



ORIGINAL RESEARCH PAPER

Anaesthesiology

CHANGES IN THE INTRACUFF PRESSURE IN DISPOSABLE CLASSIC LMA FILLED WITH EITHER AIR OR SALINE WHILE USING NITROUS OXIDE ANAESTHESIA - A PROSPECTIVE, RANDOMISED, DOUBLE BLINDED STUDY

KEY WORDS:

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ABSTRACT

Introduction: Increase in cuff pressure is seen during nitrous oxide anaesthesia if air is used to inflate the cuff of LMA. This can lead to post operative complications like sore throat, hoarseness and dysphagia. The aim of this study was to compare changes in the intracuff pressure in disposable LMA filled with Air or Saline in the cuff while using nitrous oxide anaesthesia and to asses postoperative pharyngolaryngeal complications. **Methods:** This was a prospective, randomized comparative study conducted in a tertiary care hospital in Karnataka. 80 patients were randomized into two groups containing 40 patients each using computer generated random numbers and sealed envelope method. For subjects in Group A, air was injected into disposable LMA and for the subjects in Group S, Saline was injected. **Results:** The groups were comparable for demographic data, type of surgery, size of LMA, duration of anaesthesia, cuff volume and seal pressure. The mean cuff pressures at 30, 60, 90 and 120 minutes and at the end of surgery were significantly higher in group A as compared to group S (p <0.05). The cuff pressure increased from 70.42 ± 8.3 cm H2O to 98.31 ± 4.66 cm H2 O at 120 minutes in group A, whereas there was no significant increase in cuff pressure from baseline in group S. **Conclusion:** Intracuff pressure increases significantly within 15 minutes of nitrous oxide anaesthesia when air is used to inflate the cuff than saline. Pharyngeal complications like sore throat, dysphagia are high in air group when compared to saline group.

INTRODUCTION

Laryngeal mask airway (LMA) is useful for airway management during anaesthesia and resuscitation. Because of its ease of insertion and better airway seal, it is used as a rescue device during difficult or failed intubation.¹ Increase in cuff pressure is seen during nitrous oxide anaesthesia if air is used to inflate the cuff of LMA.² This will lead to post operative complications like sore throat, hoarseness and dysphagia. This increase in the pressure can be minimized by using agents other than air. There are several studies regarding monitoring of intracuff pressure in endotracheal tube using saline, nitrous oxide, O₂ + N₂O mixture and assessing postoperative pharyngolaryngeal complications^{3,4} but hardly any studies regarding this with respect to Laryngeal Mask Airway. The aim of this study was to compare changes in the intracuff pressure in disposable LMA filled with Air or Saline in the cuff while using nitrous oxide anaesthesia and to asses postoperative pharyngolaryngeal complications.

METHODOLOGY

This was a prospective, randomized comparative study conducted in a tertiary care hospital in Karnataka. 80 patients were randomized into two groups containing 40 patients each using computer generated random numbers and sealed envelope method. For subjects in Group A, air was injected into disposable LMA and for the subjects in Group S, Saline was injected.

After obtaining institutional ethical committee clearance, patients aged between 18 to 60 years and belonging to ASA Physical status I & II undergoing elective surgery under general anaesthesia were included in the study. Written, informed consent of all the patients was obtained after explaining the procedure. All patients included in the study were made to undergo a thorough pre-operative assessment including detailed history, clinical examination and necessary investigations. Age, height, weight and ASA grade of the patients were recorded. Patients with history of sore throat in the last 6 weeks were excluded from the study.

Patients were allocated into group A or group S by computer generated randomization table. Group A patients received air, Group S received saline in the disposable LMA cuff. Patients were received into Operation theatre, Intravenous

(IV) line was secured using appropriate gauge cannula. Electrocardiogram (ECG), noninvasive blood pressure (NIBP), oxygen saturation (SPO₂) and capnography were monitored.

Patient were preoxygenated with 100% oxygen. Induction was achieved using Fentanyl 1-2 mcg/kg and propofol 2-3mg/kg. When the depth of anaesthesia was adequate as assessed by relaxation of jaw, loss of eyelash reflex appropriate size LMA was inserted by an anaesthesiologist. Neuromuscular blocking agent was used if required. Cuff was filled with air or saline until an absence of audible leak with peak airway pressure of < 20 cmH₂O was noted. After confirming proper placement of LMA by capnography and bilateral chest movement it was fixed. Anaesthesia was maintained using 35% oxygen, 65% nitrous oxide and an inhalational agent. Patient was ventilated with tidal volume 8-10 ml/kg, I:E ratio 1:2, respiratory rate was adjusted to maintain EtCO₂ between 35-45 mmHg.

