ANESTHETIC MANAGEMENT OF THE OBESE PARTURIENT

Essay

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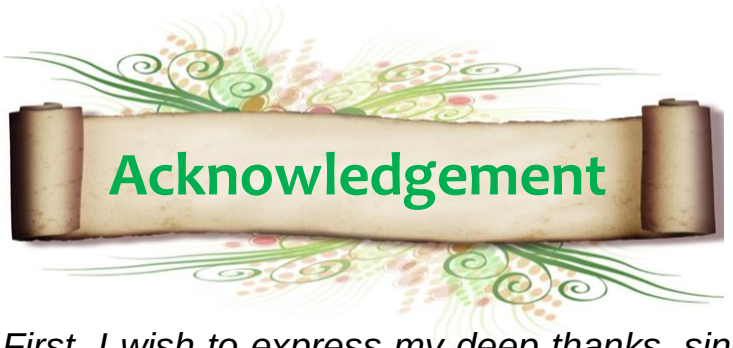

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Abstract:

The purpose of this article is to review the fundamental aspects of obesity, pregnancy and a combination of both. The scientific aim is to understand the physiological changes, pathological clinical presentations and application of technical skills and pharmacological knowledge on this unique clinical condition. The goal of this presentation is to define the difficult airway, highlight the main reasons for difficult or failed intubation and propose a practical approach to management Throughout the review, an important component is the necessity for team work between the anesthesiologist and the obstetrician. Certain protocols are recommended to meet the anesthetic challenges and finally concluding with "what is new?" in obstetric anesthesia.

Keywords: Adipocyte, complications, difficult airway, morbidly obese, parturient, regional, team work.

