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Lists of Abbreviations

Abbreviation	*Meaning*
ACC	*: American college of cardiology*
ALS	*: Advanced Life Support*
AF	*: Atrial fibrillation*
AHA	*: American heart association*
AV node	*: Atrioventricular node*
CAD	*: Coronary artery disease*
CHB	*: Complete heart block*
CNS	*: Central nervous system*
CPR	*: Cardiopulmonary Resuscitation*
DADs	*: Delayed afterdepolarizations*
DC	*: Direct current*
EADs	*: Early afterdepolarizations*
ECG	*: Electrocardiogram*
ETT	*: Endotrachial Tube*
FDA	*: Food and Drug Administration*
g	*: Electrical conductance*
i or I	*: Electrical currents*
IV	*: IntraVenous*
LAFB	*: Left Anterior Fascicular Block*
LBBB	*: Left bundle branch block*
LMA	*: Laryngeal mask airway*

Lists of Abbreviations (Cont.)

Abbreviation	*Meaning*
MAT	*: Multifocal Atrial Tachycardia*
MI	*: Myocardial infarction*
NE	*: Norepinephrine*
OR	*: Operation Room*
PACs	*: Premature atrial complexes*
PEA	*: Pulseless electrical activity*
PJCs	*: Premature Junctional complexes*
PSVT	*: Paroxysmal supraventricular tachycardia*
PVCs	*: Premature Ventricular complexes*
RBBB	*: Right bundle branch block*
RF	*: Radiofrequency*
ROSC	*: Return of spontaneous circulation*
SA node	*: Sinoatrial node*
TE	*: Transesophageal*
VF	*: Ventricular fibrillation*
VT	*: Ventricular tachycardia*
WPW	*: Wolf Parkinson White syndrome*

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Dealing With Cardiac Dysrhythmias In Relation To Anesthesia

Essay

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

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التعامل مع عدم انتظام ضربات القلب وعلاقته بالتخدير

توطئه للحصول على درجة الماجستير فى **التخدير**

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٢٠١٠

الملخص العربي

يتكون نظام التوصيل الكهربائي للقلب من مجموعة من الخلايا القلبية عالية التخصص قادرة على توليد وتوصيل الإشارات الكهربائية خلال عضلة القلب.

قد يحدث عدم انتظام ضربات القلب نتيجة لخلل في تكوين النبضات أو خلل في توصيلها أو كلاهما معاً. وعادة ما يقسم عدم انتظام ضربات القلب إلى اضطرابات في معدل النبض واضطرابات في التوصيل.

هناك عديد من العوامل التي قد تسبب عدم انتظام ضربات القلب مثل العقاقير المستخدمة في التخدير وأثناء العملية التخديرية مثل أثناء تركيب الأنبوبة الحنجرية وجهاز الوريد المركزي. أيضاً قد يحدث عدم انتظام ضربات القلب نتيجة الخطوات الجراحية ونتيجة لنقص نسبة الأكسجين في الدم أو لوجود أمراض سابقة في عضلة القلب.

التعامل مع عدم انتظام ضربات القلب يشمل تشخيص هذه الاضطرابات عن طريق رسام القلب الكهربائي وعلاجها. وعلاج عدم انتظام ضربات القلب يشتمل على العلاج بالعقاقير والعلاج بالصدمات الكهربائية.

وحيث أن عدم انتظام ضربات القلب قد يؤثر على الوظائف الحيوية مما قد يهدد حياة المريض، لذا تهدف هذه الدراسة إلى مساعدة طبيب التخدير على التعامل مع عدم انتظام ضربات القلب أثناء التخدير للوصول بالمريض لبر الأمان.


بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ
قَالُوا سُبْحَانَكَ لاَ عِلْمَ لَنَا إِلاَّ مَا
عَلَّمْتَنَا إِنَّكَ أَنتَ الْعَلِيمُ الْحَكِيمُ
صدق الله العظيم
سورة البقرة آية (٣٢)

INTRODUCTION

Cardiac dysrhythmias are a term for a large and heterogeneous group of conditions in which there is abnormal cardiac electrical activity. Dysrhythmias are usually classified according to heart rate abnormalities and conduction abnormalities. Conduction abnormalities are classified according to site and degree of blockade **(*Kass and Clancy 2006).***

The clinical significance of these dysrhythmias for the anesthesiologist depends on the effect they have on vital signs and the potential for their deterioration into a life threatening rhythm ***(Hines and Marschall, 2008)***.

Many types of cardiac dysrhythmia can occur during anesthesia, there are several major factors contributing to the development of these dysrhythmias during anesthesia as endotracheal intubation, anesthetic drugs, hypoxia, electrolytes disturbance, and other many causes. Correction and prevention of these causes can be the only required treatment ***(Hines and Marschall, 2008)***.

