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Research Article

# INCIDENCE OF TRAUMA USING SUPRAGLOTTIC AIRWAYS WITH AND WITHOUT MUSCLE RELAXANT: A COMPARATIVE STUDY

**Dr Ajit Kumar Singh, Dr Padmini HS, Dr. Maruti Gupta, Dr. Archana Singh, Dr Subir Mukherjee and Dr M Arun Kumar**

Department of Anaesthesiology and Critical care, Military Hospital, Belgaum, Karnataka, India. 599001

**A R T I C L E I N F O**

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**A B S T R A C T**

**Background:** Supraglottic airways are used commonly in surgeries of short duration requiring General Anaesthesia and requiring airway control or ventilation. Incidence of trauma and airways related complications like bronchospasm aspiration and sore throat are reported. We hypothesized that the use of small doses of short duration muscle relaxant will reduce the incidence of complications, effort of insertion and less haemodynamic swings compared to insertion of SGA's without muscle relaxant.**Methods:** A total 60 patients were registered for study after applying exclusion and inclusion criteria for and 30 were assigned by random allocation using lottery system. undergoing short duration surgeries under GA into 2 groups and will be administered General anesthesia, using 2mg/kg IV and fentanyl 1mcg/kg. SGA will be inserted in one group using muscle relaxant ( Succinyl Choline 25 mg) and 0.5 ml of normal saline as placebo in other group. Patients will be monitored for haemodynamic parameters, complications and adverse event by independent observer. Collected data was analyzed using student t test and chi square using SPSS 20 Software. **Results:** It was observed that there was no demographic difference in both groups. There was no difference between ease of insertion and incidence of airway complications like bronchospasm, laryngospasm, aspiration, trauma and haemodynamic swings. **Conclusion:** Use of muscle relaxants although might help in insertion, lesser incidence of airway complications but in this study there was statistically insignificant difference



## INTRODUCTION

Supraglottic airway devices have become invaluable for both routine and difficult airway management. Supraglottic airways are used commonly in surgeries of short duration requiring General Anaesthesia and require airway control or ventilation. Invention of LMA by Archie brain was the landmark invention in 1983 and helped in efficient management of airway**. (1)** SGA are better than of mask ventilation due to lesser leak and patient awareness and bridge to intubation as they are less invasive compared to ETT intubation. They are supra glottic hence minimal impact on ciliary movements and secretions and hence less chances of VAP and trauma.

SGAs, although are less traumatic in compare to ETT, still many incidences of trauma and airway complications are reported. Reports of use of muscle relaxant are there. We intend to use small dose of succinylcholine 25 mg in adult patients of ASA I & II undergoing surgery at our tertiary care centre. It is experienced in few cases where succinylcholine is used after induction with Inj propofol 2mg/kg body weight, ease of insertion and lesser incidence of trauma in compare to the patients where SGA were inserted without using muscle relaxant.

This study is conducted to assess the incidence of trauma, haemodynamic impact and ease of insertion when SGA's are inserted with and without succinyl choline. it's been proven by many studies that Supraglottic airways are less invasive compare, less traumatic and lesser haemodynamic instability in comparision to endotracheal intubation. In this study we are trying to observe that after using short acting and short duration muscle relaxant like succinylcholine used during insertion of SGA's results in less incidence of trauma, better haemodynamic profile and less complications in comparison to inserting LMA without muscle relaxant. If results are according to hypothesis then succinylcholine in very low dose can be used safely in patients with better recovery profile.

## MATERIAL AND METHODS

Prospective randomized controlled trial conducted in all adult female patients between 18 – 50 yrs of age included in the study were, ASA grade 1-2, undergoing short duration surgeries of 50-60 minutes duration under GA, Airway MPCL-I,II & III, in operation theatre of command hospital after approval of ethical committee from hospital ethical review committee and informed consent from patients.

