

A Case of Mediastinal Emphysema Possibly Caused by the Insertion of a Laryngoscope

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(Received January 18, 2016; Accepted April 7, 2016)

Insertion of a laryngoscope to a patient with a strong pharyngeal reflex resulted in pharyngeal injury and subsequent development of mediastinal emphysema. An increase in airway pressure accompanying a strong pharyngeal reflex, as well as pharyngeal injury were thought to be factors associated with the development of mediastinal emphysema.

Key words: Vomiting reflex, Pharyngeal injury, Mediastinal emphysema

INTRODUCTION

Many cases of mediastinal emphysema are closely associated with operations performed in the fields of otolaryngology and oral surgery [1-6]. Here, we report a case of mediastinal emphysema, which developed as a result of pharyngeal injury that occurred during laryngomicrosurgery, in a patient with a strong vomiting reflex.

CASE REPORT

The patient was a 43-year-old woman with a height of 151 cm and a weight of 51 kg. Her previous medical history included total thyroidectomy with neck dissection, and total hysterectomy. On June 2015, she noticed hoarseness of voice. She visited an otolaryngologist and was diagnosed as having laryngeal granuloma (Fig. 1). She was scheduled to undergo treatment of removal of the granuloma by laryngomicrosurgery (LMS). In general, LMS is performed by an otolaryngologist after intubation; a direct laryngoscope is inserted intraorally and the surgery is performed while the lesion of the glottis is being directly observed. In this patient, the granuloma had occupied a part of the vocal cords. We considered that when trying to perform intubation, there was a risk that the muscle relaxant may relax the vocal muscles so that the granuloma would obstruct the glottis and cause airway obstruction. Therefore, for this case, we chose to perform surgery under sedation, which is performed without intubation. Dexmedetomidine (DEX), which has both analgesic and sedative effects, was chosen as the sedative drug. Course of anesthesia: DEX was administered according to the instructions on the package insert (initial loading dose : 6 μ g/kg/h for 10min + maintenance dose : 0.4-0.7 μ g/kg/h). To avoid occurrence of the vomiting reflex at the time of direct laryngoscope insertion, topical anesthetic (8% xylocaine) was sprayed into the oral cavity a few times. The vomiting reflex occurred

in the patient upon spraying of the topical anesthetic. Upon insertion of the laryngoscope by the anesthesiologist to anesthetize the laryngeal area, the patient demonstrated a strong vomiting reflex. Insertion of the laryngoscope was concluded to be problematic, and the anesthesiologist informed to the otolaryngologist that surgery under sedation would be difficult.

The otolaryngologist replied that the granuloma would not completely block the airway upon administration of the muscle relaxant, and that there would be enough space to insert the tracheal tube into the vocal cords. We therefore changed the method of anesthesia to general anesthesia by tracheal intubation. However, the patient had previously had a thyroidectomy, and hence her degree of backward neck flexion was insufficient. Therefore, we used a video laryngoscope (Airway Scope®: AWS) with which tracheal intubation can be performed without backward neck flexion (Fig. 2a).

AWS has a guiding groove exists on the side of the blade to fix the tracheal tube (Fig. 2b). By this guiding

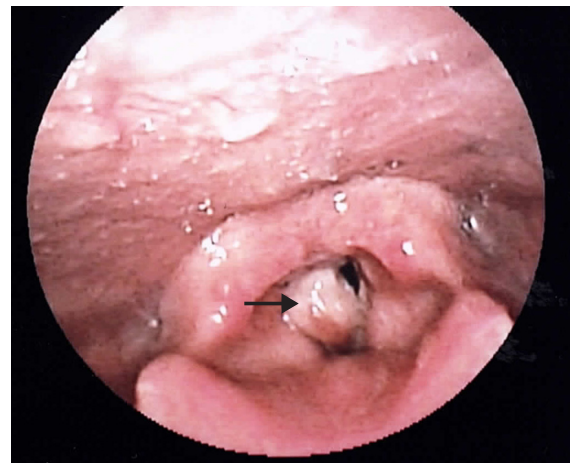


Fig. 1 The arrow (→) shows the laryngeal granuloma.

