An audit of post-operative sore throat using different laryngeal mask airways

INTRODUCTION

The laryngeal mask airway (LMA) is mainly used as an alternative to tracheal intubation in both emergency and operative settings. It is easier to insert, causes less trauma to the trachea and has smoother emergence as compared to the endotracheal tube (ETT),[1,2] and in one study, LMA use lowered the incidence of post-operative hoarse voice, cough and laryngospasm as compared to in intubated patients.[3] Post-operative sore throat (POST) is also reported to be lower in LMA use[4] and is the main endpoint that is looked at in our study.

POST is a very common complication of LMA insertion, with its incidence reaching 32.9% of patients in one study.[5] Even between the different LMAs, the incidence and severity of POST vary. In particular, the LMA i-gel has been reported to have a lower incidence of POST as compared to the other LMAs.[6,7] Locally, there has been a paucity of studies looking at the difference in incidence and severity of POST between i-gel and the other LMAs.

Therefore, we performed a cross-sectional observational study on the incidence and severity of POST after LMA insertion and compared this across the different models, with the aim of adding on to local data, paving the way for future larger multi-centre studies with the end-goal of impacting clinical practice, healthcare costs, patient outcomes and patient satisfaction.

MATERIALS AND METHODS

The study was granted DSRB (Domain Specific Review Board, the institution's ethics review board) clearance for exemption from full ethics review, in view that the study handles anonymised data, poses minimal risk to its recruited patients and meets the required ethical standards.

Sample size calculation and probability of error calculation were not possible due to the minimal previous local data specific to the LMA models compared in the study. Furthermore, given that the study is an audit of clinical practice, an appropriate time period for the sample population was instead specified for the study.

For the study, a total of 88 patients coming for surgery who required LMA insertion were recruited in a one-month period between April 2019 and May 2019, from both the Day Surgery Operating Theatre and the Major Operating Theatre in a tertiary hospital. Pregnant women and children were excluded from the study.

Patients requiring LMA insertion underwent induction and emergence by trained and certified clinicians. Patient data was procured and de-identified in the Post-Anaesthesia Care Unit (PACU) by the nurses and sisters in the PACU. Patient data included the type of LMA used, the size of LMA used, the presence of POST and the severity of sore throat. Cuff pressures were monitored and maintained between 50 and 60 mmHg for Ambu® Auraflex LMA, Flexible LMA (F-LMA) and Classic LMA. The i-gel LMA does not have an inflatable cuff. Incidence of sore throat was defined as 'Yes' or 'No'. The severity of sore throat was graded with a pain score from 0 to 3, with Grade 0, 1, 2, 3 meaning painless, mild, moderate, and highly severe ('Never an LMA again'), respectively. The four-point pain score used was adapted from previous studies analysing POST in LMA utilisation.[8,9] Due to local data protection regulations, patient biodata (including age, sex, weight) were omitted. Data points which were missing a pain score were taken as absence of sore throat.

The results were analysed using SPSS (IBM Corp, 2013, IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp). The severity of POST was taken as a parametric variable and the incidence of POST was taken as a non-parametric variable. Parametric variables were analysed with Student's *t*-test. Non-parametric variables were analysed with Fisher's Exact Test and Mann-Whitney U test. *P* value <0.05 was taken as statistically significant.

F-LMA and Classic LMA were omitted from the statistical analysis for individual qualitative discussion as the sample size was too small for statistical analysis (only one incidence of use in each LMA). Comparison of differences in POST between different sizes of LMA was also omitted from statistical analysis due to small sample size and is qualitatively discussed instead.

RESULTS

Of the 88 patients recruited, the Ambu® Auraflex LMA, i-gel LMA, F-LMA and Classic LMA were used in 69, 17, 1 and 1 patients, respectively.

Comparing the Ambu® Auraflex LMA and the i-gel LMA, there was a significantly higher incidence of POST associated with the use of the i-gel LMA ($P = 0.013$). When comparing the severity of POST between the two LMAs, there was significantly more pain with the i-gel LMA ($P = 0.003$) [Table 1].

Comparing the incidence of sore throat between the different sizes of LMA, for i-gel, usage of the size 3 and size 4 LMAs caused POST in 0% and 33.3% of cases, respectively, whereas for Ambu®Auraflex, usage of size 3, size 4 and size 5 LMAs caused POST in 0%, 7.8% and 0% of cases, respectively [Table 2].

The one instance of the usage of the F-LMA and Classic LMA each was not associated with POST.

DISCUSSION

The main findings in our study are the increased incidence and severity of POST after i-gel insertion compared to Ambu® Auraflex and, interestingly, increased POST associated with smaller sizes of Ambu® Auraflex.

