Successful perioperative airway management in a patient with angiomatous macroglossia for laser ablation under general anesthesia

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Abstract

Macroglossia is defined as an abnormal enlargement of the tongue that predominantly affects pediatric patients and is not frequent in adult patients. Hypothyroidism and hyperpituitarism may cause macroglossia in adults. In addition, infiltration of the tongue by abnormal tissues, including angiomatous and lymphatic malformations and amyloidosis, is a major cause of macroglossia, particularly in adults.

Here we describe the case of a 63-year-old male patient with massive macroglossia due to tongue hemangioma who underwent laser ablation under general anesthesia. Elaborate preanesthetic anatomical and functional airway evaluation facilitated successful airway management in this patient, even in the presence of massive macroglossia.

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Introduction

Anesthetic management of patients with macroglossia remains challenging for anesthesiologists, despite the current availability of various devices for tracheal intubation (Atkins *et al.* 2011; Bent 2004).

The establishment of a secure airway is a prerequisite for safe anesthetic management in patients with macroglossia (Divekar *et al.* 1982; Tewari *et al.* 2009). To achieve this, evaluation of macroglossia and assessment of all potential structures and functions affected by the enlarged tongue are required (Perkins 2009). Magnetic resonance imaging (MRI) studies can evaluate intrinsic tongue musculature and surrounding tissue size. Assessment with laryngoscopy and pharyngoscopy can also reveal the patency of the upper airway tract, including the pharynx, larynx, and glottis.

In this report, we describe our experience of successful perioperative airway management in a 63-year-old male patient with tongue hemangioma and consequent macroglossia requiring laser ablation and biopsy under general anesthesia.

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Case Report

A 63-year-old male (weight, 53 kg; height, 173 cm) was scheduled to undergo laser ablation and biopsy for tongue hemangioma accompanied by massive macroglossia (Figures 1A and B). The patient reported a childhood history of cervical lymphangioma that had been resected under general anesthesia. In addition, he was being treated for hypertension with calcium channel blockers.

The patient had been aware of an enlarged tongue since childhood. This enlargement gradually progressed and reached an extent where the tongue protruded from the oral cavity 6 months ago. He was also suffering from eating and swallowing disorders since approximately 3 months. However, he could talk and sleep in a supine position. There were no symptoms of upper airway obstruction, including dyspnea and sleep apnea. No abnormal weight loss was observed. MRI revealed enlargement of the top and base of the tongue, which occupied the entire oral cavity (Figures 2A and 2B). Endoscopic examination revealed the absence of abnormal anatomical changes in the upper respiratory tract, including the nasal cavity, pharynx, and larynx, as well as the absence of abnormal pathological changes in the glottis (Figure 3). His pharyngeal reflex was well preserved. The hemangioma was also found to the anterior cervix and the orifice of the left nostril (Figure 1).

On preoperative examination, the patient was considered as ASA PS 2. We planned laser ablation under general anesthesia under a conscious or semiconscious condition, with tracheal intubation via the right nostril. He was informed that he might have to undergo tracheostomy before or after surgery to achieve a secured airway.

On the day of surgery, he was admitted to our day surgery unit (DSU) in an ambulatory condition. In the surgery unit, he was placed in a supine position that did not induce dyspnea. Oxygen saturation (SpO_2) was maintained at 96% under room air. Under standard monitoring including electroencepharography, 4 mg of midazolam and 100 µg of fentanyl were intravenously administered and visualization of the glottis using a Macintosh laryngoscope under spontaneous respiration was attempted. The glottis was

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identified by direct laryngoscopy; therefore, the trachea was intubated with an endotracheal tube via the right nostril (ID 6.5, Northpolar™ Portex). Following successful intubation, general anesthesia was induced by the administration of propofol, remifentanil, and rocuronium and maintained. Flurbiprofen and diclofenac sodium (50 mg) were administered for postoperative analgesia. After 61 min of SCITON and KTP laser ablation, the administration of propofol and remifentanil was terminated and 0.25 mg of flumazenil was introduced. After full emergence, his trachea was extubated under airway observation using broncoscopic guidance, with an otolaryngologist on standby in case emergent tracheostomy was required. No swelling of the base of the tongue or glottis was observed.

