Laryngeal mask airway with mouth opening less than 20 mm

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We describe the use of a laryngeal mask airway in three adult patients whose mouth opening varied from 12 mm to 18 mm. The first patient's incisal opening was 12 mm. His airway was otherwise normal and the standard laryngeal mask was used as the definitive airway for the 90 min revision of facial scars and bone graft to mandible. The second patient, who had an incisal opening of 18 mm, was scheduled for posterior fossa craniotomy. She adamantly refused awake fiberoptic tracheal intubation. Following induction of general anaesthesia, a standard laryngeal mask was inserted and, through this, fiberoptic intubation was performed. The third patient, in addition to a mouth opening of only 18 mm, had limited neck movement from previous flap reconstruction following mandibulectomy, hemiglossectomy and radical neck dissection. For three more reconstructive head and neck procedures that ranged from 90 min to nine hours, the flexible reinforced laryngeal mask was inserted under topical anaesthesia and its correct position confirmed by fiberoptic laryngoscopy before induction of general anaesthesia. Maintenance of anaesthesia in all cases was uneventful and there were no postoperative complications.

Cette observation décrit l'utilisation du masque laryngé chez trois adultes avec une ouverture buccale dont les limites se situaient entre 12 et 18 mm. Le premier patient avait une ouverture interincisive de 12 mm. Ses voies respiratoires étaient par ailleurs normales et un masque laryngé standard a été utilisé pour le maintien de la perméabilité des voies aériennes pendant une intervention de 90 min effectuée pour retoucher des cicatrices faciales et effectuer une greffe osseuse à la mâchoire. La seconde patiente dont l'ouverture interincisive était limitée

à 18 mm était programmée pour une craniotomie de la fosse postérieure. Elle refusait intensément l'intubation vigile par fibroscope. Après l'induction de l'anesthésie générale, l'intubation fibroscopique a été réalisée à travers un masque laryngé standard déjà inséré. Le troisième patient avait, en plus d'une restriction de l'ouverture interincisive à 18 mm, une limitation des mouvements cervicaux causés par une intervention de reconstruction avec lambeau cutané après une mandibulectomie, une hémiglossectomie et une dissection radicale du cou. Pour trois autres chirurgies de reconstruction cervicale et céphalique ultérieures, un masque laryngé renforcé a été inséré sous anesthésie topique et sa position vérifiée sous laryngoscopie fibroscopique avant l'induction de l'anesthésie. Dans tous les cas, l'anesthésie s'est déroulée sans incidents et sans complications postopératoires.

The laryngeal mask airway (LMA) has been used in a variety of congenital and acquired conditions^{1,2} that distort the anatomy of the upper airway making direct laryngoscopy and tracheal intubation difficult. However, we have been unable to find documentation of its use in patients whose mouth opening is severely limited. The average distance between upper and lower incisor teeth in patients with normal temporomandibular joint function is 47 mm with a range of 31–55 mm.³ We describe the use of the LMA in three patients whose mouth opening was <20 mm. For two patients it was used as the definitive airway for reconstructive head and neck surgery. For the third patient, who refused awake fiberoptic tracheal intubation, it provided a clear airway during oro-tracheal fiberoptic intubation under general anaesthesia.

Key words

ANAESTHETIC TECHNIQUES: intubation;
COMPLICATION: difficult intubation;
EQUIPMENT: fiberoptic bronchoscope, laryngeal mask airway;
INTUBATION, TRACHEAL: difficult.

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Case #1

A 44-yr-old man, weight 87 kg, presented for revision of facial scars and bone graft to mandible. He had severely limited temporomandibular joint mobility from a self-inflicted gunshot wound 20 yr earlier, multiple crowned upper teeth and a 12 mm incisal opening. He had undergone reconstructive surgery on four previous occasions in ten years with awake fiberoptic tracheal intubation on each occasion. On this occasion, after pre-oxygenation and with a fiberoptic bronchoscope immediately available, anaesthesia was induced with propofol

and alfentanil. A size #4 LMA was squeezed and manoeuvred with some difficulty between the teeth, beyond which it passed easily into the pharynx to provide a clear airway during the 1½ hr revision of facial scars and bone grafts to mandible and zygoma. Anaesthesia was maintained with nitrous oxide and isoflurane in oxygen with spontaneous respiration. Recovery was uneventful.

Case #2

A 46-yr-old woman, weight 75 kg, was scheduled for a six-hour posterior fossa craniotomy in the prone position. She had 18 mm incisal opening, upper incisor crowns, and her airway was Mallampati class III.⁴ She had previously undergone temporomandibular joint surgery when, following induction of general anaesthesia, she regained consciousness during a difficult laryngoscopy and intubation. On this occasion awake fiberoptic intubation was advised, but she adamantly refused. Following preoxygenation, therefore, general anaesthesia was induced with thiopentone 450 mg and sufentanil 5 µg, followed by succinylcholine 100 mg. Laryngoscopy revealed only the tip of the epiglottis, so a size #3 LMA was inserted, at the second attempt, to provide a clear airway. A 6 mm cuffed tracheal tube was passed through the LMA into the trachea with the aid of a fiberoptic bronchoscope. The LMA cuff then deflated but the LMA itself was left in place during surgery and was removed at the time of tracheal extubation. Recovery was uneventful.

