A COMPARISON BETWEEN AIR-Q® INTUBATING LARYNGEAL MASK AIRWAY AND C-MAC® VIDEO LARYNGOSCOPE FOR INTUBATION IN SIMULATED DIFFICULT INTUBATION PATIENTS WITH CERVICAL COLLAR

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DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF MEDICINE (ANAESTHESIOLOGY)

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UNIVERSITI SAINS MALAYSIA

2018

ACKNOWLEDGEMENTS

I would like to take this opportunity and express my gratitude and appreciation to those who have helped and guided me in making this dissertation possible.

First, I would like to express my deepest gratitude to my supervisor Dr W. Mohd Nazaruddin W. Hassan his valuable advices, insightful discussion, encouragement and valuable advices. Their abundance experienced that shared with me was a blessing.

I would also like to thanks to Prof Dr. Nik Hisamuddin Nik Ab. Rahman (Head of department Of Emergency) and the emergency staff for lending me their department video laryngoscope C-Mac during my recruitments of samples in trauma operating theatre beside the emergency red zone.

Special thanks to my co-supervisors, Dr Rhendra Hardy Mohamad Zaini for his guide for teaching me the proper technique of using both gadgets in the situation of anticipate difficult intubation.

Not to forget to all lecturers from the Department of Anaesthesia, my fellow colleagues OT nurses who always aided me in the preparation of my thesis especially in the OT theatres.

Besides that, I would also like to thank Wong Wei Kin for helping me to identify any pitfall in my study that can be improved.

Last but not the least, a big thanks to my beloved mom for her prayers, unconditional patience and support, which without all her supports the success of this study would not be possible.

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ABBREVIATIONS

AFOI	Awake fibreoptic intubation
ANOVA	Analysis of variance
ASA	American society of anaesthesiologist
CI	Confidence interval
CL	Cormack Lehane
dBP	Diastolic Blood Pressure
ETT	Endotracheal tube
FOS	Fibreoptic scope
GA	General anaesthesia
HR	Heart rate
HUSM	Hospital University Sains Malaysia
ICU	Intensive Care Unit
ILMA	Intubating Laryngeal Mask Airway
JEPeM (Manusia)	Research Ethics Committee (Human) - Jawatankuasa Etika Penyelidikan
MAP	Mean arterial pressure
PR	Pulse rate

OR	Operating room
RR	Respiratory rate
SD	Standard deviation
SPSS	Statistical analysis software package
sBP	Systolic Blood Pressure
TMD	Thyromental Distance

ABSTRACT

Background: Special airway devices are useful adjunct during difficult airway situation. The aim of this study was to compare between Air-Q® intubating laryngeal mask airway (ILMA) and C-MAC® video laryngoscope in term of effectiveness of intubation, intubation time, haemodynamic changes and complication post intubation in stimulated using cervical collar.

Methods: 80 patients, age 18-60 years, ASA I-II, with no features of difficult intubation who were scheduled for elective surgery under general anaesthesia were randomized into two groups: Group Air-Q (n=40) and Group C-MAC (n=40). After successful induction with IV fentanyl (1-1.5 mcg/kg), IV propofol (1.5-2 mcg/kg) and IV rocuronium (1 mg/kg), cervical collar was applied to all patients. Group Air-Q was inserted with Air-Q® ILMA followed with blind intubation through it. Group C-MAC was intubated using C-MAC® video laryngoscope. The ease of intubation, intubation time, haemodynamic changes and complications were recorded.

Results: C-MAC® video laryngoscope showed higher successful rate of first attempt intubation than Air-Q® ILMA *(*100% vs 55%, *P=0.001).* Requirement of optimization however was significantly more in Air-Q® ILMA than C-MAC® video laryngoscope (37.5% vs 5.0%, *P=0.001).* Mean duration of intubation was shorter in C-MAC® than Air-Q® ILMA (57.8±14.4s vs 164.6±58.0s, *P=0.001*). There was no significance difference in haemodynamic parameters and complication in post intubation.

