

Faculty of medicine
Ain shams university
Department of anesthesiology and intensive care



Recent Advances in Anesthetic Management of a Morbidly Obese Parturient

Essay

Submitted for Partial Fulfillment of Master Degree in Anesthesiology

Presented by

Mohamed Sayed Abdelaziz

M.B.B.C.H, Faculty of Medicine, Cairo University

Under Supervision of

Prof.Dr. Sherif Farouk Ibrahim

Professor of Anesthesiology, Intensive Care and Pain
Management,
Faculty of Medicine, Ain Shams University

Dr. Aktham Adel Ehsan

Assistant Professor of Anesthesiology, Intensive Care and Pain
Management, Faculty of Medicine, Ain Shams University

Dr. Raham Hasan Mostafa

Lecturer of Anesthesiology, Intensive Care and Pain
Management,
Faculty of medicine , Ain Shams University

**Faculty of Medicine
Ain Shams University
2015**

Acknowledgment

First of all, thanks are all due to God for blessing this work until it has reached its end.

I would like to express my deepest gratitude to **Prof. Dr. Sherif Farouk**, Professor of Anesthesiology, intensive care and pain management, Faculty of Medicine, Ain shams University, for this great support and continuous encouragement throughout this whole work. It is a great honor to work under his guidance and supervision.

I am truly grateful to **Dr. Aktham Adel**, Assistant Professor of Anesthesiology, intensive care and pain management, Faculty of Medicine, Ain shams University, for his kind advice throughout this work.

My deepest appreciation and thanks are due to **Dr. Raham Hasan**, Lecturer of Anesthesiology, intensive care and pain management, Faculty of Medicine, Ain shams University, for her close supervision, sincere help, valuable suggestions and continuous encouragement throughout the whole work.

Contents:

○ List of Abbreviations.....	1
○ List of tables.....	4
○ List of figures.....	5
○ Introduction.....	6
○ Aim of the Essay.....	8
○ Chapter 1: physiological changes in pregnancy of a morbid obese parturient.....	9
○ Chapter 2: Obesity associated comorbid conditions.....	28
○ Chapter 3: Anesthetic Management of A Morbid Obese Parturient.....	41
○ Summary.....	105
○ References.....	109
○ Arabic summary.....	124

List of Abbreviations

ABW	: Adjusted Body Weight
ACOG	: American College of Obstetricians and Gynecologists
AFP	: Alfa Fetoprotein
AKI	: Acute Kidney Injury
ASA	: American Society of Anesthesiologists
BMI	: Body Mass Index
BPP	: Biophysical Profile
BSA	: Body Surface Area
CO	: Cardiac Output
CPAP	: Continuous Positive Airway Pressure
CS	: Cesarian Section
CSE	: Combined Spinal Epidural
CSF	: Cerebrospinal Fluid
CT	: Computed Tomography
CVD	: Cardiovascular Disease
CVP	: Central Venous Pressure
DM	: Diabetes Mellitus
EFW	: Estimated Fetal Weight
EKG	: Electrocardiogram
ERV	: Expiratory Reserve Volume
ETT	: Endotracheal Tube

FFM	: Free Fat Mass
FIO ₂	: Fraction of Inspired Oxygen
FRC	: Functional Residual Capacity
GDM	: Gestational Diabetes Mellitus
GFR	: Glomerular Filtration Rate
IAP	: Intra-Abdominal Pressure
IBW	: Ideal Body Weight
ICU	: Intensive Care Unit
IL	: Interleukin
ILMA	: Intubating Laryngeal Mask Airway
IRV	: Inspiratory Reserve Volume
IV	: Intravenous
IVF	: Invitro Fertilization
LBW	: Lean Body Weight
LMA	: Laryngeal Mask Airway
LV	: Left Ventricle
NAFLD	: Non Alcoholic Fatty Liver Disease
NSAID	: Non-Steroidal Anti-Inflammatory Drug
NST	: Non Stress Test
NTD	: Neural Tube Defect
OD	: Outer Diameter
OR	: Operating Room
OSA	: Obstructive Sleep Apnea
PEEP	: Positive End Expiratory Pressure

