Anaesthetic Considerations of Grown Up Congenital Heart Disease In Patient Undergoing Non Cardiac Surgery

Essay

Submitted for partial fulfillment of master degree
In Anaesthesiology

By:

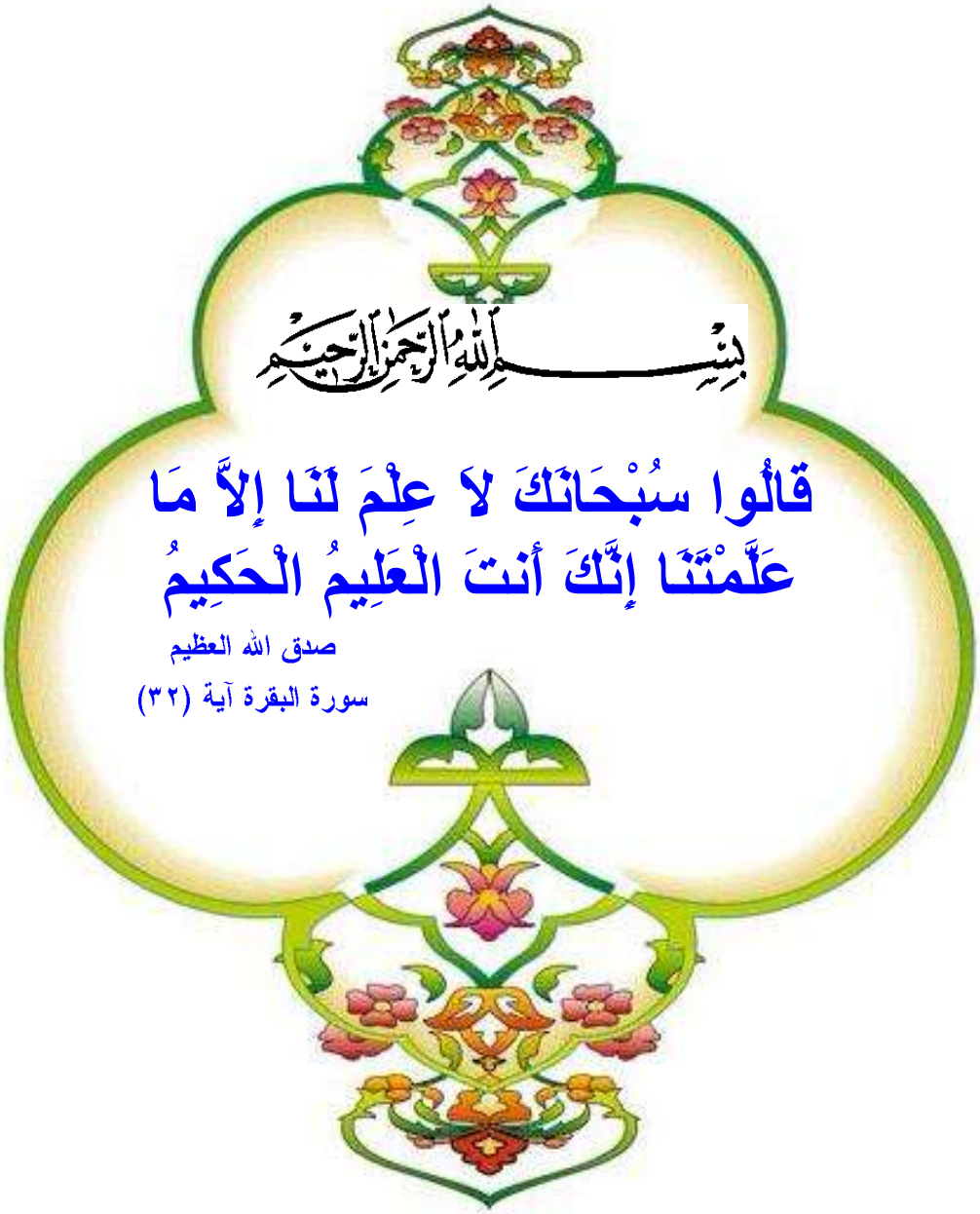
Yasser Abd Elhamid Abd Elmagid
M.B.B.ch

Supervised by

Prof. Dr/ Samia Ibrahim Sharaf
Professor of Anaesthesia and Intensive Car
Faculty of Medicine, Ain Shams University

Dr/ Ahmed Mohammed Shafik
Assistant Professor of Anaesthesia and Intensive Care
Faculty of Medicine, Ain Shams University

Faculty of Medicine
Ain Shams University
٢٠١٣


بسم الله الرحمن الرحيم
قالُوا سُبْحَانَكَ لاَ عِلْمَ لَنَا إِلاَّ مَا
عَلَّمْتَنَا إِنَّكَ أَنتَ الْعَلِيمُ الْحَكِيمُ
صدق الله العظيم
سورة البقرة آية (٣٢)

Acknowledgement

First and foremost, thanks and praise **Allah** *most gracious, most merciful*

Words stand short when coming to express my deepest gratitude and greatest thanks to **Prof. Dr. .Samia Ibrahim Sharaf** *Professor of Anaethesia and ICU, Faculty of Medicine, Ain Shams University, for his constant encouragement, constructive guidance and unlimited support all through my career. Working under his supervision is a real privilege. To him I feel indeed grateful.*

I am also greatly indebted to **Dr. Ahmed Mohammed Shafik** *Assistant Professor of Anaethesia and ICU, Faculty of Medicine, Ain Shams University, for her supervision, sincere help and continuing encouragement throughout the whole work.*

To my beloved family, I will always be eternally indebted, for their continuous encouragement and infinite tolerant support.

