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COMPARISON OF INSERTION CHARACTERISTICS OF PROSEAL LARYNGEAL MASK AIRWAY USING ROTATION TECHNIQUES VERSUS STANDARD INTRODUCER TECHNIQUE IN ADULTS UNDERGOING LAPAROSCOPIC CHOLECYSTECTOMY

Anaesthesiology

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ABSTRACT

Background: Airway management is the most essential skill in Anesthesiology and the inability to secure the airway is one of the most common reasons for anesthesia-related morbidity and mortality. [2,4] **Aim:** This study aimed to evaluate and compare the insertion characteristics of Proseal laryngeal mask airway (LMA) using the standard introducer technique, 90-degree rotation technique, and 180-degree rotation technique in adult patients undergoing Laparoscopic Cholecystectomy. **Material And Method:** After institutional ethical approval and informed written consent of patients participating a prospective, interventional, randomized, comparative study was carried out on 90 Patients in the age group 20-60 years, of either gender, ASA I/II, scheduled for laparoscopic cholecystectomy under general anesthesia with controlled ventilation using the ProSeal LMA were included in the study. The patients were randomized into three groups: Group I - Standard Introducer technique (n=30); Group II - 90-degree rotation technique (n=30); Group III - 180-degree rotation technique (n=30). **Result:** The incidence of failure of Proseal LMA, blood staning of Proseal LMA and Sore throat were significantly more in standard introducer technique as compared to rotation technique. **Conclusion:** The study concluded that the 90-degree rotation technique and 180-degree rotation were both superior to the introducer technique in adult patients in terms of insertion time, ease of insertion score, manipulation requirement, blood staining of PLMA and post-op dysphagia/sore throat .

KEYWORDS

Proseal LMA, Rotation, Standard technique.

INTRODUCTION:

The laryngeal mask airway (LMA) device was first designed with the expectation of creating a device that diminished adverse anatomical and physiological events associated with upper airway manipulation. It has been shown to have beneficial effects over intubation by avoiding invasion of the larynx and trachea thereby reducing sympathetic stimulation.[1,4]

Using supra-glottic airway devices comes with many advantages including speed and reliability of placement, the requirement of a lower skill set, removal of the need for additional equipment, more hemodynamic stability with insertion and removal along with a lower risk of airway trauma. Patients with an LMA require a significantly less anesthetic agent to maintain the depth of anesthesia than those who are intubated.[3]

Various techniqus have been developed to improve the insertion of the LMA ProSeal in patients; with an introducer, pharyngoscopic, rotation techniques, suction catheter/gum elastic bougie based and fiberscope.[3,4] The insertion eases with the conventional introducer technique since it occupies less space than the finger, directs the cuff around the oropharynx inlet and facilitates full depth of insertion. However, it is reported to be more difficult due to impaction at the base of the mouth and folding of the cuff. The incidence of trauma depicted by blood staining of LMA and sore throat can be significantly reduced by avoiding the contact of the device with the palate and pharyngeal wall with the rotation techniques.[2,5]

MATERIALS AND METHODS:

Study design: A prospective, comparative, interventional, and randomized study.

Sample size: It was conducted on 90 consenting adult patients of either gender after obtaining hospital ethical committee approval. The minimum required sample size with 80% power of the study and a 5% level of significance was 27 patients in each study group. Hence the total sample size taken was 90.

Inclusion criteria:

1) Age 20-60 years
2) ASA grade I and II
3) Scheduled for Laparoscopic Cholecystectomy
4) Using LMA ProSeal for airway management.

Exclusion criteria:

1) Patients with an anticipated difficult airway (Modified Malampatti Grade 3-4, mouth opening < 2.5 cms, restricted neck movements)
2) History of systemic and metabolic disorders, recent upper respiratory tract infection, sore throat, asthma, risk of regurgitation and aspiration, and pregnancy were excluded.

Technique:

In the operating room monitor with echocardiogram, pulse oximetry, noninvasive blood pressure and temperature probe was attached and base line vitals were recorded. Intravenous access with 18 G intravenous cannula was secured, All patients in both groups were started with Ringer's lactate at 6 ml/kg/hr and received Inj. Ondansetron 0.15 mg/kg and Inj. Glycopyrolate 0.004 mg/kg intravenously as pre medication. After pre oxygenation, induction was performed with intravenous Propofol 2 mg/kg until loss of verbal contact followed by Injection Cis-atracurium 0.2 mg/kg intravenously. After standard intravenous induction an appropriately sized ProSeal LMA was selected as per the weight of the patient and inserted three minutes after Cis-Atracurium administration according to the randomized selected technique by the anesthesiologist trained for at least six months. Another anesthesiologist noted the parameters. The cuff of ProSeal LMA was fully deflated and flattened. A water-based gel was applied to the posterior aspect and lateral surfaces of the LMA for lubrication. The patient was supine with the head on a pillow placed in the sniffing position.

In Group II, the patient's mouth was opened. Holding the LMA ProSeal, its entire cuff was placed into the patient's mouth via the midline approach without finger insertion and then rotated 90 degrees counterclockwise around the tongue and then advanced until the resistance of the hypopharynx was felt. Then it was rotated back to the midline while being advanced further ahead. [2,4]

For the III group, the ProSeal LMA was turned in a 180-degree back-to-front position with the concavity facing toward the hard palate (like an airway). It was then advanced into the base of the hypopharynx until resistance was felt. At this point, the LMA was rotated 180 degrees anti-clockwise and positioned in the pharynx. [3,5]

The requirement of manipulations for the insertion of LMA ProSeal was noted. The number of attempts of LMA ProSeal insertion was also noted. An insertion attempt was defined as the placement of LMA ProSeal in the mouth. A failed attempt was defined as its removal from the mouth because of failed passage, malposition, or ineffective

ventilation. If SpO2<95%, mask ventilation was done before the next attempt. A maximum of three attempts were allowed before a failure was recorded in which case standard airway protocol was followed. After the LMA ProSeal was positioned in the pharynx, the cuff of LMA ProSeal was inflated with air up to the maximum volume recommended to 60cmH_2O pressure using a cuff pressure monitor and maintained at this pressure. The LMA ProSeal was fixed and taped.
Anesthesia was maintained with O2:Air (50:50), one minimum alveolar concentration of Sevoflurane and Inj. Cisatracurium 1mg SOS.

