Effects of Atrial Fibrillation Cardioversion after Percutaneous Mitral Balloon Valvuloplasty on Echocardiographic Left and Right Atrial Functions

Thesis

Submitted for partial fulfillment of MD degree
In Cardiology

By

HossamAldin Zaki Alsayed AbuOmara

Msc Cardiology,

Under supervision of

Dr. Aly Ramzy Abd-Almagid

Dr. Amal Mohamed Ayoub

Dr. Said Abd-Alhafiz Khaled

Professors of cardiology
Ain Shams University

Dr. Sameh Samir Raafat

Dr. Ayman Mortada Abdel Moteleb

Lecturers of Cardiology

Faculty of Medicine
Ain Shams University

2014

Acknowledgment

First and foremost, I thank Allah for all blessings I have and for helping me in accomplishing this work.

I would like to express my sincere gratitude to ***Dr. Aly Ramzy****, professor of cardiology, for being that great person who really inspires the whole cardiology department.*

I must extend my warmest gratitude to ***Dr. Amal Ayoub,*** *professor of cardiology, for her precious time, great help and faithful advice. Really, wordings can never express my deep appreciation for her effort and care.*

I can never forget to thank ***Dr. Said Khaled,*** *professor of cardiology. He is really my role model.*

Here comes the turn to refer the right to whom it belongs; ***Dr. Sameh Samir****, lecturer of cardiology. This is actually his work and I have only arranged and presented the data. Wordings aren't enough to pay him back his favor.*

I would also like to thank ***Dr. Ayman Mortada****, lecturer of cardiology, for his sincere effort and willingness to help me all the time.*

I owe ***Dr. Azza Alfiky,*** *professor of cardiology, much gratitude for her kind care and guidance. She is always encouraging me to do my best.*

Last and not least, I would like to thank all my colleagues for their co-operation and support as well as all the patients who had participated in this study.

Dedication

To the soul of my parents,

I dedicate this work

Lists

List of Figures

List of Tables

List of Tables

List of Abbreviations

AADs	Anti-Arrhythmic Drugs
ACEIs	Angiotensin-Converting Enzyme inhibitors
AF	Atrial Fibrillation
Ar	Atrial reversal
AR	Aortic Regurgitation
ASE	American Society of Echocardiography
AV	Atrio-Ventricular
AVNRT	Atrio-Ventricular Node Re-entrant Tachycardia
BSA	Body Surface Area
cm	Centimeter
CRP	C-Reactive Protein
CT	Computed Tomography
DC	Direct Current
EAE	European Association of Echocardiography
ECG	Electrocardiogram
IAS	Inter-Atrial Septum
ICE	Intra-Cardiac Echocardiography
INR	International Normalized ratio
LA	Left Atrium
LAA	Left Atrial Appendage
LAEDV	Left Atrial End-Diastolic Volume
LAEF	Left Atrial Emptying Fraction
LAFI	Left Atrial Function Index
LAESV	Left Atrial End-Systolic Volume
LAVI	Left Atrial Volume Index
LV	Left Ventricle
LVEF	Left Ventriclar Ejection fraction
MMP	Matrix Metallo-Proteinases
MPG	Mean Pressure Gradient

MR	Mitral regurgitation
mL	Milliliter
mm	Millimeter
mmHg	Millimeter mercury
MRI	Magnetic Resonance Imaging
MS	Mitral Stenosis
MSCT	Multi-Slice Computerized Tomography
MV	Mitral Valve
MVA	Mitral Valve Area
NSR	Normal Sinus Rhythm
NYHA	New-York Heart Association
PHT	Pressure Half-Time
PMBV	Percutaneous Mitral balloon Valvuloplasty
PVI	Pulmonary vein Isolation
RA	Right atrium
RFCA	Radio-Frequency Catheter ablation
RHD	Rheumatic Heart Disease
ROI	Region Of Interest
RT3DE	Real-Time 3-Dimensional Echocardiography
RVSP	Right Ventricular Systolic Pressure
SD	Standard Deviation
SR	Sinus Rhythm
TAPSE	Tricuspid Annular Plane Systolic Excursion
TEE	Trans-Esophageal Echocardiography
TIMP	Tissue Inhibitors of Metallo-Proteinases
TR	Tricuspid-Regurgitation
VTI	Velocity-Time Integral