Contents

List of Abbreviations

ACTH : Adrenocorticotrophic hormone

ACOG : American College of obstetrics and gynecology

BMI : Body mass index

CAD : Coronary artery disease

CNB : Central neuraxial block

CPAP : Continuous positive airway pressure

CS : Cesarean section

CSE : Combined spinal epidural

CT : Computed tomography

CV : Closing volume

CVCI : Can not ventilate, can not intubate

DVT : Deep venous thrombosis

E : Ectopic

EBP : Epidural block patch

ECG : Electrocardiogram

ERV : Expiratory reserve volume

FDA : Food and Drug Administration

FEV_1 : Forced end expiratory volume at first second

FFA : Free fatty acids

FRC : Functional residual capacity

FVC : Forced vital capacity

GDM : Gestational diabetes mellitus

H_2 antagonist : Histamine receptor type 2 antagonist

HDL : High density lipoprotein

IBW : Ideal body weight

IC : Inspiratory capacity

IL-6 : Interleukin number 6

ILMA : Intubating laryngeal mask airway

IR : Insulin resistance

IV : Intravenous

Kgs : Kilograms

KPA : Kilopascal

LBW **:** Lean body weight

LGA : Large for gestational age

LMA : Laryngeal mask airway

LMWH : Low molecular weight heparin

LT : Laryngeal tube

LUD : Left uterine displacement

MAC : Minimum alveolar concentration

MVV : Maximum voluntary ventilation

NEFA : Non esterified fatty acid

NICU : Neonatal intensive care unit

NIH : National Institute of Health

NO : Nitric oxide

NTDs : Neural tube defects

OHS : Obesity hypoventilation syndrome

OSA : Obstructive sleep apnea

$PaCo_2$: Partial pressure of carbon dioxide in the arterial blood

PACU : Postanesthesia care unit

PaO_2 : Partial pressure of oxygen in the arterial blood

PCA **:**Patient controlled analgesia

PDPH : Postdural puncture headache

PEEP : Positive end expiratory pressure

PEFR : Peak expiratory flow rate

PFT : Pulmonary function test

PPA R-μ : Peroxisome proliferator –activated protein-gamma

RR : Respiratory rate

RV : Residual volume

S_2-S_4 : Sacral vertebrae 2, 3 and 4

SAR : Simplified airway risk

SD : Shoulder dystocia

T_{4-6} : Thoracic vertebrae 4, 5 and 6

TAP : Trans-abdominis plane block

TBW **:** Total body weight

TLC : Total lung capacity

TNFα : Tumor necrosis factor alpha

TTJV : Trans-tracheal jet ventilation

TV : Tidal volume

UK : United Kingdom

US : Ultrasound

VBAC : Vaginal birth after Cesarean section

VC : Vital capacity

VF : Visceral fat

VLDL - C : Very low density lipoprotein cholesterol

VTE : Venous thromboembolism

WHO : World Health Organization

List of Figures

List of Tables

Introduction

Obesity is a metabolic disease in which abnormal or excessive accumulation of adipose tissue represents greater than normal proportion of body mass **(Badye et al., 2014)**. The World Health Organization also projects that by 2025, more than 50% of the United States population will have a BMI >30 kg/m^2. In the United States, obesity rates has reached epidemic proportions with extreme obesity (BMI >40 kg/m^2) showing the greatest increase, particularly among women **(World Health Organization , 2013).**

The World Health Organization (WHO) defines "overweight" as a BMI ≥25, obesity as a BMI ≥30. Obesity is further categorized by BMI into Class I (30 to 34.9); Class II (35 to 39.9) and Class III obesity (>40). Morbid obesity is BMI ≥40 kg/m^2 and super obesity is classified as a BMI ≥50 kg/m^2 **(National Institutes of Health ,1998**).

The dramatically increasing rate of obesity in the general population also extends to women of reproductive age. There is at least 60% of women of child-bearing age are overweight or obese. Obesity increases the risk for Cesarean delivery significantly. Anesthesiologists are thus increasingly

faced with the care for morbidly obese parturients **(McTigue et al., 2006)**.

Although there are no pregnancy-specific definitions of obesity, the American College of Obstetricians and Gynecologists (ACOG) recommends using height and weight measured at the first prenatal visit to calculate the BMI. Pregnant women are considered obese when the BMI is ≥30 kg/m^2, and morbidly obese when the BMI is ≥40 kg/m^2. The maternal body weight is expected to increase during pregnancy due to increase in blood volume, fetus, placenta, amniotic fluid, and deposition of new fat and protein. The normal mean maternal weight increase during pregnancy is 17% of the pre-pregnancy weight or about 12 kg**.** However, it is important to recognize that the allowable weight gain during pregnancy varies by pre-pregnancy BMI **(Stotland, 2009)** .

Overweight and obesity are major risk factors for a number of chronic diseases. There is evidence that risk of chronic disease increases progressively from a BMI of 28 kg/m^2 **(Edwards et al., 2008)**. Physiological changes of pregnancy interact with pathological changes of obesity and may add to the peripartum risks **(Chang, 2004).**

Overweight and obese women are at increased risk of several pregnancy complications. Similarly, fetuses of pregnant women who are overweight or obese are liable to prematurity, stillbirth, congenital anomalies, macrosomia with possible birth injury, and childhood obesity **(Cedergren, 2004).**

The obese parturient often requires delivery by Cesarean and is more likely to experience prolonged surgery **(Weiss et al., 2004).** Neuraxial catheter-based techniques such as: spinal, epidural, combined spinal-epidural anesthesia (CSE) are optimal in obesity to allow for all of the possible outcomes, including a surgical delivery **(Turkstra et al . , 2010)**.

General anesthesia should be avoided unless absolutely necessary. The anatomic changes produced by both pregnancy and obesity increase risk for difficult intubation, rapid desaturation and hypoxia during periods of apnea. The urgency of the obstetric situation must be weighed against the risk of general anesthesia. If general anesthesia is necessary, additional experienced personnel and difficult airway equipment must be available **(Turkstra et al . , 2010).**

Obesity is a risk factor for a number of normal labor complications. Vaginal delivery is more difficult because of high rates of cephalopelvic disproportion. Neuraxial labor analgesia (epidural, spinal, or combined spinal-epidural analgesia) is the most effective method of labor analgesia. The side effect profile of these techniques is acceptable to most women and obstetricians **(American Society of Anesthesiologists, 2007).**

Morbid obesity increases the risk for postoperative complications, including: hypoxemia, atelectasis, deep venous thrombosis, pulmonary embolism, pneumonia, pulmonary edema, postoperative endometritis, wound infection and dehiscence **(Hood and Dewan, 2003).**