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Original Research Paper

Anaesthesiology

A COMPARATIVE ANALYSIS OF THE EFFICACY OF AMBUAURAGAIN & LMA SUPREME IN ADULT PATIENTS SCHEDULED FOR ELECTIVE SURGERIES UNDER GENERAL ANESTHESIA

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KEYWORDS :

General anaesthesia is an integral part of any anaesthetic and life-saving technique. The most definitive way of securing the airway is by endotracheal intubation continues to be the "gold standard". But many conditions such as neck immobility, secretions and blood, small mouth opening of less than three finger breadths, obesity, incomplete frontal dentition, airway oedema, oral obstruction (tumor, mechanical obstruction), and maxillofacial trauma causes difficult laryngoscopy and intubation causing risk to patient's life[1]. Owing to the high failure rate of the direct laryngoscope (up to 30%), several devices including the video laryngoscope and supraglottic airway (SGA) have been developed[2].

In 1981, Archie Brain developed the laryngeal mask airway (LMA), which resolved the problems of position instability and epiglottic obstruction occurring with the use of mask and other airways, while at the same time producing no greater gastric insufflation than Endotracheal tubes (ETT)[3].

LMA Supreme was introduced in 2007 by Archie Brain. The LMA Supreme has the advantage of having gastric access. The anatomically shaped airway tube allows easy insertion and prevents kinking. An effective and high seal pressure, built-in bite blocker, presence of fixation tab and drain tube for gastric aspiration are some of the attractive features of LMA Supreme.

Ambu AuraGain (Ambu, Ballerup, Denmark) is a novel cuffed supraglottic airway introduced in November 2015, which has a preformed curve and also a built-in gastric port. It is a single use device and is anatomically curved to follow human airway. It provides high seal pressure can be used as a conduit for intubation. It has an integrated gastric access, bite block and broader airway tube. Ambu AuraGain is preformed to follow the anatomy of human airway, and soft rounded curve allows easy insertion & easy gastric tube placement. This study was undertaken in our hospital to compare the Ambu Aura Gain and LMA Supreme in relation to ease of insertion, no. of attempts, insertion time of device, oropharyngeal leak pressure, ventilator parameters, associated haemodynamic response and incidence of post insertion and post-operative complications in anaesthetized adult patients with controlled ventilation posted for elective surgery.

METHODS

The present study entitled "A Comparative Analysis of the Efficacy of Ambu AuraGain and LMA Supreme in Adult Patients Scheduled for Elective Surgeries under General Anaesthesia" was carried out in the Department of Anaesthesiology and Critical Care in our hospital.

After hospital's ethical committee's approval and written informed consent from the patient's attendant, the present study was conducted on 80 patients who were scheduled for a variety of surgical procedure requiring general anaesthesia of age 18 to 60 years, both sexes, ASA grade 1-2 were included in the study. Patients with limited mouth opening (less than 2 cm), anticipated difficult airway, oral mass, with increased risk of aspiration, or having a history of symptomatic gastro-oesophageal reflux or hiatus hernia, Symptoms related to laryngo-pharyngeal anomaly, Musculoskeletal abnormalities affecting the cervical vertebrae, CNS, CVS, Respiratory system and musculoskeletal disorders were excluded from the study.

The patients were randomly allocated into two groups of 40 patients each. These patients were selected by 1:1 allocation ratio using computer generated random numbers concealed in sealed opaque envelope.

Group AAG – Patient received general anaesthesia and airway protection with Ambu AuraGain
Group LMAS –Patient received general anaesthesia and airway protection with LMA Supreme.

Procedure

On arrival of the patient in the pre-operative room, an 18-gauge intravenous cannula was inserted under local anaesthetic application and an infusion of normal saline was started.

Standard monitoring was applied before induction which included ECG, pulse oximeter, capnography and Non-invasive Blood pressure monitor. Intravenous access was obtained with 18G peripheral venous cannula in the forearm. The patient was placed in supine position with the patient's head on a pillow of 10cms height. Pre-oxygenation was done for 3 minutes with 100% oxygen. All patients were given inj. glycopyrrolate 0.004 mg/kg iv, inj. midazolam 0.02mg/kg iv and inj. fentanyl 2 mcg/kg iv. Anaesthesia was induced with inj. propofol 2mg/kg iv and inj succinylcholine 2mg /kg iv. An appropriate size supraglottic airway device (Ambu AuraGain or LMA Supreme) was inserted for airway protection as per group allocation.

The posterior surface of the mask was lubricated with water soluble jelly just prior to insertion. Stood behind the patient's head and placed the patient's head in the sniffing position and face at a vertical level of the operator's umbilicus. The cuff of SAD was completely deflated prior to insertion. After insertion, the cuff of each device was inflated with air to attain a cuff pressure of 60 cmH2O as measured with a handheld aneroid manometer (Ambu® Pressure Gauge; Smiths Medical Intl Ltd, Kent, UK). The total volume of air needed to do this was determined by inflating each device with an initial amount of 25 ml, after which the manometer was connected to ascertain the cuff pressure, with subsequent addition or withdrawal of air in aliquots of 1–3 ml to achieve the final pressure of 60 cmH2O[4].

