Prevalence and Predictors of Atrial Fibrillation in Haemodialysis Patients

Thesis
Submitted for Partial Fulfillment of Master Degree in Internal Medicine

By

Mahmoud Mohamed Hamed Ahmed Alshiaty
M.B.B.Ch
Faculty of Medicine – Ain-Shams University

Under Supervision of

Prof. Dr. Gamal Elsayed Mady

Professor of Internal Medicine and Nephrology
Faculty of Medicine - Ain Shams University

Dr. Sahar Mahmoud Shawky

Lecturer of Internal Medicine and Nephrology
Faculty of Medicine - Ain Shams University

Dr. Cherry Reda Kamel

Lecturer of Internal Medicine and Nephrology
Faculty of Medicine - Ain Shams University

Faculty of Medicine
Ain shams University

2011

معدل انتشار و متنبئات الذبذبة الأذينية في مرضى الاستصفاء الدموي

رسالة توطئة للحصول على درجة ماجستير في الباطنة العامة

مقدمة من

[illegible]

بكالوريوس الطب و الجراحة

كلية الطب جامعة عين شمس

تحت إشراف

أستاذ دكتور / جمال السيد ماضي

أستاذ أمراض الباطنة و الكلى

كلية الطب- جامعة عين شمس

دكتور / سحر محمود شوقي

مدرس أمراض الباطنة و الكلى

كلية الطب- جامعة عين شمس

دكتور / شيري رضا كامل

مدرس أمراض الباطنة و الكلى

كلية الطب- جامعة عين شمس

كلية الطب

جامعة عين شمس

2011

SUMMARY AND CONCLUSION

Atrial fibrillation (AF) is the most common arrhythmia in the general population; its prevalence increases with age and generally is associated with increased mortality.

Cardiovascular disease is common in ESRD patients. At the same time, renal disease, even at the earliest stages, is a cardiovascular risk factor.

Despite major advances in dialysis technology, mortality is still high in patients with end-stage renal disease. Mortality is seen 10 to 15 times more often than it is in age- and sex-matched normal populations, and about half of the deaths are due to cardiovascular diseases.

AF may be favoured by myocardial modifications that are common in HD patients and that lead to structural and electrical remodelling, with a decrease in atrial effective refractory period and conduction velocity. Moreover, the sharp transmembrane ionic movements occurring during HD sessions may favor the onset of the arrhythmia.

Early diagnosis of AF would not only allow the early initiation of rate and rhythm control therapy, but could also

LIST OF CONTENTS

		PAGE
LIST OF FIGURES		II
LIST OF TABLES		V
LIST OF ABBREVIATIONS		VII
INTRODUCTION		1
AIM OF THE WORK		5
REVIEW OF LITERATURE		6
I.	**CHRONIC KIDNEY DISEASE**	6
II.	**CARDIOVASCULAR COMPLICATIONS IN CKD**	33
III.	**ATRIAL FIBRLILLATION**	45
IV.	**ATRIAL FIBRILLATION IN HAEMODIALYSIS PATIENTS**	91
PATIENTS AND METHODS		103
RESULTS		107
DISCUSSION		124
SUMMARY AND CONCLUSION		131
RECOMMENDATION		135
REFERENCES		136
ARABIC SUMMARY		-

LIST OF FIGURES

Figure No.	Title	Page
1	Normal Values for GFR in Men and Women	13
2	Relationship of Serum Creatinine Level to Measured GFR in the Modification of Diet in Renal Disease Study.	16
3	CVD mortality in the general population (GP) compared with patients with ESRD treated by dialysis	33
4	Kaplan-Meier curve showing mortality in patients with ESRD by Hgb level	39
5	Relative mortality risk by serum phosphorus quintiles	41
6	Coronary calcification in dialysis patients compared with nonrenal disease patients with or without CAD	42
7	Probability of overall survival in patients with ESRD with aortic stiffening, divided into tertiles.	43
8	The prevalence of atrial fibrillation in general population	45
9	Cardiac Arrhythmia Suppression Trial	49

