Injuries Associated with General Anaesthesia

Essay

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Anaesthesia

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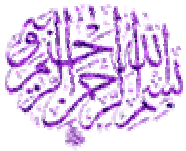

فَتَعَالَى اللَّهُ الْمَلِكُ الْحَقُّ وَلَا تَعْجَلْ بِالْقُرْآنِ
مِن قَبْلِ أَن يُقْضَى إِلَيْكَ وَحْيُهُ وَقُل رَّبِّ
زِدْنِي عِلْمًا

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Anna Tawfik Kamel

Contents

List of Abbreviations

ASA	:	American Society of Anesthesiologists
BMI	:	Body Mass Index
BNI	:	Blind Nasal Intubation
CV	:	Closing Volume
DVT	:	Deep Venous Thrombosis
ECG	:	Electrocardiography
ED	:	Emergency Department
ESU	:	Electrosurgical Unit
ETC	:	Esophageal/Tracheal Combitube
ETI	:	Endotracheal Intubation
EtO	:	Ethylene Oxide
ETT	:	Endotracheal Tube
FRC	:	Functional Residual Capacity
ICU	:	Intensive Care Unit
IPPV	:	Intermittent Positive Pressure Ventilation
LMA	:	Laryngeal Mask Airway
MV	:	Mask Ventilation
OR	:	Operating room
PACU	:	Post Anaesthetic Care Unit
PAE	:	Paradoxical air embolism
PCDT	:	Percutaneous Dilatational Tracheostomy
PEEP	:	Positive End Expiratory Pressure
TMJ	:	Temporomandibular Joint
VAE	:	Venous Air Embolism
VC	:	Vital Capacity
VILI	:	Ventilator-Induced Lung Injury

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Introduction

Airway management is one of the most important functions of the anaesthiologist. Following induction of general anaesthesia, control of the airway moves from patient to anaesthetist. Difficulty in managing the airway is the most important cause of anesthesia-related morbidity and mortality. In the American Society of Anesthesiologists (ASA) Closed Claims Project, 6% of all claims concerned airway injury. Difficult intubation was a factor in only 39% of airway injury claims. Unfortunately, good-quality information on the frequency and nature of major adverse events related to anaesthetic airway management is incomplete **(Hagberg et al., 2013).**

During surgical procedures, the surgical team is responsible for positioning the patient in a way that optimizes surgical exposure while still protecting the patient from harm. Patient's injury due to surgical positioning can take many forms, from end organ damage due to hypoxia or hypotension to direct nerve injury due to compression or traction. There are pre-existing risk factors for positional injuries, some are modifiable and others are not. Non modifiable risk factors include length, type of the surgery, patient age and body weight. Other patient risk factors that are more difficult to

manage but can be minimized with appropriate preoperative care if possible are nutritional status, chronic illness and pre-existing pressure ulcers **(Beckett, 2010).**

The skin is the largest organ of the human body and is highly susceptible to injury during surgical procedures. Although skin and muscle injury are significant, they often pass unrecognized. During surgery, the duration of pressure on certain points, the inability to reposition one's self, the effect of anesthesia and analgesia on vasculature and arterial blood pressure, as well as the potential for blood loss can set the stage for skin injury. Other less common causes of skin lesions after surgery include allergic contact dermatitis and burns under the dispersive electrode of the electrosurgical device. Most skin lesions that arise during surgical procedures are due to an incorrect application of antiseptic solutions **(Borrego, 2013).**

Patient's transportation and manual patient handling put patients at considerable risk for musculoskeletal injury, pain and negative outcomes to the patients. Most patient's handling injury are located in the lowerback, but injuries can also occur in the middle and upper back, shoulders, neck, arms, wrists and even hands and knees. That's why patient transportation should be done in a coordinated procedure with several

helpers. The perioperative team members should communicate with each other ensuring that the patient's head, shoulders, pelvis and legs are all secured, also securing tubes, drains and catheters; taking actions to support these devices and prevent dislodging, as any of these devices might be dislodged without proper support **(Beya, 2005).**

Aim of the Work

The aim of the work is to focus on different types of injuries that might occur during general anesthesia and how to avoid them; in order to provide safety for both the patient and the anaesthesiologist.

Airway Injuries

Airway management is fundamental to safe anaesthetic practice. In most circumstances it passes uncomplicated, but it has been recognized for many years that complications of airway management occur with serious consequences. The inability to secure the airway, with consequent failure of oxygenation and ventilation, is a life-threatening complication. Time is a very crucial factor in this context. It is also known that airway injury during airway management is a significant source of morbidity for patients and a source of liability for anaesthesiologists. Unfortunately, a reliable test for detecting all patients at risk does not exist ***(Cook et al.,2010).***

Tools of airway management during general anaesthesia include:

1. Mask Ventilation (MV).
2. Nasal and Oral Airways.
3. Laryngeal Mask Airway (LMA).
4. Endotracheal intubation.
5. Esophageal/tracheal combitube (ETC).
6. Retrograde intubation
7. Needle cricothyrotomy.

