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Perioperative Myocardial Infarction

Essay

Submitted for Partial Fulfillment of Master degree in intensive care

By

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2016

بسم الله الرحمن الرحيم

قَالُوا سُبْحَانَكَ لاَ عِلْمَ لَنَا إِلاَّ مَا
عَلَّمْتَنَا إِنَّكَ أَنتَ الْعَلِيمُ الْحَكِيمُ

صدق الله العظيم

سورة البقرة آية (٣٢)

First and foremost, thanks to ***Allah*** *for giving me the will and the patience to finish this work.*

In a few grateful words, I would like to express my deepest gratitude and appreciation to ***Prof. Dr. Gehan Fouad Kamel,*** *Professor of Anesthesia , Intensive, Care and Pain Management, Faculty of Medicine-Ain Shams University, for her great concern and generous help. Without her generous help, this work would not have been accomplished in its present picture.*

I am sincerely grateful to ***Dr. Assem Adel Moharram,*** *Lecturer of Anesthesia, Intensive Care and Pain Management, Faculty of medicine, Ain Shams University, for his kind help and constructive suggestions to achieve this work.*

I would also like to express my deep appreciation to ***Dr. Ghada Mohamed Samir,*** *Lecturer of Anesthesia, Intensive Care and Pain Management, Faculty of Medicine-Ain Shams University, for her great kindness, constant assistance and guidance.*

Contents

%	Percent
ACC	American College of Cardiology
ACE	Angiotensin-Converting Enzyme
ACEIs	Angiotensin-Converting Enzyme Inhibitors
ACS	Acute Coronary Syndrome
ADP	Adenosine Diphosphate
AF	Atrial Fibrillation
AHA	American Heart Association
AMI	Acute Myocardial Infarction
ASA	American Society of Anesthesiologists
BB	Beta Blocker
BMS	Bare-Metal Stent
BNP	B-type Natriuretic Peptide
CABG	Coronary Artery Bypass Graft
CAD	Coronary Artery Disease
CAS	Carotid Artery Stenting
CEA	Carotid Endarterectomy
CIED	Cardiovascular Implantable Electronic Device
CK-MB	Creatine Kinase - Muscle/ Brain
COPD	Chronic Obstructive Pulmonary Disease
COR	Class of Recommendation
CPG	Clinical Practice Guideline
CPT	Current Procedural Terminology
CVC	Central venous catheter
CVP	Central Venous Pressure

DAPT	Dual Antiplatelet Therapy
DASI	Duke Activity Status Index
DES	Drug-Eluting Stent
DSE	Dobutamine Stress Echocardiogram
ECG	Electrocardiogram
EF	Ejection Fraction
EMI	Electromagnetic Interference
ERC	Evidence Review Committee
GDMT	Guideline-Directed Medical Therapy
GWC	Guideline Writing Committee
HF	Heart Failure
ICD	Implantable Cardioverter-Defibrillator
LAD	Left Anterior Descending artery
LBBB	Left bundle branch block
LCX	Left Circumflex artery
LIMA	Left Internal Mammary Artery
LOE	Level of Evidence
LV	Left Ventricular
LVEF	Left Ventricular Ejection Fraction
LVH	Left ventriclar hypertrophy
MACE	Major Adverse Cardiac Event
MET	Metabolic Equivalent
Mg/dl	Milli gram per deciliter
MI	Myocardial Infarction
MLR	Multiple Logistic Regressions
MmHg	Milli meter Mercury
MOD	Multiple Organ Dysfunction Syndrome
MPI	Myocardial Perfusion Imaging
MPM	Mortality Probability Model
N/A	Not Applicable