**Corresponding author:* **Dr Ajit Kumar Singh**
Department of Anaesthesiology and Critical care, Military Hospital, Belgaum, Karnataka, India. 599001

Sample size of 60 patients were determined after size calculation, estimated using formulae. These patients were enrolled and divided into 2 groups of 30 each groups. Group A were SGA was inserted using small dosages of 0.5 mg/Kg body weight of Succinyl CoA intravenously, a short acting depolarizing muscle relaxant and Group B where SGA was inserted without muscle relaxant. Patient were enrolled and assigned using lottery system into each group. Patients involved in study were given unique code to maintain confidentiality and any identity like name, hospital ID and was not disclosed in the study

All the patients enrolled for study were assessed during pre anesthetic check up for Airway assessment to anticipate difficult airway, allergy to succinyl CoA and electrolyte imbalance- Hyperkalemia, non-supine positioning for surgery, obese and pregnant patients, patients with increased risk for regurgitation of gastric contents, intra-abdominal or airway procedures and long duration of surgery ASA Grade 3 and above, CAD/IHD. Any neuromuscular disorders, Weight greater than 100 kg, COPD/Bronchial Asthma, Extremes of age, Coagulopathy. Supraglottic airways have been successfully used in patients with these relative contraindications but in this study we excluded these patients.
All patients undergoing short duration surgeries under GA will be randomly allocated into 2 groups and will be administered General anesthesia, using injection Propofol 2mg/kg IV and fentanyl 1mcg/kg. for induction after puring all monitors and preparation for intubation standby, One group will be receiving Succinylcholine 0.5 mg/ Kg body wt and other group will receive same volume of Normal saline as placebo i.e control. Intervention Group A will be administered Succinylcholine 25 mg after induction with a propofol 2mg/kg body wt and fentanyl 2mg/kg body weight and placebo i.e Group B – will be administered 0.5 ml Normal saline after induction with a propofol 2mg/kg body weight and fentanyl 2mcg/kg body weight. Patients will be monitored for following parameters by independent observer Intraoperatively for

- Ease of Insertion.
- Incidence of trauma during insertion.
- Standard monitors to asses haemodynamic status.
- Airway complications.

Patient postoperatively will be monitored 01 hr in post op room for any complications and then in ward for next 24 hrs for any complications. Adequate and stringent safety Measures with closed monitoring by anaesthesiologist in operation theatre study was conducted. Equipments of resuscitation, difficult airway control and crash cart were standby as for any surgery conducted in operation theatre.

Data was collected in various charts used during anaesthesia for demographic comparision and other variables to rule out any confounding factors. Both groups after randomization were compared using monitoring chart, complications and ease of insertion in respect of various stages of insertion, maintenance and removal of SGA intra-operatively and postoperative vitals monitoring was carried out.Statistical Analysis included profiling of patients on different demographic and clinical parameters etc. Quantitative data will be presented in terms of means and standard deviation. Qualitative/categorical data will be presented as absolute numbers and proportions. Student t test will be used for comparison of individual quantitative parameters. Cross tables will be generated and chi square test will be used for testing of associations. P-value < 0.05 is considered statistically significant. SPSS software will be used for analysis.

## RESULT

This study was carried in all female patients at tertiary care centre undergoing short duration surgeries under General Anaesthesia where supraglottic airways(SGA) like Igel and LMA were inserted using very small dose succinylcholine and incidence of haemodynamic swings, Airway complications, difficulty of Insertion were observed and compared with insertion of SGA's without muscle relaxant in other group of patients. On analyzing demographic profile of patients in both group A and group B regarding Age, ASA grading there were comparable and differences were non significant. Refer figure 1.

