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Anesthesia for Down's syndrome with atlantoaxial instability using laryngeal mask airway

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Introduction

The laryngeal mask airway (LMA) has gained popularity as an alternative to conventional mask anesthesia or tracheal intubation [1,2]. Several reports have confirmed that the LMA is a safe and useful technique for airway maintenance even in patients with congenitally abnormal airway anatomy, such as micrognathia and the Pierre Robin syndrome [3,4]; however, to our knowledge, no published reports have yet discussed the application of the LMA for general anesthesia in patients with Down's syndrome. Patency of the upper airway may be difficult to maintain [5] and there is a high incidence of atlantoaxial instability among individuals with Down's syndrome [6]. Endotracheal intubation is difficult in these patients because elevation and extension of the head must be prevented while the cervical spine is held straight in order to avoid compression of the spinal cord and/or the vertebral arteries.

We describe a child with Down syndrome complicated with atlantoaxial dislocation, in whom LMA was successfully applied for airway management and anesthesia during myelography, cervical tomography and computed tomography of the neck.

Case report

An 8-year-old girl with Down's syndrome (weight: 42 kg, height: 130 cm) suffered from atlantoaxial dislocation. Fixation of atlas on axis, using stainless wires, had been performed 2 years before. The patient had been complaining of hypesthesia and motor weakness of upper extremities since the week before, and a cervical X-ray showed that the wires were cut off and the axis was subluxated. A Hallo-brace was put on the patient's neck and she was scheduled for cervical tomography, myelography, and computed tomography (CT). We chose to use general anesthesia because the patient was mentally retarded and could not otherwise be expected to lie still.

The patient was given 8 mg of diazepam orally and 0.2 mg of atropine for premedication. An oxygen saturation probe and electrocardiogram electrodes were attached to the patient, and anesthesia was slowly induced with nitrous oxide (60%) and sevoflurane (0.4–4.0%) in oxygen (30%). While the Hallo-brace was left on to immobilize the neck, an LMA (Intavent size #2, Amsterdam Netherlands) was inserted and placed over the laynx; the neck and head were not elevated. The cuff was inflated with 10 ml of air and ventilation was manually assisted. No muscle relaxant was administered for the insertion. Anesthesia was maintained with nitrous oxide (60%) and sevoflurane (0.8–2.0%) in oxygen (30%). The patient was placed in the right lateral position, and a contrast medium was intrathecally injected at L4/5 for myelography. After myelography was performed, the patient was transferred to another room to take cervical tomograms. The patient was subsequently transferred to the room for CT. The cervical tomogram and CT of the neck in the area of the larynx are shown in Figs. 1 and 2, respectively, which show the similar scheme of the LMA in the position described by Brain [1]. Patency of the upper airway was obtained with spontaneous respiration during these examinations and transports. The examinations were performed uneventfully, and the LMA was removed with ease when the patient began to swallow. There were no complications related to the insertion of the LMA and these examinations.

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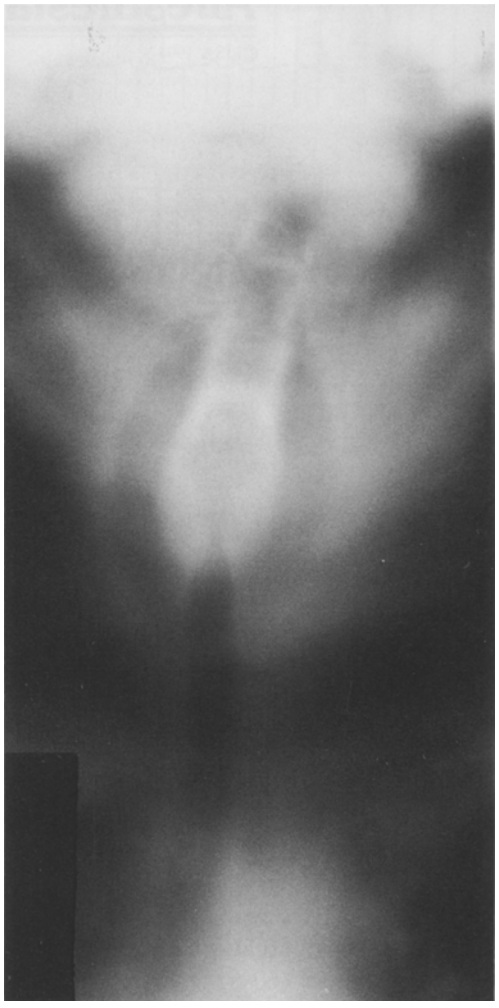