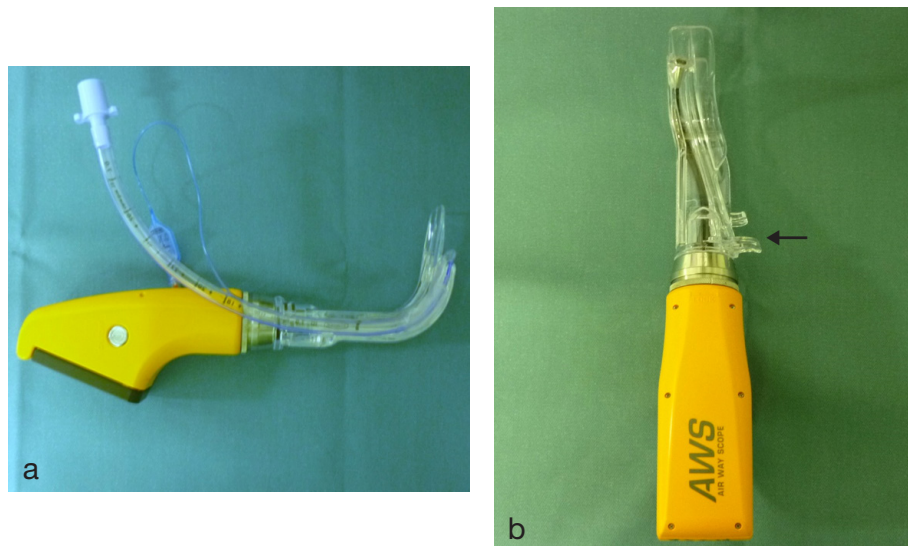


Fig. 2 a: The video laryngoscope (Airway Scope®: AWS) with tracheal tube was shown.
b: The arrow (←) shows the guiding groove exists on the side of the blade to fix the tracheal tube.

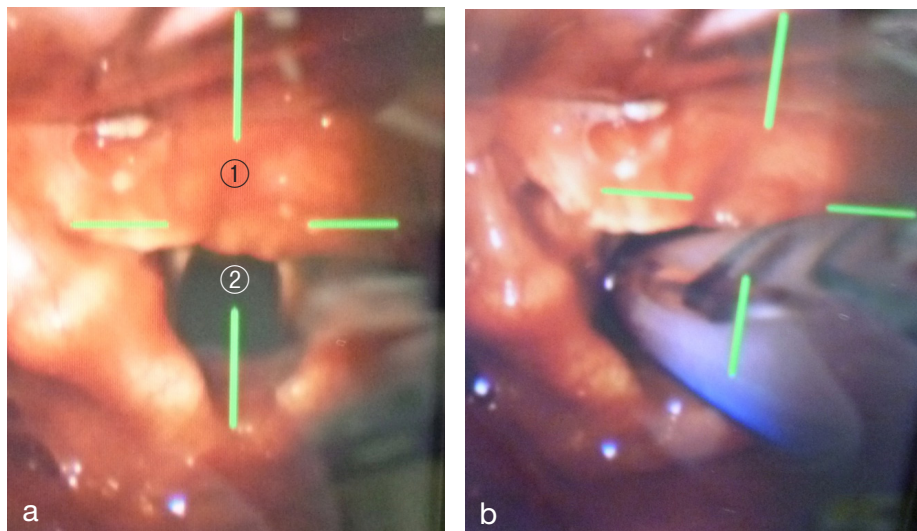


Fig. 3 a: The epiglottis (①) and the vocal fold (②) are observed on the video monitor.
b: The tracheal intubation was shown into vocal fold.

groove, the glottis is observed on the video monitor to assist (Fig. 3a) in the tracheal intubation (Fig. 3b). Induction of anesthesia was performed using a combination of propofol (50 mg), fentanyl (50 µg), and rocuronium bromide (50 mg). After adequate manual ventilation, the AWS was inserted into the oral cavity. Upon inserting the AWS into the oral cavity and resistance was felt by the hands. The AWS was withdrawn out of the oral cavity, and then inserted once again. After the tracheal intubation, the otolaryngologist inserted the direct laryngoscope, and commented that a small amount of blood could be seen in the hypopharynx. After hemostasis with a cotton ball the otolaryngologist resected the granuloma. After surgery, the patient was extubated and returned to her room. On the day after surgery, the patient complained of pain in the throat and a slight fever. The otolaryngologist suspected pharyngitis and inserted an electronic endoscope, and identified mucosal injury in the posterior wall of the hypopharynx (Fig. 4). And chest computed

tomography (CT) was performed. On the chest CT, an area of low absorption (air) around the esophagus and trachea was observed, and the patient was diagnosed as having mediastinal emphysema (Fig. 5a, b).

The patient did not complain of any breathing difficulty, and her oxygenation was maintained. The patient spent a few days at rest and was administered antibiotics. A few days later, the endoscopy was done. The patient's mucosal injury of hypopharynx was judged to have healed (Fig. 6), and meals were started. The patient did not develop throat pain or fever upon resuming oral meals, and hence her mediastinal emphysema was considered to have healed, and she was discharged from hospital.