Yasser A.elhamid

Contents

List of Abbreviations

ACC	:	American College of Cardiology
AF	:	Atrial fibrillation
AHA	:	American Heart Association
AO	:	Aortic opening
ASD	:	Atrial septal defect
ASD	:	Atrial septal defect
AVA	:	Aortic valve area
BT	:	Blalock Toussig
CHD	:	Congenital heart disease
CHF	:	Congestive heart failure
CNS	:	Central nervous system
COP	:	Cardiac output
GUCH	:	Grown up congenital heart disease
HTN	:	Hypertention
IE	:	Infective endocarditis
INR	:	International Normalised Ratio
NPO	:	Nothing per os
NYHA	:	New-York Heart Association
PAP	:	Pulmonary artery pressure
PCC	:	Prothrombin complex concentrate
PCO_2	:	Partial CO_2 tension
PDA	:	Persistent ductus arteriosus
PO_2	:	Partial O_2 tension
PT	:	Prothrombin Time
PTT	:	Partial Thromboplastin Time
PVR	:	Pulmonary vascular resistance
Qp/Qs	:	Pulmonary flow /systemic flow ratio
SVR	:	Systemic vascular resistance
TGA	:	Trasposition of great arteries
TOF	:	Tetrology of fallot

List of Abbreviations (Cont.)

UFH	:	Unfractionated heparin
VSD	:	Ventricular septal defect
VWF	:	Von Willebrand factor
WHO	:	World Health Organization

List of tables

List of Boxes

List of Figures

Introduction

Congenital heart defects are the most common group of inborn defects, occurring in approximately ٨ in ١،٠٠٠ live births. It is estimated that approximately ٣٠،٠٠٠ children are born annually with congenital heart diseases (CHD). In the era before the development of pediatric cardiac surgery, the majority of untreated patients born with congenital heart disease die in infancy or childhood, and only ١٥-٢٥٪ survive into adulthood. Those who survive were the patients who have a mild form of the disease that has allowed them to survive without surgical or interventional cardiac catheterization. ***(Deanfield J. et al., ٢٠٠٣)***

Advances in prenatal diagnosis pediatric cardiac surgery cardiac pediatric anesthesia, and critical care over the past ٤٠ years have resulted in survival of these children beyond their third decade of life. This dramatic success has created a rapidly increasing population of adult patients with congenital heart disease (CHD). ***(Fleisher LA. et al., ٢٠٠٧)***

The spectrum of CHD ranges widely from relatively mild defects to lesions of moderate to severe lesions characterized by several coexistent malformations, patients

with moderate to severe CHD undergoing non-cardiac surgery should be referred and followed up in a comprehensive adult CHD centre, These centers include cardiologists, heart surgeons, and cardiac anesthesiologists with specialized training and extensive experience in the field so the patient would obtain the appropriate consultation. ***(Therrien J. et al., ٢٠٠١)***

The most common complications should be considered as well as the anesthetic and surgical techniques employed in these procedures and their hemodynamic consequences. Also the medications required for these unique patients need to be considered along with their inherent side effects. Stratification into high- or low-risk surgery must be well established where it is based on whether the operation is elective or emergent and major or minor. ***(Lorraine Weiss: ٢٠٠٤)***.

Aim of the Work

The ultimate goal of this essay is to provide the anesthesia care provider with an understanding of the basic underlying anatomy and associated physiology of the most common congenital heart defects as applied to the adult age group. It also provides an overview of the long-term consequences and the preoperative and intraoperative implications of those CHD when undergoing non-cardiac surgery and the potential hemodynamic consequences of various anesthetic and surgical techniques.

Chapter I

Classification and Pathophysiology of Congenital Heart Diseases

Incidence and Etiology CHD:

Congenital anomalies of the heart and cardiovascular system occur in ٧-١٠ per ١٠٠٠ live births (٠,٧٪-١٪).Almost one-third of those infants, or ٢,٦ per ١٠٠٠ live births, however, have critical disease, which is defined as a malformation severe enough to result in cardiac catheterization, cardiac surgery, or death within the first year of life. Today, with early detection and proper management, the majority of infants with critical disease can be expected to survive the first year of life. Most who now survive infancy will join the increasingly large cohort of adults with congenital heart disease. ***(Hoffman and Kaplan, ٢٠٠٢).***

Although earlier theories concerning the etiology of congenital heart diseases suggested that most defects were multifactorial , the malformations are caused by a combination of a hereditary predisposition (presumably caused by abnormalities in the genetic code) and an environmental trigger more recent advances in molecular biology suggest that a much higher percentage are caused by point mutations **(Belmont.,١٩٩٨).**

Some abnormalities are caused by chromosomal aberrations. Trisomy ٢١ (Down syndrome) is highly associated with complete atrioventricular (AV) canal, VSDs, and tetralogy of Fallot, and children with Turner syndrome (XO chromosome) frequently have coarctation of the aorta. Other anomalies are caused by teratogens: VSD in fetal alcohol syndrome, Ebstein's anomaly in a fetus with prenatal exposure to lithium, and patent ductus arteriosus (PDA) in mothers who contracted rubella during the first trimester are examples.

It is clear now that a higher proportion of congenital heart disease than previously thought is caused by single-gene defects and that the same malformation may be caused by mutant genes at different loci. **(Belmont, ١٩٩٨).**

Table (١): Incidence of Congenital Heart Diseases

Diagnosis	Incidence (%)
Ventricular septal defect	٢٨
Atrial septal defect (secondum)	١٠
Patent ductus arteriousus	١٠
Tetralogy of Fallot	١٠
Pulmonary stenosis	١٠
Aortic stenosis	٧
Coarctation of aorta	٥
Transposition of great arteries	٥
Atrial septal defect (primum)	٣
Total anomalous pulmonary venous return	١

(Ray et al., ٢٠٠٤)