Is it safe to use supraglottic airway in children with difficult airways?

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The supraglottic airway has a potential role in patients with difficult airways. There have been numerous reports of successful use of the supraglottic airway in patients in whom both tracheal intubation and facemask ventilation were difficult, and the device is now regarded as a ‘rescue’ device in cases of ‘cannot intubate, cannot ventilate’ scenario.1–6 The supraglottic airway can also function as an aid to tracheal intubation, and studies have confirmed that this usage is highly effective in patients with difficult airways.1–3 In addition, in adult patients with difficult airways, the supraglottic airway (without tracheal intubation) usually can provide clear airways during anaesthesia. In this issue, Jagannathan and colleagues5 report a retrospective analysis of the efficacy of sole of a supraglottic airway in children with difficult airways.

Jagannathan and colleagues5 searched for children who had been predicted to have difficult airways caused by anatomical deformities (such as Treacher-Collins syndrome, subglottic stenosis, and pharyngeal masses), and those with history of difficult tracheal intubation and difficult facemask ventilation. Among 77 272 children who underwent general anaesthesia during a 4-yr period, the authors identified 459 children (0.6%) with difficult airways. In 109 of the 459 children, a supraglottic airway was used as a primary airway during anaesthesia, and it provided clear airways in 105 of the 109 children. In the remaining four children, reinsertion of a supraglottic airway (two patients) and tracheal intubation (two patients) became necessary.

Indications and contraindications

So, can we regard the supraglottic airway as being able to reliably provide a clear airway in a child with difficult airway? The answer would be ‘yes’, as the study by Janannathan and

23 Marik PE, Levitov A, Young A, Andrews L. The use of NICOM (Bioreactance) and Carotid Doppler to determine volume responsiveness and blood flow redistribution following passive leg raising in hemodynamically unstable patients. Chest 2013; 143: 364–70
Airway? The study by Janannathan and colleagues has shown a high success rate of its use. Can we then use a supraglottic airway in any child with difficult airway? The study by Janannathan and colleagues does not provide a direct answer to this, but a supraglottic airway was used in only 109 of the 459 children with difficult airways. Although it is not clear how each anaesthetist judged to use a supraglottic airway or to intubate the trachea in each patient, it is apparent that such a high success rate was obtained by avoiding the use of a supraglottic airway when it was not indicated.

As in the general population, the supraglottic airway is contraindicated in children at increased risk of pulmonary aspiration, in those with collapsible lower airways (such as in those with anterior mediastinal masses), and in those in whom intermittent positive pressure ventilation with high airway pressures is required (Table 1). The supraglottic airway should be regarded as relatively contraindicated in a child with a partially collapsible lower airway, such as in tracheomalacia.

When insertion of a supraglottic airway is predicted to be difficult, it would not be safe to induce anaesthesia and rely on its use, as there is no guarantee that the device can be inserted successfully. We should be aware that, even in patients with ‘normal airways’, insertion of a supraglottic airway may fail in up to 10% of cases, and the incidence of failure at the first attempt at insertion can be as high as 30%. There are several situations in which both insertion of a supraglottic airway and tracheal intubation can be difficult: a limited mouth opening, restricted head and neck movement, and cricoid pressure. If there is a risk of difficult insertion of a supraglottic airway, awake tracheal intubation should be chosen. Alternatively, it may be possible to insert a supraglottic airway before induction of anaesthesia and maintain spontaneous breathing during anaesthesia.

Even when a supraglottic airway has successfully been inserted, airway complications occasionally occur during general anaesthesia. In adult patients, in 5–6% of cases, airway complications may occur during the use of the device, requiring urgent treatment, such as replacement of the device or emergency tracheal intubation. Four independent risk factors of failure have been identified: male gender, obesity, poor dentition, and rotation of a surgical table.

In conclusion, the study by Janannathan and colleagues has shown that the supraglottic airway can be reliably used in children with difficult airways. It seems reasonable to conclude that, only with careful preoperative assessment of indications and contraindications of the supraglottic airway, an experienced anaesthetist can use a supraglottic airway in children with difficult airways.

**References**


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**Table 1** Contraindications of the supraglottic airways in children with difficult airways

<table>
<thead>
<tr>
<th>Absolute contraindications</th>
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<tr>
<td>Increased risk of pulmonary aspiration</td>
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<tr>
<td>Airway obstruction beyond the glottis</td>
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<td>High airway pressure</td>
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<th>Relative contraindications</th>
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<tr>
<td>Partially collapsible lower airway</td>
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<td>Restricted access to the airway</td>
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<td>Inexperience with the use of a supraglottic airway</td>
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**Declaration of interest**

T.A. has received honoraria from the distributors of the laryngeal mask airway and the i-gel for giving lectures.
Lipid rescue: does the sink hold water? And other controversies

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The very first reports of successful use of i.v. lipid emulsion (ILE) preparations to ameliorate local anaesthetic toxicity originated from the laboratory of Guy Weinberg MD in 1998.1 Demonstration of a significant increase in the LD50 for bupivacaine after ILE application in a rodent model rapidly beget an explosion of experimental, and more latterly clinical, interest in the use of lipid preparations as antidote. Largely driven by the ‘sink’ theory positing sequestration of lipophilic xenobiotics to an expanded intravascular lipid phase,2 new researchers have extended the profiling of lipid rescue beyond lipid-soluble local anaesthetics and demonstrated the effect for ILE in animal models of lipophilic calcium channel blockers,3 4 tricyclic antidepressants,5 6 antipsychotics,7 and antiarrhythmics8 9 to name but a few. Successful resuscitation in clinical cases of local anaesthetic systemic toxicity (LAST) with lipid infusion have been well documented10–13 and anecdotal instances of seemingly dramatic recovery for non-local anaesthetic drug poisonings likewise reported.14 15 Confirmation of clinical efficacy has seen ILE endorsed by anaesthetic societies on both sides of the Atlantic16 17 with support also forthcoming from toxicologic forums18 endorsing ILE use as potential adjuvant to resuscitation in lipophilic drug poisonings. And so lipid emulsion smoothly transitions from parenteral nutritional supplement to established antidote.

If only it were that simple. The rapid ascent of ILE as rescue therapy in LAST, and indeed toxicology in general, provides a case study in adoption of novel therapies when data pertaining to both the scope and mechanism of action remain incomplete. For there is much about ILE that remains unknown. Indeed despite significant research effort over the last decade and—a-half, the exact mechanism, or perhaps more rightly mechanisms, of action for ILE are only just beginning to be fully elucidated. Similarly, the scope of indications for utilization of lipid, particularly beyond that in LAST, remains the subject of significant controversy.19 It is into such a background that the present edition of the journal publishes two pre-clinical investigations further exploring ILE use in local anaesthetic toxicity—two more pieces in the puzzle. They ask: does ILE therapy confer benefit in the paediatric population suffering LAST? The answer in the model interrogated at least appears in the affirmative. The answers to the more fundamental questions posed, however, are less clear. How do we integrate ILE into standard APLS resuscitation algorithms? And what is the fundamental mechanism of action of ILE in LAST anyway? By examining some of these unanswered questions pertaining to ILE, the authors serve to bring us incrementally closer to a complete understanding of this novel therapy.