Conclusion: Intubation with C-MAC® video laryngoscope was better in success rate and shorter in intubation time than blind intubation with Air-Q® ILMA in simulated difficult airway patients. However, the complication post intubation was comparable.

ABSTRAK

Latarbelakang: Peranti saluran udara khas adalah tambahan yang berguna semasa keadaan laluan udara yang sukar. Tujuan kajian ini adalah untuk membandingkan antara tiub laryngeal mask Air-Q® (ILMA) dan laryngoskop video C-MAC® dari segi keberkesanan intubasi, masa intubasi, perubahan haemodinamik dan intubasi pos komplikasi yang dirangsang menggunakan kolar serviks.

Kaedah: 80 pesakit, umur 18-60 tahun, ASA I-II, tanpa ciri-ciri intubasi sukar yang dijadualkan untuk menjalani pembedahan elektif di bawah anestesia umum adalah rawak kepada dua kumpulan: Kumpulan Air-Q (n = 40) dan Kumpulan C-MAC (n = 40). Selepas induksi yang berjaya dengan IV fentanyl (1-1.5 mcg / kg), IV propofol (1.5-2 mcg / kg) dan IV rocuronium (1 mg / kg), kolar serviks digunakan untuk semua pesakit. Kumpulan Air-Q dimasukkan dengan Air-Q® ILMA diikuti dengan intubasi buta melaluinya. Kumpulan C-MAC diintubasi menggunakan laringoskop video C-MAC®. Kemudahan intubasi, masa intubasi, perubahan hemodinamik dan komplikasi telah direkodkan.

Keputusan: C-MAC® menunjukkan kadar percubaan percubaan pertama yang lebih tinggi daripada ILMA Air-Q® (100% vs 55%, *P = 0.001*). Keperluan pengoptimuman bagaimanapun adalah lebih tinggi dalam ILMA Air-Q® daripada laryngoskop video C-MAC® (37.5% vs 5.0%, *P = 0.001*). Tempoh minum intubasi adalah lebih pendek dalam C-MAC® berbanding Air-Q® ILMA (57.8 ± 14.4s vs 164.6 ± 58.0s, *P = 0.001*). Tidak terdapat perbezaan yang signifikan dalam parameter hemodinamik dan komplikasi selepas intubasi.

Kesimpulan: Intubasi dengan laringoskop video C-MAC® adalah lebih baik dalam kadar kejayaan dan lebih pendek dalam masa intubasi daripada intubasi buta dengan ILMA Air-Q®. Walau bagaimanapun hemodinamik dan komplikasi selepas intubasi adalah setanding.

CHAPTER 2: INTRODUCTION

2.1 Introduction

Unexpected difficult intubation is a challenge. “Can’t intubate, can’t ventilate situation” can be anaesthesiologists’ nightmare. There is no standard definition of difficult intubation in available literature. It can be defined as a situation where it requires multiple intubation attempts in the absence or presence of tracheal pathology (practice guideline for management difficult airway 2003). The most serious outcome for failed intubation is hypoxic brain damage. 40% of the deaths are attributed to the inability to have proper management of difficult intubation according to American Society of Anesthesiologist (ASA) Closed Claim Project (1). Minor complications are like traumatic airway injury due to multiple attempts of intubation such as laceration wound at the lip and tongue as well laryngeal or pharyngeal injury(1, 2). Choice of airway adjunct, proper steps of manoeuvre and proper positioning need to be familiarised by the practitioners. Besides that, anaesthetist should be able to identify high risk patient so that specific strategic can be implemented (3).

Applying the cervical collar will lead difficulty in intubation due to limitation of the mouth opening, impaired glottis visualization, worsen the facemask ventilation and last but no least the accuracy of the assessment of Cormack Lehane classification will be less accurate (4). Direct laryngoscope with cervical immobilization will reduce the chance of successful intubation. This is due to alignment of the oral, pharynx and larynx in order to visualize the cord unable to achieve when the neck is limited (5). Nasal or oral awake fibreoptic intubation will be consider as a first choice in anticipated difficult intubation (6).

