ORIGINAL RESEARCH

A comparative evaluation of two doses of Low Dose Succinylcholine to Facilitate Laryngeal Mask Airway Insertion

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ABSTRACT

Introduction: In this context, the administration of general anaesthesia via the laryngeal mask airway (LMA) is commonly employed. Ensuring an open airway is crucial for any anaesthesia operation. The search for discovering an optimal device for maintaining an open airway has been ongoing since the beginning of general anaesthesia. **Material and methods:** This is a study conducted on 150 patients using a method where neither the patients nor the researchers knew which treatment they were receiving. This research was conducted in the nursery facility. Patients were not given any premedication. All instances occurred in the voluntary environment. Surgeries that involved the use of the LMA and required general anesthesia were part of this study. The patients involved were classified as American Society of Anesthesiologists (ASA) physical status Classes I and II. They were between the ages of 20 and 60 and required general anaesthesia using the LMA.**Results:**A total of 150 patients were involved in this investigation. They were evenly distributed among the three groups: group I received a placebo, group II received 0.1 mg/kg of succinylcholine, and group III received 0.25 mg/kg of succinylcholine. All groups had an equal distribution in terms of age, weight, height, and BMI from a demographic perspective. The ratio of males to females was the same in all three groups, even though each group had more males than females. There was no statistically significant difference in coughing and gagging among all three groups, although there were more instances in the placebo group based on clinical observations. Only two patients in the placebo group experienced a partial laryngospasm. No other patients experienced laryngospasm.**Conclusion:** This study suggests that both Midazolam and succinylcholine can assist in the installation of LMA, resulting in favourable to satisfactory conditions during propofolanaesthesia. Additionally, both drugs offer comparable conditions for LMA insertion. A small amount of succinylcholine helps with the placement of the LMA. 0.25 mg/kg of succinylcholine appears to be the ideal dosage as it offers noticeably improved conditions for intubation compared to 0.1 mg/kg succinylcholine and placebo, without any notable negative effects.

INTRODUCTION

Ensuring the airway remains open is crucial for any procedure involving anaesthesia. The search for an optimal device to ensure a clear airway has been ongoing since the introduction of general anaesthesia. The Laryngeal Mask Airway can be seen as a connection between the Face Mask and the Endotracheal tube, considering the existing airway devices. The LMA is a recently developed device that helps with the treatment of airway issues in both children and adults. It was initially introduced by Dr. Archie Brain in 1981 at the Royal London Hospital in Whitechapel.[1] It results in modest disruptions in the cardiovascular and respiratory systems.[2] Despite the widespread use of LMA, there is no ideal induction method that ensures favourable insertion conditions. The most commonly used agent for LMA insertion remains propofol, as it is the most effective in reducing oropharyngeal reflexes.[3]Laryngeal Airway Airway insertion is performed using Propofol because it effectively reduces the laryngeal reflexes, unlike other induction drugs.[4]However, it is frequently observed that Propofol alone may not adequately inhibit patient movement, coughing, and gagging.[5] Unfavourable reactions to the placement of a laryngeal mask airway (LMA), such as feeling the need to gag, coughing, and laryngospasm, can hinder or perhaps prevent the proper positioning of the device.[6]Despite the widespread use of LMA, there is no ideal method of introducing it that ensures favourable insertion conditions. The most commonly used agent for LMA insertion remains propofol, as it

is the most effective in reducing oropharyngeal reflexes.[7] Research indicates a significant occurrence of unfavourable insertion conditions when using the typical amount of propofol (2-3 mg/kg). Nevertheless, its utilisation in quantities that permit sufficient relaxation of the jaw and prevent the patient from reacting to the insertion of the LMA.[8,9] Movement and laryngospasm often lead to low blood pressure,[10-12] and prolonged apnea.[13] Ho and Chui[14] Noted that a small amount of suxamethonium was used to help with the placement of the LMA and to improve the accuracy of its location. This also reduced the occurrence of swallowing, gagging, and movement of the head or limbs.