After successful extubation, a nasal airway was placed and the patient was transferred to the postanesthesia care unit. The total anesthesia time was 134 min. He did not complain of dyspnea in a sitting position, and SpO_2 was maintained at approximately 95% under room air. After 85 min, the nasal airway was removed and he moved, on foot, to the step-down recovery area in the DSU and stayed there for 90 min. Subsequently, he moved into the general ward after it was confirmed that he could safely drink clear water. His postoperative course was uneventful with no airway distress, and he was discharged on postoperative day 5.

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Discussion

Macroglossia is defined as an abnormal enlargement of the tongue (Perkins 2009). In our patient, MRI clearly indicated an enlargement of the top and base of the tongue. Macroglossia is predominantly observed in pediatric patients and is not very frequent in adult patients. In patients with Beckwith–Wiedemann syndrome, which is a genetic disorder, macroglossia arises from hyperplasia of the tongue tissues and hypertrophy of the tongue musculature (Horn *et al.* 2001; Kimura *et al.* 2008). In adults, hypothyroidism and hyperpituitarism may cause macroglossia due to hyperplasia of the tongue tissues. In addition, infiltration of the tongue by abnormal tissues, including angiotic, lymphatic, and venous malformations and amyloidosis, is a major cause of macroglossia (Catalfamo *et al.* 2012; Shetty *et al.* 2001; Tasker & Geoghegan 2005; Xavier *et al.* 2005). In this patient, the tongue was enlarged because of a tongue hemangioma.

Assessment or evaluation of structures and functions controlled or affected by the tongue is absolutely necessary for successful anesthetic management (Kimura *et al.* 2008; Perkins 2009). The intrinsic tongue musculature and the size of the infiltrated tissues should be assessed by computed tomography and, preferentially, MRI. When macroglossia causes airway impairment, the simplest and most reliable method of evaluation is nasopharyngoscopy that assesses the patency of the nasopharynx, oropharynx, and hypopharynx, as well as the laryngeal airway. Direct laryngoscopy can also be used to determine whether the airway is compromised at multiple sites. Functional evaluation is also crucial. Our patient did not suffer from sleep apnea or dyspnea, and his pharyngeal reflex was well preserved. On the basis of this information, we decided to intubate the patient under a semiconscious condition. We also administered hypnotics and narcotics, both of which had antagonists available.

At first, we attempted to visualize the glottis via direct laryngoscopy under a semiconscious condition and succeeded in performing tracheal intubation at the first trial. Moreover, we prepared a fiberoptic scope and supraglottic airway devices such as a laryngeal mask airway™ and iGel™ as backups for airway management. Finally, we chose to perform airway management via nasotracheal intubation, which

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requires airway observation using a fiberoptic scope. Hemangiomas of the oral cavity affect not only the tongue but also the pharynx, larynx, and glottis (Bent 2004; Divekar *et al.* 1982; Perkins 2009). The tumor in our patient extended to the orifice of the left nostril (Figure 1).

In conclusion, successful airway management was facilitated in the presence of massive macroglossia in our patient. This case report emphasizes the importance of elaborate preanesthetic anatomical and functional airway evaluation in patients with macroglossia requiring surgery under general anesthesia.

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125 Figure Legends

126 Figure 1 A large hemangioma of the tongue visualized after tracheal intubation

127 A) Frontal view B) Lateral view

128 The enlarged tongue is protruding from the oral cavity. The tumor covers the orifice of the right nos-

129 tril.