Two other options that have emerged to handle this condition are video laryngoscopy and intubating laryngeal mask airway (7). Daniel Cookgas (St. Louis, MO, USA) has invented the new supraglottic device (Air-Q®) in 2005. Air-Q® ILMA is user-friendly, easy and quicker to put a placement on the patient and can be use a conduit for intubation using endotracheal tube. As for C-MAC®, it is the 4th generation of Karlz Storz video laryngoscope. Video laryngoscope lead to the improvement of the glottis visualization by requiring only alignment of the pharyngeal and laryngeal axes. There has been no study to compare between this two airway equipment in term of the effectiveness in intubation in difficult airway.

The guideline has been revised in 2003 which included the usage of laryngeal mask airway (Fastrach) as rescues devise for ventilation and as well as a conduit for insertion of the endotracheal tube either blindly or assisted with flexible fibreoptic bronchoscope (8). The usage of video laryngoscope and intubating laryngeal mask airway in the difficult algorithm represents as a major advance in airway management and has been implemented in difficult airway algorithm.

2.2 Literature review

There is some situation whereby unanticipated difficult intubation can occur. It can be defined as a situation where it requires multiple intubation attempts in the absence or presence of tracheal pathology (practice guideline for management difficult airway 2003). Incidence of difficult intubation was 5.8% for the overall patient population, 6.2% for normal patients excluding obstetric and obese patients, 3.1% for obstetric and 15.8% for obese patients according in a meta-analysis of 35 studies (9).

Several methods have been implemented to identify patients with anticipated difficult airway during the preoperative assessment so that morbidity and mortality due to failed intubation can be reduced. These are the examples of ways to predict difficult intubation bedside assessment such as Mallampati classification, thyromental distance, sternomental distance, mouth opening and Wilson risk score(10). Wilson risk score consists of five factors associated with difficult intubation: weight, upper cervical spine movement, jaw movement, receding mandible and protruding upper teeth. Score of 0-2 for each factor will be given subjectively. Total score of 2 or more will predict 75% of difficult intubation (Wilson et al). Mallampati 3 and 4, short neck, obesity and receding mandible are the predictor of difficult intubation as well (11).

Unexpected difficult intubation is a challenge. “Can’t intubate, can’t ventilate situation” can be anaesthesiologists nightmare. Almost 0.9%-6% of such cases have been encountered (12). Failed intubation can lead to catastrophic morbidity and mortality. The most serious outcome for not being to intubate will be hypoxic brain damage. Minor complication will be example

like traumatic airway injury due to multiple trial of intubation. 30-40% of the deaths are attributed to the inability to have proper management of difficult intubation according to American Society of Anaesthesiologist (ASA) Closed Claim Project (1).

Video laryngoscope and Intubating laryngeal mask airway have been implemented in difficult airway algorithm. Few modifications of the devices have been done to ease and increase successful rate of intubation.

The simplified LMA was first described by Brain in 1983 (13) Throughout the years, improved versions with advanced designs were made available with enhanced safety and effectiveness. LMA has been developed further for tracheal intubation, ILMA (14).

Daniel Cookgas (St. Louis, MO, USA) has invented the new supraglottic device (Air-Q®) in 2005. It was designed for smoother and easier insertion of the conventional cuffed tracheal tubes. Over the years, Air-Q® Cookgas has undergone several refinements in design which make it has the characteristic benefits:

1. Innovative tip design which prevents mask from folding, allowing a smarter insertion

2. An auxiliary hole that improves air flow and helps prevent epiglottic

down-folding

3. An oval-shaped, hyper-curved airway tube which better approximates the anatomy for easy insertion

4. A keyhole-shaped airway outlet to direct the ETT midline

toward the laryngeal inlet facilitate intubation

5. Mask ridges to improve anterior mask seal

6. Large airway tube inner diameter

7. Short airway tube length

8. Removal standard 15mm circuit adapter

9. Anterior Curve of the airway

10. Approximate the upper oropharyngeal airway and may provide stable end to end coupling with epiglottis

11. Higher posterior heel height which may improve the seal of base of tongue

It is available as a single use and reusable device. Shorter shaft and wider airway tube specifically designed to permit the ease of blind tracheal intubation or by fibreoptic bronchoscope (15). Besides that, Air-Q® also has an elevated keyhole-shaped ventilating orifice which designed to prevent epiglottic downfolding which is one of it special feature.

