Salwa Akl

بسم اللّه الرحمن الرحيم

مركز الشبكات وتكنولوجيا المعلومات

قسم التوثيق الإلكتروني

Salwa Akl

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها

علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

Pharmacological Methods to Decrease Coughing on Emergence Following General Anesthesia with Tracheal Intubation in lower Abdominal Surgeries

A Thesis

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By

Omnia Lotfy Mohammed El Sayed Shady
M.B., B. Ch., Alexandria University

Under supervision of

Prof. Dr. Ayman Mahmoud Mokhtar Kamaly
Professor of Anesthesia, Intensive Care and Pain Management
Faculty of Medicine, Ain Shams University

Prof. Dr. Karim Youssef Kamal Hakim
Professor of Anesthesia, Intensive Care and Pain Management
Faculty of Medicine, Ain Shams University

Prof. Dr. Rania Maher Hussien
Assistant professor of Anesthesia, Intensive Care and Pain Management
Faculty of Medicine, Ain Shams University

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بسم الله الرحمن الرحيم

قالوا

سبحانك لا علم لنا

إلا ما علمتنا إنك أنت

العليم الحكيم

صدق الله العظيم

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List of Abbreviations

Abb.	Full term
AE	*Anesthesia emergence*
ASA	*American Society of Anesthesiologist*
BP	*Blood pressure*
DEX	*Dexmedetomidine*
ECG	*Electrocardiogram*
ET	*Endotracheal*
$ET\text{-}CO_2$	*End-tidal carbon dioxide*
ETT	*Endotracheal tube*
FiO_2	*Fraction of Inspired Oxygen*
GA	*General anesthesia*
HR	*Heart rate*
BURP	*Backward upward and rightwards pressure*
ICU	*Intensive care unit*
IV	*Intravenous*
LC	*Locus ceruleus*
LMA	*Laryngeal Mask Airway*
MAC	*Minimum alveolar concentration*
MAP	*Mean arterial pressure*
PACU	*Post anesthesia care unit*
PO	*Postoperative*
RLN	*Recurrent laryngeal nerve*
RSS	*Ramsay sedation scale*
FRC	*Functional residual capacity*
SLN	*Superior laryngeal nerve*
SpO_2	*Peripheral capillary oxygen saturation*
TV	*Tidal volume*
$\alpha_2\text{-}AR$	*alpha2 adrenoceptor*

INTRODUCTION

Physiological responses remain common during anesthesia emergence (AE) and endotracheal (ET) extubation, causing complications including cough, laryngospasm, bronchospasm, and tachycardia ***(Jain et al., 2015), (Dutta et al., 2016).***

The frequently cited complaints following anesthesia include postoperative airway complications such as sore throat, cough, and sputum, among which post-extubation cough has been repeatedly reported to be associated to mechanical irritations such as external pressure, the ET intubation method, ET cuff, ET tube (ETT) size, and so forth ***(Narimani et al., 2016).***

Coughing frequently occurs on emergence from general anesthesia (GA), and it ensues as the effects of anesthesia retreat. Coughing allows greater peripheral and central nervous system perception of the tracheal irritation caused by the endotracheal tube. In addition to being uncomfortable, coughing has harmful physiological consequences as; increased intrathoracic pressure, decreased venous return to the right atrium, increased intra-abdominal pressures and decreased functional residual capacity (FRC) ***(Tung et al., 2020).***

Cough during emergence from general anesthesia increases blood pressure (BP), heart rate (HR) as well as increases the incidence of myocardial ischemia, bronchospasm, and bleeding ***(Ratnani et al., 2017).*** It multiplies the pain caused by surgery and increases intracranial and intraocular pressure in patients with brain involvement or glaucoma ***(Desai et al., 2019), (Lam et al., 2015).***

The physiological sequelae of peri-extubation coughing may lead to significant complications, including neck hematoma after thyroidectomy ***(Rosato et al., 2004),*** wound dehiscence after laparotomy ***(van Ramshorst et al., 2010),*** and intracerebral hemorrhage after intracranial surgery. As such, a ‘smooth emergence’, aiming to minimize coughing and subsequently avoid these complications, has been advocated ***(Drummond et al., 2015).***

Given the multitude of publications on various medical strategies to decrease peri-extubation coughing, and the lack of clarity on what is the best evidence based pharmacological strategy, a more thorough study of the published data and systematic review of minimizing emergence coughing is warranted ***(Tung et al., 2020).*** Also, the paucity of literature regarding extubation techniques highlights a need to incorporate strategies for extubation in airway management guidelines ***(Popat et al., 2012).***

Also, it should be noted that the COVID-19 pandemic has heightened the importance of developing the knowledge of effective techniques to achieve smooth emergence. In an effort to reduce the transmission of COVID-19 to healthcare workers, altered extubation setups have been devised to physically shield workers from aerosol and droplets generated during extubation ***(Matava et al., 2020), (Au Yong et al., 2020).***

A range of methods is available to reduce post extubation coughing, such as local and IV injection of topical anesthetics ***(Modir et al., 2018)***. Furthermore, IV use of opioids is an alternative to reduce cough at the end of the operation and during ET extubation ***(Clivio et al., 2019).*** Also, dexamethasone is a potent corticosteroid with analgesic, anti-inflammatory, and antiemetic properties. Preoperative IV dexamethasone has been reported to reduce the incidence of postoperative pain and swelling following surgeries ***(Elhakim et al., 2003), (Biro et al., 2005).***

Dexmedetomidine (DEX), an α_2-adrenoceptor agonist with antinociceptive, sedative, and hypotensive actions, and when infused, it reduces HR, systemic vascular resistance, and BP. Studies found that DEX alone can reduce cough without decrease in respiratory rate ***(Lee et al., 2015).*** Furthermore, other studies suggested that DEX and lidocaine, respectively, reduces cough ***(Fan et al., 2015).***

AIM OF THE WORK

The goal of this study is to explore various pharmacological perioperative techniques that can be used to achieve a smooth extubation while caring for an uncomplicated patient without significant risk factors for extubation failure.

The study determines the relative efficacies of Dexmedetomidine IV, Lidocaine IV and Dexamethasone IV in decreasing the incidence of moderate to severe emergence coughing and accomplishment of better quality of emergence from general anesthesia as evidenced by stable mean arterial pressure (MAP) and heart rate (HR), without hypotension, delayed recovery, and excessive sedation in lower abdominal surgeries conducted under general anesthesia using endotracheal tube.

Emergence Coughing Following Endotracheal Intubation

There is a lack of consensus regarding the definition of an ideal extubation, otherwise known as a "smooth extubation" or "smooth emergence". Smooth extubation and successful extubation are often mistakenly considered to be equivalent events. Successful extubation may indicate a purely respiratory level of success with patients tolerating the removal of the endotracheal tube, while a "smooth extubation" may include the lack of any physiological responses that can lead to adverse outcomes from extubation ***(Tiffany et al., 2021).***

Five factors should be included in the definition and practice of smooth emergence. *They include**:***

1- Limited respiratory tract irritation

2- Avoidance of significant hemodynamic shifts.

3- Avoidance of iatrogenic injury

4- Maintaining airway patency.

5- Physiological oxygenation/ventilation, and patient's comfort

(Tiffany et al., 2021)