreviation

ABPM	Ambulatory blood pressure monitoring
ACS	Acute coronary syndrome
AF	Atrial fibrillation
BP	Arterial blood pressure
BNP	Beta natriuretic peptide
CHF	Congestive heart failure
CVD	Cerebrovascular disease
DCM	Dilated cardiomyopathy
DM	Diabetes mellitus
DBPs	Mean sleeping diastolic blood pressure
DBPw	Mean waking diastolic blood pressure
DBP24h	Mean 24-hour diastolic blood pressure
dipSBP	Systolic blood pressure dipping
dipDBP	Diastolic blood pressure dipping
ECG	12- leads Electrocardiogram
ER	Emergency room
HTN	Hypertension
GRF	Glomerular filtration rate
ICM	Ischemic cardiomyopathy
LAD	Left atrial dimension

LBBB	Left bundle branch block
LVEDD	Left ventricle end diastolic diameter
LVESD	Left ventricle end systolic diameter
LVEF	Left ventricular ejection fraction
MI	Myocardial infarction
PCI	Percutaneous Coronary Intervention
SBPw	Mean waking systolic blood pressure
SBPs	Mean sleeping systolic blood pressure
SBP24h	Mean 24-hour systolic blood pressure
WCH	White coat hypertension
2D echo	2-dimensional echocardiography

INTRODUCTION

The prevalence of systolic heart failure is raising progressively with an ageing population and the improved salvage rates of acute coronary disease.

Heart failure symptoms are increasingly common and debilitating. Symptoms due to either systolic or diastolic dysfunction of the heart are associated with significant morbidity, recurrent hospitalizations and mortality.

In particular, the recurrent hospital admission pattern and its associated expenses makes this disease cluster a major public health problem [2,3].

Despite the study of the therapeutic value of medications, large clinical trials have identified hemodynamic, neurohormonal, immunological, and inflammatory alterations[1] that have distinct prognostic value according to the evolutionary stage of the heart failure, characterizing this syndrome as a complex disease.

Congestive heart failure is associated with alterations in sympathetic and parasympathetic nervous system, renin – angiotensin system and vasopressin and ANP secretion[19]. Indeed, patients with severe congestive heart failure have increased sympathetic nervous activity and impaired baroreceptor function, which will directly influence diurnal blood pressure profile. Thus, the circadian variability of systolic blood pressure represents multiple factors, which characterise an integrated response of the cardiovascular system.

This finding of a reduction in the circadian variability of blood pressure in systolic heart failure patients was supported by several subsequent controlled studies [20–23] although again there were some exceptions to the observation [24].

ABPM makes the diagnosis and treatment of nocturnal hypertension possible and is especially indicated for patients with borderline hypertension, the elderly, pregnant women, patients with treatment-resistant hypertension and patients with symptoms suggestive of hypotension.[13,14]

Ambulatory blood pressure monitoring has also been useful to define those hypertensive patients who lose their normal nocturnal dip in blood pressure during sleep

Even though ambulatory blood pressure monitoring induces modest sleep disturbances, it can accurately evaluate nighttime blood pressure profile and heart rate, without affecting sleep efficiency and quality. Sleep evaluation may be particularly useful in essential hypertension, as poor quality of nocturnal sleep were associated with non-dipping status.[15]

AIM OF THE WORK

The aim of the study is to determine the circadian variation of blood pressure in the patient with systolic heart failure NYHA functional class IV and impact of medical treatment on this variation if improvement occur or not

CHAPTER I

AMBULATORY BLOOD PRESSURE USES AND BENEFITS

Ambulatory blood pressure devices have two main methods of blood pressure detection: auscultatory and oscillometric detection of pressure cuff deflation pulse waveforms. These are generally studies in the non-dominant arm of the brachial waveform. The auscultatory method uses a microphone to detect Kortokoff sounds whereas the oscillometric method detects the initial (systolic blood pressure) pulse by counter pressure in the closed loop device and maximal (mean arterial pressure) oscillations of the brachial artery, calculating diastolic blood pressure either with a validated algorithm or by the loss of pulsatile pressure change. Both methods are less reliable in presence of an irregular pulse (such as in atrial fibrillation) through increased variance, although the method has been used successfully to outpatients with chronic atrial fibrillation and hypertension [4]. The frequency of recordings, the impact of ambulatory activity, mental and physical stress, and motion artifact and sleep cycle disturbance have all received in the hypertension literature. In addition, none of these issues invalidate or devalue the impact of repeated measures of blood pressure in a non-clinic environment.