List of Contents

List of Contents *(Cont...)*

Introduction

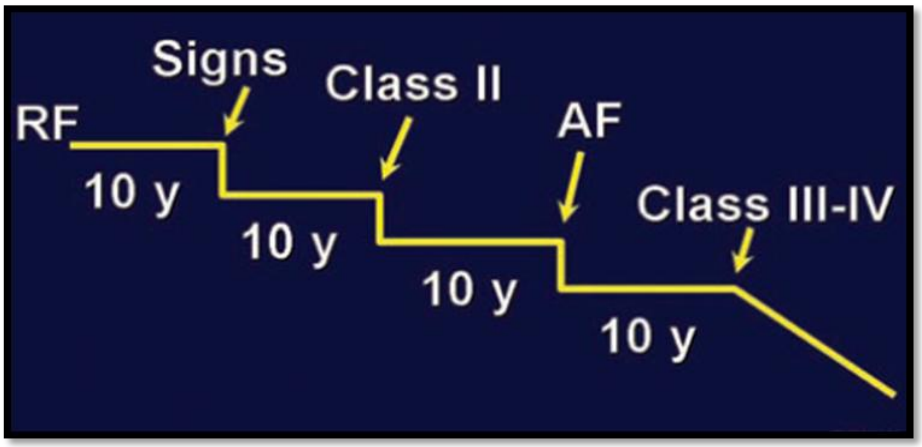
Mitral stenosis (MS) is characterized by obstruction to left ventricular inflow at the level of mitral valve due to structural abnormality of the mitral valve apparatus. The most common cause of MS is rheumatic fever. Although the prevalence of rheumatic fever has greatly decreased in industrialized countries, mitral stenosis still results in significant morbidity and mortality worldwide.[1,2]

Mitral stenosis is a disease of plateaus (Figure 1).There is a period of 1 to 2 decades after the onset of rheumatic fever before signs of MS appear. This is followed by another period of 1 to 2 decades before mild symptoms occur. Mild symptoms of dyspnea on exertion may be present for another 1 to 2 decades. During this time, the onset of atrial fibrillation (AF) may cause further decompensation, but this can be treated by rate control. Finally, severe New York Heart Association (NYHA) class III or IV symptoms develop.[3]

Atrial fibrillation usually develops in MS patients in the presence of pre-existing electrocardiographic evidence of left atrial enlargement and is related to the size of the chamber, the extent of fibrosis of the left atrial

myocardium, the duration of the atriomegaly and the age of the patient. The tendency for development of systemic embolization correlates directly with the patient's age and the size of the left atrial appendage and inversely with the cardiac output. Eighty percent of the patients of MS in whom systemic emboli develop are in AF.[4]

Figure 1: Mitral stenosis is a disease of plateaus[3]



Treatment options for symptomatic MS are pharmacologic therapy or/and intervention either percutaneously or surgically when indicated. Although pharmacologic therapy cannot prevent this progression of MS, it can provide significant symptomatic relief. It also has an important role in managing, and in some cases, preventing the various complications of MS. Since MS is a mechanical disorder, its natural history is significantly

altered, with an improvement in mortality, only by percutaneous mitral balloon valvotomy or surgery.[5] The development of percutaneous mitral balloon valvotomy (PMBV) by Inoue in 1984 and Lock in 1985 for the treatment of selected patients with MS has revolutionized the treatment of this disorder.[6,7]

The rhythm control of AF associated with MS is often difficult using antiarrhythmic drugs (AADs), even after a PMBV. Some studies have examined the efficacy and safety of direct current (DC) cardioversion of AF following PMBV. However, few studies have examined the efficacy and safety of simultaneously performing radiofrequency catheter ablation (RFCA) and a PMBV in patients with MS and AF. **Machino et al.** found that hybrid therapy using RFCA and a PMBV was safe and feasible, and significantly improved the AF free survival rate compared to DC following a PMBV.[8]

Aim of the study

To assess the effect of AF cardioversion following PMBV on echocardiographic left and right atrial functions as well as its clinical repercussions compared to the effects of PMBV without AF cardioversion on the same parameters.