Succinylcholine is a fast-acting, short-duration depolarizing muscle relaxant. It is a medicine that has been shown effective over time. It is readily accessible and affordable. The use of succinylcholine to assist in the insertion of the LMA prevents the suppression of the respiratory centre and does not affect consciousness, making it beneficial. Succinylcholine has been shown to aid in the insertion of LMA, both with and without the use of another drug like fentanyl or midazolam.[15-18]

MATERIAL AND METHODS

This is a study conducted on 150 patients using a method where neither the patients nor the researchers knew which treatment they were receiving. The research was conducted in the nursery facility. Patients were not given any premedication. All instances occurred in the optional environment. Surgeries that involved the use of the LMA and required general anaesthesia were part of this study. Patients included were classified as American Society of Anesthesiologists (ASA) physical status Classes I and II, aged between 20 and 60, and in need of general anaesthesia with the LMA. individuals who were obese with a body mass index (BMI) more than 30, individuals who had a known problematic airway, and patients who were scheduled for oral surgery were not included in the study. Consent was gained from all patients after providing them with information. Patients were given a high concentration of oxygen before the procedure. Anaesthesia was initiated with 2 micrograms per kilogramme of fentanyl, followed by 2 milligrammes per kilogramme of propofol administered at a steady rate of 40 milligrammes over 10 seconds, adjusted until vocal response was no longer present. If this amount of propofol was not enough, further doses of 0.25 mg/kg were administered every 15 seconds until the desired level of sedation was achieved. A computerised randomization method was utilised to assign patients to three groups: placebo (Group I), 0.1 mg/kg (Group II), and 0.25 mg/kg (Group III) of Succinylcholine. The technique of allocation concealment involved the use of opaque envelopes labelled with serial numbers. The individual responsible for giving the medication would select the suitable syringe from a set of three that had been prepared by the anesthesiologist, as indicated in the envelope. The traditional LMA was placed 60 seconds after administering the study medication using the conventional insertion technique. Patients were evaluated for jaw relaxation, coughing, gagging, laryngospasm, and overall insertion circumstances by the same anesthesiologist for all patients since these are subjective endpoints. The number of insertion attempts and total propofol use were also noted, along with the duration of apnea, hemodynamic changes, presence of fasciculation, and postoperative muscle pain. Heart rate before induction, systolic blood pressure, diastolic blood pressure, mean arterial blood pressure, and saturation were measured. The same measurements were taken after the induction and after the insertion of the LMA. If the first effort at insertion was unsuccessful, anaesthesia was continued using 2% isoflurane. An extra dose of 1 mg/kg of propofol was administered, and another try at insertion was made after 30 seconds. Patients were observed using routine monitoring techniques, including the use of an electrocardiogram, noninvasive blood pressure measurement, pulse oximetry, and end-tidal CO2 monitoring. Anaesthesia during the surgery was maintained using a mixture of oxygen and nitrous oxide in equal proportions, along with 1% isoflurane. The usage of pain relievers during surgery was standardised. 1 gramme of intravenous paracetamol was given to all patients. If the anesthesiologist determined that the patient needed more pain relief during or after the surgery, it was given and recorded. Patients were assessed for muscle pain at 2 and 4 hours after surgery. Telephone assessment was conducted to evaluate myalgia lasting up to 24 hours. An evaluation of LMA implantation was conducted utilising many standardised criteria. Assessment of LMA placement was only done during the initial insertion attempt.

RESULTS

A total of 150 patients were involved in this investigation. They were evenly distributed among the three groups: group I received a placebo, group II received 0.1 mg/kg of succinylcholine, and group III received 0.25 mg/kg of succinylcholine. All groups had an equal distribution in terms of age, weight, height, and BMI from a demographic perspective. The ratio of males to females was the same in all three groups, even though each group had more males than females. There was no statistically significant difference in coughing and gagging among the three groups, although clinically there appeared to be more in the placebo group. Only two patients in the placebo group experienced a partial laryngospasm. No other patients experienced laryngospasm. All the dates are displayed in table 1, table 2, table 3, and table 4.

