Tissue Doppler study of Right Ventricular strain before and after Balloon Mitral Valvuloplasty

By

Maged Tewfik Fahim

M. B. B. Ch

Under supervision of

Prof. Osama Abd El Aziz Rifaie

Professor of Cardiology

Ain Shams University

Dr. Mohamed Ismail Ahmed

Lecturer of Cardiology

Ain Shams University

Department of Cardiology

Ain Shams University

٢٠٠٧-٢٠٠٨

Acknowledgment

It is great to feel success and have the pride of achieving all what is always aspired. Nevertheless, one must not forget all those who usually help and push him onto the most righteous way that inevitably ends with fulfillment and perfection.

When the instant comes to appreciate all those kind-hearted people, I soon mention **Prof. Osama Abd El Aziz Rifaie,** Professor of Cardiology, Ain Shams University, the person who gave me the honour to be his student. He really helped me by his precious opinions and contributive comments that served much in the construction of this work.

Great thanks are also due to **Dr. Mohamed Ismail Ahmed,** lecturer of Cardiology, Ain Shams University. He was always there to care, support, encourage and provide constructive pieces of advice in every possible way.

I cannot forget the help of the medical staff and nursing team in our Cardiology department for their cooperation in the practical part of this work.

I would also like to record my thanks and sincere gratitude to my family for their great help and support throughout the work.

Table of contents

List of Tables

List of Figures

Abbreviations

A late diastolic strain rate

ACC American college of cardiology

AF atrial fibrillation

AHA American Heart Association

AR aortic regurgitation

ASD atrial septal defect

A٢ aortic component of the second heart sound

BMV balloon mitral valvuloplasty

BSA body surface area

dST diastolic strain

E early diastolic strain rate

ECG electrocardiography

Fw free wall

ICT Isovolumic contraction time

IVRT isovolumic relaxation time

LV left ventricular

MPG mean pressure gradient

MR mitral regurgitation

MRI Magnetic resonance imaging

MS mitral stenosis

MV mitral valve

MVA mitral valve area

NYHA New York Heart Association

OS opening snap

P٢ pulmonary component of second heart sound

ROI region of interest

RV right ventricular

RVSP right ventricular systolic pressure

S systolic strain rate

SR Strain rate

SRI strain rate imaging.

sST systolic strain

STS Society of Thoracic Surgeons

S١ first heart sound

S٢ second heart sound

S٣ third heart sound

S٤ fourth heart sound

TDE Tissue Doppler echocardiography

tdST total diastolic strain

TEE transesophageal echocardiography

TR tricuspid regurgitatation

tsST total systolic strain

TVI tissue *velocity* imaging

Introduction

Recently, the value of right ventricular (RV) function as a prognostic factor has been recognized in various pathological situations, including heart failure, myocardial infarction, and pulmonary embolism (١-٣) However, the assessment of RV contractile function remains cumbersome, likely because of the complex anatomy and thin wall structure of the RV.

RV volumes and ejection fraction can be estimated using either radionuclide angiography, magnetic resonance imaging, or three-dimensional echocardiography(٤-٦) . However, a comprehensive approach to RV function would require the assessment of not only the global performance but mostly the regional heterogeneity of RV contraction (٧).

The development of new quantitative echocardiographic techniques such as ultrasonic strain & strain rate (SR) imaging , has enhanced the ability to non invasively assess regional myocardial function.Strain representing the relative magnitude of segmental systolic shortening and its temporal derivative, the Strain rate (SR) i.e. the maximal velocity

of systolic shortening, is considered as an accurate index of myocardial contractility, capable of differentiating regional myocardial contractions from hypokinetic ones. It is not dependent on adjacent myocardial motion or heart translation.

Balloon Mitral valvuloplasty is considered the treatment of choice for patients with Rheumatic Mitral stenosis yet the immediate results on RV pressure overload relieve is not detected by conventional ٢D & Doppler studies.

The RV segmental & global function improvement is not detected by conventional immediate echocardiographic study, the evolution of new tissue Doppler derived technique might aid to the study.