CASE REPORTS

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Impossible Insertion of the Laryngeal Mask Airway and Oropharyngeal Axes

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THE laryngeal mask airway (LMA) has been used widely for airway management during general anesthesia in the last decade.[1] There have been reports in which the LMA successfully secured the airway as an alternative and as an aid to anticipated difficult tracheal intubation in patients with ankylosing spondylosis of the cervical spine or atlantooccipital joint due to severe rheumatoid arthritis.[2–4] However, Pennant and White suggested that the use of the LMA is contraindicated in patients who are unable to extend the neck because of ankylosing spondylitis, severe rheumatoid arthritis, or cervical spine instability.[1] This controversy remains unresolved.

In this report, we describe anesthesia for a patient with advanced rheumatoid arthritis in whom LMA insertion was impossible. The reason was thought to be the acute angle between the oral and the pharyngeal axes at the back of the tongue. We investigated the correlation between the angle and difficulty of LMA insertion in an attempt to resolve the controversy.

Case Report

A 65-yr-old, 39-kg woman, diagnosed with rheumatoid arthritis at age 30 yr, was admitted to our hospital for right total knee replacement.

On admission, her mouth opening was greater than 4 cm but her upper airway Mallampati classification was grade 4.[5] The patient requested general anesthesia and refused awake intubation. General anesthesia combined with spinal block was planned.

Twenty five milligrams pirenzepine and 0.25 mg brothizolam were given orally 90 min before surgery. The patient was monitored with a continuous electrocardiogram, a pulse oximeter, and blood pressure. Spinal puncture was performed, and 10 mg tetracaine was injected. After confirming development of a sensory block to the T7 dermatome, 150 mg thiopental was administered, and inhalation of 4% sevoflurane with 50% N_2O in oxygen was initiated *via* mask. The lungs could be manually ventilated easily. Laryngoscopy revealed a grade 4 laryngoscopic view, as defined by Cormack *et al.*[6] We chose the LMA as an alternative airway to an endotracheal tube because it has been used for the anticipated difficult intubation.[7–10] However, insertion of the LMA (Intavent, size #3, Henley-on-Thames, England) was unsuccessful despite three attempts using the standard technique recommended by Brain.# We ensured the mask tip remained flattened against the hard palate and avoided the tongue, but the cuff tip of the LMA faced the posterior pharyngeal wall and was curled. Even with the alternative technique,[11,12] using a laryngoscope, or with Guedel technique, insertion of the LMA was impossible. We tried to flatten the mask tip and press the LMA forward into the posterior hypopharyngeal wall, using fingers, a spoon, a Magil's forceps, and a self-maintaining retractor. All these attempts, however, followed the same course, in which the mask tip folded over or the mask tube kinked against the posterior pharyngeal wall. Also, the LMA could not be advanced further downward onto the posterior pharyngeal wall.

Surgery was started under general anesthesia with sevoflurane and nitrous oxide in oxygen *via* a face mask. Her intraoperative course was uneventful.

The roentgenogram of her neck was compared with those of five normal patients in whom the LMA had been successfully inserted. A series of roentgenograms of the neck at maximal head extension revealed the following: The angle between the oral and the pharyngeal axes at the back of the tongue was 105 ± 2° in five normal patients

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Key words: Anatomy: oropharyngeal axes. Anesthetic techniques: tracheal intubation. Equipment: laryngeal mask airway.

Brain AIJ: The Intavent Laryngeal Mask Instruction Manual. 2nd edition. Henley-on-Thames, Intavent International, 1991.

(fig. 1a), whereas that angle was 70° in this patient (fig. 1b). The narrow angle between the oral and the pharyngeal axes at the back of the tongue was considered a reason for impossible LMA insertion in our case. We further investigated the relationship between LMA insertion and the degree of this angle as follows.

An aluminum plate was bent to an angle corresponding to the 70° angle between the oral and the pharyngeal axes at the back of the tongue in this patient's roentgenogram. After lubrication of the deflated cuff with lidocaine jelly (Xylocaine jelly, Astra, Sweden), we slid the LMA along the curvature of this model. However, it jammed against the wall at the corner (fig. 2a). By the same method, LMA insertion was tested with the plate bent at a 105° angle, corresponding to the angle between the oropharyngeal axes in patients in whom the LMA was successfully positioned (fig. 2b). Finally, we tested LMA insertion using the same procedure and changing the angle at which the aluminum plate was bent, in 5° increments from 110° to 75°. These results showed that, (1) at an angle greater than 90°, the LMA successfully slid along the curvature at the corner of this model, (2) at approximately 90°, the LMA could not be advanced without kinking at the corner, (3) at an angle less than 90°, the LMA jammed against the wall at the corner.