RAMP	: Rapid Airway Management Positioner System
RCOG	: Royal College of Obstetricians and Gynecologists
RV	: Residual Volume
SGAs	: Supraglottic Airway Devices
SV	: Stroke Volume
TAP	: Transverse Abdominis Muscle
TBW	: Total Body Weight
TNF	: Tumor Necrosis Factor
TV	: Tidal Volume
UK	: United Kingdom
V/Q	: Ventilation/Perfusion
VBAC	: Vaginal Birth after Cesarean
VLDL	: Very Low Density Lipoprotein
VTE	: Venous Thromboembolism
WHO	: World Health Organization

List of Tables

Table No.	<i>Title</i>	Page
1	<i>Classification of obesity According to BMI</i>	10
2	<i>Cardiovascular changes in pregnancy, obesity and combined</i>	17
3	<i>Adjustment to routine prenatal care in obese pregnant woman</i>	25
4	<i>Pregnancy and fetal outcomes in obesity</i>	27
5	<i>Obesity associated comorbid conditions</i>	29
6	<i>Factors that influence the risk of Obstructive sleep apnea in parturients</i>	33
7	<i>Perinatal complications of Obstructive sleep apnea parturients with obesity</i>	34
8	<i>Dosing of common anesthetic drugs in the obese</i>	57
9	<i>Preoperative tests for predicting difficult intubation in obstetric patients</i>	72

List of Figures

<i>Figure No.</i>	<i>Title</i>	<i>Page</i>
1	Schematic illustration of the effects of severe obesity on (FRC)	14
2	Obesity-related alterations and their potential relevance to critical illness	20
3	Hormonal changes during pregnancy in obese parturients predisposing them to Obstructive sleep apnea	32
4	STOP-Bang questionnaire	35
5	Ramp position	47
6	Optimal Ramp position illustrating oral axis, pharyngeal axis and laryngeal axis	48
7	Operating table specialized for morbidly obese patients	49
8	Table RAMP position	50
9	Most common head positions compared to Ramped position	51
10	Relationship of TBW, fat weight, and LBW to BMI in a standard height male	53
11	Identification of midline by patient assist	64
12	Ultrasound imaging for identifying the midline for epidural catheter insertion	65
13	Transverse approach to identify midline for epidural catheter insertion	65
14	Unanticipated difficult intubation algorithm	82
15	Anticipated difficult airway algorithm	83
16	Direction of panniculus retraction	94
17	CO ₂ sampling/O ₂ delivery for non-intubated patient groups as regarding sedation scores	102

INTRODUCTION

Obesity has become a public health epidemic in many nations worldwide, and is a serious health problem among reproductive-aged women. Morbid obesity and its comorbid conditions place the parturient and fetus at increased risk of complications related to pregnancy, surgery and anesthesia. [*Vricella L, 2010*]

Obesity is linked to a number of co-morbidities, including type 2 diabetes, cancer and cardiovascular diseases. [*Hanley, 2010*]

Morbid obesity accentuates the physiological changes associated with pregnancy. It is not uncommon in the morbidly obese parturient to see systolic and diastolic dysfunction of the left ventricle, pulmonary hypertension and obstructive sleep apnea. Moreover, endothelial dysfunction, a consequence of insulin resistance and dyslipidemias, may predispose these patients to pregnancy induced hypertension. [*Wolf M, 2001*]

The physiological and anatomical changes caused by both obesity and pregnancy increase the potential of an unanticipated difficult airway, impossible mask ventilation and rapid desaturation during the apneic phase. Morbidly

obese patients undergoing open abdominal surgery are at increased risk for serious respiratory complications including pulmonary embolism, pneumonia, atelectasis, aspiration and respiratory failure *[Yu CK, 2006]*.

Surgery in this patient population is considered high risk but careful planning, preoperative risk assessment, adequate anesthetic management, strict venothrombotic event prevention, and effective postoperative pain control will all help to reduce risk. *[Ankichetty, 2012]*

Increased vigilance needs to occur not only during induction of anesthesia, but also during emergence and recovery. Moreover, vigilance should be maintained in the postoperative period for the development of complications such as hypoxemia, atelectasis and pneumonia, deep venous thrombosis and pulmonary embolism, pulmonary edema, postpartum cardiomyopathy, postoperative endometritis, wound infection and dehiscence. *[Saravanakumar, 2006]*

Aim of the essay

Our study aims to provide an insight into the magnitude and pathophysiological features of obese parturient, maternal and neonatal associated risks, along with peculiar anesthesiological management strategies.