Managing limitations of the LMA Classic laryngeal mask as a conduit for tracheal intubation in impending paediatric airway obstruction: a case report

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Case report

Peritonsillar abscess (quinsy) is the most common deep neck infection in children and adolescents, although it is less frequently seen in young children.[1] Airway compromise is a feared complication. We describe the successful management of a patient with impending paediatric airway obstruction. The LMA Classic™ laryngeal mask (Teleflex Medical Ltd., Co. Westmeath, Ireland) was the only paediatric-sized supraglottic device available in our operating theatre and was modified to work around its limitations as a conduit for tracheal intubation.

In March 2020, an 18-month-old girl with good past health weighing 9.5 kg was admitted to our district general hospital 8 days after onset of fever up to 38.9°C, with worsening left facial swelling, inspiratory stridor during sleep, drooling and poor feeding.

On examination, she was pink and calm when carried upright. Her throat was swollen with bilateral grade 3 tonsils and the left cheek and submandibular region were grossly swollen (~10 cm × 6 cm). Contrast computed tomography of the neck revealed a 3.3-cm × 4.8-cm × 3.8-cm peritonsillar abscess with rightward deviation of the upper airway and significant narrowing at the larynx, with the narrowest cross-section measuring 3.5 mm (Fig 1).

In view of the critical airway diameter and the impending progression to complete airway

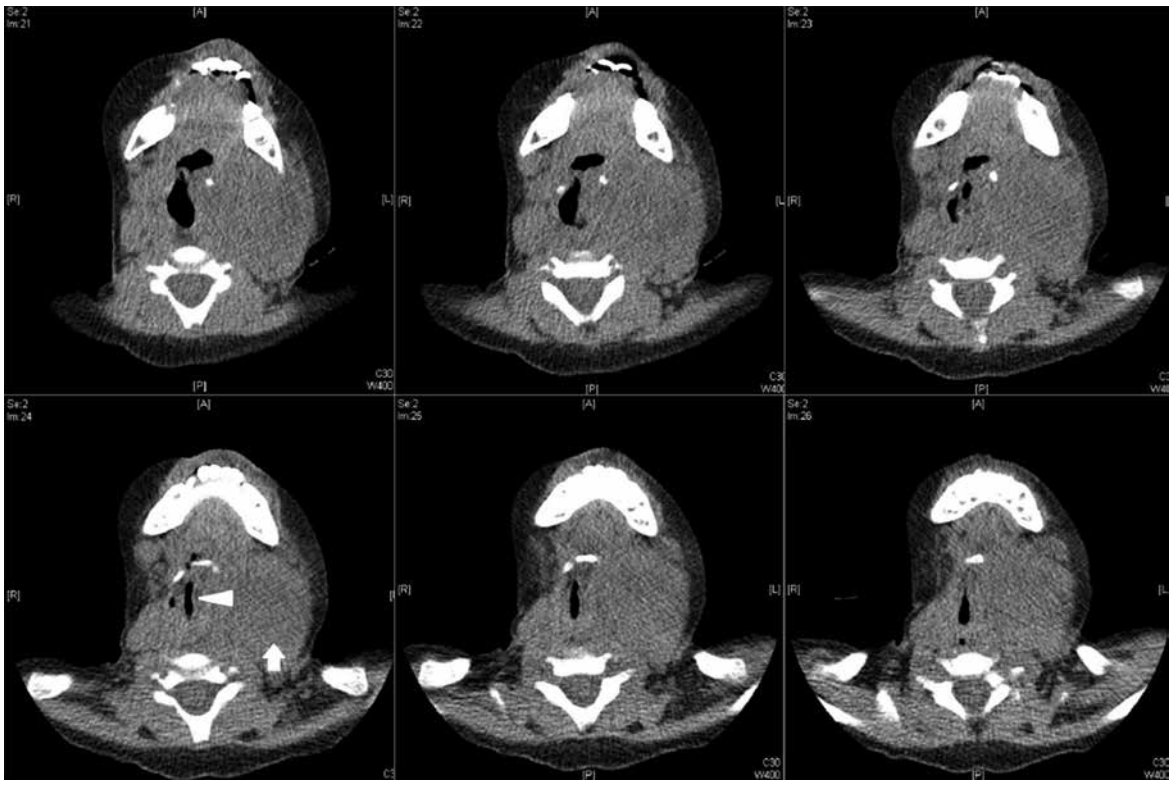

FIG 1. Computed tomography films showing critical airway narrowing at the larynx (arrowhead) due to obstruction by peritonsillar abscess (arrow)

obstruction, and after discussion with the on-call head and neck surgeons and the patient's mother, the decision was made to proceed with emergency incision and drainage under general anaesthesia.

