Editorial

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Use of supraglottic airway devices in paediatric patients in the Indian context - some we know, some we need to know and march ahead

Surveys in medical research are useful means to accumulate information on and to understand attitudes to healthcare practices.[1] Recent surveys across the globe suggest that the pattern of use of supraglottic airway devices (SADs) in paediatric anaesthesia is inconsistent.[2-5] In this issue of the *Indian Journal of Anaesthesia*, Jain *et al*. report their findings of a pan-Indian survey of practices and pattern of use of SADs in paediatric patients.[5] The authors must be congratulated for carrying out the first Indian study that tried to reach out to a much larger cohort, used a validated questionnaire and included questions that are the need of the hour considering the rapid evolution of SADs.[5] Moreover, the authors' insightful interpretation of their findings in the context of current literature makes it an interesting read.[5] Regrettably, a response rate of 2.3% raises more than a few unfortunate concerns.[5-8] It is noted that surveys of healthcare personnel, especially of physicians, can be challenging.[8] An author's deep anguish for not obtaining the desired responses for a survey can be felt in his letter to the editor of this journal.[9] Although authors have rightly pointed out the possible reasons for such a low response, such a dismal response rate, even though higher than the calculated sample size, can introduce substantial biases; mainly non-response bias.[5-8] This may adversely impact the generalisability and applicability of their reported data.[8] It could have been avoided if the final correspondence was preceded by a survey that would have identified a potential respondent who practices paediatric anaesthesia.[1]

It can also be argued that response rate cannot represent the quality of data.[7] Response representativeness is more relevant than quantification of the response.[7] Among many other possibilities, it may be that only those who practice paediatric anaesthesia or use SADs in children may have responded. It would have made things a little bit clearer if the authors had provided information about how many respondents did not use SADs in children and what are the reasons.[7] So, what do we do? Do we accept the results as a representation of national practice pattern? Or do we simply ignore them? Even though the authors could have devised strategies to improve the response rate, data from this survey contains the highest number of responses from India.[1,4,5,8,9] Hence, can we just take a middle path and evaluate the respondent's practices in the context of available literature and try to get some more insight?

The very same year that the first clinical experience with laryngeal mask airway (LMA®) was published, it was realised that device dislodgement, obstruction of the proximal aperture of the airway with epiglottis, risk of aspiration of gastric contents and leak around the cuff, especially during assisted or controlled ventilation were hindrances to its use.[10] It was logical to postulate that apart from meticulous case selection, modification of the design to obtain better application of the cuff to the pharyngeal surfaces, sealing of the oesophageal aperture and provision to drain the stomach contents would decrease the risk of aspiration.[10,11] Designing a cuff that prevents escape of air without exerting much pressure on the mucosa may allow the device to be used with ventilation modes or co-morbid conditions that generate higher airway pressures, while at the same time, decreasing the risk of airway-related morbidities, aspiration and device dislodgement.[11]

SADs can also be used as a conduit for endotracheal intubation, either by blind technique with or without assistance by a bougie or guided by fibreoptic devices.[10,11] A device that allows smooth passage of the insertion cord and endotracheal tube along with a good glottic view may be the bridge between imminent death and life during difficult airway scenario.[10] Thus, these devices are frequently compared with each other in terms of oropharyngeal leak pressure (OPLP), success rate of insertion at the first attempt, time taken to insert, ease of insertion, fibreoptic glottic view and overall complications.[10-17] Detailed discussions on the historical aspects, properties that influence its use in routine as well as special circumstances and clinical indications have been recently published.[10,11,17,18] Many randomised controlled trials carried out specifically in paediatric age group have compared these various clinical properties in the last two decades. This has led to the publication of a few meta-analyses and comparisons of some of the measured outcomes are presented in Table 1.[12-17]

Paediatric anaesthesiologists in the USA and UK use the first-generation SADs more frequently.[2,3] In fact, meta-analyses suggest that the second-generation devices may provide certain advantages over the first-generation SADs [Table 1]. It is heartening that the choice of SADs in majority of Indian respondents has evolved and is substantiated by the available literature.[4,5,12-18,20]

Some of the second-generation SADs provide better OPLP, that increases the confidence of the practising anaesthesiologist to use them in patients whose breaths are controlled or assisted or with less complaint lungs [Table 1].[11] Even though fewer respondents from India used pressure control ventilation (PC), volume control (VC) and pressure support (PS) ventilation compared to those in the USA and UK, it can be anticipated that the use of PC/VC/PS ventilation will be feasible and gain popularity in India.[2,3,5] However, for certain SADs, ventilation may prove to be difficult in certain head positions even with a superior OPLP.[19] Whether achieving a higher OPLP translates into reduction of incidence of aspiration can be answered in the future only.[11]

It is generally believed that complications of SADs are more pertinent in small children. Hence, ingrained is this belief that a sizable proportion of respondents across the surveys has never used SADs in small children.[2,3,5] A recent narrative review suggests that certain newer generation SADs may not pose such risks as was seen with their predecessors and multivariate analysis suggests that neither age <2 years nor smaller size LMA® increased the risk of device failure.[11,21] It is worth noticing that the frequency as well as the pattern of adverse events reported in the survey by Jain *et al*. is different than other surveys as well as the available meta-analyses.[2,3,5,12-17] These meta-analyses do not indicate that any specific device may lead to an overall meaningful decrease in complication rates.[12-17] It must be remembered that none of the studies included in these meta-analyses evaluated complications as the primary outcome; thus they were statistically underpowered to examine this very pertinent aspect. Nonetheless, they still alert us that complications are not that rare. It is worthwhile to investigate whether the anatomical uniqueness of Indian population or inadequate experiences with the device is responsible for these discrepancies.

