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Short communications

Assessment of the lingual tonsil and vallecula during fiberoptic intubation

Yushi U. Adachi[1,2], Maiko Satomoto[3], Hideyuki Higuchi[4], Kazuhiko Watanabe[1], Yoshitaka Uchihashi[1], and Tetsuo Satoh[1]

[1] Department of Anesthesiology, National Defense Medical College, 3-2 Namiki, Tokorozawa, Saitama 359-8513, Japan
[2] Medical Clinic of Kumagaya Base, Japan Air Self Defense Force, 839 Jurokuken, Kumagaya, Saitama 360-0846, Japan
[3] Medical Corps of 1st Air Wing, Japan Air Self Defense Force, Nishiyama-cho, Hamamatsu, Shizuoka 432-8551, Japan
[4] Department of Anesthesia, Japan Self Defense Force Hanshin Hospital, 4-1-50 Kushiro, Kawanishi, Hyogo 666-0024, Japan

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A difficult airway causes anesthesiologists the most concern during the induction of anesthesia [1,2]. Many factors can cause a difficult airway, including lingual tonsils [3,4]. Although the lingual tonsil sometimes hypertrophies and becomes life-threatening by causing a difficult airway [5,6], there is scant information on the risk of encountering a hypertrophied lingual tonsil during the induction of anesthesia [5]. The lingual tonsil is a ventral structure of the larynx [7], and it is impossible to assess its shape or size during conventional orotracheal intubation using a laryngoscope because of its anatomical position. Moreover, the condition of the lingual tonsil has never been assessed to predict the risk or difficulty of airway management or orotracheal intubation [8–10]. The incidence of cases of lingual tonsil hypertrophy is not clear; however, many anesthesiologists do not know that a lingual tonsil exists or what implications it has for the airway. This investigation assessed the lingual tonsil during fiberoptic orotracheal intubation in the clinical setting of a medical college hospital.

After acquiring permission from our Institutional Review Board, written informed consent was obtained from 105 scheduled surgical adult patients, with ASA physical status I or II, who required general anesthesia and orotracheal intubation. Patients with severe cardiovascular complications, a known difficult airway, or lung disease were excluded. All participants were premedicated with hydroxyzine $1\,mg\cdot kg^{-1}$ and atropine $10\,\mu g\cdot kg^{-1}$ intramuscularly 30 min before entering the operating room. Standard monitoring, including ECG, noninvasive blood-pressure monitoring, and pulse oximetry, was used. After 3 min of preoxygenation, anesthesia was induced with $2\,mg\cdot kg^{-1}$ propofol and neuromuscular blockade was achieved by administering $0.12\,mg\cdot kg^{-1}$ vecuronium. In some cases, $2\,\mu g\cdot kg^{-1}$ of fentanyl was administered before inducing anesthesia. The patient's lungs were ventilated via a standard face mask.

Fiberscopic observation and intubation were performed by an experienced anesthesiologist. A bite block was inserted into the patient's mouth to prevent damage to the fiber. The attending anesthesiologist in charge of the case elevated and supported the patient's jaw to acquire an adequate view of the pharyngeal and laryngeal structures [11,12]. We recorded the fiberscopic view with a video recorder. Pictures of the lingual tonsil and vallecula were clearly obtained with the fiberscope placed in the retropharyngeal space. The observation was terminated and the patient's trachea was intubated following the standard procedures for orotracheal fiberscopic intubation.

After all intubation procedures had been completed, one anesthesiologist who was blinded to the patient's background assessed the shape and size of the lingual tonsil from the recorded picture. The lingual tonsil was classified into four groups according to shape and size following the criteria shown in Fig. 1, and the visibility of the vallecula was classified into three groups following the criteria shown in Fig. 2.

The patients' mean (±SD) age, weight, and height were 47.6 ± 17.4 years, 58.9 ± 12.7 kg, and 160.8 ± 10.3 cm, respectively. The results are shown in Figs. 1 and 2. Only 33 patients had a smooth, flat lingual tonsil. Three patients had a tumorlike hypertrophied lingual tonsil. The vallecula was not fully visible in about one third of the patients. All patients could undergo mask ventilation without severe difficulty. No patient had a history of palatine tonsillectomy.