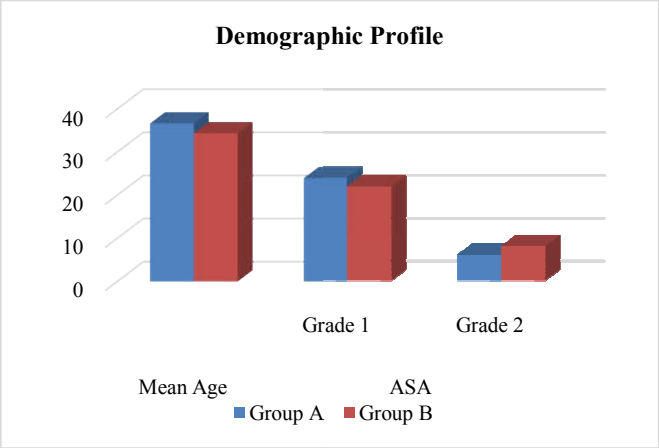


**Figure 1** Demographic profile of both groups

Haemodynamic parameters like Blood pressure, Heart rate, Saturation and end tidal Co2 were recorded and compared with baseline parameters at different stages like at the time of Induction, induction, at the time of SGA insertion, monitoring after 04 mins and 08 mins and at the time of SGA removal. After analyzing this data it was observed there was no statistically significant ($P$>0.05) difference was observe between both groups of the study, regarding hemodynamic changes which include Diastolic BP, Systolic BP, Heart Rate, SPO2 and ETCO2 at baseline, induction, at the time of SGA insertion, monitoring after 04 mins and 08 mins and at the time of SGA removal throughout the duration of the surgery.(Figure 2)

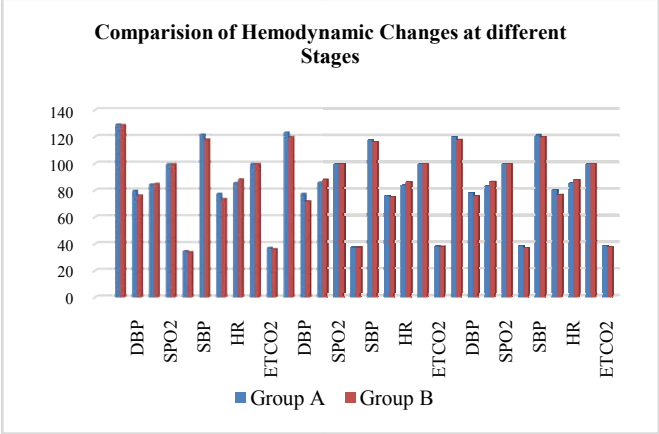


**Figure 2** Comparison of Haemodynamic changes Both groups

Effect of using small dose of muscle relaxant in compare to placebo on incidence of complications like Bronchospam, airway trauma, Sore Throat, Aspiration and hoarseness it was observed that incidence of complications like trauma 9 (30%) was more in group B than Group A 3 (10%), i.e insertion of SGA without muscle relaxation had more incidence in compare to the group where SGA was placed using muscle relaxation and was statistically significant (P Value <0.05%). Incidence of Sore throat 5 (17%) were occurred in Group B compare to Group A where it was only 1 (3%) but it was not statistically significant (P > 0.05). Incidence of bronchospasm was observed 2 ( 6 % ) in each groups was nonsignificant (P > 0.05%). Aspiration and Hoarseness was not reported in any of the group Refer figure 3.

**Table 1** Incidence of Complications in both Groups

| Complications | Group A | Group B | P Value |
|---|---|---|---|
| Bronchospasm | 2 (6) | 2 (6) | 1.000 |
| Trauma | 3 (10) | 9(30) | 0.054 |
| Sore Throat | 1 (3) | 5 (17) | 0.088 |
| Aspiration | 0 | 0 | - |
| Hoarseness | 0 | 0 | - |

**Table 2** Level of Difficulty- Both the Groups

| (Level of Difficulty) No of Attempts | Group A (n=30) | Group B (n=30) | P Value |
|---|---|---|---|
| First Attempt | 24 (80) | 20 (66) | .395 (NS) |
| Second Attempt | 4 (13) | 8 (27) | |
| Third Attempt | 2 (7) | 2(7) | |

Table 2 shows that insertion of SGA devices and ventilation was possible at the first attempt in 80% of patients in the group A and in 66% in group B. In 7% of the patients in both group it was possible after the third attempt. The difference between both groups regarding insertion attempts was statistically not significant (*P*=0.395).