Air-Q® ILMA available in four sizes (2.0, 2.5, 3.5 and 4.5) and is designed to ventilate patients within range of weight range of 17 to 100kg. It allows the insertion of size endotracheal tube between 5.5 to 8.5mm internal diameter. ILMA was the better method comparing with direct laryngoscope because less neck extension required for intubation despite time requirement in intubation was longer with ILMA (16).

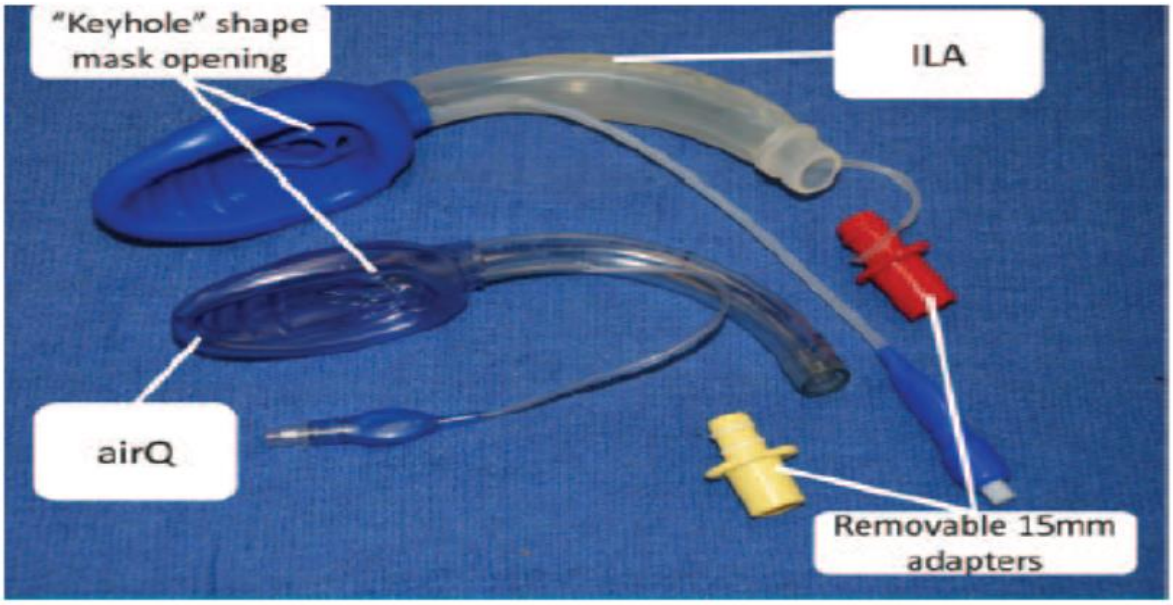

Figure 1: Air-Q® ILMA (Intubating Laryngeal Mask Airway) with "keyhole" shape mask opening to prevent epiglottic downfolding. *Image adapted from Hernandez et al 2012*.

Recommendations:

Size	IBW	Max. OETT	Mouth Opening[1]	← → [2]	Volume[3]	Inf. Vol.[4]
4.5	70-100 kg	8.5mm	25 mm	20 cm	25 ml	4-5 ml
3.5	50-70 kg	7.5mm	23 mm	18 cm	18 ml	3-4 ml
2.5	30-50 kg	6.5mm	20 mm	16 cm	12 ml	2-3 ml
2.0	17-30 kg	5.5mm	17 mm	13 cm	8 ml	1-2 ml
1.5	7-17 kg	5.0mm	14 mm	10 cm	5 ml	1 ml
1.0	4-7 kg	4.5mm	11 mm	8 cm	3 ml	.5-1 ml
0.5	< 4 kg	4.0mm	8 mm	6 cm	2.5 ml	0-.5 ml

Figure 2: Selection of device according to patient weight. *Image adapted from product information of Air-Q® ILMA Malaysia 2011*.