Intracuff pressure was monitored using cuff pressure manometer at 0, 15, 30, 45, 60, 90, 120 mins and the corresponding airway pressures were recorded.

At the end of surgery, the anaesthesiologist removed the LMA when patient was fully awake. Patients were monitored in post anaesthesia care unit for pharyngolaryngeal complications like sore throat, hoarseness, dysphagia for 1hr, 2hr and 24hrs. Sore throat was graded as follows:

- Grade 0 - No sore throat
- Grade 1 - Mild sore throat (less than with cold)
- Grade 2 - Moderate sore throat (as with cold)
- Grade 3 - Severe sore throat (more severe than with cold)

Hoarseness was graded as follows:

- Grade 0 - No hoarseness
- Grade 1 - Mild hoarseness (noticed by patient only)
- Grade 2 - Severe hoarseness (noticed by others)
- Grade 3 - Aphonia (inability to speak)

Data obtained was analyzed using SPSS 16.0 version. Chi-Square test and independent sample t test were used for ordinal and continual data respectively.

RESULTS

The groups were comparable for demographic data, type of surgery, size of LMA, duration of anaesthesia, cuff volume and seal pressure as shown in Table 1.

Table 1: Comparison of the two groups

	Group A	Group S	p
Age(yrs)	40.2±12.9	40.6±18.3	0.93
Weight(kg)	54.8±5.9	58.3±10.2	0.19
Size 3 LMA	28	12	0.2
Size 4 LMA	22	18	0.19
Cuff Volume* (ml)	17.3±5.6	21.5±7.5	0.05
Seal Pressure* (cm of H2O)	21.60±3.7	18.7±2.2	0.006
Anaesthesia Duration (min)	70.0±56	70.5±22	0.97
Vt(ml)	505.0±35	486.25±37	0.68
Vte(ml)	472.0±37	445.75±35	0.68

The mean cuff pressures at 30, 60, 90 and 120 minutes and at the end of surgery were significantly higher in group A as compared to group S (p <0.05). The cuff pressure increased from 70.42 ± 8.3 cm H2O to 98.31 ± 4.66 cm H2 O at 120 minutes in group A, whereas there was no significant increase in cuff pressure from baseline in group S as shown in Figure 1.

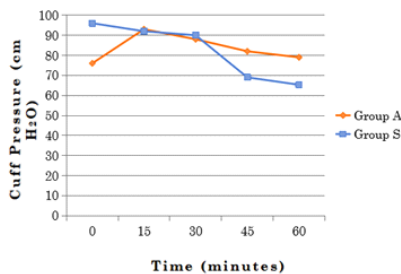


Figure 1: Intracuff pressure between the groups

Intraoperative complications such as sore throat and dysphagia were found to be greater in Group A as shown in Figure 2.

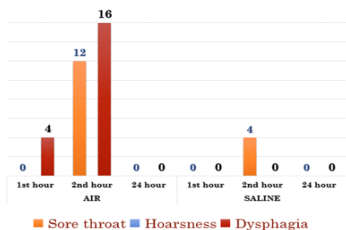


Figure 2: Intraoperative complications between the groups

DISCUSSION

In our study we found that intracuff pressure increases significantly within 15 minutes of nitrous oxide anaesthesia when air is used to inflate the cuff than saline. This is similar to a study by Chung et al where they used air in classic LMA and they concluded that monitoring of intracuff pressures and keeping it below 60 cmH2O reduces postoperative pharyngolaryngeal complications by 70%.⁵ In another study conducted by NL Ahmad et al in 60 patients undergoing elective surgery; air and distilled water was used to fill endotracheal tube cuff. They found that when distilled water was used to fill the cuff, the rise in cuff pressure during nitrous oxide anaesthesia was lower than that of an air filled cuff.⁶

In our study, pharyngeal complications like sore throat, dysphagia were found to be higher in air group when

compared to saline group. This was found to be in agreement with a study conducted by Ali N P et al on 120 patients undergoing elective surgery. They used air, distilled water and 2% lignocaine to fill the endotracheal tube cuff and they concluded that lignocaine as cuff inflating agent reduces the incidence of post operative sore throat and dysphagia.⁷

Similarly, Davide Cattano et al compared LMA unique and LMA supreme using air and saline in mannequins and found that no significant difference in intracuff pressure. But smaller volume of saline was needed to maintain oropharyngeal seal without any detectable air leak.⁸

CONCLUSION

Intracuff pressure increases significantly within 15 minutes of nitrous oxide anaesthesia when air is used to inflate the cuff than saline. Pharyngeal complications like sore throat, dysphagia are higher in air group when compared to saline group.

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