10	Antiarrhythmic drug therapy to maintain sinus rhythm in patients with recurrent paroxysmal or persistent atrial fibrillation	58
11	The rate of recurrent atrial fibrillation in CTAF	71
12	Amiodarone for maintenance of sinus rhythm in SAFE-T	71
13	Rate control algorithm	73
14	Rate control versus rhythm control in AFFIRM	79
15	Rate control versus rhythm control in RACE	79
16	Rate of ischemic stroke	86
17	Prevalence of AF among the studied HD patients	109
18	Types of AF among AF +ve HD Patients	110
19	Comparison between the two groups as regarding age	113
20	Comparison between the two groups as regarding duration of HD	113
21	Comparison between the two groups as regarding sex	114
22	Comparison between the two groups as regarding hypertension	114
23	Comparison between the two groups as regarding DM	115
24	Comparison between the two groups as regarding CAD	116

25	Comparison between the two groups as regarding the smoking	116
26	Comparison between the two groups as regarding the mean laboratory values	118

LIST OF TABLES

Table No.	Title	Page
1	Classification of Chronic Kidney Disease	10
2	Prevalence of CVD by target population	34
3	Traditional versus uremia related risk factors for CVD	37
4	Meta-analysis of randomized controlled trials of warfarin and aspirin for primary prevention of stroke in atrial fibrillation.	52
5	Guidelines of DC cardioversion of AF	53
6	Guidelines of phamacological cardioversion of AF	55
7	Recommended doses of drugs proven effective for phamacological cardioversion of AF	56
8	Preventive measures against thromboembolism in patients with AF undergoing cardioversion	60
9	Pooled results of randamized controlled trials of efficacy and adverse effects of anti arrhythmic drugs used for acute conversion of AF	63
10	Guidlelines summary of pharmacological cardioversion of AF≥7 days	64
11	Guidelines summary of pharmacological cardioversion of AF≤7 days	65
12	Guidelines summary of maintainence of sinus rythm	67

13	Guidelines of doses of drugs used in maintenance of sinus rhythm in AF.	68
14	Types of proarrythmia during treatment of AF	69
15	Pharmacologic rate control in AF	74
16	Intravenous pharmacologic agents for acute heart rate control in AF	76
17	CHAD2 score system	83
18	Some descriptive Data about the patients included in the study.	107
19	Etiology of ESRD among the studied HD patients	108
20	Prevalence of AF among the studied HD patients	109
21	Types of AF among AF+ve Patients	110
22	Comparison between risk variables in HD	111
23	Mean laboratory values in relation to AF	117
24	Lab laboratory values before and after haemodialysis in relation to AF	119
25	Doppler and echocardiography features of patients with and a control group without atrial fibrillation	120
26	Multivariate logistic regression analysis for prediction of atrial fibrillation in haemodialysis patients	123

LIST OF ABBREVIATION

AADs	Antiarrhythmic Drugs
AAFP	American Academy of Family Physicians
ACC	American College of Cardiology
ACCP	American College of Chest Physicians
ACE	Angiotensin Converting Enzyme
ACEI	Angiotensin-Converting Enzyme Inhibitors
ACP	American College of Physicians
AF	Atrial Fibrillation
AFL	Atrial Flutter
AFFIRM	The Atrial Fibrillation Follow-Up Investigation of Rhythm Management
AHA	American Heart Association
AIPRD	ACE Inhibitors and Progressive Renal Disease Trial
ARBS	Angiotensin Receptor Blockers
ARIC	Atherosclerosis Risk in Communities
AV	atrioventricular
BMI	Body Mass Index
BP	Blood Pressure
Ca X PO4	Calcium Phosphorous
CAD	Coronary Artery Disease

cAMP	Cyclic adenosine monophosphate
CAST	Cardiac Arrhythmia Suppression Trial
CBC	Complete Blood Count
Ccr	Creatinine Clearance
CKD	Chronic Kidney Disease
CNHT	Canadian Normal Hematocrit Trial
COPD	Chronic Obstructive Pulmonary Disease
CRP	C Reactive Protein
CTAF	Canadian Trial of Atrial Fibrillation
CVD	Cardiovascular Disease
DC	Direct-current
dDAVP	1-desamino-8-D-arginine vasopressin
DM	Diabetes Mellitus
EBCT	Electron-Beam Computed Tomography
ECG	Electrocardiogram
eGFR	Estimated Glomerular Filtration Rate
EP	Electrophysiologic Studies
ESC	European Society of Cardiology
ESRD	End Stage Renal Disease
FPG	Fasting Blood Glucose
FP	False Positive
GFR	Glomerular Filtration Rate
HD	Haemodialysis
HDL-C	High Density Lipoprotein Cholesterol