Correct placement of the devices was confirmed by easy bag ventilation, absence of audible air leak around the cuff at peak airway pressures up to 20cm H_2O and normal square wave capnogram. The time was measured with the help of a stopwatch. The number of attempts required for SAD insertion was recorded. A failed attempt was defined as removal of the device from the mouth before it is reinserted. If the device was not successfully inserted in third attempt this was recorded as failure of SAD insertion.

A well lubricated appropriate size gastric tube was introduced through gastric port.

Maintenance of anaesthesia was done with O2, isoflurane and atracurium 0.1mg/kg.

At the end of surgery neuromuscular blockade was reversed with inj. neostigmine 0.05mg/kg and inj. glycopylorrate 0.01 mg/kg. After patient attained adequate muscle power and normal respiration, SAD was removed after proper suctioning of oral cavity.

Complications such as desaturation (SpO2<94%), regurgitation or aspiration, laryngospasm/bronchospasm, oropharyngeal or laryngeal trauma (blood staining of device), sore throat and hoarseness of voice were recorded. Patient was shifted to recovery room.

Observations

Following parameters were observed:
1) Ease of insertion based on subjective score assessed on 3-point scale[5]
1 = Easy
2 = Satisfactory
3 = Difficult
2) Insertion attempts
Maximum of three attempts each for SAD insertion was done. More than three attempts taken were considered failure.
3) Insertion time of SAD
It is defined as the time when SAD is picked up in the hand until bilateral chest rise with the first capnogram upstroke is seen.
4) Haemodynamic parameters
Following parameters were observed and recorded at different time interval i.e. after premedication, after induction [before SAD placement], after SAD placement at 0min, 1min, 3min, 5min, 10min. Heart Rate (beats per min), Systolic Blood Pressure (mm Hg), Diastolic Blood Pressure (mm Hg), Mean Arterial Pressure (mm Hg) & Oxygen Saturation (%)
5.) Oropharyngeal leak pressure
It is defined as the airway pressure at which the leak is heard with fresh gas flow at 3l/min with closed APL valve. It was performed one minute after successful insertion of device by closing the circle system's expiratory valve at fixed fresh gas flow of 3 l/min. Pressure in breathing circuit was increased until airway pressure reached equilibrium. The airway pressure at which equilibrium was recorded and a gas leak occurs as determined by audible leak or by detection of an audible noise with a stethoscope placed directly lateral to thyroid cartilage, was the oropharyngeal leak pressure[6]. The oropharyngeal leak pressure was measured with an aneroid meter attached to circle system of anaesthesia work station (Mindray, China).
6) Ventilatory parameters
Following parameters were observed at 15 mins after insertion of airway by integrated spirometry in anaesthesia workstation (Mindray China) - Respiratory rate, Tidal Volume and Minute Volume-Inspired tidal volume (ml), Expired tidal volume (ml), Leak volume (ml) and Leak fraction, EtCO2 (mmhg)
7) Ease of nasogastric tube placement[5]
1 = Passed easily
2 = Passed with difficulty
3 = Impossible to pass
8) Post-operative sore throat was recorded in the recovery room and graded at 6th and 24th hours
Grade 0-No sore throat
Grade 1-Mild sore throat (pain on swallowing solid)
Grade 2-Moderate sore throat (pain on swallowing liquid)
Grade 3- Severe throat (pain even on swallowing
9) Postoperative airway complications including blood on the device, laryngospasm, bronchospasm, hoarseness of voice, dysphagia, tongue, lip, and dental trauma was evaluated in the recovery room in 24 hrs postoperative period.

Statistical Analysis

The data was analysed by SPSS (Statistical Package for Social Science) software version 29. ANOVA test was applied for quantitative data. Students unpaired t test was applied for haemodynamic parameters. Categorical data was analysed using Chi square test.

For all statistical analysis, the value of p <0.05 was considered significant.

Observations

The patients in both the groups were comparable in view of age, gender, height, weight, body mass index, ASA grade distribution.

There was no statistically significant difference in two groups with regard to insertion attempts.

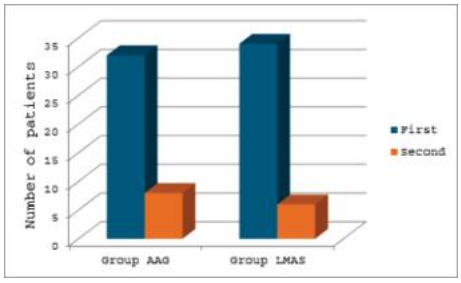

Fig: 01 Distribution According to No. of Insertion Attempts.

In our study mean insertion time of AAG group was slightly higher than LMAS group [11.3 v/s 10.7sec respectively]. There was no statistically significant difference between two groups. [P-value>0.05]

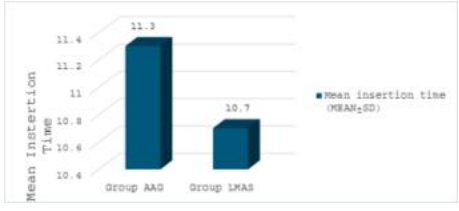

Fig:02 Comparison of Mean Insertion Time [Seconds]

In our study 30 patients underwent easy insertion, 2 patients had satisfactory insertion and 8 patient had difficulty in insertion in group AAG. In LMAS group 32 patient had easy insertion, in 2 patient there was satisfactory insertion and 6 patient had difficulty in insertion. The distribution was comparable in both groups.