Air-Q® ILMA is user-friendly, easy and quicker to put a placement on the patient and can be use a conduit for intubation using endotracheal tube. In a pilot study the clinical use of Air-Q® ILMA, the use of Air-Q® as a conduit for tracheal intubation had shown a successful rate in intubating paediatric patients in a situation of difficult airway (17). Intubating with normal endotracheal tube by using Air-Q® ILMA showed better successful rate comparing intubating by using Fastrach with its own reinforced tube (18). Besides that, Air-Q® also provide better glottic view during fibreoptic assessment using Brimacombe score (15). Besides that, in a study done by Sk Malhotra et al, successful rate of intubation was higher rate in Air-Q® (96.6%) compare with Fastrach ILMA (91.6%) (18).

Developmental of video laryngoscopes is to improve the success rate of intubation. C-MAC® is one of the example of video laryngoscope and it is the 4th generation of Karlz Storz video laryngoscope. D-blade component was introduced in the late 2010. Video laryngoscope can lead to improvement of the glottis visualization by requiring only alignment of the pharyngeal and laryngeal axes. It showed that it can reduce the number of intubation attempts, intubation time and mobilization of the cervical (19).

C-MAC® is a new generation of KARL STORZ video laryngoscope. It has the feature of the standard macintosh blade design with source and small digital camera at the distal third of the blade which extends to a wide display monitoring. It is available in the form of standard Macintosh blade shapes with size of sizes 2, 3 and 4, the MILLER shape (sizes 0 and 1) for paediatric intubation and in the blade shape for difficult airways, the D-BLADE (20). C-MAC® can view the glottis in two ways, firstly with direct view with naked eye and secondly indirect view from the monitor with the help of miniature camera at the tip of the blade (21).

Figure 3: C-MAC® Video Laryngoscope. *Image adopted from KARL STORZ GmbH & Co. KG*

DORGES (2013) has listed the application of C-MAC® video laryngoscope such as follows:

- Routine oral or nasal intubation in elective or emergency

- Anticipated difficult laryngoscopy

- Confirmation of airway device placement

- Exchange of extra laryngeal devices, endotracheal tubes and DLT

- Teaching airway anatomy/intubation procedure

Several studies have shown the successful use of the C-MAC® in the operating room and in prehospital emergency medicine (20). The use of Macintosh blades with the C-MAC® improved the glottic view in patients who were difficult to intubate using direct laryngoscopy in the operating room (22). Regarding the utilization of C-MAC® video laryngoscopy for

direct and indirect assisted endotracheal intubation, C-MAC® can improve laryngeal views and reduce the number of necessary laryngeal manipulations (23).

2.3 Justification Of The Study

A variety of newer supraglottic airway devices with certain modification have emerged in the clinical practice especially in the usage in difficult scenario. The aim of this randomized study is conducted is to evaluate the performance and efficacy of the Air-Q® ILMA to use as a blind intubation in simulated difficult by using cervical collar as compare with C-MAC® video laryngoscope. Hope the outcomes of this study it helps advancing our knowledge and in selecting appropriate devices if facing difficult intubation so that in future morbidity and mortality can be reduced.

2.4 Methodology

2.4.1 Research Design

This was a prospective, single-blinded, randomized control study with C-MAC® video laryngoscope as a control and Air-Q® ILMA as an intervention

2.4.2 Study Area

The study will be conducted at General Operation Theatre (GOT), Hospital Universiti Sains Malaysia (HUSM).

2.4.3 Study Population

Study population the patients that undergone elective operation under general anaesthesia.

2.4.4 Study Period

12 months.

