Original Research Article

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Comparison of Proseal Laryngeal Mask Airway Versus Endotracheal Tube in Anaesthetized Adult Patients

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Abstract

Endotracheal tube (ETT) is always considered as a standard device to keep an airway patent during surgery. Airway management of patients has also progressed form endotracheal tube to lesser invasive laryngeal mask airway. The proseal laryngeal mask airway (PLMA) is a recently introduced supraglottic airway device. It provides higher seal pressure and offer a better protection against regurgitation and gastric insufflation.

Aims and Objective: To compare the efficacy of PLMA and ETT in terms of pulmonary ventilation, ease and no of attempts of placement and hemodynamic parameters.

Material and Method: A prospective, simple randomized and comparative study was carried out after ethical committee approval in 60 patients, aged 20-50 years, with ASA grade I and II of either gender undergoing elective surgery under general anaesthesia at tertiary care centre in india during 2015 and 2016 to compare the efficacy of PLMA and ETT in terms of pulmonary ventilation, ease and no of attempts of placement and hemodynamic parameters.

Result: Both the groups were comparable regarding age, gender, height and baseline vitals. Patients intubated with PLMA showed no or minimal change in heart rate and mean arterial pressure as compared to ETT. The intubation time was comparable in both groups. The two groups were comparable with respect to number of attempts required for insertion of both the devices, (P> 0.05).

Conculsion: The comparative study showed PLMA has a good hemodynamic stability. It is concluded from our study that placement of PLMA is relatively easy and simple. The performance of PLMA is as good as the conventional ETT in providing general anaesthesia.

Keywords: Proseal Laryngeal Mask Airway; Regurgitation; Insufflation and Hemodynamic.

Introduction

The general anesthesia with cuffed ETT effectively maintains ventilation and protects the respiratory tract against regurgitation and aspiration [1]. The exaggerated hemodynamic responses [2], situations of failed intubation and damage to oropharyngeal structure at insertion are the serious concerns with endotracheal intubation [3].

Laryngeal Airway Mark (LMA) is a supraglotic device developed by British anesthetist Archie Brain and has been in use since 1988. LMA has more recently come into use in the emergency setting as an important accessory device for management of the difficult airway [4]. The drawbacks of LMA classic has a low pressure cuff which is inadequate for controlled ventilation and to protect the lungs against aspiration [5].

Brain [6] in 2000 developed a new modification of LMA called PLMA with improved ventilatory characteristics. It offers protection against regurgitation and gastric insufflations [5]. Proseal

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LMA has double cuff, reinforced airway tube and an oesophageal drainage tube. It provides better seal around the glottis and permits high airway pressure without leak. This study therefore was undertaken to compare the efficacy of PLMA and ETT in terms of pulmonary ventilation, ease of placement and hemodynamic parameters.

Aims and Objectives

The primary objectives of our study are:

1. Comparison of intubation response
2. Comparison of intubating conditions in terms of ease and number of attempts.

Method and Material

A prospective, simple randomized and comparative study was carried out after ethical committee approval in 60 patients, aged 20-50 years, with ASA grade I and II of either gender undergoing elective surgery under general anaesthesia at tertiary care centre in india during 2015 and 2016.

Patients were divided randomly by computer generated numbers to one of the following groups.

Group A (n=30) - Patients were intubated with PLMA

Group B (n=30) - Patients were intubated with ETT

Patients with hypertension, ischemic heart disease, cerebrovascular disease, mallampati grade III and IV, ASA grade III and IV, heart block, heart failure and body mass index ≥ 30 kg/m^2 previous difficult intubation, severe respiratory distress, patients on beta blockers and vasodilators and patients undergoing ENT surgery were excluded from study.

Software NCAA PASS 2000 was used to calculate sample size. To achieve power of 80% and α error of 0.05, 60 patients were required with 30 patients in each group.

Pre anaesthetic check up was done one day prior to surgery along with airway examination. Mallampati grading was done. Written informed consent was obtained from all the patients. Tab alprazolam 0.5mg was given night before surgery. Tab ranitidine 150 mg was given an hour before surgery with a sip of water. In preoperative room, baseline parameters were recorded. Intravenous line was secured with 20 gauge cannula. Midazolam 2 mg was given 30 minutes prior to surgery.