NGT	Naso Gastric Tube
NSQIP	National Surgical Quality Improvement Program
NSTEMI	Non-ST Segment Elevation Myocardial Infarction
NT-proBNP	N-terminal pro-BNP
NYHA	New York Heart Association
P value	Probability value
PAD	Pain, Agitation/Sedation Delirium
PAMI	Primary Angioplasty in Myocardial Infarction
PaO_2	Partial Oxygen Tension In Arterial Blood
PAP	Pulmonary Arterial Pressures
PAR	Pressure-adjusted heart rate
PCI	Percutaneous Coronary Intervention
PCO_2	Partial Pressure Of Carbon Dioxide Tension
PE	Pulmonary embolism
PEEP	Positive end-expiratory pressure
PMCE	Perioperative Major Cardiac Events
POSSUM	Physiological and Operative Severity Score for enUmeration of Mortality and morbidity
PSI	Pneumonia Severity Index
PURSUIT	Platelet glycoprotein IIb/IIIa in Unstable angina: Receptor Suppression Using Integrilin Therapy
PVC	Pulmonary Artery Catheter
RASS	Richmond Agitation-Sedation Scale
RCA	Right Coronary Artery
RCRI	Revised Cardiac Risk Index
RCT	Randomized Controlled Trial
RIFLE	Risk, Injury, Failure, Loss of kidney

	function, and End-stage renal failure
ROC	Receiver Operating Characteristic
RR	Respiratory Rate
RTS	Revised Trauma Score for adults
SAH	Subarachnoid Hemorrhage
SAPS	Simplified Acute Physiology Score
SAS	Sedation-Agitation Scale
SBP	Systolic Blood Pressure
SIHD	Stable Ischemic Heart Disease
SIRS	Systemic inflammatory Response Syndrome
SMR	Standardized Mortality Ratio
SOFA	Sequential Organ Failure Assessment
SR	Systematic Review
STEMI	ST-elevation myocardial infarction
STS	Society of Thoracic Surgeons
SVT	Supraventricular Tachycardia
SYNTAX	Synergy Between Percutaneous Coronary Intervention With TAXUS and Cardiac Surgery
TEE	Transesophageal Echocardiogram
TIA	Transient Ischemic Attack
TIMI	Thrombolysis In Myocardial Infarction
TPA	Tissue Plasminogen Activator
TTE	Transthoracic Echocardiography
UA	Unstable Angina
UA/NSTEMI	unstable angina/non–ST-elevation myocardial infarction
UPLM	*Unprotected Left Main Disease*
VHD	valvular heart disease
VT	*Ventricular Tachycardia*

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Introduction

Major perioperative cardiac events are estimated to complicate between 1.4% and 3.9% of surgeries. Because most surgeries are elective, there is the opportunity to implement strategies to reduce this risk. Accurate identification of patients at risk for such events will allow patients to be better informed about the benefit-to-risk ratio of procedures, and utilization of preventive interventions, and areas of future research. This essay focuses on the important features of the initial pre-operative clinical risk assessment, indications for diagnostic testing to quantify cardiac risk, and the methods and indications for pre-emptive therapies ***(Coll Cardiol 2015).***

Perioperative myocardial infarction/injury (PMI) is an episode of myocardial ischemia occurring during or in the days after noncardiac surgery. Over 230 million major surgical procedures are performed annually worldwide, the perioperative setting is a common challenge for hospital physicians, and also for primary care physicians providing follow-up care. Despite advances in all fields of medicine, there is still a significant risk of death related to major noncardiac surgical procedures. The observed 30-day

mortality depends on patient-related as well as procedural factors and ranges between 1% and 10%. Cardiovascular complications, particularly PMI, seem to be major contributors to up to 40% of all deaths ***(Botto et al., 2014).***

The perioperative cardiovascular management of the adult patient undergoing noncardiac surgery includes preoperative risk assessment and cardiovascular testing, as well as perioperative pharmacological (including anesthetic) management and perioperative monitoring that includes devices and biochemical markers. The key to optimal management is communication among all of the relevant parties (i.e., surgeon, anesthesiologist, primary caregiver, and consultants) and the patient. The goal of preoperative evaluation and managment is to promote patient engagement and facilitate shared decision making by providing patient with clear, understandable information about perioperative cardiovascular risk in the context of the overall risk of surgery ***(Fleisher et al., 2014).***

Aim of the work

This assay is to highlight recent updates in assessment and Electrophysiology and Pathophysiology and different ways in the diagnosis and management of perioperative myocardial infarction.

