Dexmedetomidine versus Ketamine-Propofol for Sedation of Obese Patients Undergoing Upper Gastrointestinal Endoscopy

Thesis

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By

Ola Nasser Hussain Zaher

M.B.B.Ch, Faculty of Medicine, Ain Shams University.

Under Supervision of

Dr. Reem Hamdy El Kabarity

Professor of Anesthesia, Intensive care and Pain Management
Faculty of Medicine-Ain Shams University

Dr. Rania Magdy Mohamed Ali

Assistant Professor of Anesthesia, Intensive care and Pain Management
Faculty of Medicine-Ain Shams University

Dr. Mohamed Moien Mohamed

Lecturer of Anesthesia, Intensive care and Pain Management
Faculty of Medicine-Ain Shams University

Faculty of Medicine
Ain Shams University
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List of Abbreviations

ASV .....: Adaptive support ventilation

BMI .....: Body mass index

CBC.....: Complete blood picture

CPAP .....: Continuous positive airway pressure

CT scan .....: Computed tomography scan

CVS .....: Cardiovascular system

DVT.....: Deep venous thrombosis

ERCP .....: Endoscopic retrograde cholangiopancreatography

ETT .....: Endotracheal tube

FRC .....: Functional residual capacity

GA .....: General anesthesia

GABA.....: Gamma-aminobutyric acid

GERD.....: Gastroesophageal reflux disease

GI .....: Gastrointesinal

HR .....: Heart rate

ICU.....: Intensive care unit

Ketofol .....: Ketamine-propofol combination

MABP .....: Mean arterial blood pressure

MAS .....: Modified aldrete score

MRI.....: Magnetic resonance imaging

NAFLD .....: Nonalcoholic fatty liver disease

NASH.....: Nonalcoholic steatohepatitis

NAVA.....: Neurally adjusted ventilatory assist

NMDA Receptor : N-Methyl-d-aspartate receptor

NSAIDS .....: Nonsteroidal anti-inflammatory drugs

OFA.....**:** Opioid-free anesthesia

OHS.....: Obesity hypoventilation syndrome

OR .....**:** Operating room

OSA.....**:** Obstructive sleep apnea

PAV.....: Proportional assist ventilation

PCS.....**:** Patient-controlled sedation

PSV.....**:** Pressure support ventilation

VTE.....**:** Venous thromboembolism

Abstract

Background: Gastrointestinal endoscopy is an uncomfortable and stressful procedure for most patients. Conscious sedation is a common strategy for improving patient comfort during this procedure. Benzodiazepines (gamma-aminobutyric acid (GABA) agonists) such as midazolam have been used for sedation of patients undergoing gastrointestinal endoscopy. The effective dose ranges of such agents differ considerably among patients, making it difficult to achieve stable sedation. Also obesity is a significant health problem that has assumed epidemic proportions. As a result, the number of obese patients requiring endoscopy is increasing. It is relatively unknown how safe the current practices of sedation for endoscopic procedures are in bariatric patients. Therefore, special consideration should be given to these patients.

Aim of the Work: To compare the sedative properties and haemodynamic and respiratory effects of Dexmedetomidine and a Ketamine-Propofol combination (ketofol) in obese patients undergoing Upper GI Endoscopy.

Patients and Methods: This study was conducted in the endoscopy unit of Ain Shams University Hospital after obtaining approval from the Research Ethical Committee of Ain Shams University. A prospective, randomized controlled clinical trial was found to be the most suitable design in order to achieve the study objectives. Cases were divided into 2 groups using computer generated random list of numbers in sealed opaque envelopes.

Results: We found that ketamine-propofol infusion (1:3) is a better sedation regimen for upper gastrointestinal endoscopy compared to dexmedetomidine as lesser time is taken to achieve optimal sedation, with no hemodynamic unstability or postprocedure complications.

Conclusion: In this study, we compared a group of 40 upper GIT endoscopy obese patients (BMI 30-40) who received procedural sedation with either Dexmedetomidine or propofol-ketamine combination, we found that ketamine-propofol infusion (1:3) is a better sedation regimen for upper gastrointestinal endoscopy compared to dexmedetomidine as lesser time is taken to achieve optimal sedation, with no hemodynamic unstability or post procedure complications.