Fig. 1

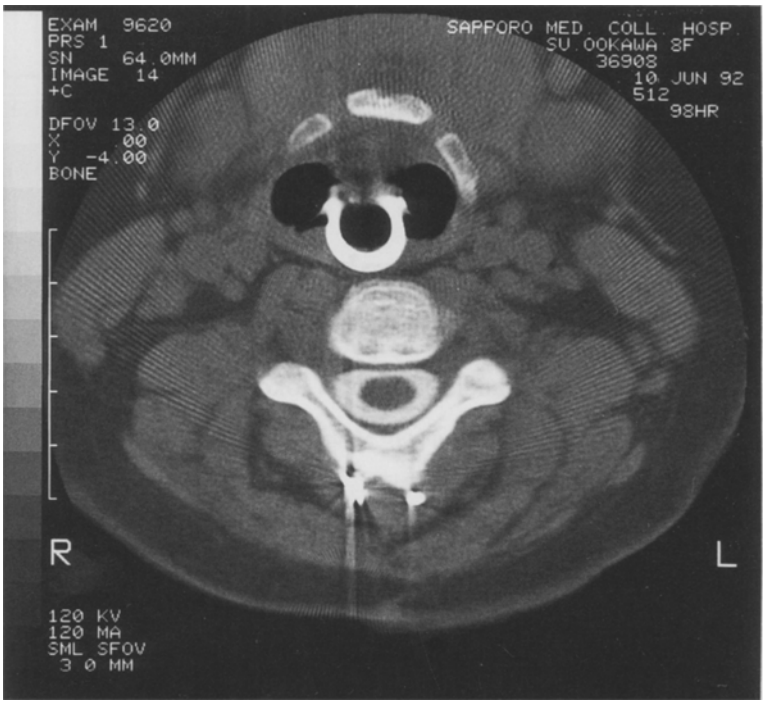

Fig. 2

Fig. 1. Cervical tomogram of the neck in the area of the larynx
Fig. 2. Computed tomography of the neck in the area of the larynx

Discussion

Patency of the upper airway is usually difficult after a patient with Down's syndrome loses consciousness, reflecting the short neck, small mouth, narrow nasopharynx, and large tongue characteristic of these patients [5]. Furthermore, in this patient, it seemed difficult to maintain mask ventilation during anesthesia since it was necessary to transfer her to the other rooms for these examinations. On the other hand, conventional tracheal intubation appears to be impossible in patients with atlantoaxial instability, as they require immobility of the cervical spine; maintaining the head in the classic 'sniffing position' for the tracheal intubation appears to confer a significant risk of compressing the spinal cord and/or the vertebral arteries.

The LMA was designed primarily to offer some of the advantages of endotracheal intubation while avoiding the fundamental disadvantages [1]. It has been reported that this device is safe and useful in airway management in patients with Pierre Robin syndrome, micrognathia, and Edward's syndrome as well as in patients with normal airway anatomy [2,3,7].

In the present patient, insertion of the LMA was easy with the Hallo-brace in place, and patency of the upper airway was obtained with spontaneous respiration in the supine and lateral decubitus positions. The position of the LMA shown in Figs. 1 and 2 is similar to the scheme of the LMA in the position described by Brain et al. [8]. Thus, the LMA was properly inserted to the level of the larynx and maintained the airway in the present patient. Although we used the LMA only during anesthesia for these radiographic examinations, tracheal intubation is necessary for a variety of surgical procedures. It is clear that the LMA facilitates fiberscope-aided tracheal intubation [9,10]. Accordingly, the present patient could be anesthetized, the LMA inserted, and then the fiberoptic bronchoscope passed through, which could then be used to insert an endotracheal tube.

In conclusion, the LMA was successfully used for airway management during general anesthesia in a Down's syndrome patient with atlantoaxial instability; this obviated the difficulties of conventional tracheal intubation and the risks of compression of the spinal cord and/or vertebral arteries.

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