Case #3

A 42-yr-old man, weight 51 kg, had undergone hemiglossectomy, mandibulectomy, radical neck dissection, and radiation two years previously with three subsequent flap reconstructions. For the last procedure, awake fiberoptic nasotracheal intubation was performed for the 16 hr procedure. A second anaesthetist who took over after ten hours noticed an airway leak, rhonchi on chest auscultation, and high airway pressure on inspiration. He was unable to pass a fiberoptic bronchoscope into the trachea and a chest radiograph showed the tip of the tube at the level of the vocal cords. Several unsuccessful attempts were made to pass a tube exchanger into the trachea but eventually reintubation of the trachea was accomplished blindly after deflation of the tracheal tube cuff. Postoperatively, the patient was admitted to the intensive care unit. The next day his vocal cords were very swollen and tracheal intubation was required for 36 hr postoperatively, following which recovery was uneventful.

Three months later, he presented for the first of three additional head and neck reconstructive procedures that lasted for 6 hr, 3 hr and 9½ hr. He had full upper dentition, one lower tooth, mouth opening of 18 mm, and

FIGURE 1 Case #3. Severe neck scarring, limited neck movement and limited mouth opening.

FIGURE 2 Case #3. Reinforced laryngeal mask airway secured in place for nine-hour surgical procedure.

minimal neck extension (Figure 1). On each occasion he received glycopyrrolate 0.2 mg, midazolam 2 mg and fentanyl 100 µg *iv* followed by topical anaesthesia of the tongue and pharynx with 5 ml viscous lidocaine 2% and lidocaine 10% spray. After preoxygenation, a size #4 reinforced LMA was squeezed through the narrow mouth opening with minor difficulty and transient discomfort to the patient. It then passed very easily into the pharynx without intraoral digital guidance, presumably because of the space available from the previous hemiglossectomy. Its cuff was inflated and its clinically correct position confirmed on each occasion with the fiberoptic bronchoscope before general anaesthesia was induced. The tubular portion was brought up over the cheek and fixed in position using OpSiteTM (Figure 2). Controlled ventilation was commenced and there was no audible leak.

Maintenance of anaesthesia was uneventful using isoflurane in closed circuit nitrous oxide and oxygen 500 ml · min⁻¹ fresh gas flow for the first procedure, isoflurane in closed circuit oxygen 250 ml · min⁻¹ for the second, and nitrous oxide and oxygen 3000 ml · min⁻¹ for the third. At the conclusion of each procedure, the patient himself removed the LMA within 15 min of arrival in recovery room. There were no respiratory sequelae and ICU management was not required.

Discussion

The anteroposterior diameter of size #3 and size #4 LMA is 23 mm at the junction of the tubular portion and the mask. This can be reduced to 19 mm with moderate digital pressure. The deflated LMA cuff can even be manipulated through an autoclavable gastroscope bite guard⁴ (Olympus Japan MB-42) whose internal height is only 14 mm. We therefore anticipated only minor difficulty in passing the LMA through the limited mouth opening and into the pharynx of these patients.

All three patients were scheduled for elective surgery. They were fasting and had no history of gastro-oesophageal reflux. All were classed as "difficult intubation" and the fiberoptic bronchoscope was immediately available in the operating room. The first two were not expected to present difficulty with bag and mask ventilation if insertion of the LMA was difficult or impossible.

The incisal opening of only 12 mm in the first patient meant that the tubular portion of the LMA, whose external diameter is 13 mm, was minimally compressed throughout anaesthesia without affecting the pattern of respiration. In patients with even more restricted incisal opening, an alternative method is to pass the LMA behind the molar teeth from the angle of the mouth into the pharynx and then manoeuvre the tubular part forward between the teeth to lie centrally (Brain AIJ: personal communication).

The third patient's facial contours were so distorted that adequate ventilation by bag and mask would have been difficult, if not impossible. The reinforced LMA was therefore inserted under topical anaesthesia and its correct position confirmed by fiberoptic laryngoscopy before general anaesthesia was induced. Although the medical grade silicone from which the LMA is made is soft and pliable, this patient found its insertion transiently painful as if it was squeezed between the previously irradiated floor of his mouth and his upper teeth. Auscultation over the epigastrium during manual ventilation was silent on each occasion before a neuromuscular blocking drug was administered to facilitate controlled ventilation. Maintenance and recovery on all three occasions were uneventful.

Use of the LMA is controversial with controlled ven-

tilation because of the possibility of gastric insufflation, and also when access to the airway is restricted because of concern about its possible displacement during surgery. These contraindications are relative and should be balanced against refusal of awake intubation by the second patient, and the difficulty of tracheal reintubation during previous surgery in the third patient. In the latter case, reintubation with the fiberoptic bronchoscope and tube exchangers failed whereas repositioning of an LMA can be performed blindly and does not require additional equipment. However, perfect positioning of the LMA under local anaesthesia for such procedures as we describe in case #3 should be confirmed before general anaesthesia is induced. That an airtight circuit with no leak to the stomach or atmosphere is possible for long periods during positive-pressure ventilation is supported by our use of basal oxygen flow for three hours during the second procedure. We conclude that the LMA may be considered in patients with restricted mouth opening for guided intubation or for definitive airway surgery and during recovery from anaesthesia.

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