At the conclusion of surgery anaesthesia was reversed with Inj. Glycopyrrolate 0.008 mg/kg and Inj. Neostigmine 0.05 mg/kg.

Statistical Analysis:

1) Data were entered in Microsoft Excel 2010 and analysis was done by using the program Statistical Product and Service Solutions (SPSS).
2) Categorical variables are presented in number and percentage (%) and continuous variables are presented as mean ± SD.
3) Quantitative variables were compared using analysis of variance (ANOVA) between the three groups while qualitative variables were compared using the Chi-square test.

OBSERVATIONS AND RESULTS:

The study population was comparable on demographic parameters, age, gender, and anthropometric parameters - height, weight, and BMI. As the study was conducted in elective cases posted for laparoscopic cholecystectomy surgery, the majority of patients were females and ASA grade I/II.

The majority of the patients in all the groups had ProSeal laryngeal mask airway (PLMA) size 3 or 4. No significant difference in the PLMA size of the three groups was seen in the study. (p=0.001)

All the baseline hemodynamic parameters were comparable between the three groups. A declining HR from baseline to five minutes after insertion in all groups. A similar trend was observed with MAP. The mean values of EtCO2 and airway pressures at one, three, and five mins post PLMA insertion was comparable in all the three groups.

Insertion time was significantly shorter in the group with the 90-degree rotation technique and 180-degree rotation group as compared to the standard introducer group (p =0.013)

A statistically significant difference was seen in the manipulation requirement. A significantly less number of patients 15% required manipulations with the 90 degree rotation group and 180 degree rotaion group 22% as compared to group I 32%. (p = 0.028)

Overall successful insertion rate was 2 failure in the standard introducer group, 1failure in the 90-degree rotation group and 1 failures in the 180-degree rotation group. There was no significant difference in overall successful insertion rates. These patients were intubated as per protocol and were not evaluated for post-operative adverse events.

Oropharyngeal seal pressure was significantly higher in groups with 90-degree rotation and 180-degree rotation as compared to the standard introducer group indicating that both 90-degree and 180-degree rotational techniques provide a better seating of the LMA ProSeal than the introducer group. (p= 0.001)

A statistically significant difference was seen in the incidence of LMA ProSeal blood staining and 180-degree rotation technique. A significantly less number of cases had trace blood-stained PLMA with a 90-degree rotation technique and 180-degree rotation technique than the standard technique. (p=0.003)

Table: Proseal LMA insertion charachterstics and associated data

	GROUP I (STANDARD INTRODUCER TECHNIQUE)	GROUP II(90 DEG ROTATION)	GROUP 3 (180 DEG ROTATION)
MEAN INSERTION TIME	24.39±3.14 s	19.18±2.06 s	22.02± 1.82 s
EASE OF INSERTION SCORE<2	18%	12%	7%
MEAN OROPHARNGEAL SEAL PRESSURE (CM H2O)	30.22±2.16	36.62±1.02	34.22±1.87
BLOOD STAINING	14%	16%	8%
SORE THROAT	26%	28%	11%
DYSPHAGIA	2.34%	1%	0.5%
FAILURE OF DEVICE	2	1	1

DISCUSSION:

In this prospective, comparative, interventional, and randomized study conducted in 90 adult patients, we compared the insertion characteristics of LMA ProSeal insertion using the standard introducer technique (group I), 90-degree rotation technique (group II), and 180-degree rotation technique (group III). Our study showed a statistically significant difference between 90-degree and 180-degree rotation techniques over the standard introducer technique in the insertion time and the first attempt insertion success rate. The mean oropharyngeal seal pressure was also observed to be higher in 90 and 180 degree rotation group compared to standard introducer technique group. The incidence of sore throat and dysphagia were also significantly less in Group II and Group III compared to Group I.

Hagashi et al in their study on 200 subjects in elective surgeries observed similar results with the use of Proseal LMA. They observed similar results in insertion time and ease of insertion. Although more manipulation of device was observed in 90 degree rotation group. They also observed more blood staining of posterior surface of proseal lma in 180 degree rotation group.

Toress et al in there study observed similar ease of insertion score in 90 degree and 180 degree rotation methods though tis was signifivantly better than standard introducer techniqur group.

Murray et al on their study on 120 patients observed that Proseal LMA seal Pressure was higher in 90 degree mehod compared to 180 degree and standard mehod.

Studies done by Kumar et al, Misbah et al and Modric et al had results which were in consensus with the results of our study.

Limitations:

1) The study was conducted in adult patients of ASA I and ASA II having normal airways for elective surgery, hence our findings may not apply to patients with a difficult airway.
2) It was not possible to blind the technique of insertion from the anesthesiologist doing the observations causing a source of potential bias.
3) The PLMA was inserted in anesthetized paralyzed patients and so the results may vary in spontaneously breathing patients.
4) The type of manipulation was based on the Anesthesiologist's assessment.

CONCLUSION:

The 90-degree rotation technique and 180-degree rotation were both superior to the standard introducer technique in adult patients in terms of insertion time, ease of insertion score, manipulation requirement, blood staining of PLMA, and post-op sore throat/dysphagia.

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