2.4.5 Inclusion Criteria, Exclusion Criteria and Withdrawal Criteria

Inclusion criteria

1. American Society Of Anaesthesia (ASA) physical status 1-2
2. Patients plan for elective surgery that required endotracheal intubation
3. Age 18-60 years old
4. Mallampati 1 and 2
5. Thyromental distance more than 6 cm

Exclusion criteria:

1. BMI more than 30 kg/m2
2. Pregnant patient
3. Patient with increased risk of aspiration
4. Laryngeal and pharyngeal pathology
5. High risk of cardiac and respiratory system insufficiency

6. Patient that anticipate or has history of difficult intubation

7. Patient planned for awake intubation

8. Patient is having upper respiratory tract infection

9. Unconscious patient

Withdrawal criteria

If any of the following issue arise, the participant can be withdrawn from the study

1. Violation of the criteria for inclusion and/or exclusion

2. Participant choose to withdraw from the study despite already agreed to participate in the study (written consent taken)

3. Occurrence of adverse event or serious adverse event

4. Change of participant clinical condition resulting poorer physical status

5. Patient goes into emergency surgery before the elective surgery taking place

6. Unanticipated events such as inadequate anaesthesia, laryngospasm, blockage of view due to upper airway secretion and difficult laryngeal view due to undetected upper airway mass or pathology

2.4.6 Sample Size Estimation

Sample size is calculated by using ScalexMean and ScalexProp version 1.0.2 (Naing 2016) for my sample size calculation

Below will be the sample size that required for each objective.

1. Assuming the overall success rate of 97% in Group C-MAC® video laryngoscope (McElwain et al 2011), sample size of 40 in each arm were needed to detect a difference of 20% respectively at 80% power and 5% significance level

2. Assuming the success at the first attempt rate of 93% in Group C-MAC® video laryngoscope (Aziz MF et al 2012), sample size of 36 in each arm were needed to detect a difference of 25% respectively at 80% power and 5% significance level

3. Assuming the mean time to achieve successful intubation was 16s (SD 15) in Group C-MAC® video laryngoscope ((McElwain et al 2011), sample size of 36 in each arm were needed to detect a difference of 10s respectively at 80% power and 5% significance level.

4. Assuming the mean changes of the haemodynamic (MAP, HR) pre and post intubation in Group C-MAC® video laryngoscope (McElwain et al 2011) with SD 17, sample size of 21 in each arm were needed to detect a difference of 15mmHg respectively at 80% power and 5% significance level.

5. Assuming the proportion of any complications is 23% in Group C-MAC® video laryngoscope (Michael F. Aziz et al 2011), sample size of 20 in each arm were needed to detect a difference 25% at 80% power and 5% significance level.

Overall sample size was estimated using objective 1 because of larger sample size.

Therefore, total of 80 patients were required for research study

2.4.7 Sampling Method

Patients that fulfil the criteria for this study and agreed to participate in the study were given full explanation about this study and written consent was taken.

The study will be conducted in the operating theatre of HUSM.

The written consent will be taken a day for the patients that scheduled for operation on the next day.

Convenience sampling was used for the recruitment of patients based on the list of operation for the next day. These patients were divided into two groups using the allocation sequence generated from online randomisation software (http://www.randomisation.com). Patients were randomised whether will be undergo tracheal intubation using either Air-Q® ILMA or C-MAC® video laryngoscope.

2.4.8 Recruitment of Subject & Informed Consent Seeking

Patients that meets the study criteria will participate in this study. Through explanation will be given to each patient along with copy of Patient Information Sheet. Consent will be obtained once all the questions have been answered to their satisfaction.

2.4.9 Research Tool

1) Device:

Air-Q® Intubating Laryngeal Mask Airway

- Produce in 2005
- Manufactured by Cookgas LLC at St Louis Missouri USA
- Size 3.5 (weight 50-70 kg) & 4.5 (weight 70-100 kg). The choice of LMA is determined by the weight of patient

C-MAC® Video Laryngoscope

- Developed and manufactured by the Karl Storz GmbH & Co. KG (Tuttlingen, Germany) in 1999

2) Water soluble lubricant (KY Jelly) and syringe 20cc

3) Standard monitoring devices that already available at study area to monitor patient's hemodynamic

- Non invasive blood monitoring – Philip
- Pulse Oxymeter – Drager
- Electrocardiography - Drager

4) Data collection form

2.4.10 Data Collection Method

The study was divided into screening, pre-operative, intra-operative and post-operative period.

