Emergency use of the laryngeal mask airway in severe upper airway obstruction caused by supraglottic oedema

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Summary
We report two cases of severe upper airway obstruction caused by supraglottic oedema which developed rapidly at the time of anaesthesia. Conventional methods to relieve the obstruction failed and it was only overcome when a laryngeal mask airway (LMA) was inserted and positive pressure applied manually during inspiration. In one case a fibrescope was passed via the LMA and this revealed two cushions of oedematous false vocal cords protruding into the bowl of the LMA which were pushed out of the way when positive pressure was applied during inspiration. We believe that the LMA should be considered in the emergency management of severe upper airway obstruction even when this involves supraglottic oedema. (Br. J. Anaesth. 1995; 75: 785–786)

Key words

Maintenance of a clear airway is fundamental to every general anaesthetic technique. Unfortunately, reports of airway catastrophies leading to mortality still appear in the literature [1]. The introduction of the laryngeal mask airway (LMA) has made a significant contribution in overcoming this problem. We describe two cases of severe airway obstruction caused by supraglottic oedema which were relieved effectively by use of the LMA with manually assisted positive pressure ventilation.

Case reports
PATIENT NO. 1
A 48-yr-old male was admitted with gross bilateral submandibular swelling (Ludwig’s angina) which had developed over the previous 7 days after a dental extraction. On examination, the patient’s jaw was open partially but fixed, with an interincisor gap of approximately 2–3 cm. The base of the tongue was presumed to be swollen as the tongue seemed to fill most of the oral cavity. The patient was unable to phonate correctly or to swallow saliva.

An “awake” fibreoptic intubation was planned and the procedure explained to the patient. He was premedicated with papaveretum 10 mg and hyoscine 0.2 mg i.m. Pulse oximetry and ECG monitoring were commenced in the anaesthetic room and the patient received fentanyl 50 μg and droperidol 2.5 mg i.v. as he appeared agitated. The right nostril was anaesthetized with 4 % lignocaine and the fibrescope was passed into the pharynx using additional boluses of lignocaine spray via the fibrescope. Attempts to see the larynx with the fibrescope proved impossible because of the grossly distorted anatomy. Repeated attempts resulted in the development of stridor and hypoxaemia, and further attempts were abandoned. A Guedel airway was inserted and 100 % oxygen was administered via a face mask and Bain breathing system. Despite these measures stridor persisted even when inspiration was assisted by squeezing the reservoir bag. As mouth opening was limited, a size 3 LMA was chosen and was passed moderately easily between the incisors and into the pharynx. This immediately provided a clear airway through which gas induction was commenced. As anaesthesia was deepened the stridor returned and progressively increasing airway obstruction developed.

Gentle manual inspiratory assistance overcame this obstruction completely and surgical drainage was allowed to proceed. Although a substantial amount of pus was removed, any subsequent attempt to allow spontaneous breathing resulted in almost complete inspiratory obstruction. Postoperative fibreoptic examination of the pharynx through the LMA revealed two cushions of false vocal cords protruding into the bowl of the LMA which were pushed out of the way when positive pressure was applied during inspiration. Several attempts at reversing anaesthesia failed to relieve the obstruction completely at any stage of the “awakening” phase. The possibility of postoperative airway obstruction on the ward swayed those present to perform a tracheotomy which, despite being sited in an infected field, posed no early or late problems. With the tracheostomy in situ, a conventional laryngoscopy using a Mackintosh blade revealed a grossly swollen pharynx, the lateral walls of which appeared to meet in the midline, and the tip of a hyperaemic and swollen epiglottis. The tracheostomy was decannulated 5 days later.

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PATIENT NO. 2
A 46-yr-old man was admitted for removal of laryngeal polyps. He presented with a 5-yr history of intermittent hoarseness which had become progressively worse over the previous 3 months. He smoked 30 cigarettes per day.

At the preoperative examination he was found to be morbidly obese with a body mass index of 48 (weight 123 kg and height 151 cm). He had an interincisor gap of 3 cm and his airway was assessed as Mallampati class I. Although he appeared to have a short thick neck, thyromental distance was 7.5 cm and he had good neck extension.

No premedication was given. After preoxygenation, anaesthesia was induced with propofol 180 mg and suxamethonium 100 mg. Direct laryngoscopy revealed a grade I Cormack and Lehane’s classification with large bilateral cystic polyps overlying the vocal cords. His trachea was intubated with a 5.0-mm cuffed microlaryngeal tube and he was given atracurium 50 mg. The lungs were ventilated with a mixture of isoflurane and nitrous oxide in oxygen. Fentanyl 100 μg was given before surgery. Standard monitoring was used.

The polyps were excised in a procedure that lasted approximately 30 min. Neostigmine 2.5 mg and glycopyrronium 0.5 mg were given to antagonize any residual neuromuscular block. Because of the patient’s obesity, he was sat up and the cuff of the microlaryngeal tube deflated as upper airway reflexes returned. He coughed out the microlaryngeal tube. Immediately, complete upper airway obstruction developed. The patient was returned to the supine position where attempts to ventilate his lungs with a Guedel airway and nasopharyngeal airway and facemask were unsuccessful. Desaturation occurred rapidly (SpO₂ 50%) Re-intubation was attempted but was impossible because of gross supraglottic oedema. A size 4 LMA was inserted and gentle inflation of the lungs achieved satisfactory oxygen saturation with 100% oxygen. Airway obstruction recurred whenever the patient was allowed to breathe spontaneously without this assistance on inspiration. A tracheotomy was performed without difficulty and the trachea was decannulated successfully 4 days later.

Discussion
Gross supraglottic oedema may occur unexpectedly (case No. 2) or its severity may be underestimated in an awake patient (case No. 1). In both the above case reports the LMA allowed oxygenation in circumstances where other methods had failed. In both cases the principal underlying cause of the airway obstruction (gross oedema of supraglottic structures) was not relieved by conventional measures such as a Guedel airway with positive pressure delivered by face mask. It would also seem that a correctly placed LMA on its own is not always sufficient to overcome an obstruction until positive pressure is applied, creating a passage through to the larynx. This was demonstrated with the fibrescope in case No. 1.

We believe that the LMA was successful in these cases because, by virtue of its length, it is inserted closer to the larynx than a Guedel airway so bypassing more of the obstruction. The force then applied by squeezing the bag would have less residual obstruction to overcome in order to maintain an airway. We speculate that harder tissue, such as tumour or haematoma, which was obstructing the bowl of the LMA might well offer too great a resistance to be overcome by the use of the LMA in this way.

The LMA has been recommended as an emergency airway in the patient whose lungs cannot be ventilated using a bag and conventional face mask and whose trachea cannot be intubated [2–5]. If effective oxygenation is not achieved rapidly, then transtracheal jet ventilation should be commenced immediately [6]. However, local pathology of supraglottic structures is viewed as a relative contraindication to emergency use of the LMA [3]. The above case reports demonstrate that this is not necessarily so and that an effective airway can be achieved in this situation using the LMA, and even in circumstances where transtracheal jet ventilation would have been extremely difficult to achieve until completion of surgery (case No. 1).

We believe that even in patients with airway problems involving the pharynx or larynx, the LMA should be tried briefly if conventional measures are unsuccessful. If effective gas exchange is achieved, then a permanent stable airway (tracheostomy) should be obtained as rapidly as possible. If not then transtracheal jet ventilation or a surgical airway should be established rapidly.

References