The sizing of all our airway equipment was checked in advance. The distal aperture bars of a #1.5 LMA Classic laryngeal mask were cut to facilitate use as an intubation conduit.

The patient had a 24G intravenous cannula in situ on arrival in theatre. Surgeons were ready at the bedside with front-of-neck access equipment on standby. Hong Kong College of Anaesthesiologists standard monitoring was applied. Gaseous induction with spontaneous ventilation was performed using an Ayres' T-piece and 4% sevoflurane in 100% oxygen. After an adequate depth of anaesthesia was achieved as assessed by vital parameters, intubation using video laryngoscopy was attempted. Two initial attempts were unsuccessful, with very rapid desaturation down to an SpO_2 of 50% to 60%. Subsequent attempts at rescue bag mask ventilation failed despite optimisation by positioning and oropharyngeal airway. Fortunately, a final attempt to insert the laryngeal mask was successful and ventilation was maintained.

As a definitive airway was still necessary, a 2.2-mm fibreoptic bronchoscope was passed through the laryngeal mask and a 3.5-mm Microcuff endotracheal tube (ETT) carefully railroaded over the bronchoscope into the trachea. Correct positioning was confirmed by bilateral chest auscultation and capnography. We deemed it unsafe to leave the laryngeal mask in place as traction could risk ETT dislodgement postoperatively. The video laryngoscope was used to visualise the distal end of the ETT near the vocal cords and it was secured with Magill forceps. The laryngeal mask was slowly pulled out over the ETT, but the 15-mm connector of the laryngeal mask could not be passed over the ETT pilot balloon even when deflated. Hence, we carefully cut down the laryngeal mask with scissors, leaving only the end with the 15-mm connector still attached (Fig 2).

The operation proceeded uneventfully. Subsequently the patient was transferred to the paediatric intensive care unit and kept intubated and sedated. She was discharged after a short hospital stay, with good recovery on clinic follow-up examination.

FIG 2. Endotracheal tube cuff 'stuck' on 15-mm connector (arrow); remnants of cut down LMA Classic laryngeal mask with scissor incision line seen (arrowhead)

Discussion

Paediatric airway emergencies are rare and among the most challenging crises faced by anaesthetists. Unique paediatric considerations such as inability to cooperate during preoxygenation, intolerance to awake techniques and difficult front-of-neck access, in addition to inherent differences in paediatric physiology, significantly reduce the safe apnoeic time and greatly increase the risk of hypoxia.

Ideally, this case would have been managed in a specialist tertiary centre with a wider selection of equipment and expertise; unfortunately, our requests for night-time case transfer were denied. The availability and use of an intubating laryngeal mask with a larger-sized inner channel such as an air-Q™ (Salter Labs, Lake Forest [IL], United States) would have been preferable to an LMA Classic. This would have made it easier for us to remove the laryngeal mask over the ETT after intubation without having to improvise with our limited equipment in an already stressful situation. Although the Association of Paediatric Anaesthetists guidelines[2] recommend leaving the laryngeal mask in place after intubation, we deemed it necessary to remove it since continued postoperative ventilation was anticipated.

Often, manufacturer-recommended ETT/laryngeal mask combinations take account only of the ability to pass the ETT through the laryngeal mask. They may not consider the ability to remove the laryngeal mask over the ETT when the diameter of the ETT pilot balloon cuff exceeds that of the outer diameter of the ETT. This problem was illustrated in an article by Kleine-Brueggeney et al[3] who found that only the air-Q models of supraglottic airways were able to be removed over the ETT with

all manufacturer-recommended size combinations, as the air-Q had the largest inner channel diameter among other equivalently sized supraglottic airways.

Alternatively, we could have chosen to cut off the pilot balloon and repair the cuff with an angiocatheter.[4] Another option might have been to use an uncuffed tube, although it would not have been ideal in our case due to the possibility of postoperative blood or secretions tracking down and contaminating the lower airway. Furthermore, exchange of a poorly fitting uncuffed tube would have been difficult and potentially dangerous in our situation, as the airway could easily have been lost.

In conclusion, in addition to meticulous airway planning, testing combinations of ETT and laryngeal mask for both insertion and subsequent removal is important to avoid complications during airway management. Availability of an intubating laryngeal mask such as an air-Q may be particularly advantageous in such cases.

Author contributions

Concept or design: GCH Cheng.
Acquisition of data: GCH Cheng.
Analysis or interpretation of data: GCH Cheng.
Drafting of the manuscript: Both authors.
Critical revision of the manuscript for important intellectual content: GCH Cheng.

Both authors had full access to the data, contributed to the study, approved the final version for publication, and take responsibility for its accuracy and integrity.

Conflicts of interest

Both authors have disclosed no conflicts of interest.

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Ethics approval

This case report was published with the written consent of the patient's mother.

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