Screening period

Patients were selected according to inclusion and exclusion criteria during preoperative assessment after obtaining approval from Ethics committee. Written consent will be explained and obtained from the parents. These patients were divided into two groups using the allocation sequence generated from online randomisation software (http://www.randomisation.com). Patients were randomised to undergo tracheal intubation using either Air-Q® ILMA or C-MAC® video laryngoscope.

Operator has been performed using the Air-Q® intubating laryngeal mask (ILMA) and C-MAC® video laryngoscope for almost 40 times respectively before conducting this study.

Pre-operative period

Pre-operative assessment was done in the respective ward by the operator (single assessor). Demographic and airway variables of the patients were recorded such as the age, gender, weight, BMI, mallampati score and thyromental distance. Premedication will be given midazolam to the patients 7.5 mg prior to operating theatre.

Intra-operative

Upon arrival in to the operation room, standard monitoring will be applied such as pulse oxymeter, non-invasive arterial pressure and electrocardiogram to the patients.

Baseline hemodynamic such as BP, HR and MAP will be charted.

Pre-oxygenation 100% will be given for 3-5 minutes using the facemask. Anaesthesia will be induced by using IV fentanyl 1-1.5 mcg/kg, IV propofol 1.5-2 mg/kg and titrated accordingly to induce anaesthesia in a dose sufficient to produce loss of verbal response.

After the induction of anaesthesia, the patients will be manually ventilated with sevoflurance (2-2.5%) in oxygen. During this period, the pillow will be removed and will be replaced with head ring.

Appropriate cervical collar will be applied to the patients so that easy airway became difficult for the purpose of this study. The appropriate size of the cervical collar is chosen by placing extended fingers on the side of a cervical collar which was initially measured the patients neck. Neuromuscular blockage rocuronium 1.0mg/kg will be administered and waited for 90 seconds for muscle relaxant to take effect. Intubation will be preceded by the operator either using the C-MAC® video laryngoscopy or Air-Q® ILMA for the selected patients. The choice of Air-Q® ILMA to use for blind intubation depending on the weight of patient, size 3.5 (weight 50-70 kg) & 4.5 (weight 70-100 kg).

All the patients will be mechanically ventilated for the duration of procedure and anaesthesia was maintained with sevoflurance 1.75-2% and mixture of air and oxygen with a ratio of (2:1).

In this study, C-MAC® video laryngoscope was used as a control. Group A: C-MAC® video laryngoscope

1. Blade was introduced with the camera portion at the end of it while swapping the tongue to the side
2. The glottis opening can be observed in the monitor screen and the ETT was advanced accordingly
3. Correct placement was confirmed by chest rise, auscultation and capnography
4. If failed to introduce the endotracheal tube to the glottis opening, the following manoeuvres was applied to prevent unsuccessful intubation.
    a) External laryngeal pressure
    b) Increase the lifting force of the intubating device or withdrawal of the intubating device.

Group B: Air-Q® ILMA

1. Suitable size was chosen based on the patient body weight
    a) Body weight: 70-100 Kg (LMA Size 4.5) suitable ETT max 8.5 mm
    b) Body weight: 50-70 Kg (LMA size 3.5) suitable ETT max 7.5 mm
    c) Body weight: 30-50 Kg (LMA size 2.5) suitable ETT max 6.5 mm

This sequence is based on the instruction that given by manufacture.