Table 1: Assessment of laryngeal mask airway insertion conditions

Jaw relaxation - Young et al.	Coughing and gagging - Young et al.	Laryngospasm- Young et al	Patient movement- Nimo et al.	Overall insertion conditions- modified scheme of Lund and Stovner
Good	none	none	none	Excellent: Insertion easy, no gagging, coughing, movement, or laryngospasm
Incomplete	Mild	Partial	Mild	Good: Insertion resulting in mild-to-moderate coughing, gagging, movement with no laryngospasm
Poor	Moderate	Total	Moderate	Poor: Insertion possible but resulting in moderate to severe coughing, gagging, patient movement with no laryngospasm
	Severe		Severe	Unacceptable: Severe coughing, gagging, movement, or laryngospasm

Table 2: Demography

Variable	Placebo-saline(Group I)	Succinylcholine	
		0.1 mg/kg (Group II)	0.25 mg/kg (Group III)
Number of patients, n (%)	50 (33.33)	50 (33.33)	50 (33.33)
Age (year), mean±SD	42±10	39±10	40±10
Weight (kg), mean±SD	63±13	60±12	62±13
Height (cm), mean±SD	163±8.9	163±8.97	161±9.3
BMI, mean±SD	24.3±4.5	23.9±4	24.3±4
Sex (male:female), n (%)	30:20 (60:40)	30:20 (60:40)	30:20 (60:40)

Table 3: Jaw relaxation, coughing and gagging, patient movement, laryngospasm, overall insertion conditions

Variable	Placebo saline (Group I)	Succinylcholine	
		0.1 mg/kg (Group II)	0.25 mg/kg (Group III)
Jaw relaxation (P=0.028),n(%)			
Good	30 (60)	30 (60)	39 (78)
Incomplete	18 (36)	16 (32)	10 (20)
Poor	2 (4)	4 (8)	1 (2)
Gagging, cough (P=0.61), n(%)			
None	42 (88)	45 (90)	46 (92)
Mild	3(6)	3 (6)	2 (4)
Moderate	3 (6)	2 (4)	1 (2)
Severe	2 (4)	0	1 (2)
Patient movement (P=0.019), n (%)			
None	35 (70)	44 (88)	45 (90)
Mild	6 (12)	3 (6)	3 (6)
Moderate	6 (12)	2 (4)	1 (2)
Severe	3 (6)	1 (2)	1 (2)
Laryngospasm (P=0.139), n (%)			
None	49 (98)	50 (100)	50 (100)
Partial	1 (2)	0	0
Total	0	0	0
Overall insertion conditions (P=0.004), n (%)			
Excellent	34 (68)	40 (80)	42 (84)
Good	9 (18)	3 (6)	6 (12)
Poor	5 (10)	3 (6)	1 (2)
Unacceptable	2 (4)	4 (8)	1 (2)
Number of insertion attempts (P=0.29), mean±SD	1 (0.29)	1 (0.29)	1 (0.27)

Table 4: Propofol consumption and fasciculations

Variable	Placebo-saline (Group I)	Succinylcholine	
		0.1 mg/kg (Group II)	0.25 mg/kg (Group III)
Total propofol dose in mg (P=0.026), median (IQR)	140 (120-160)	135 (110-150)	130 (120-145)
Propofol, n (%)			
2 mg/kg	40 (80)	43 (86)	48 (96)
3 mg/kg	10 (20)	7 (14)	2 (4)
Fasciculations, n (%)	3 (6)	25 (50)	36 (72)

DISCUSSION

The LMA has become popular as a versatile airway device and is currently used as often as the endotracheal tube. Once the patient is sufficiently anaesthetized, it can be inserted without using laryngoscopy. After the operation, constriction of the glottic aperture may occur with endotracheal intubation, but not with laryngeal mask airway insertion. The LMA is accepted at a lower level of anaesthetic concentration compared to the tracheal tube, which enables a quicker recovery from anaesthesia. Various induction and co-induction agents have been utilised for the insertion of LMA. An agent of this nature should possess qualities such as rapid induction. Sufficient rest and inhibition of reflexes Simple insertion Cardiovascular and respiratory stability Minimal adverse effects and restrictions & Positive patient reception.