130

131 Figure 2 Magnetic resonance image of the tongue, pharynx, larynx, and glottis

132 A) Sagittal plane B) Coronal plane

133

134 Figure 3 Nasopharyngoscopic view of the glottis

135 No edema or stenosis are observed.

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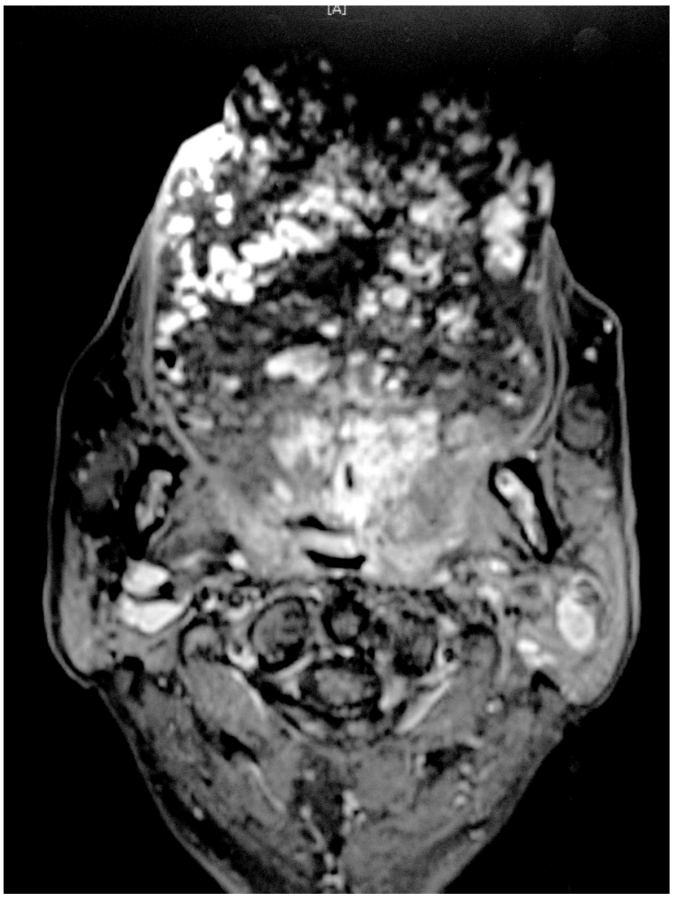
A

B

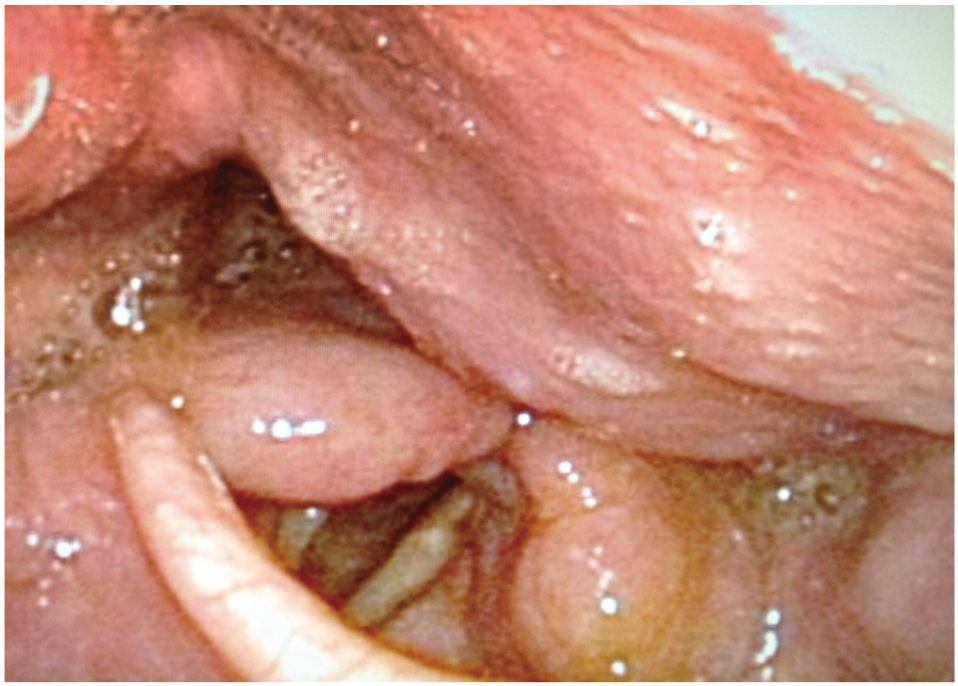
Tani et al. Fig.1

A

B



Tani et al. Fig.2



Tani et al. Fig.3