2. The external surface of the cavity was lubricated using lignocaine 2%
3. The inner diameter of the Air-Q® ILMA was lubricate with the ETT that covered with lignocaine gel so that can ease the blind intubation

4. The frontal portion of the Air-Q® ILMA was introduced into pharynx by gently applying inward and downward pressure using the curvature of intubating laryngeal airway until fixed resistance to forward movement is felt
5. Preferable the two-marking line situated at the shaft of the Air-Q® ILMA at the lips.
6. The placement was confirmed by chest rise, no leaking sound and once connected to the ventilator there is a sign of capnography
7. Once the proper placement of the Air-Q® ILMA was confirmed, the 15mm circuit connector was removed
8. The size of endotracheal tube was chosen accordingly to allowable size of ETT that can pass through the Air-Q® ILMA and insertion will be proceeded
9. After the endotracheal tube was inserted, the confirmation was done by auscultation and capnography
10. Once confirm in situ, endotracheal connector was removed
11. Air-Q® device was later been pulled out by using the stylet to keep the endotracheal tube in place
12. The endotracheal tube connector was placed back to the ETT and auscultation was done again to confirm the placement
13. If the insertion of the ETT was unsuccessful, few manoeuvres was applied:
    a) Slowly pull out the Air-Q® ILMA and at the same time push in the ETT
    b) Up and down manoeuvre: Backing the airway device out slowly up to 6cm and reinsert back
    c) Chandy manoeuvre: Pushing the mask slightly further in with the tip of the mask toward the oesophageal sphincter
    d) Apply cricoid pressure when inserting the endotracheal tube

An independent unblinded observer (well trained GA staftnurse) will be in charge recording the following parameter:

1. Successful intubation of first attempt

2. Number of attempts

3. Intubation Time

- C-MAC® video laryngoscope: defined as when start to hold the airway device until confirmation of the intubation by auscultation and capnography

- Air-Q® ILMA: defined as when start to hold the airway device until to the successful rate of intubation by evidence of auscultation and capnography. If the first attempt failed, the duration of intubation will be continue until the successful attempt of intubation (max three intubation attempts)

4. Haemodynamic changes

- BP, MAP and HR recorded during preoperative as a baseline, 1 min, 5 min and 10 min after intubation

5. To Assess patients in the recovery regarding post intubation complication.

Failure of the tracheal intubation (defined as removal of the endotracheal tube from C-MAC® video laryngoscope or remove Air-Q® ILMA from oral cavity)

Allow 3 attempts of intubation, if more than that considered as failed intubation

Atropine 0.02 mg/kg and neostigmine 0.04 mg/kg was used for the reversal of the neuromuscular blockage.

The study was considered complete following successful intubation and observation of vital signs for 10 minutes. Subsequent care was provided by the medical officer and anaesthetic in charge.

Post-Operative

Sevoflurane is turned off and 100% oxygen was administered once the operation is done. Muscle relaxant is reversed by atropine 0.02 mg/kg and neostigmine 0.04 mg/kg for the reversal of the neuromuscular blockage. Any complications were documented such as airway trauma/blood staining post intubation, sore throat and hoarseness of voice was assessed in the recovery.

2.4.11 Risk Of conducting of This Study

1. Fail to intubate the patient by using the assigned gadget

2. Multiple manipulation will lead to:

→ injury to the oral cavity

→ irritation to the airway which will cause bronchospasm

2.4.12 Airway Management Plan

If the patient is on cervical collar and unable to intubate, cervical collar was removed immediately. Oxygenation and anaesthesia was maintained with close fitting facemask.

After stabilisation, patient was intubated using macintosh blade (direct view) without any further delayed.

2.4.13 Proposed Data Analysis

The completed research forms were checked and complied.

Statistical Package for Social Science (SPSS) version 22 software was used for the data entry and analysis.

The data from Air-Q® ILMA and C-MAC® video laryngoscope was analysed using Chi-square for categorical data and independent t-test for numerical data.

As for multiple comparison on serially measure data (mean blood pressure and mean arterial pressure), repeated measure ANOVA was used.

The results were presented as frequency (percentage) and mean (standard deviation). The difference was considered statistically significant when the p value is less than 0.05.

2.5 References

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