Anaesthesia Technique

After shifting the patient to operation theatre, monitors were attached and baseline parameters (BP, Pulse rate and ECG) were recorded using Philips intellivue mx700 monitor. Pre oxygenation was done with 100% oxygen for 3 minutes before induction. Patients were induced with thiopentone 5mg/kg, nalbufine 0.1-0.2 mg/kg, vecuronium bromide 0.08-0.1 mg/kg body weight, Oxygen, N_2O (50:50) and halothane 2%. IPPV was done for 3 minutes. Intubation was performed by senior anaesthesiologist who has atleast five years experience of working in anaesthesia

In group A, an appropriate size PLMA was selected based on weight criteria. The Cuff of the PLMA was fully deflated prior to insertion. Its posterior surface was lubricated with 2% lignocaine jelly. PLMA was inserted through the oral cavity using index finger technique, index finger was kept anteriorly at the the base of the bowl. After placement the PLMA cuff was inflated. Chest movements were checked visually as well as with ascultation on manual ventilation. All these factors indicated that PLMA was properly positioned.

In group B the patients were intubated with appropriate size ETT using Macintosh laryngoscopic blade. Anaesthesia was maintained by controlled ventilation with O_2:N_2O, (50:50), isoflurane 0.5% and vecronium as per requirement.

After Insertion of Device following Parameters were Recorded

No of attempts: successful insertion at first attempt was considered as easy insertion where as insertion at 2nd or 3rd attempt was considered as difficult insertion.

Mean time of placement: time taken from removal of face mask till successful placement of the airway

Haemodynamic responses like heart rate, mean arterial blood pressure were recorded before induction and also after insertion of devices at 1, 3 and 5 minutes.

Signs of correct PLMA placement are correct position of bite block, bilateral equal chest expansion, capnograph tracing and easy passage of orogastric tube.

Results

Both the groups were comparable regarding age, weight, gender, ASA grading and mallampatti

grading. Mean time of PLMA placement was lower as compared to ETT (Table 1).

In group A, the insertion of PLMA in first attempt was seen in 24 (80.0%) patients as compared to 23 (76.7%) patients in group B. In group A, the insertion in second attempt was seen in 6 (20.0%) patients as compared to 7 (23.3%) in group B. The two groups were comparable with respect to number of attempts required for insertion of both the devices. The difference was statistically not significant (p> 0.05) (Table 2).

There was significant difference seen in mean heart rate in both the groups at 1 and 3 minute after airway device placement. Similarly significant difference was seen in mean blood pressure at 3 minute in both the groups (Table 3 and 4).

Table 1:

Demographic Data	Group A PLMA	Group B ETT
AGE	45.12± 10.03	44.74±9.45
Gender M/F	12/18	14/16
Weight	66.23±8.51	66.76±7.98
ASA Physical Status I / II	26/4	25/5
Mallampatti Grading Grade I / Grade II	22/8	23/7
Mean time of placement	15 ± 3	18± 4

Table 2: Distribution of Patients according to no. of attempts required for insertion of device

No. of Attempts	Group A (PLMA)	Group B (ETT)	p value	Significance
1 attempt	24 (80.0%)	23 (76.7%)	P= 0.754	NS
2 attempt	6 (20.0%)	7 (23.3%)		
Total	30 (100.0%)	30 (100.0%)		

Table 3: Changes in Heart rate (HR) in two groups at different time intervals

Heart Rate	PLMA	ETT	T-Test	P- Value	Significance
Pre-induction	67.37±10.91	72.73±13.13	-1.085	0.090	NS
After insertion at 1 min	69.53±11.04	77.2±11.78	-2.6	0.012	Significant
3 min	67.00±7.52	93.50±10.46	11.268	<0.001	Highly Significant
5min	69.67±9.07	69.97±10.88	-0.129	0.898	NS

Table 4: Change in Mean Arterial pressure (MAP) in two groups at different intervals

MAP	PLMA	ETT	t- test	p-value	Significance
Pre-induction	92.63±7.41	88.77±10.77	1.620	0.111	NS
After induction 1min	92.87± 5.8	92.10±6.78	2.926	0.225	NS
3 min	90.77± 4.28	101.1±7.21	-6.751	<0.001	Highly significant
5min	94.17±6.48	94.03±7.15	0.076	0.94	NS

Discussion

Cuffed ETT ensures a patent airway and adequate ventilation. It also provides safe glottic seal especially for laparoscopic procedures under general anesthesia. The pressure response to tracheal intubation may be harmful to patients with ischemic heart disease or hypertensive patients. Attempts have been made to attenuate this response over a period of time. A variety of new airway devices have been added. A relatively new device, the PLMA is an improved version of a classic LMA and offers some added safety features over the classic LMA such as providing a better glottic at low mucossal pressure and a drain tube to vent out air and regurgitation material from the stomach. (Cook TM. Nolam) [12].

