بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

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جامعة عين شمس

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The Effect of Depth of Anaesthesia on the Severity of Mitral Insufficiency by Transesophageal Echocardiography

Thesis

Submitted for Partial Fulfillment of
Master Degree in ***Anaesthesia***

By

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Ehab Essam Khamis Al Hanash

List of Contents

List of Abbreviations

Abb.	Full term

ACC ..... *American College of Cardiology*
AEP ..... *Auditory evoked potential*
AF ..... *Atrial fibrillation*
AHA ..... *American Heart Association*
AML ..... *Anterior mitral leaflet*
ASE ..... *Anaesthesiologists*
AV ..... *Atrioventricular valves*
BAEP ..... *Brainstem Auditory Evoked Potential*
BIS ..... *Bispectral index*
Bp ..... *Blood pressure*
Bpm ..... *Beat per minute*
CABG ..... *Coronary artery bypass graft*
CS ..... *Coronary sinus*
DM ..... *Diabetes mellitus*
ECG ..... *Electrocardiography*
EEG ..... *Electro-encephalogram*
EF ..... *Ejection fraction*
Ep ..... *Evoked potential*
ERO ..... *Effective regurgitant orifice area*
FEMG ..... *Frontalis electromyogram*
GA ..... *General anaesthesia*
GIT ..... *Gastrointestinal tract*
HTN ..... *Hypertension*
ICP ..... *Intracranial pressure*
JA ..... *Jet area*
LAD ..... *Left anterior descending artery*
LLAEP ..... *Long Latency Auditory Evoked Potential*
LOC ..... *Lower oesophageal contractility*
LV ..... *Left ventricle*
LV ..... *Left ventricle*
LVIDD ..... *Left ventricular internal diameter in diastole*

List of Abbreviations cont...

Abb.	Full term
LVIDS	*Left ventricular internal diameter in systole*
LVOT	*Left ventricular outflow tract*
MAP	*Mean arterial pressure*
MLAEP	*Middle Latency Auditory Evoked Potential*
MR	*Mitral regurgitation*
MRI	*Magnetic resonance imaging*
MS	*Mitral stenosis*
OP	*Operative*
PISA	*Proximal isovelocity surface area*
PML	*Posterior mitral leaflet*
PW	*Pulsed-Wave*
RHD	*Rheumatic heart disease*
SAM	*Systolic anterior motion*
SD	*Standard deviation*
SEMG	*Spontaneous surface electromyogram*
SLOC	*Spontaneous lower oesophageal contractions*
SSEP	*Somatosensory evoked potential*
SVR	*Systemic vascular resistance*
TEE	*Transesophageal echocardiography*
TIVA	*Total intravenous anaesthesia*
TTE	*Transthoracic echocardiography*
VC	*Vena contracta*
VEP	*Visual evoked potential*

List of Tables

List of Figures

List of Figures cont...

INTRODUCTION

Evaluation of the degree of mitral regurgitation (MR) is crucial during anaesthesia for mitral valve surgery. The degree of MR may change during anaesthesia. During general anaesthesia, there is an overall decrease in sympathetic tone, myocardial contraction, preload and afterload. The clear effect can impact pre-existing MR and may lead to measurement values different from the pre-operative assessment values ***(Ahn et al., 2019).***

The most common valvular heart disease is the mitral valve regurgitation. The causes of MR are either primary which is related to the mitral valve apparatus, or secondary which is related to left ventricle. Mitral valve apparatus is a dynamic structure consisting of annulus, which separates the left atrium and left ventricle it also gives attachment to the mitral valve. It is not a rigid fibrous ring but pliable changing shape during the cardiac cycle, mitral valve also consists of two leaflets, tendinous chords and the papillary muscles, the leaflets are referred to as anterior and posterior, also as aortic and mural, the posterior (mural) leaflet is narrow and extends two-thirds around the left atrioventricular junction within the ventricle. The posterior leaflet has clefts that form three scallops. These scallops do not extend all the way through the leaflet to the annulus. Carpentier's nomenclature describes the most lateral segment as P1, which lies adjacent to the anterolateral

commissure, P2 is central, and most medial is P3 segment, which lies adjacent to the posteromedial commissure. The anterior leaflet of mitral valve is much broader than the posterior leaflet, comprises one third of the annular circumference. The anterior leaflet is also divided imaginary into three regions labelled A1, A2 and A3 corresponding to the adjacent regions of the posterior leaflet. The tendinous cords are fan-shaped running from the papillary muscles and inserting into the leaflets, there are three types of chordae according to where they attach Primary chords attach to the free edge of the rough zone of both leaflets. Secondary chords attach to the ventricular surface in the body of the leaflets. The tertiary chords are found in the posterior leaflet only. The posteromedial papillary muscle gives chords to the medial half of both leaflets (P3, A3 and half of P2 and A2). Similarly, the anterolateral papillary muscle chords attach to the lateral half of the mitral leaflets (A1, P1 and half of P2 and A2) ***(El Sabbagh et al., 2018).***

Complete coaptation and symmetrical overlap of both mitral leaflets is essential in preventing regurgitation. Since there are a number of ways in which valve failure may occur, it is useful to recognize the underlying etiology, as this helps in initiating the process of understanding the mechanisms involved in valve failure. Carpentier's classification describes leaflet motion in relation to the mitral annular plane. Type 1 describes normal leaflet motion. Mitral regurgitation jet tends

to be central and due to either perforation of the leaflet, such as trauma or endocarditis, or annular dilatation, usually the result of left ventricular disease. Type 2 describes excessive leaflet motion above the annular plane into the left atrium and is a result of leaflet prolapse usually the result of degenerative disease. Finally type 3 describes leaflet restriction and is categorized into two types; type 3a, where the restriction is throughout the cardiac cycle, i.e. in systole and diastole (usually the result of rheumatic valve disease) and type 3b, where the leaflet restriction is seen in systole alone (usually the result of regional wall motion abnormalities seen in ischaemic mitral regurgitation). The commonest mitral regurgitation aetiologies are degenerative (60%), rheumatic (post-inflammatory, 12%) and functional (25%). The latter includes 'ischaemic' mitral regurgitation. Other less common causes include congenital abnormalities and endocarditis. With all these aetiologies mitral annular (or orifice), dilatation is observed to varying degrees ***(Karen et al., 2010).***

Of the many intra-operative cardiac monitoring used nowadays, none has provided as much beneficence as echocardiography. Transesophageal echocardiography is the study of the heart from the esophagus and is achieved by mounting a small transducer on the tip of a flexible endoscope. The close relation of the esophagus to the posterior surface of the heart overcomes access problems associated with transthoracic imaging. Since its introduction into clinical