## DISCUSSION

Supraglottic airways are used commonly in surgeries of short duration requiring General Anaesthesia and might require airway control or ventilation where risk of aspiration is minimal. Supraglottic airway devices (SGAs) are tools used for airway management in anesthesia and also in certain situations outside the operating room. SGA are better than of mask ventilation due to lesser leak and patient awareness and bridge to intubation as they are less invasive hence chances of VAP and trauma is less.(1,2)

These SGAs, although are less traumatic, but still, many incidences of trauma are reported. We intend to use small dose of succinylcholine 25 mg in adult patients of ASA I & II undergoing surgery at our tertiary care centre. It is experienced in few cases where succinyl CoA is used after induction with Inj propofol 2mg/kg body weight, ease of insertion and lesser incidence of trauma in compare to the patients where, SGA were inserted without muscle relaxant.

This study is conducted to assess the incidence of trauma, haemodynamic impact and ease of insertion when SGA's are inserted with and without succinyl choline.

Supraglottic airway devices have become invaluable for both routine and difficult airway management. After the introduction of the laryngeal mask airway (LMA) classic in the 1980s, there has been a steady increase in the applications for use of supraglottic airways as well as incidence of use. According to the fourth national project, in the UK they are used in approximately 56% of general anesthetics.(2)

There are many different types of supraglottic airway devices in single-use and reusable forms, including intubating supraglottic airways and supraglottic airways allowing gastric decompression. Supraglottic airway devices are sized according to the patient's weight, and sizes vary by manufacturer. (3)

Management of airway under general anaesthesia or securing airway in emergency condition by paramedics and other healthcare professional not very well versed with endotracheal intubation or mask ventilation had brought paradigm shift in approach and attitude of clinicians since invention of LMA. (13)

Numerous supraglottic airways are available in the market and numerous studies are available citing one SGA better over other. These airways are now a essential part of difficult airway cart and proved to save numerous life, by bailing out healthcares in difficult airway conditions. (4-6)

For routine airway management, advantages over endotracheal intubation include fast placement without the need of a laryngoscope, less hemodynamic changes with insertion and removal, less coughing or bucking with removal, no need for muscle relaxants, preserved laryngeal competence and mucociliary function, and less laryngeal trauma.(7)

Supraglottic airways can be a life saving tool for oxygenation and ventilation as a rescue device in a "cannot intubate, cannot ventilate" situation. They can also be a conduit for intubation in a difficult airway scenarios. When other oxygenation or ventilation techniques have failed, a supraglottic airway device may succeed as a rescue device as several of the risk factors for difficult facemask ventilation and difficult intubation are not risks for difficult supraglottic airway placement.(8-9)

Relative contraindications include non-supine positioning, obese and pregnant patients, patients with increased risk for regurgitation of gastric contents, intra-abdominal or airway procedures and long duration of surgery. Supraglottic airways have been successfully used in patients with these relative contraindications, but the risk versus benefit of use in these situations must be considered.(10)

Aspiration is a concern with supraglottic airway placement. This risk of aspiration increases with high airway pressures, gastric inflation and poor airway positioning over the glottic opening. Complications of laryngeal mask airways in patients with difficult airways include bronchospasm, postoperative swallowing difficulties, respiratory obstruction, laryngeal nerve injury, edema, and hypoglossal nerve paralysis. (10-12)

SGA has better safety record in terms of complications in compare to ETT as they are less invasive but still they induce period of hemodynamic instability and complications. They can cause arrhythmias brady/tachycardia, bronchospasm, laryngospasm in comparison to other group where SGA were inserted without muscle relaxants. (12,13)