ECG remains the standard monitor of cardiac electrical activity during anesthesia and allows the anesthesiologist for early detection and management of cardiac dysrhythmias. ***(Miller, 2009).***

Detection and management of cardiac dysrhythmias during anesthesia is very important and considered as a life saving for the patient so that the aim of this study is to discuss this problem to help the anesthesiologists to deal with it during their practice.

Aim of the work

The purpose of this essay research is to discuss the normal physiology of the heart conduction, types, causes, classification, management and methods of dealing with cardiac dysrhythmias in relation to anesthesia.

Cardiac pacemaker and the conduction system

The conduction system of the heart is a set of very specialized cardiac cells that initiate and conduct electrical signals through the heart with precise coordination and great speed. Spontaneous depolarization is initiated in the pacemaker cells of the sinoatrial (SA) node (Figure 1). As the electrical impulse moves along the conduction system a wave of depolarization is propagated throughout the heart causing progressive contraction of cardiac muscle cells.

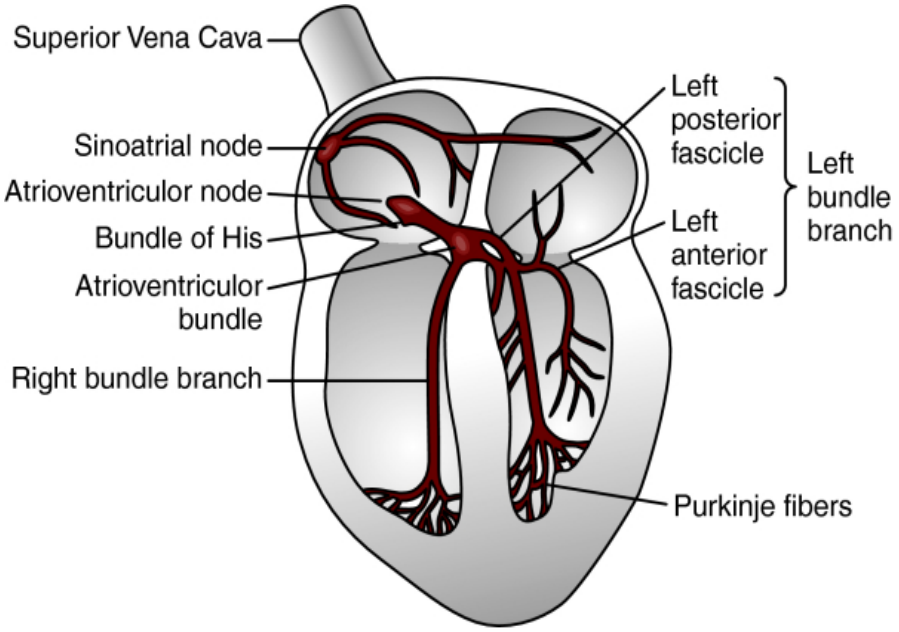

Figure (1): Anatomy of the conduction system for transmission of cardiac electrical impulses ***(Hines and Marschall, 2008)*.**

The sinoatrial node:

The sinoatrial node is the primary site for impulse initiation, spontaneously discharging at a rate between 60 and 100 beats per minute. The SA node is located at the junction of the superior vena cava and the right atrium. It is richly innervated by sympathetic and parasympathetic nerve endings ***(Becker and Anderson, 1976).***

Spontaneously generated action potentials from pacemaker cells in the SA node pass through the atrium via anterior, middle and posterior internodal tracks to the AV node. Impulses also pass from pacemaker cell to cell within the atrium via gap junctions ***(Becker and Anderson, 1976).***

The atrioventricular node (The AV node):

The AV node is located in the septal wall of the right atrium, anterior to the coronary sinus and above the insertion of the septal leaflet of the tricuspid valve ***(Anderson et al., 1975).***

The AV node, like the SA node, is innervated by parasympathetic and sympathetic nerves. The AV node slows the conduction velocity of the electrical impulse, which allows time for atrial contraction, to contribute additional volume to the ventricle in late diastole. This volume contributes an additional 20% or so to cardiac output. After a brief slowing of the electrical impulse at the AV node, the impulse continues down the conduction tract along the bundle of His. The bundle of His quickly divides into right and the left bundles within the interventricular septum (Figure 1) ***(Anderson et al., 1975).***

The AV node gives rise to the AV bundle (bundle of His), the AV bundle passes through a fibrous opening into the interventricular septum and divides into the right and left bundle, The right bundle supplies the right ventricle. The left bundle further divides within the interventricular septum into anterior superior and posterior inferior divisions to supply the left ventricle; these bundles continue to divide to form the Purkinje fibers ***(Anderson et al., 1975).***