Address correspondence to: Y.U. Adachi
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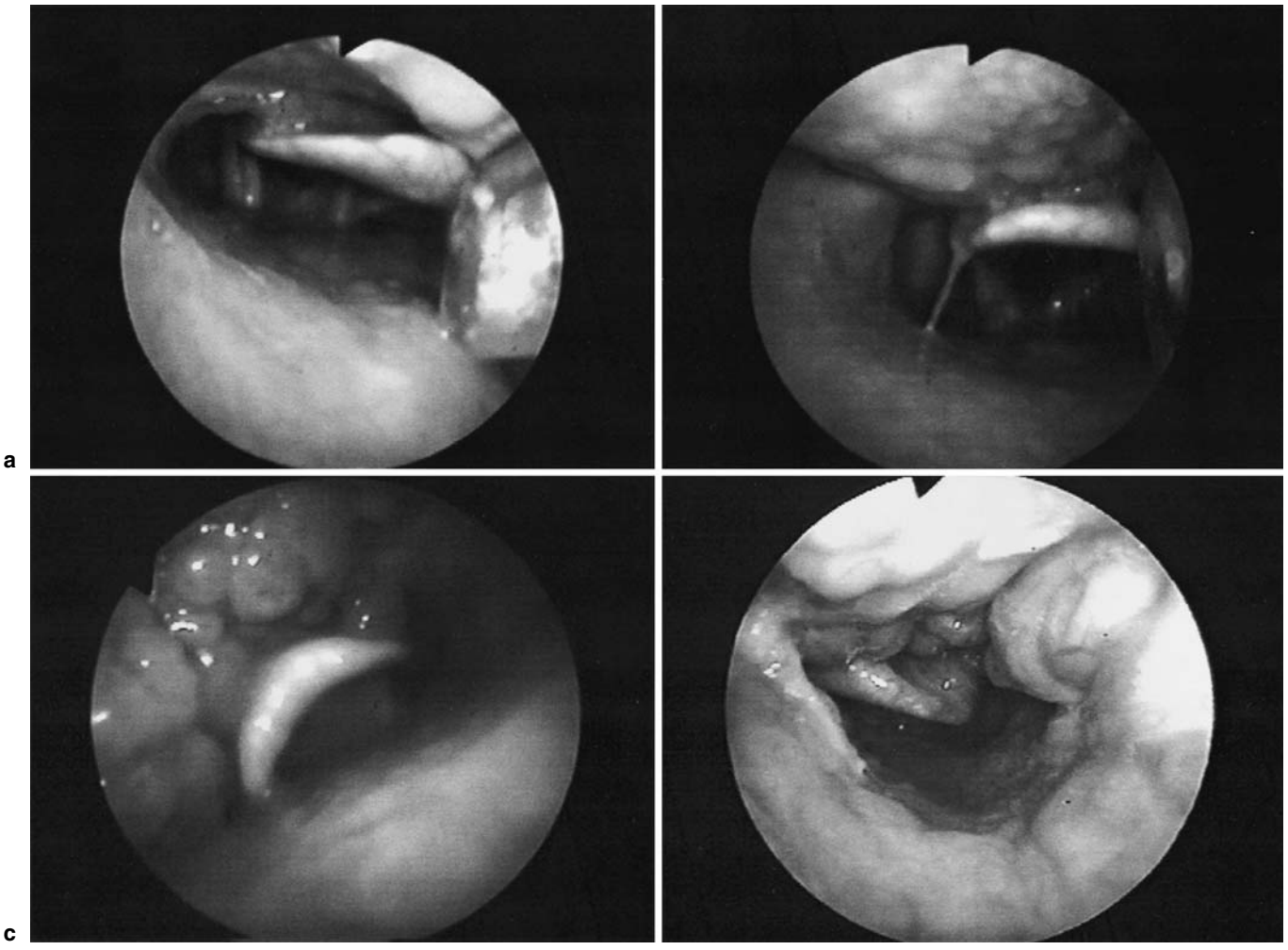

Fig. 1. Criterion and results of lingual tonsillar hypertrophy. Among 100 patients, the lingual tonsil was smooth and flat in 33 (**a**), was small and follicular in 41 (**b**), was mildly swollen in 28 (**c**), and showed tumorlike hypertrophy in 3 (**d**)

Recently, we reported a new method of orotracheal intubation using a fiberscope [12], and we observed many more patients with hypertrophied lingual tonsils than we expected. Golding-Wood et al. [7] identified only 25 patients in a retrospective screening of notes from a 26-year period. However, Jones et al. [6] and some anesthesiologists have reported unexpected difficult airways that might have been caused by lingual tonsil hypertrophy [5,13–15].

Our results suggest a much greater probability of encountering patients with lingual tonsil hypertrophy than was previously expected [5,16]. Many patients participating in the study had lingual tonsil hypertrophy, with few apparent findings. Our criteria for evaluating the lingual tonsil might have room for discretion, because no one has tried to assess the degree of hypertrophy using a fiberscope; therefore, we may have overestimated the amount of hypertrophy. Iwano et al. [16] reported that about 40% of the pharyngeal cavity was occupied by the lingual tonsil. Our findings are in accordance with the previous study [16].

Tracheal intubation and ventilation with a face mask are reported to be very difficult in patients with lingual tonsil hypertrophy [3,5,6,17]. The correlation between "cannot intubate, cannot ventilate" and lingual tonsil hypertrophy is unknown; however, this scenario is one of the most worrying events for anesthesiologists. Although the etiology of lingual tonsil hypertrophy is unknown, patients are reported to have a history of palatine tonsillectomy [6,7,18]. Lingual tonsil hypertrophy might be the result of compensation for removal of the palatine tonsils [19]. Large, tumorlike hypertrophied tonsils blind the laryngoscopic view and may obstruct the airway [6].

Orotracheal intubation using a conventional laryngoscope after assessment by fiberscopy was not permitted for ethical reasons. The correlation between the fiberoptic findings and the difficulty of intubation is still

Fig. 2. Criterion and results of the visibility of the vallecula. Among 100 patients, the vallecula was fully visible in 64 (**a**), partly obstructed in 34 (**b**), and completely obstructed in 7 (**c**)

unknown because many complex factors may be involved in addition to the lingual tonsil. This investigation reports the incidence of lingual tonsil hypertrophy encountered during induction of anesthesia. Further studies are needed to reveal the influence of hypertrophy on airway management.

In conclusion, we examined the shape and size of the lingual tonsil in scheduled surgical patients during the induction of anesthesia. Patients with lingual tonsil hypertrophy are not considered rare. Anesthesiologists may need to pay much more attention to hypertrophy of the lingual tonsil, and further investigations are required.

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