Keywords: *Dexmedetomidine - Ketamine-Propofol - Upper Gastrointestinal Endoscopy*

Introduction

Gastrointestinal endoscopy is an uncomfortable and stressful procedure for most patients. Conscious sedation is a common strategy for improving patient comfort during this procedure. Benzodiazepines (gamma-aminobutyric acid (GABA) agonists) such as midazolam have been used for sedation of patients undergoing gastrointestinal endoscopy. The effective dose ranges of such agents differ considerably among patients, making it difficult to achieve stable sedation. ***(Nishizawa et al., 2017)***

Obesity is a significant health problem that has assumed epidemic proportions. As a result, the number of obese patients requiring endoscopy is increasing. Morbid obesity can result in pulmonary hypertension, obstructive sleep apnea, and restrictive lung disease. It is relatively unknown how safe the current practices of sedation for endoscopic procedures are in bariatric patients. Therefore, special consideration should be given to these patients, and endoscopists need to be aware of challenges that may be present while performing endoscopic procedures in obese patients. ***(Triantafillidis et al., 2013)***

Propofol, a phenolic derivative, has sedative and hypnotic effects that are mediated by the GABA receptor. It has no analgesic action. It is highly lipophilic, and thus can rapidly cross the blood-brain barrier, resulting in an early onset of action. The most important disadvantage of propofol is the risk of rapidly induced deep sedation, with the possibility of causing respiratory and cardiovascular depression. On the other hand, recent meta-analysis shows that the use of propofol as a sedative during gastrointestinal endoscopy provides a shorter recovery time and better sedation than traditional sedative agents without causing an increase in cardiopulmonary complications. ***(Nishizawa et al., 2017)***

Ketamine-Propofol is a combination of ketamine and propofol. Ketamine is an N-methyl D-aspartate receptor antagonist with the properties of sedation, analgesia, and amnesia without causing respiratory depression. Its drawbacks are vomiting and recovery agitation. Propofol has rapid onset and fast recovery time from sedation but is inadequate as a sole agent in semi-invasive procedures as it lacks analgesic properties. It induces cardiovascular depression and hypotension in a dose-dependent manner and

also causes apnea. The untoward effects of ketamine and propofol are reduced and balanced by each other as a combination (ketofol) producing synergistic, smoother sedation with a favorable hemodynamic profile. Ketofol has been used in proportions of 1:1–1:10 (ketamine:propofol), and it has been shown that 1:3 has a better advantage in procedural sedation. Ketofol has been used in ECT, pediatric cardiac catheterization, ERCP, dressings for burns, short procedural sedation for lumbar puncture, and bone marrow aspiration in various combinations and has shown adequate sedation with balanced hemodynamic parameters. ***(Sruthi et al., 2018)***

Dexmedetomidine is an alpha-2 adrenergic receptor agonist and has an eight times higher than clonidine for alpha-2 adrenergic receptors. It has sedative, anxiolytic and analgesic properties that produce cardiorespiratory stability at the therapeutic doses. The use of dexmedetomidine may be expanded as an intravenous drug in the medical procedures. Dexmedetomidine is approved by the United States Food and Drug Administration for short-term sedation (< 24 h) in adult patients in the intensive care unit (ICU). It also has been used in combination with other sedoanalgesic drugs during painful

procedures. Several reports in the literature have been confirmed about its effective use in various gastrointestinal endoscopic (GIE) procedures, although further controlled studies are needed to reinforce its use. This review is aimed to define the role of dexmedetomidine in GIE procedures. ***(Amornyotin ,2016)***

Aim of the Study

This study is to compare the sedative properties and haemodynamic and respiratory effects of Dexmedetomidine and a Ketamine-Propofol combination (ketofol) in obese patients undergoing Upper Gastrointestinal Endoscopy.

Review of Literature

Obesity and anesthetic considerations

Introduction

Obesity is a medical condition with a multi-system disorder, particularly involving the respiratory and cardiovascular systems; therefore, a multidisciplinary anesthetic approach is required***. (Lotia and Bellamy, 2008),*** the WHO organization classified obesity as shown in **(Table1).**

Table (1): World Health Organization classification of obesity

Body mass index; kg.m2	Classification
< 18.5	Underweight
18.5–24.9	Normal
25.0–29.9	Overweight
30.0–34.9	Obese 1
35.0–39.9	Obese 2
> 40.0	Obese 3 (previously ‘morbid obesity’)

(*Nightingale et al., 2015)*

Prevelance of obesity

A study in 2016 in Egypt showed that out of 3000 participants, with the mean age of 22.4 ± 2.8 years there were