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Cardiac Dysrrhythmias In Relation To Anesthesia

Essay

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Amr Galal El-Sherbeny

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Lists of Abbreviations

AFFIRM	**:**	Association For Federal Information Resources Management
Ach	**:**	Acetylcholine
AECG	**:**	Ambulatory External Electrocardiogram
AF	**:**	Atrial fibrillation
AHA	**:**	American heart association
ALS	**:**	Advanced Life Support
AMI	**:**	Acute myocardial infarction
AP	**:**	Action potential
APB	**:**	Atrial premature beat
APD	**:**	Action potential duration
ATP	**:**	Adenosine triphosphate
AV	**:**	Atrioventricular
AVN	**:**	Atrioventricular node
AVNRT	**:**	AV Nodal Reentrant Tachycardia
Bpm	**:**	Beat per minute
C:V	**:**	Compression Ventilation ratio
Ca^{2+}	**:**	Calcium
CABG	**:**	Coronary artery bypass grafting
CAD	**:**	Coronary artery disease
CBs	**:**	Calcium channel Blockers
CC	**:**	Cardiovascular Collapse
CHF	**:**	Congestive heart failure
CL	**:**	Chloride
CNS	**:**	Central nervous system

CPAP	**:**	Continous Positive Airway Pressure
CPR	**:**	cardiopulmonary Resuscitation
DADs	**:**	Delayed afterdepolarizations
DC	**:**	Direct current
EAD	**:**	Early afterdepolarization
ECG	**:**	Electrocardiogram
EPS	**:**	Electrophysiological study
ESWL	**:**	Extra-corporeal shock wave lithotripsy
ETT	**:**	Endotracheal tube
FDA	**:**	Food and Drug Administration
GIA	**:**	Guide wire Induced Arrhythmia
H.B	**:**	Heart block
HR	**:**	Heart rate
HRS	**:**	HeartRhythmSociety
i or I	**:**	Electrical currents
$\mathbf{I_{CaL}}$	**:**	L-Type Ca Channels/ Current
$\mathbf{I_{CaT}}$	**:**	T-type Ca Channels /Current
ICD	**:**	Implantable Cardioverter-Defibrillator
$\mathbf{I_f}$	**:**	Funny current
IHD	**:**	Ischemic heart disease
IJV	**:**	Internal jugular vein
$\mathbf{I_k}$	**:**	Delayed Rectifier Potassium Current
$\mathbf{I_{KI}}$	**:**	Background Potassium Current
$\mathbf{I_{kr}}$	**:**	Rapid Potassium channels/current
$\mathbf{I_{ks}}$	**:**	Slow potassium channels/current
$\mathbf{I_{kur}}$	**:**	Ultra-rapid potassium channels/current
$\mathbf{I_{Na}}$	**:**	Sodium current

I_{TI}	**:**	Transient Inward Current
I_{to}	**:**	Transient outward current
IV	**:**	IntraVenous
K^+	**:**	Potassium
LAFB	**:**	Left Anterior Fascicular Block
LBBB	**:**	Left bundle branch block
LMA	**:**	Laryngeal mask airway
LPFB	**:**	Left posterior fasicular block
LQT	**:**	Long QT interval
LQTS	**:**	Long QT Syndrome
LV	**:**	Left ventricle
MAT	**:**	Multifocal Atrial Tachycardia
MI	**:**	Myocardial infarction
N_20	**:**	Nitrous oxide
Na^+	**:**	Sodium
NCX	**:**	Sodium Calcium Exchanger
NE	**:**	Epinephrine
OR	**:**	Operation Room
OSA	**:**	Obstructive sleep apnea
PAC	**:**	Premature atrial contraction
$PaCo_2$	**:**	Co_2 tension
PACs	**:**	Premature atrial complexes
PCS	**:**	Peripheral conduction system
PEA	**:**	Pulseless electrical activity
PEM	**:**	Protein energy malnutrition
PSVT	**:**	Paroxysmal supraventricular tachycardia
PVCs	**:**	Premature Ventricular complexes

RBBB	**:**	Right bundle branch block
RF	**:**	Radiofrequency
RMP	**:**	Resting membrane potential
ROSC	**:**	Return of spontaneous circulation
RV	**:**	Right ventricle
SA	**:**	Sinoatrial
SAN	**:**	Sinoatrial node
SCN5A	**:**	sodium channel, voltage-gated, type V, alpha subunit
SVR	**:**	systemic vascular resistance
TdP	**:**	Torsade de pointes
TEE	**:**	Trans-Esophageal Echocardiography
VF	**:**	Ventricular fibrillation
VT	**:**	Ventricular tachycardia
WPW	**:**	Wolf Parkinson White syndrome

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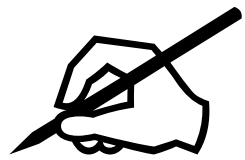

Introduction
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Aim of work

Introduction

Life threatening cardiovascular events under anesthesia is uncommon. However, adverse cardiovascular events occurring during and after the emergence of anesthesia occur more frequently. Although the incidence is higher during cardiac surgery, intra-operative dysrrhythmias affect up to 29% of patients undergoing non-cardiac surgery. Relatively minor fluctuations in cardiovascular and hemodynamic parameters due to Arrhythmias can have significant long-term implications for example, post-operative atrial fibrillation is associated with a 2-3 fold increase in stroke risk, as well as a higher incidence of myocardial infarction, congestive heart failure, ventricular dysrrhythmias and renal failure ***(Valchanov et al., 2011)***.

The incidence of intra-operative cardiac dysrrhythmias depends on the definition (benign versus life threatening), patient characteristics and the type of surgery (frequent incidence during cardiothoracic surgery **(*Miller and Pardo, 2011)*.**

Cardiac dysrrhythmias are an important cause of complications throughout the perioperative period. Although our understanding of arrhythmias has increased considerably in recent years, they remain a source of concern for anesthesiologist ***(Garcia, 2006).***

In the normal human heart, each beat originates in the SA node (specialized tissue in the right atrium) resulting in a regular normal sinus rhythm ***(Ganong, 2005).***

Arrhythmia or Dysrrhythmia is defined as "Abnormality of cardiac rate, rhythm or conduction which can be either lethal (sudden cardiac death) or symptomatic (syncope, near syncope, dizziness or palpitations) or asymptomatic". Immediate diagnosis and intervention by the anesthesiologist will prevent degeneration of an arrhythmia into a life-threatening event ***(Dua and Kumra, 2007)***.

Ion channels provide the molecular basis for cardiac electrical activity. These channels have specific ion selectively and are responsible for the precise and timely regulation of the passage of charged ions across the cell membrane in cardiac cells. Impairment in the flow of these ions predisposes to cardiac arrhythmias ***(Farwell and Gollob, 2007).***

The ion channels are classified into three classes (based on the cation they conduct) sodium, calcium and potassium channels ***(Thompson and Balser, 2004).***

Arrhythmias can be classified by the heart rate into tachyarrhythmias and bradyarrhythmias. Arrhythmias can also be classified based on where they arise from as either ventricular (within the ventricles) or supraventricular (anywhere above the