Assessment of Mitral valve by Trans-esophageal echocardiography

Essay

*Submitted for partial fulfillment of Master degree **in anesthesia***

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Mohammad El-Sayed Halawa

Contents

List of Abbreviations

2D : Two-dimensional
3D : Three dimensional
AF : Atrial fibrillation
AML : Anterior mitral leaflet
A-mode : Amplitude mode
AS : Aortic stenosis
B-mode : Brightness mode
CAD : Coronary artery disease
CDMI : Color Doppler myocardial imaging
CFD : Color flow Doppler
CFD : Color-flow Doppler
CHF : Congestive heart failure
CWD : Continuous wave Doppler
CWD : Continuous-wave Doppler
DT : Deceleration time

EDF	: End diastolic volume
EROA	: Effective regurgitant orifice area
ESV	: End systolic volume
FSV	: Forward stroke volume
HPRF-PWD	: High pulse repetition frequency pulsed wave Doppler
LA	: Left atrium
LAA	: Left atrial appendage \ Left atrial area
LAP	: Left atrial pressure
LAX	: Long axis
LFEF	: Left ventricular ejection fraction
LV	: Left ventricle
LVEDP	: Left ventricular end diastolic pressure
LVOT	: Left ventricular outflow tract
ME	: Mid-esophageal
MI	: Myocardial infarction
M-mode	: Motion mode

MR	: Mitral regurgitation
MS	: Mitral stenosis
MV	: Mitral valve
MVR	: Mitral valve repair
PBMV	: Percutaneous balloon mitral valvuloplasty
PHT	: Pressure half time
PISA	: Proximal isovelocity surface area
PML	: Posterior mitral leaflet
PWD	: Pulsed-wave Doppler
PW-TDI	: Pulsed wave tissue Doppler imaging
RF	: Regurgitant fraction
RJA	: Regurgitant jet area
RSV	: Regurgitant stroke volume
RT-3D	: Real time three dimensional
SAM	: Systolic anterior motion
SAX	: Short axis

STE	: Speckle tracking echocardiography
TEE	: Trans-esophageal echocardiography
TG	: Trans-gastric
TSV	: Total stroke volume

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Introduction

There has been a substantial increase in the use of Trans-esophageal echocardiography (TEE) in the last 10 years. Much of this has been due to the increase in peri-operative echocardiography in patients undergoing cardiac and major non-cardiac surgery, and in intensive care. Knowledge and skills of echocardiography are now part of the fundamental training of cardiologists, cardiac anesthesiologists, intensivists, and all specialists who care for patients undergoing cardiac surgery. The routine use of TEE in all open heart surgeries and thoracic aortic surgical procedures is one of the recent recommendations of North American Guidelines of the American society of anesthesiologists and the society of cardiovascular anesthesiologists. ***(Thys et al.,2010)***.

Transesophageal echocardiography (TEE) has become a standard of care in the cardiac operating room, allowing the anesthesiologist to play an important part in the surgical decision-making process. In that role, few areas are as challenging as the assessment of intraoperative mitral regurgitation (MR) and mitral stenosis (MS), and it has a high impact on the course of surgery and on patient outcome***.(Perrino and Reeve 2008)***.

Transesophageal echocardiography (TEE) is superior to the transthoracic approach for characterizing the anatomy and function of the mitral valve (MV).Transthoracic echocardiography is often adequate for the study of mitral stenosis. In patients with poor echocardiographic windows, or in whom TEE is performed for other reasons, the cause and severity of mitral stenosis are almost always revealed by TEE.***(Nanda et al.,2007)***.

Recent developments in Doppler imaging have enhanced our capability to quantify myocardial function. Conventional techniques, including two-dimensional (2D) imaging, spectral and color-flow Doppler have clear limitations**.** To overcome these limitations, a number of technologies have been introduced, placing special emphasis on myocardial quantification. These include pulsed-wave tissue Doppler imaging (PW-TDI), color Doppler myocardial imaging (CDMI), speckle tracking echocardiography (STE) and three dimensional (3D) echocardiography. ***(Cheitlin et al., 2003)***.

Aim of the Work

This study reviews the practical applications and recent advances in intra-operative assessment of mitral valve by Transesophageal echocardiography (TEE).

Chapter 1

Anatomical Consideration of the Mitral Valve

Mitral valve (MV) anatomy is a complex entity constituted of 6 different parts:

1) 2 leaflets
2) The annulus
3) 2 papillary muscles
4) Chordae tendinae
5) The fibrous skeleton of the heart
6) The left ventricular walls

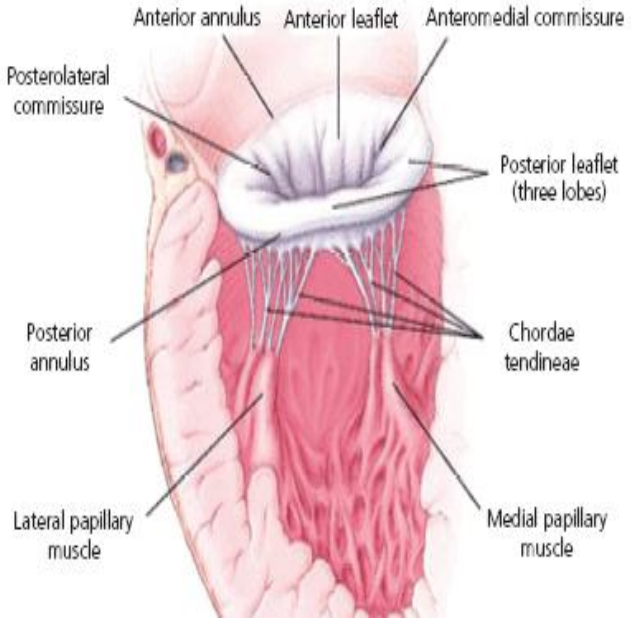

Fig. (1): Mitral valve anatomy

The leaflets:

Represent a continuous (uninterrupted) structure but showing some regional differences, being consequently subdivided in an anterior and a posterior segment separated by the two commissural areas ***(May, Yin 1995)***.