8. Fiberoptic intubation.
9. Blind nasal intubation.
10. Awake intubation.
11. Tracheostomy.

(Gene et al., 2005).

1. Mask ventilation (MV):

Mask ventilation is the most basic, yet the most essential skill in airway management. It is the primary technique of ventilation before tracheal intubation or insertion of any other airway devices. While applying a mask to a patient's face, soft tissue damage may occur if the tissue is subjected to excessive pressure. Care must be taken to avoid contact with the eyes to prevent corneal abrasions. Excessive pressure on the mandible may damage the mandibular branch of the facial nerve, resulting in transient facial nerve paralysis. Pressure on the mental nerves has been implicated in causing lower-lip numbness **(Calder and Yentis, 2008).**

2. Nasal and Oral Airways:

Nasal and oral airways are useful in patients to relieve airway obstruction, especially during facemask ventilation at the beginning or end of anaesthesia. The nasal airway should be carefully placed through one of the nares after lubricating its

exterior. The nasal airway must be long enough to pass through the nasopharynx, but short enough that it still remains above the glottis. Oral airways relieve airway obstruction by displacing the tongue anteriorly. Oral airways should be placed with care to prevent trauma to the teeth and oropharynx **(Adnet, 2000).**

3. Laryngeal Mask Airway (LMA):

The laryngeal mask airway (Fig. 1) has several advantages over endotracheal intubation, such as easy placement, no need for laryngoscopy and also no need for visualization of the vocal cords. Morever the LMA avoid vocal cord trauma associated with intubation and it is well tolerated. However, numerous complications are associated with the LMA, such as inability to protect against pulmonary aspiration and regurgitation of gastric contents. The incidence of regurgitation of small amounts of gastric contents was reported to be as high as 25%. However, the overall risk of aspiration and regurgitation using the LMA is in the same low range as for endotracheal intubation when the indications and contraindications of LMA usage are respected **(Son et al., 2002).**

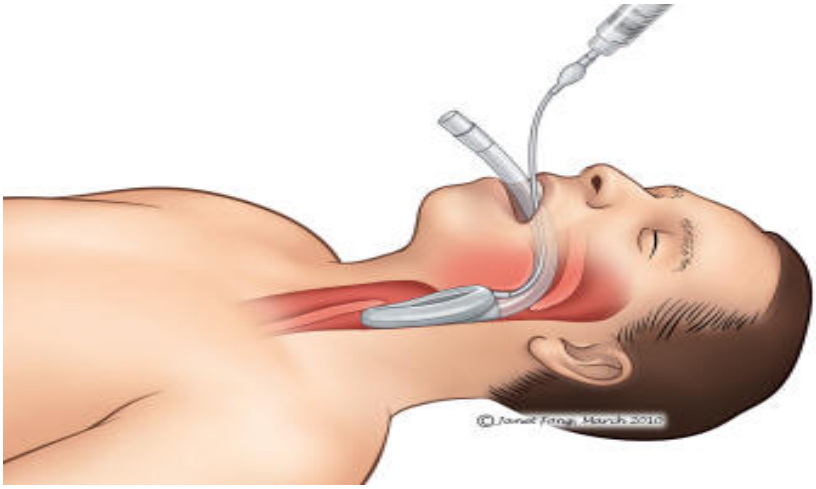

Fig. (1): Laryngeal Mask Airway **(Son et al., 2002).**

4. Endotracheal intubation (ETI):

Endotracheal intubation is a rapid, simple, safe and non surgical technique; that achieves all the goals of airway management. There is a close relationship between difficult intubation and traumatic intubation. In cases of difficult intubation (poor view of the vocal cords), lifting forces of the laryngoscope's blade needs to be increased, which may lead to damage of the intraoral tissues and osseous structures. A difficult intubation may thus become a traumatic intubation. Use of increasing force may induce swelling or bleeding as the intubation becomes more and more difficult and may turn into a ‘cannot intubate’ and possibly even a ‘cannot ventilate’

situation. If intubation fails after three attempts, another technique should be used in accordance with the airway management algorithm **(Divita and Bhowmick,2005).**

5. Esophageal/tracheal combitube (ETC):

Esophageal/tracheal combitube is an esophago/tracheal double-lumen airway; it is designed for emergency use when standard airway management measures have failed **(Keller et al., 2002).**

- ***Complications of ETC:***

1- Obstruction of the upper airway.
2- Subcutaneous emphysema.
3- Pneumomediastinum and Pneumoperitoneum.
4- Esophageal lacerations or perforation have also been reported.

(Keller et al., 2002).

6. Retrograde intubation:

Tracheal intubation over a guide wire introduced in a retrograde manner from below the vocal cords and brought out through the mouth or nose, is popularly known as retrograde intubation **(Dhara, 2009).**