The vast majority of current literature suggests that usage of the LMA i-gel compared to other LMAs in the market is associated with similar or lower incidence of POST.[6,7,10] This is postulated to be due to the incorporation of a thermoplastic elastomer cuff instead of the usual inflatable cuff[11] which hence exerts less pressure on the hypopharynx.[6] Lower cuff pressures are associated with lower incidence and severity of POST.[12,13] However, there was one study that reported greater incidence of sore throat with i-gel insertion.[14]

In our study, we found that the incidence and severity of POST for i-gel LMA were increased as compared to other forms of LMAs used. A contributing factor to this finding could potentially be the greater difficulty of insertion which could predispose to greater laryngopharyngeal trauma and thus sore throat, agreeing with current literature,[15] although some studies report the opposite: greater ease of insertion of the i-gel LMA.[16]

An interesting finding in our study described **greater** incidence of POST post-Ambu® Auraflex LMA insertion in the Size 4 population compared to the Size 5 population. The majority of current literature disagrees with this finding, and suggests that a larger size of LMA correlates with greater laryngopharyngeal trauma and therefore POST.[17] However, in one study, smaller sized LMAs resulted in greater POST, due to inappropriate sizing corresponding to the bodyweight of the patient.[18] Hence, in our situation, the likely reason for the greater incidence of POST in a smaller size Ambu® Auraflex LMA is that the Size 4 was used inappropriately in certain patients, resulting in a higher incidence of POST.

There are a few other confounders in the study which could explain the differences in both incidence and severity of POST between our study and current literature.

The first would be the differences in procedures in which the LMAs were used in. The duration and the procedure itself could cause or exacerbate laryngopharyngeal trauma, and thus affect the findings. Another confounder would be that current literature did not specifically compare i-gel and Ambu® Auraflex, which could account for the differences in data. Next, the study populations in literature are different from our study population. Ventilation difficulty, defined as inadequate seal, gas leak, resistance to gas in one study was found to be affected by anatomical differences accorded by race and ethnicity,[19] hence population differences and

Table 1: POST Incidence and Severity[1]

LMA	i-gel (*n*=17)	Ambu Auraflex (*n*=69)	*P*
Incidence of Post-operative Sore Throat; *n* (%)	5 (29.4)	4 (5.8)	0.013
Severity of Sore Throat; *n* (%)			0.003
Grade 0	12 (70.6)	65 (94.2)	
Grade 1	0 (0)	2 (2.9)	
Grade 2	5 (29.4)	2 (2.9)	
Grade 3	0 (0)	0 (0)	

[1]POST – Post-operative Sore Throat

Table 2: POST Incidence in Different LMA Sizes[1]

i-gel	Size 3 (*n*=2)	Size 4 (*n*=15)	
Incidence of Post-operative Sore Throat; *n* (%)	0 (0)	5 (33.3)	
Ambu Auraflex	**Size 3 (*n*=5)**	**Size 4 (*n*=51)**	**Size 5 (*n*=13)**
Incidence of Post-operative Sore Throat; *n* (%)	0 (0)	4 (7.8)	0 (0)

[1]LMA – laryngeal mask airway; POST – Post-operative sore throat

thus anatomical differences[20] could be a confounder in our study as well. Finally, as also discussed above, current literature suggests that the size of the LMA could affect the degree of airway morbidity post-operatively[17] and thus with a larger sample size these differences could be elucidated more clearly.

Regarding the limitations of our study, the main limitation is its limited duration and, therefore, limited sample size and patient population, which can affect the representativeness of the data procured and analysed. For instance, we could only record one instance of F-LMA and Classic LMA utilisation. With a background of a paucity of local data, our findings further suggest the need for larger studies to provide further evidence before a definitive conclusion can be made. Another limitation was the method of data collection, where patients were asked to subjectively rate the severity of pain by different data collectors which could influence the data, especially if there are variations in the phrasing of the questions. Hence, future research could consider the need for data to be collected by a dedicated team who has agreed on the phrasing of the questions. Lastly, a common limitation to LMA research, which is also reported in other studies, is that the insertion of the LMA is performed by different clinicians, resulting in operator-dependent patient outcomes, and a method to address this would be to recruit patients with LMA insertions by a team of clinicians with similar levels of experience and skills.

In conclusion, the i-gel LMA has been reported to have lower incidence of POST by numerous studies. Our findings report the converse, with greater incidence and greater severity of POST with i-gel use. Future larger scale multi-centre studies would be required to address the confounders above to better refine the findings, which is important as it could affect clinical practice, cost and patient outcomes.

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Conflicts of interest

There are no conflicts of interest.

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