Faculty of Medicine

Recent Advances In Intraoperative Cardiac Arrhythmia *Protocol of an Essay*

Submitted for Partial Fulfillment of Master Degree in Anesthesiology

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2017

لتطورات الحديثة في الاضطرابات القلبية اثناء العمليات الجراحية

رسالة

توطئة للحصول على درجة الماجستير فى التخدير

مقدمة من

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٢٠١٣

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٢٠١٧


بسم الله الرحمن الرحيم
قالوا
سبحانك لا علم لنا
إلا ما علمتنا إنك أنت
العليم الحكيم
صدق الله العظيم
سورة البقرة الآية: ٣٢

First of all, all gratitude is due to God almighty for blessing this work, until it has reached its end, as a part of his generous help, throughout my life.

Really I can hardly find the words to express my gratitude to Prof. Dr. Hesham Mohammed El Azzazi, Professor of Anesthesia and Intensive Care faculty of medicine, Ain Shams University, for her supervision, continuous help, encouragement throughout this work and tremendous effort she has done in the meticulous revision of the whole work. It is a great honor to work under her guidance and supervision.

I would like also to express my sincere appreciation and gratitude to Dr.Halah Salah El-Din El Ozairy, lecturer of Anesthesia and Intensive Care, faculty of medicine, Ain Shams University, for his continuous directions and support throughout the whole work.

With great appreciation and gratitude, I express my indebtedness to Dr. Diaa El Din Shalaby Al Awady, Lecturer of Anesthesia and Intensive Care for his great experience, knowledge, kind advice and endless support for this work.

Last but not least, I dedicate this work to my family, whom without their sincere emotional support, pushing me forward this work would not have ever been completed.

Ahmed Hossam El Din Hassan Abdel Fattah

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List of Abbreviations

ACLS : Advanced cardiac life support

AF : Atrial Fibrillation

AFL : Atrial flutter

AV node : Atrioventricular node

AVRT : Atrioventricular re-entrant tachycardia

bpm : Beat per minute

COP : Cardiac Output

CAD : Coronary Artery Disease.

CHF : Congestive Heart Failure.

DAD : Delayed after Depolarization

EAD : Early after depolarization

ECG : Electrocardiogram

EM : Membrane potential

ESC : European Society of Cardiology

ERP : Effective refractory period

FAT : Focal atrial tachycardia

List of Abbreviations (Cont.)

GA : General anesthesia

HPS : His-purkinjie system

HR : Heart rate

ICD : Implantable cardioverter-defibrillator

IF : Impulse formation

MAT : Multifocal atrial tachycardia

MI : Myocardial infarction

PACU : Post-anesthesia care unit

SVT : Supraventricular tachycardia

VT : Ventricular tachycardia

VF : Ventricular fibrillation

WPW : Wolf-Parkinson-White

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Introduction

Arrhythmias represent an important cause of perioperative complications because during this period there are several clinical situations that may trigger changes

in cardiac rhythm. These rhythm changes may be due to a primary etiology or to reversible causes that should be corrected.

The prevalence of cardiac arrhythmias varies according to type of surgical procedure and the patient. In a multicenter study with 17,201 patients undergoing general anesthesia, arrhythmias (tachycardia, bradycardia, or other arrhythmias) were observed in 70.2% of which only 1.6% required treatment.

Alarge number of patients undergoing non-cardiac surgeries may develop dysrhythmias although the incidence of atrial fibrillation (AF) is low after exploratory thoracotomy, this incidence increases in elderly patients undergoing lobectomy, pneumectomy, and esophagogastrectomy reaching to 12% to 33% ***(Amar, 2007)***

Several schemes have been used to classify the mechanisms of cardiac arrhythmias. Traditionally, these have been divided into nonreentrant and reentrant activity. An alternative scheme divided them into those occurring at the cellular and tissue levels. A dynamics-based classification, focusing on the trigger tissue substrate interactions, divided arrhythmogenic mechanisms into

unstable calcium cycling, reduced repolarization reserve, and excess repolarization reserve ***(Anumonowo, 2015).***

After the diagnosis of arrhythmia the distinction between benign arrhythmia and those that carry the risk of sudden death is fundamental. The choice of anesthetic agents is important to minimize episodes of tachyarrhythmia. Prevention is as important as treating arrhythmias. Recognition of risk factors, adequate selection of drugs for each patient and monitoring represent the most important steps in prevention ***(Michelle, 2011).***

Aim of the Work

Discuss the recent advances, incidence, etiology and management of intraoperative cardiac arrhythmia.

Chapter 1

Pathophysiology of cardiac arrhythmia

I. Anatomy of the heart:

The heart essentially is a conical structure composed of layers of myocardium enclosing the atrial and ventricular chambers. The atrial and ventricular walls are anchored to the fibrous atrioventricular valve annuli. The aorta and main pulmonary artery arise from their respective fibrous valve rings, and these four fibrous rings together are termed the fibrous skeleton of the heart ***(Virmani et al., 1987).***

Located in the central chest, the heart within the pericardial sac resides in the middle mediastinum, with two-thirds of its volume to the left and one-third to the right of center (Figure 1) ***(Virmani et al., 1987).***

The heart has four chambers, two upper atria, the receiving chambers, and two lower ventricles, the discharging chambers. The atria are connected to the ventricles by the atrioventricular valves and separated from the ventricles by the coronary sulcus ***(Virmani et al., 1987).***