Discussion

LMA insertion appeared to be easier when the angle between the oral and the pharyngeal axes was greater than 90° at the back of the tongue.[13–15] The angle in a patient in whom the LMA was successfully inserted is usually 105° when the neck is flexed and head extended, the maneuver considered necessary for successful LMA insertion. There have been few reports that refer in detail to difficult LMA insertion because of narrowing in this angle.[15] The current findings suggest that successful LMA insertion requires the angle to be greater than 90°.

In conclusion, we presented a case of anesthesia for a patient in whom LMA insertion was impossible. An angle between the oral and the pharyngeal axes of less than 90° at the back of the tongue may make LMA insertion impossible.

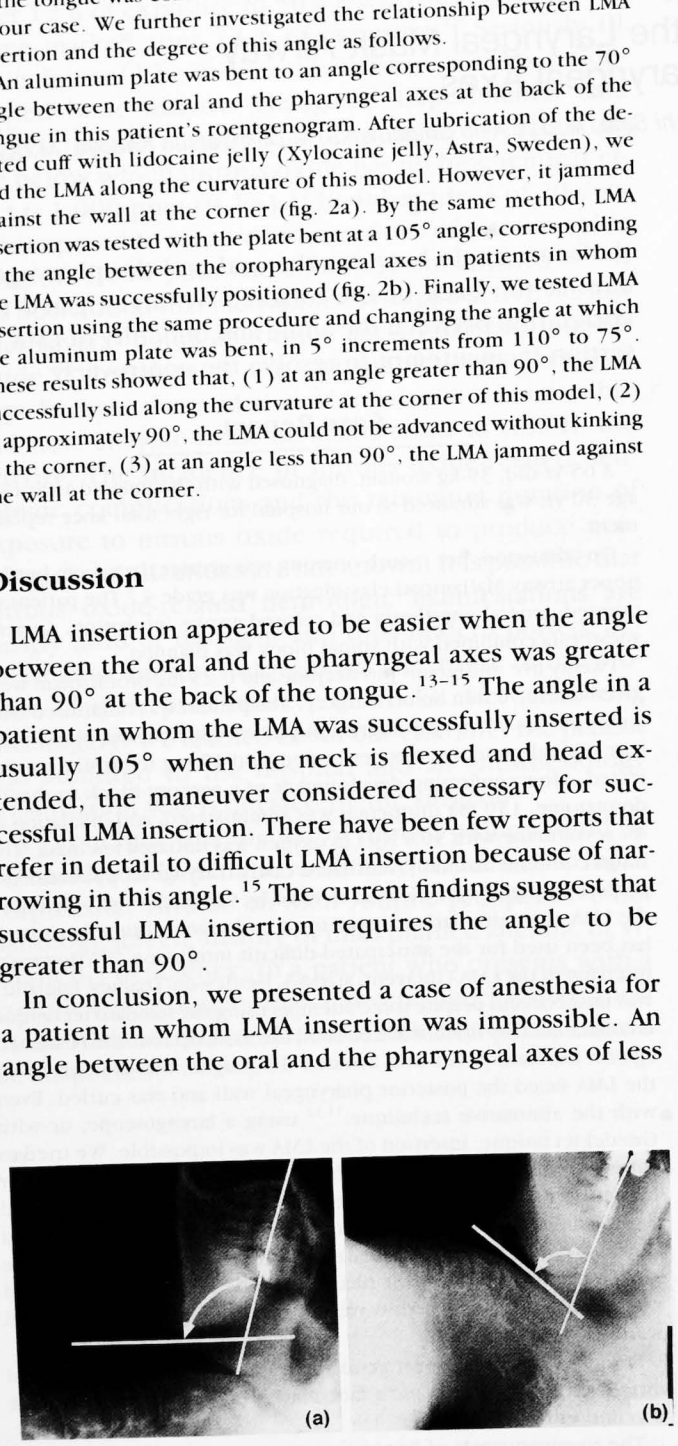

Fig. 1. At neck flexion and maximal head extension, the angle between the oral and the pharyngeal axes at the back of the tongue is usually 105° in a normal patient in whom LMA was successfully inserted (*a*), whereas the angle was 70° in this patient (*b*).