Assessment of perioperative myocardial infarction

ANATOMY OF THE CORONARY CIRCULATION

There are 2 major coronary arteries; right and left (Fig.1). The right coronary artery arises from the right coronary sinus of Valsava and runs down in the groove between the right atrium and the right ventricle. Its branches supply the sinus node, the atrioventricular node and bundle of the right ventricle and the inferior part of the left ventricle. The left coronary artery, which arises from the left coronary sinus of Valsava, soon divides into two large branches: The anterior descending branch which runs down between the two ventricles anteriorly, and the left circumflex branch which passes around the groove between the left atrium and the left ventricle. The anterior descending artery supplies the interventricular septum and the anterior wall of the left ventricle. The circumflex supplies the lateral and posterior aspect of the left ventricle ***(Betts et al., 2013).***

The major vessels traverse the external surface of the myocardium, sending branches perpendicularly into the muscle mass. There are normally many small anastomoses between the coronary arteries. When an area of the heart become ischaemic, the anastomoses enlarge and then provide a collateral blood supply to the affected muscle which is often vital for its survival. The blood flow in the coronary arteries resembles that in other regions in being dependent on the blood pressure and on the vascular resistance of the arteries and arterioles. A distinctive feature of the coronary

circulation is that the arteries are compressed by the contracting myocardium during systole so that the resistance to flow at that time is sharply increased. Consequently, coronary blood flow occurs mainly during diastole. Flow is largely determined by the caliber of the small coronary arteries ***(Betts et al., 2013).***

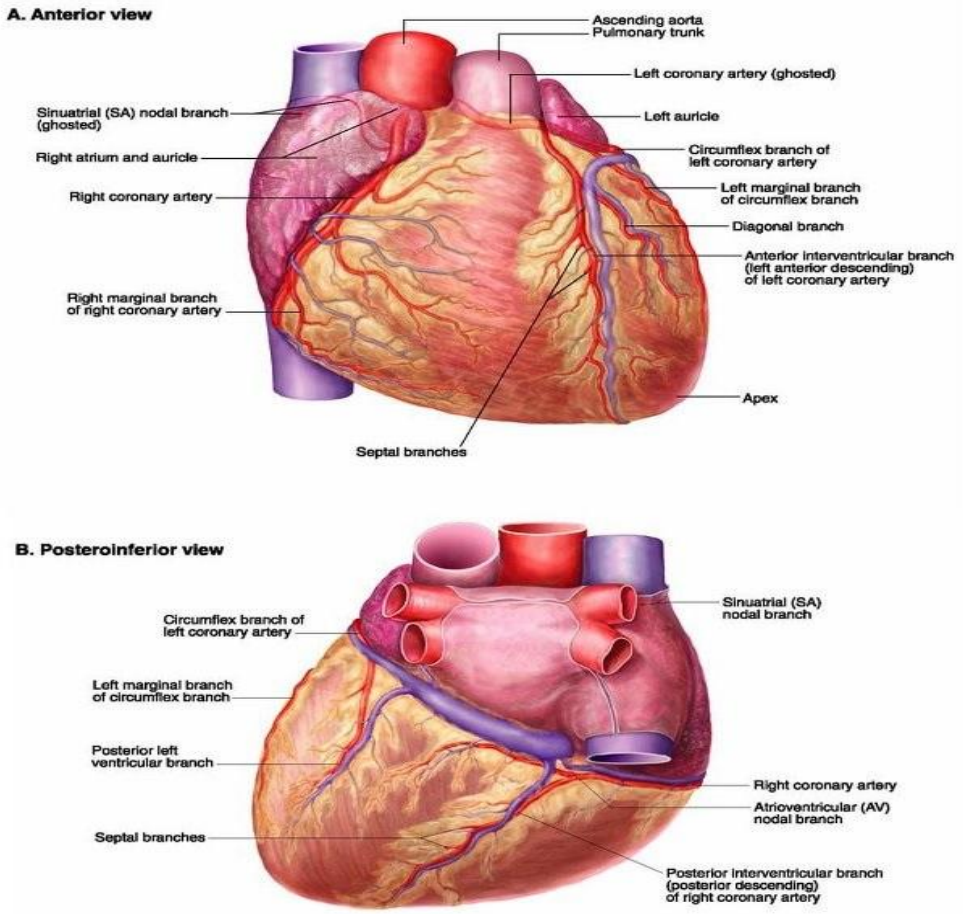

Figure 1: Anterior& Posteroinferior surfaces of the heart showing the coronary arteries (Patrick et al., 2008).