Shariffuddin *et al*. conducted study in 40 patients of ASA 1–2 grade, aged 18–65 undergoing elective surgery in supine/ lithotomy position, like in our patients, they were randomised, crossover study comparing AuraOnce with LMA Classic in paralysed anaesthetised patients. They studied oropharyngeal leak pressure (primary outcome), insertion attempts, insertion

time, number of manipulations needed, quality of ventilation, fibreoptic scoring of glottis. They observed that ease of insertion was similar in both groups but incidence of trauma, grade of fibreoptic view, peak airway pressure and quality of ventilation during maintenance of anaesthesia were similar in both groups(14)

Sudhir *et al* compared, 50 adult patients undergoing elective surgery under GA. Theses patients were randomised and crossover study was performed comparing AuraOnce with LMA Classic. In this study no neuromuscular blockade used. They studied first-insertion success rate, ease of insertion, cuff volume and pressure required to achieve a good seal, incidence of adverse airway events and presence of blood on the device on removal. The volumes of air required to inflate the cuff to produce a seal were similar, but the cuff pressure was lower for the Ambu Laryngeal Mask than the LMA Classic so although cuff volume was variable, so actual 'leak pressure' could not be ascertained.. Visual analogue scores for ease of insertion was significantly higher in Ambu and than for the LMA Classic (p=0.017). Complications were similar in both groups. They suggest that the disposable Ambu Laryngeal Mask is an acceptable alternative to the reusable LMA Classic (15)

Ng *et al*. conducted 105 ASA 1–2 female patients undergoing minor gynaecological surgery. The study design was prospective, randomised, single-blind trial which compared Aura Once and LMA Classic. In this study no neuromuscular blockade was used during insertion. Insertion time, ease of insertion, leak pressure, first-insertion success, haemodynamic changes on insertion and complications were also compared and they observed, There was no difference in time to insertion, successful insertion at first attempt, oropharyngeal leak pressure, haemodynamic response to insertion or complications of placement. The AMBU®LMA was easier to insert. There was a suggestion of reduced postoperative sore throat and pharyngeal trauma for the AMBU®LMA group. The AMBU®LMA is a viable alternative to the LMA Classic for airway management in spontaneously breathing patients. (16)

Suzanna *et al*. carried out study in 118 ASA 1–2 patients, undergoing elective surgery under GA . This study was again prospective, randomised controlled trial comparing AuraOnce with LMA Classic in paralysed patients. In this study Insertion time, insertion attempt and complications were recorded and it was observed that the Ambu® LMA was comparable to the Classic™ LMA in terms of the ease of insertion, but provided better seal during positive pressure ventilation with less postoperative sore throat (17)

Williams *et al*. studied 82 ASA 1–4 patients undergoing plastic, urological, orthopaedic or breast surgery.This study was prospective single-blind randomised controlled trial compared AuraOnce with LMA Unique in spontaneously breathing patients. It noted, There was no statistical difference between the two devices for overall success rate, insertion time, number of adjustments, laryngeal alignment, blood-staining, and sore throat ($P \geq 0.05$).The AMBU Aura Once disposable laryngeal mask provided a higher oropharyngeal leak pressure compared to the LMA Unique in spontaneously breathing adult patients.(18)

## CONCLUSION

We at our centre during insertion of SGA observed that the patients in whom muscle relaxant were administered, had similar haemodynamic profile, better ease of insertion, although regarding complications like Trauma was statistically significant in SGA inserted patients without muscle relaxant, but rest of complications like Sore throat, Bronchospasm, Aspiration and Hoarseness was comparable in both group.

