Updated Anesthetic Management of Difficult Airway and Failed Tracheal Intubation in Obstetrics

Essay

Submitted for the Fulfillment of the Master Degree in

Anesthesia

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2017

سورة التوبة الآية (١٠٥)

Acknowledgment

- All praises are to **Allah** and all thanks. He has guided and enabled me by his mercy to fulfill this essay, which I hope to be beneficial for people.

- I would like to express my deepest gratitude and sincere appreciation to **Prof. Dr. Laila Ali El Sayed El Kafrawy,** Professor of Anesthesia and Intesive Care, Faculty of Medicine, Ain Shams University for her encouragement, her kind support and appreciated suggestions that guided me to accomplish this work.

- I am also grateful to **Prof. Dr. Amr Mohamad Abd El Fatah Sayed,** Assistant Professor of Anesthesia and Intesive Care, Faculty of Medicine, Ain Shams University, who freely gave his time, effort and experience along with continuous guidance throughout this work.

- A lot of thanks are extended to **Dr. Mohamed Abd El Salam Aly Elgendy,** Lecturer of Anesthesia and Intesive Care, Faculty of Medicine, Ain Shams University for his effort, constant encouragement and advice whenever needed.

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List of Abbreviations

Abb.	Full term
AIDAA	All India Difficult Airway Association
A-O	Atlanto-occipital
ASA	American Society of Anesthesiologists
BMI	Body mass index
CEMD	Confidential enquiries into maternal deaths
CSE	Combined spinal epidural
CSF	Cerebrospinal fluid
DAS	Difficult Airway Society
DI	Difficult intubation
FETO2	End-tidal fraction of oxygen
FETO2	End-tidal fraction of oxygen
FEV1	Forced expiratory volume in one second
FRC	Functional residual capacity
FVC	Forced vital capacity
GA	General anaesthesia
ICP	Intracranial pressure
IM	Intramuscular
IUFR	Intrauterine fetal resuscitation
IUFR	Intrauterine fetal resuscitation
IV	Intravenous
LA	Local anaethetic
LMA	Laryngeal mask airway
MAC	Minimal alveolar concentration
MP	Mallampati score

Abb.	Full term
N	Newtons
OSA	Obstructive sleep apnea
PCA	Patient controlled analgesia
PCEA	Patient controlled epidural analgesia
SAD	Supraglottic airway device
SMD	Sternomental distance
SQ	Subcutaneous
TENS	Transcutaneous electrical nerve stimulation
TMD	Thyromental distance
WHO	World Health Organization

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Introduction

Medicine is a risky business and anesthesiologist are familiar with having to make difficult decisions when complex clinical emergencies arise. There are perhaps few more challenging anesthetic situations than failed tracheal intubation and when this arises in the obstetric setting, the burden on the anesthesiologist and the consequences of his/her actions may be considerable. The marked decline in general anesthesia for caesarean section in many parts of the world in recent decades has reduced the likelihood of anesthesiologists' encountering such a situation, but increased the pressure on them when they do: not only is caesarean section under general anesthesia a relatively rare event for many anesthesiologist, it tends to be reserved for women requiring the most urgent delivery. Conditions at these times are often adverse, the time pressure extreme and the 'stakes' may reasonably be described as high ***(Rucklidge and Yentis, 2015).***

Pregnancy brings a unique set of challenges to the obstetric anesthesiologist. Many of these are brought about by anatomical and physiological changes which occur in the parturient. Body mass index (BMI) increases, the breasts enlarge, the diaphragm is elevated by the growing

fetus and the airway may become edematous. Several studies have identified airway changes during pregnancy and labour, with significant changes to both airway anatomy and Mallampati scores occurring in a matter of hours. In addition to this, pregnant women undergo physiological changes, such as increased oxygen consumption, decreased functional residual capacity and a reduced time to desaturation following apnoea. The end result is a potentially more difficult airway with reduced time to achieve adequate ventilation in a situation in which maternal and foetal oxygenation is required ***(Bishop, 2015).***

The definition of failed intubation is not standard. The lowest threshold for qualification is ‘‘intubation that was not accomplished with a single dose of succinylcholine’’. McKeen et al. defined it as ‘‘unsuccessful attempts at placement of an endotracheal tube into the trachea using either direct laryngoscopy or alternative intubating equipment, the need to proceed with surgery with a non-elective unsecured airway (e.g. bag-mask ventilation or laryngeal mask airway), or the need to abort intubation or surgery and awaken the woman prior to surgery’’. At the other end of the spectrum is ‘‘inability to intubate during general anesthesia’’ ***(McKeen et al., 2011).***

The first failed tracheal intubation guideline was developed by Michael Tunstall at Aberdeen Maternity Hospital in the 1970s. Versions of this original guideline for obstetric anesthesia spread through local adaptation, and simplified guidelines were also applied to non-obstetric cases. The American Society of Anesthesiologists produced an official national guideline on management of the difficult airway in 1992 (last updated in 2013) and the Difficult Airway Society (DAS) produced an equivalent for the UK in 2004. These and other non-obstetric guidelines do not address the problem that surgery (especially for caesarean section) is often performed to ensure the wellbeing of a different individual to the patient, furthermore, an individual who has no individual legal status before birth. On the other hand, developments in obstetric anesthetic practice that have had an impact on modifications of Tunstall's guideline include the laryngeal mask and other supraglottic airway devices (SAD), antacid and oral intake protocols during labour, infrequent use of orogastric tubes for stomach emptying, rapid onset non-depolarising neuromuscular blocking drugs and rapid neuromuscular reversal agents ***(Kinsella et al., 2015)***.

Aim of the work

The aim of this essay is to clarify the safe practice of general anesthesia in obstetrics and the updated management of difficult airway and failed tracheal intubation.

Physiological and Anatomical Changes of Airway and Respiratory System in Parturient

During pregnancy, there are major alterations in nearly every maternal organ system. These changes are initiated by hormones secreted by the corpus luteum and placenta. The mechanical effect of the enlarging uterus and compression of surrounding structures playing an increasing role in the second and third trimesters. This altered physiologic state has important implications for the anesthesiologist caring for the pregnant patient ***(Ferne et al., 2009)***.

Anatomical Changes of the respiratory tract

Upper airway:

Capillary engorgement of the larynx and the nasal and oropharyngeal mucosa begins early in the first trimester and increases progressively throughout pregnancy. The effect of estrogen on the nasal mucosa leads to symptoms of rhinitis and nosebleeds. Nasal breathing commonly becomes difficult, and epistaxis may occur. Nasal congestion may contribute to the perceived shortness of