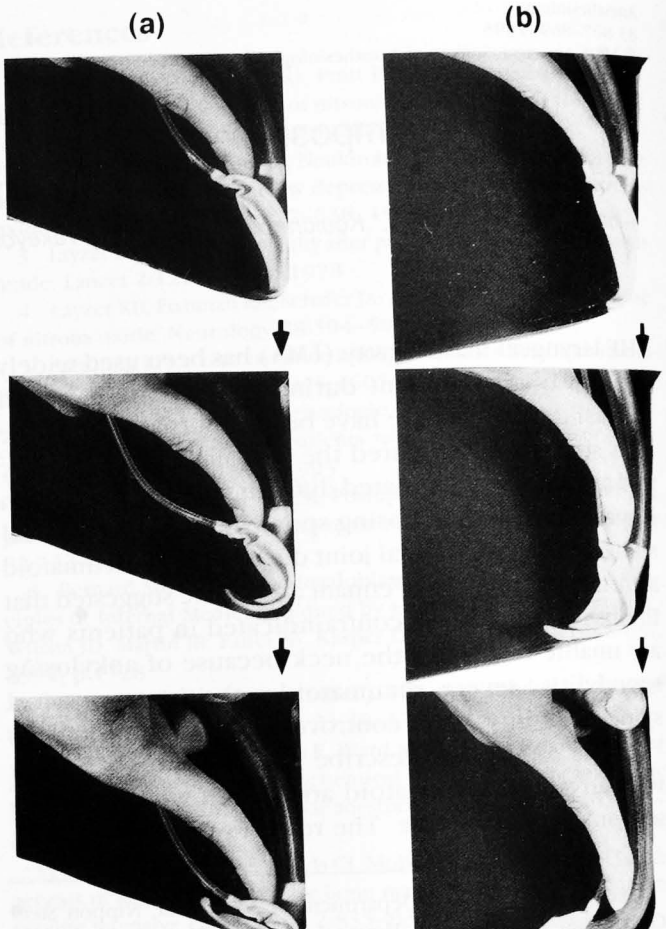

Fig. 2. Process of laryngeal mask airway insertion was reproduced in a model of the patient with an angle of 70° (*a*) and that of a patient with a normal 105° angle (*b*). At the 70° angle, the LMA could not be advanced along this curvature (*a*), but successful advancement was accomplished at an angle of 105° (*b*).

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Acute Toxic Delirium: An Uncommon Reaction to Transdermal Fentanyl

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TRANSDERMAL fentanyl (Duragesic, Janssen, Titusville, NJ) is indicated in the management of chronic pain in opioid-tolerant patients requiring opioid analgesia and is used in the treatment of cancer pain. We present a case of acute toxic delirium in a patient being treated with transdermal fentanyl.

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Key words: Analgesics, transdermal: fentanyl. Complications: delirium. Pain: chronic; cancer.

Case Report

The patient was a 14-yr-old, 41-kg boy with adenocarcinoma of unknown origin, metastatic to the liver and skeleton. He had received maximal radiation and chemotherapeutic treatment without success 3 months before admission. He was treated at home by his oncologist with transdermal fentanyl for management of his painful metastases. Other medications included 0.11 mg levothyroxine daily, 400 mg magnesium oxide twice daily, 600 mg ibuprofen as needed, and 25 mg diphenhydramine as needed. Doses of these medications had not changed for 2 months before presentation, and he took the ibuprofen and diphenhydramine infrequently. The only change in his therapy was an incremental increase in his transdermal fentanyl dose. Transdermal fentanyl was begun at 25 μg/h and was increased in 25-μg/h increments to 100 μg/h over 2 months. After each increase, the patient was maintained for 1–2 weeks before further increases were made. The day after the increase from 75 to 100 μg/h, he became more agitated than usual, progressing over 1 week to extreme agitation and hyperactivity. He was unable to sleep and was awake for much of the night before presentation. He presented for the reported admission 1 week after the final increase.

On physical examination, he was alert and oriented but extremely agitated and was unable to sit still, pulling at his clothes, with apparent involuntary movement of his lower extremities. Evaluation by a pediatric neurologist demonstrated a nonfocal neurologic examination. His motor and sensory examination results were normal. Reflexes were normal and symmetric bilaterally without clonus. Asterixis was not present. His speech was at times incoherent or inappropriate. Vital signs were as follows: pulse 120 beats/min, respirations 18 breaths/min, blood pressure 110/70 mmHg, temperature 37.3°C, and hemoglobin saturation while breathing room air 99%.