Indian guidelines recommend the use of the second-generation SADs in paediatric patients with an unanticipated difficult airway as a rescue device.[20] Ease of insertion, high success rate of the first insertion along with being a predictable conduit for ventilation and access to trachea make them attractive for such challenging situations.[11] Conflicting data are present on whether SADs can be used for blind tracheal intubation in elective surgical cases.[22,23] In low-resource settings, where fibreoptic devices may not be available, Air-QLMA® can be used to achieve blind tracheal intubation in both supine and lateral positions.[22] In contradiction, AmbuAura-i® and Air-QLMA® were found to have unacceptably low blind intubation success rate and authors recommended against such practices.[23] Even with persons with limited prior experience, the median time to achieve endotracheal intubation using a fibrotic device in paediatric patients was similar with Air-QLMA® and i-gel®, though i-gel® may make device removal difficult after tracheal intubation.[24] Many of these devices provide a better glottic view, and it can be postulated to increase the ease of fibreoptic intubation.[11] Unfortunately, most Indian anaesthesiologists may not have access to fibreoptic devices.[5] It must also be recognised that suboptimal glottic view may not impede adequate ventilation, and thus may still be useful in a difficult airway.[3] The success rates of first-time insertion for most of these devices are high with minor differences that may bear only statistical significance with doubtful clinical importance. If more attempts are allowed, the device insertion success rates are almost similar. Thus, in a controlled environment and in a patient with normal airway, one specific device may not offer advantage. However, a small difference in success may translate into a life or death situation while dealing an unanticipated difficult airway.

Table 1: Comparison of major outcomes reported in meta-analyses comparing supraglottic airway devices in paediatric anaesthesia

Study (year of publication)	Total number of RCTs	Total number of patients	Devices compared	Main outcomes*		
Zhang *et al*., 2012[12]	8	557	PLMA® compared to LMA-C®	Better OPLP Less gastric insufflation	Similar First insertion success rate Post-operative blood staining on the mask Laryngospasm Bronchospasm Hoarseness Glottic view	
Maitra *et al*., 2014[13]	9	731	i-gel® compared to PLMA®	Better OPLP	Similar First insertion success rate Ease of insertion Success of gastric tube insertion at first attempt Blood staining on the Device Device displacement	
			i-gel® compared to LMA-C®	Better OPLP	Similar First insertion success rate Ease of insertion Cough Blood staining on the device	
Choi *et al*., 2014[14]	9	1166	i-gel® compared to all LMA®†	Less blood on device Better OPLP Slightly better fibreoptic view	Similar Rate of insertion at the first attempt Rate of easy insertion Successful gastric tube insertion Coughing Sore throat PONV Desaturation Laryngospasm Bronchospasm	
Ahn *et al*., 2016[15]	10	789	AirQ LMA® compared to all other SADs†	Better best scenario fibreoptic view	Similar OPLP Success rate of device insertion Device insertion time Time to intubate Worst scenario fibreoptic view Blood stain Laryngospasm Sore throat Desaturation	Lower Ease of insertion Total success rate of intubation‡

Contd...

Table 1: Contd...

Study (year of publication)	Total number of RCTs	Total number of patients	Devices compared	Main outcomes*		
Bhattacharjee *et al*., 2017[16]	7	586	LMA-S® compared to PLMA®	Less incidence of blood stain on the device	Similar OPLP First insertion success rate Device insertion time Ease of insertion Ease of gastric tube insertion at first attempt Device displacement	
			LMA Supreme® with i-gel	Better device insertion	Similar OPLP First insertion success rate Ease of gastric tube insertion	
Mihara *et al*., 2017[17]	65	5823		i-gel®, PLMA®, Cobra PLA®-Higher OPLP PLMA®, LMA-C ®, LMA-U®-Lower risk of device failure	i-gel®-lower risk of blood staining	Risk of failure at first attempt was significantly higher in patients with body weight <10 kg than in heavier children i-gel®, PRO-Breathe-Higher risk of device failure

*Every outcome may not necessarily be based on the total number of studies included for comparison between two devices; †Subgroup analysis are not reported here; ‡Excluding result of one study. Cobra PLA® – Cobra Perilaryngeal Airway; LMA – Laryngeal Mask Airway; LMA-C® – Classic LMA; LMA-F® – LMA Flexible; LMA-S® – LMA Supreme; LMA-U® – LMA Unique; PLMA® – Proseal LMA; PONV – Post-operative nausea and vomiting; RCT – Randomised controlled trial; SADs–Supraglottic airway devices; OPLP – Oropharyngeal leak pressure

Even though the findings of the meta-analyses help us to take an informed decision regarding the use of SADs, quite understandably, these findings are marred by heterogeneity.[12-17] Moreover, there is a dearth of high-quality studies for many of the SADs.[17]

Although many aspects of the Indian respondents' practice pattern make us feel contended, it is worrisome that safe practices such as using capnography, measurement of OPLP, cuff pressure and appropriate disinfection are lacking.[5] More troubling is the fact that only a small section of them had no access to these devices required to ensure the safe use of SADs.[5]

No single SAD can currently provide the best combination of features. Apart from experience, we must be aware of each unique feature offered in a SAD and its evidence base to use it proficiently. The constant evolution of SADs should be a constant reminder for our quest to ensure maximum safety along with the desire to provide maximum comfort to our patients. Even though for majority of the respondents' past experiences were the deciding factor for the use of a device compared to its evidence base, it is heartening to see that the choices of the Indian respondents can be justified by the current available literature.[2,5] Still, there must have been a section that is yet to embrace it. This study should be also a reminder to all our fellow colleagues to voice their opinion, take part in shaping the future and march ahead with the world.

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