Hgb	Haemoglobin
HTN	Hypertension
IL-6	Interleukin 6
ILCOR	International Liaison Committee on Resuscitation
INR	International Normalized Ratio
JNC	Joint National Committee
KDOQI	Kidney Disease Outcomes Quality Initiative
LAA	Left Atrial Appendage
LDL-C	Low Density Lipoprotein Cholesterol
LV	Left Ventricular
LVH	Left Ventricular Hypertrophy
MDRD	Modification of Diet in Renal Disease
MI	Myocardial Infarction
NHANES	National Health And Nutrition Examination Survey
NHT	Normal Hematocrit Trial
NKF	National Kidney Foundation
NNT	Number Needed to Treat
NSAIDS	Non Steroidal Anti-inflamatory Drugs
NSR	Normal Sinus Rhythm
PTH	Parathyroid Hormone
OR	Odds Ratio

RACE	Rate Control vs Electrical Cardioversion for persistent AF
RAS	Renin Angiotensin System
RRT	Renal Replacement Therapy
RVSP	Right Ventricular Systolic Pressure
SAFE-T	Sotalol Amiodarone Atrial Fibrillation Efficacy Trial
sCr	Serum Creatinine
T3	Triiodothyronine
T4	Tetraiodothyronine
TSAT	Transferrin Saturation
TSH	Thyroid Stimulating Hormone

Introduction

Atrial fibrillation (AF) is the most common arrhythmia in the general population; its prevalence increases with age and generally is associated with increased mortality ***(Acar et al, 2010).***

Despite major advances in dialysis technology, mortality is still high in patients with end-stage renal disease (ESRD). Mortality is seen 10 to 15 times more often than it is in age- and sex-matched normal populations, and about half of the deaths are due to cardiovascular diseases ***(Bozbas et al., 2007).***

Many studies showed that haemodialysis (HD) patients have a high prevalence of ventricular arrhythmia and an increased incidence of sudden death, but few studies are known on the prevalence of supraventricular arrhythmia and AF in this population ***(Acar et al., 2010).***

Atrial fibrillation is a reentrant tachycardia and multiple circulating reentrant wavelets underlie the pathophysiology of this arrhythmia. The amount of tissue in fibrillation is crucial for the perpetuation of atrial fibrillation. Increased atrial dimension, decreased conduction velocity, and shortened atrial refractory time are considered important factors for this arrhythmia. Thus,atrial fibrillation relies heavily on the sizes and the electrophysiologic properties of the atria ***(Atar et al., 2006).***

Patients undergoing HD seem to be at greater risk for atrial fibrillation than patients on peritoneal dialysis. Fast ventricular responses to atrial fibrillation may lead to angina pectoris, hypotension, increased risk of thromboembolic events and serious hemodynamic deterioration ***(Atar et al., 2006).***

Many factors have been identified as a cause of increased prevalence of arrhythmia in patients with ESRD, among them the presence of coronary artery diseases (CAD), heart failure, electrolyte abnormalities, left ventricular hypertrophy (LVH), left ventricular systolic and diastolic dysfunction, hypertension, diabetes mellitus, duration of renal replacement therapy, increased volume load, uremic toxins, and silent ischemia ***(Bozbas et al., 2007).***

The estimated prevalence of atrial fibrillation in patients with end-stage renal disease is reported to be between 13% and 23.4% ***(Atar et al., 2006).***

A recent study of patients with end-stage renal disease showed that presence of atrial fibrillation was a predictor of mortality, and that 4 of every 5 patients who had atrial fibrillation died during the 4-year follow-up period ***(Vazquez et al., 2003).***

AF may be favoured by myocardial modifications that are common in HD patients and that lead to structural and electrical remodelling, with a decrease in atrial effective refractory period and conduction velocity. Moreover, the sharp transmembrane ionic movements occurring during HD sessions may favour the onset of the arrhythmia ***(Genovesi et al., 2005).***

Kidney dysfunction increased the risk of new onset of AF, and AF increased the risk of development of kidney disease. This