Suppression of pharyngeal and laryngeal reflexes is important for successful LMA insertion. Various intravenous induction drugs have been tested for LMA implantation.[19-22]Propofol is commonly used to induce anaesthesia during LMA installation because it reduces the laryngeal reflexes. The drawback of administering propofol alone is an excessive amount of patient movement, coughing, and gagging. This results in increased propofol usage, resulting in low blood pressure and a longer period of not breathing. Salem discovered that unsuccessful efforts to insert the LMA were caused by coughing and gagging in 75% of patients when only propofol was administered.[18]The success rate for the initial attempt at insertion was only 60%. Succinylcholine is a fast-acting, short-duration depolarizing muscle relaxant. It is a medicine that has been shown beneficial over time, is readily accessible, and is affordable. The use of succinycholine to assist in the insertion of the LMA is beneficial because it does not depress the respiratory centre and does not affect consciousness, unlike opioids, α2 agonists, and benzodiazepines. Regarding the potential negative effects of succinylcholine, such as malignant hyperthermia (MH), we support the use of succinylcholine because the likelihood of genetic vulnerability to MH is lower in Asia compared to the Caucasian population.[23]The general occurrence of MH during general anaesthesia has been reported as 1:40,000–1:50,000 anaesthetics in adults, with just a few case reports from Asia.[24]

There were a higher number of fasciculations in Group III. Certain patients in the group receiving a dosage of 0.1 mg/kg did not experience fasciculations. Two patients in the control group experienced "fasciculations," which were likely involuntary movements associated with propofol and were identified as fasciculations. The occurrence of muscle pain was exceedingly rare. Recently, it has been noticed that muscle pain is common following outpatient surgery, and the reasons are many. The occurrence of muscle pain is highest within the first 24 hours, but it can still happen afterwards.[25]In this study, patients were assessed for muscle pain for a maximum of 24 hours after surgery. One patient in Group II experienced myalgia after 2 hours, while two patients in the placebo group reported myalgia after 4 hours. This also supports the idea that myalgia might have multiple causes.

Additional negative effects of succinylcholine include a slow heart rate, stiffness in the jaw muscles, and high levels of potassium in the blood. Among the 150 patients, there were no cases of bradycardia or masseter stiffness. Even though we did not specifically search for hyperkalemia, since our patients were classified as ASA classes 1 and 2, an increase in potassium of 0.5 mEq/L was not considered clinically important. Side effects include increased pressure in the stomach, eyes, and brain were also not substantial in these patients. No patient experienced prolonged paralysis either.In these patients, the pressure inside the stomach, eyes, and skull was also not considerable. Extended paralysis also did not happen in any patient.

However, individuals with pseudocholinesterase deficiency may experience possible issues such as masseter spasm, prolonged apnea, and myalgia. It is advisable to avoid using succinylcholine in these circumstances. While there has been some progress in making LMA insertion easier, there is no notable variation in postoperative issues such as a sore throat and blood on the LMA. Additional parameters such as cuff pressure and lubricant may have a greater impact than trauma during insertion in determining the occurrence of these problems.

CONCLUSION

This study suggests that both Midazolam and succinylcholine can assist in the insertion of a laryngeal mask airway (LMA) during propofolanaesthesia, resulting in conditions that range from excellent to acceptable. Furthermore, the study found that the conditions for LMA insertion were

nearly same when using either of these medications. A small amount of succinylcholine helps with the placement of the LMA. 0.25 mg/kg of succinylcholine appears to be the ideal dosage as it offers noticeably improved circumstances for intubation compared to 0.1 mg/kg of succinylcholine and a placebo, without any notable negative effects. In the Asian population where mivacurium, rapacuronium, and remifentanil are not yet accessible, particularly for brief procedures, we propose that succinylcholine is a practical and economical addition.

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