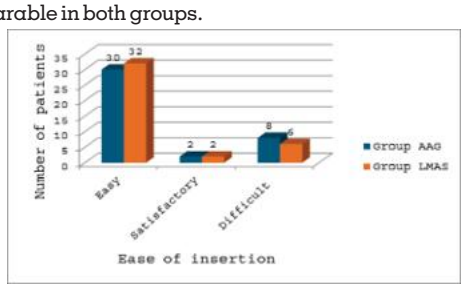

Fig: 03 Comparison of Ease of Insertion

The OLP was measured at 1 min of device insertion. The OLP in AAG group was 27.07 cm H_2O and 24.17 cm H_2O in LMAS group. The difference between both groups was statistically highly significant with P-value <0.0001.

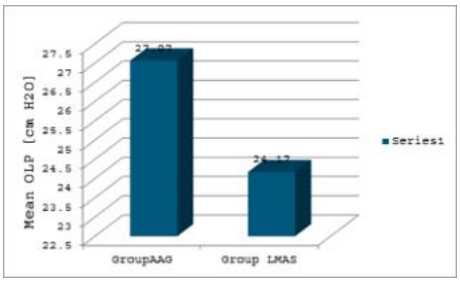

Fig 04: Comparison of Oropharyngeal Leak Pressure

In our study, nasogastric tube insertion was easy in 92.5% patients in AAG group and 87.5% patients in LMAS group. Five percent patients had difficulty in insertion of nasogastric tube in AAG group and 10% patients in LMAS group. Nasogastric tube insertion was impossible in 2.5% patients in each group. The difference between two groups was statistically insignificant.

Ventilatory parameters like inhaled tidal volume, exhaled tidal volume, leak fraction, Oxygen saturation & end tidal CO2 were also comparable in both the groups. In our study blood stain was present in 4 patients in each group. No any other post-operative complications were observed in any other group.

DISCUSSION

Second generation supraglottic airway devices are gaining importance among the anaesthesiologists for both elective cases and for difficult airway management. This is due to their better seal pressure and their effectiveness in protecting airway from the risk of aspiration of gastric contents. In the present study, the performance of Ambu AuraGain and Laryngeal Mask Airway Supreme as airway devices are compared among the adult patients undergoing elective surgeries under General Anaesthesia.

In our study, insertion of Ambu Auragain was successful in first attempt in 80% patients as compared to 85% first time insertion with LMA Supreme.

Insertion was easy in 75% patient group of Ambu Auragain with insertion time of 11.3 sec as compared to 80% patient in LMA Supreme with insertion time of 10.7 sec. In 6 patients of LMA supreme group there was difficulty in insertion as compared to 8 patients in group Ambu Auragain.

Though we did not find any significant difference with regard to ease of insertion of devices among both the groups however, **Shariffuddin et al**[4] found that in 48% (24/50) of patients, AAG could be inserted easily while it was 74% (37/50) among LMAS group (p value 0.013) with 33.4±10.9 seconds for the insertion of AAG and 27.34±11.4 seconds for LMAS.

In our study oropharyngeal leak pressure H2O was measured at 1 min after airway placement. In group Ambu Auragain OLP was 27.07 cm H2O and in group LMA supreme OLP was 24.17 cm H2O. The OLP was significantly higher in group Ambu auragain as compared to LMA Supreme group.

Similarly, David T wong et al[9] found that the OLP of the Ambu Auragain was 4.8 cmH2O higher than that of the Supreme. A higher OLP for the Auragain suggests that the Auragain can achieve a better glottic seal (and thus higher ventilatory pressures) for ambulatory surgical patients.

In our study sore throat was compared at 6th hour and 24th hour in both the groups. In group Ambu Auragain, six patients had mild sore throat at 6th hour and four patients at 24th hour. In LMAS group five patients had mild sore throat at 6th hour and three patients at 24th hour. Two patients had moderate sore throat at 6th hour in both groups. Two patients had severe sore throat at 6th hour in AAG group and one patient in LMAS group.

Similar to our result, Pradeep MS et al[8] found at 24 hours postoperatively, only 1 patient in Group LMA Supreme (3.33%) complained of sore throat from all the 3 groups of patients.

In our study both groups were comparable with regard to post-operative complications.

Similarly, Zhang J et al[9] found no significant difference in the postoperative pharyngolaryngeal complications between the two SGDs.

CONCLUSION

In conclusion, our study demonstrated satisfactory performance of the both Ambu AuraGain and LMA supreme in spontaneously breathing anaesthetised adults. Both the devices were comparable in terms of ease of insertion and insertion attempts. Oropharyngeal leak pressure was high in group Ambu Auragain which may make it more suitable for use in expert hands with positive pressure ventilation potentially increasing the margin of safety in aspiration risk.

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