**Conflict of interest**

None

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## References

1. Van Zundert TC, Brimacombe JR, Ferson DZ, Bacon DR, Wilkinson DJ. Archie Brain: celebrating 30 years of development in laryngeal mask airways. Anaesthesia 2012; 67: 1375–85.
2. Bran dt L. The first reported oral intubation of the human trachea. Anesth Analg 1987;66:1198-9.
3. Hernandez MR, Klock PA,Jr, Ovassapian A. Evolution of the extraglottic airway: A review of its history, applications, and practical tips for success. Anesth Analg. 2012;114(2):349-368.
4. Jadhav PA, Dalvi NP, Tendolkar BA. I-gel versus laryngeal mask airway-Proseal: Comparison of two supraglottic airway devices in short surgical procedures Journal of Anaesthesiology Clinical Pharmacology | April-June 2015 | Vol 31 | Issue 2.
5. Cook TM, Lee G, Nolan JP. The ProSeal™ laryngeal mask airway: a review of the literature. Can J Anesth 2005 / 52: 7 / Pp 739–760.
6. Baidya DK, Chandralekha, Darlong V, Pandey R.Comparative efficacy and safety of the Ambu_ AuraOnceTM laryngeal mask airway during general anaesthesia in adults: a systematic review and meta-analysis. Anaesthesia 2014, 69, 1023–1032.
7. Timmermann A. Supraglottic airways in difficult airway management: Successes, failures, use and misuse.*Anaesthesia*. 2011;66(s2):45-56.
8. Ramachandran SK, Mathis MR, Tremper KK, Shanks AM, Kheterpal S. Predictors and clinical outcomes from failed laryngeal mask airway unique™: A study of 15,795 patients. *Anesthesiology*. 2012;116(6):1217-1226.
9. Apfelbaum JL, Hagberg CA, Caplan RA, *et al*. Practice guidelines for management of the difficult airway: An updated report by the american society of anesthesiologists task force on management of the difficult airway. *Anesthesiology*. 2013;118(2):251-270.
10. Cook TM, Woodall N, Frerk C, Fourth National Audit Project. Major complications of airway management in the UK: Results of the fourth national audit project of

the royal college of anaesthetists and the difficult airway society. part 1: Anaesthesia. *Br J Anaesth*. 2011;106(5):617-631.
11. Cook TM and MacDougall SR. Complications and failure of airway management. British Journal of Anaesthesia 109 (S1): i68–i85 (2012) doi:10.1093/bja/aes393.
12. Michalek P, Donaldson W, Vobrubova E. Complications Associated with the Use of Supraglottic Airway Devices in Perioperative Medicine. BioMed Research International Volume 2015, Article ID 746560, 13 pages http://dx.doi.org/10.1155/2015/746560
13. Braude N, Clements E A F, Hodges U M,Andrews B P. The pressor response and laryngeal mask insertion. A comparison with tracheal intubation. Anaesfhesia 1989; 44: 5514
14. Shariffuddin II, Wang CY. Randomised crossover comparison of the Ambu AuraOnce laryngeal mask with the LMA Classic laryngeal mask airway in paralysed anaesthetised patients. Anaesthesia 2008; 63: 82–5.
15. Sudhir G, Redfern D, Hall JE, Wilkes AR, Cann C. A comparison of the disposable Ambu AuraOnce Laryngeal Mask with the reusable LMA Classic laryngeal mask airway. Anaesthesia 2007; 62: 719–22.
16. Ng SY, Teoh WHL, Lim Y, Cheong VG. Comparison of the AMBU_ Laryngeal Mask and the LMA Classic in anesthetized, spontaneously breathing patients. Anaesthesia and Intensive Care 2007; 35: 57–62.
17. Suzanna AB, Liu CY, Rozaidi SW, Ooi JS. Comparison between LMA-Classic and AMBU Aura Once laryngeal mask airway in patients undergoing elective general anaesthesia with positive pressure ventilation. Medical Journal of Malaysia 2011; 66: 304–7.
18. Williams DL, Zeng JM, Alexander KD, Andrews DT. Randomised comparison of the AMBU AuraOnce laryngeal mask and the LMA Unique laryngeal mask Airway in spontaneously breathing adults. Anesthesiology Research and Practice 2012; 2012:405812.
19. Jain S, Khan RM, Ahmed SM, Singh M. Comparison of classic laryngeal mask airway with Ambu laryngeal mask for tracheal tube exchange: A prospective randomized controlled study. Indian J Anaesth 2013;57:259-64.

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