In our study patients in both the groups were significantly comparable regarding ease of placement and number of attempts. Two third of the patients in both the groups could be intubated in the first attempt. There was no third attempt or failed insertion in either group. Similar study done by Saraswat N et-al [8] and Maltby R et-al [9] in patients undergoing laproscopic surgeries found PLMA as effective alternative to ETT. In their studies they found higher success rate with PLMA than ETT. Mean time of placement of PLMA was less as compared to ETT. Furthermore the technique of placement of PLMA using introducer or stellete

could reduce the insertion time. When both the groups were compared after insertion of device there was significant increase in mean heart rate at 1 minute and 3 minute. At 5 minute the mean heart rate in both groups were the same. This increase in heart rate could be due to sympathetic stimulation associated with laryngoscopy and intubation for ETT placement. Similarly significant increase in MAP after insertion of device was found at 1 and 3 minutes in ETT group. When finding of MAP were compared in the two groups, highly significant difference was seen at 3 minute. These findings were comparable with the study of Y. Lim [10] and Saraswat N[8]. These are due to sympathetic stimulation with laryngoscopy and intubation with ETT where as PLMA being a supraglottic device does not requires laryngoscopy.

There was no incident of regurgitation, vomiting at the time of removal of device in any patient. The double cough arrangement of the PLMA is effectively prevents the chances of aspiration. Nasogastric tube was inserted in all cases via drain tube after confirming that there was no evidence of leak. Oxygen saturation and End tidal carbon dioxide were within normal limit throughout the procedure.

Conclusion

It is concluded from our study that the placement of PLMA is easy, effective and performance is as good as the conventional ETT in respect of providing effective patent airway during the controlled ventilation. This comparative study also shows that PLMA provides good haemodynamic stability.

Reference

1 Sharma B, Sahai C, Bhattacharya A, Kumar VP, Sood J. Pro Seal laryngeal mask airway: a study of 100 consecutive cases of laparoscopic surgery. Indian J 2003;47:467-72.

2 Misra MN, Ramamurthy B. The Pro-Seal LMAtm and the tracheal tube: A comparison of events at insertion of the airway device. Internet J Anesthesiol 2008;16.

3 Keller C, Brimacombe J. Mucosal pressure and oropharyngeal leak pressure with ProSeal versus laryngeal mask airway in anesthetized and paralysed patients. Br J Anaesth 2000;85:262-6.

4 Brimacombe J, Keller C. The ProSeal LMA. A randomizes crossover study with standard laryngeal mask airway in paralyzes anesthetized patients. Anesthesiology 2000;93:104-9.

5 Keller C, Brimacombe J, Kleinasser A, Loekinger A. does the ProSeal laryngeal mask airway prevent aspiration of regurgitated fluid? AnesthAnalg 2000; 91;1017-20.

6 Brain AI, Verghese C, Strube PJ. The LMA 'ProSeal' - a laryngeal mask with an oesophageal vent. Br J Anaesth 2000;84:650-4.

7 Cook TM, Nolan JP, Verghese C, Strube PJ, Lees M, Millar JM and Basket PJF. Randomized crossover comparison of the ProSeal with the classic laryngeal mask airway in unparalysed anaethetized patients. Br J Anaesth 2002;88(4):527-533.

8 Sarawswat N, Kumar A, Mishra A, Gupta A, Saurabh G, Shrivastava U. The compression of Pro Seal laryngeal mask airway and Endotracheal tube in patients undergoing laproscopic surgeries under general anaesthes. Indian J Anaesth 2011;55:129-34.

9 Maltby JR, Beriault MT, Watson NC, Liepert D, FickGH. LMA classic TM and LMA- ProSeal TM are effective alternatives to endotracheal intubation for gynecologicalaproscopy. Can J Anesth 2003;50:71-7.

10 Lim Y, Goel S, Brimacombe JR. The Pro Seal laryngeal mask airway is an effective alternative to laryngoscope -guided tracheal intubation for gynecologicalla proscopy. Anaesth Intensive Care. 2007;35:52-6.