DISCUSSION

In the field of otolaryngology, mediastinal emphysema has been reported to occur during tracheotomy [2], after tonsillectomy [3], laryngomicrosurgery [4, 5], as well as during tracheal intubation [7, 8]. During

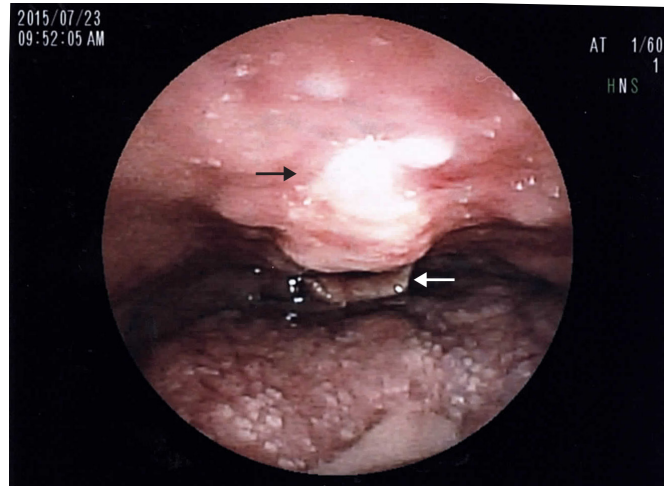


Fig. 4 The arrow (→) shows mucosal injury of hypopharynx. The white arrow (←) shows epiglottitis.

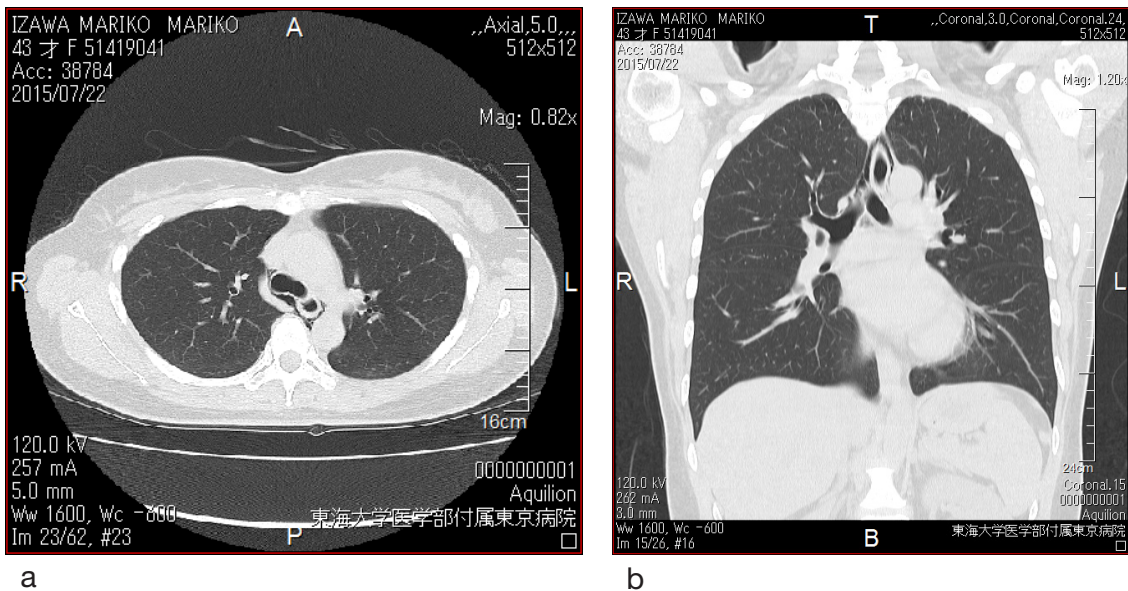


Fig. 5 a: The area of low absorption (air) around the esophagus and trachea was observed (axis-section). b: The area of low absorption (air) around the esophagus and trachea was observed (coronal-section).

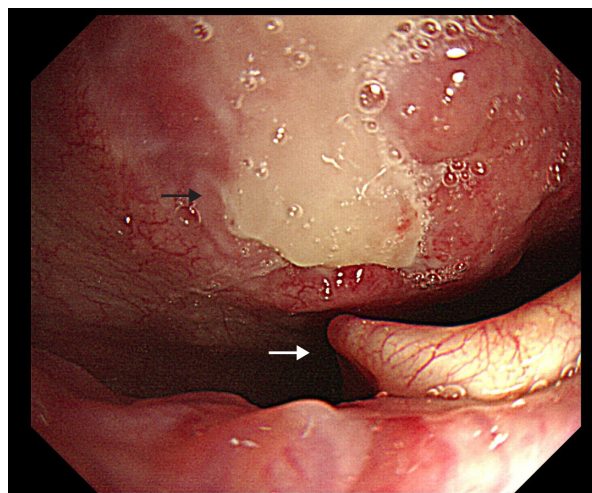


Fig. 6 The arrow (→) shows healed mucosal injury of hypopharynx. The white arrow (→) shows epiglottitis.

laryngomicrosurgery, the otolaryngologist performs insertion of a direct laryngoscope which is a procedure that is similar to tracheal intubation. Therefore, it is generally thought to be difficult to clarify whether it was the laryngoscope procedure performed by the anesthesiologist or the otolaryngologist that actually resulted in the mediastinal emphysema [4]. In our case, the anesthesiologist first performed laryngoscope insertion when the patient was showing a strong vomiting reflex. Therefore, there is the possibility that pharyngeal injured occurred at this time. There was a report of mediastinal emphysema occurring in a patient with severe vomiting due to a side effect of anti-cancer medicines [9].

In this report, the reason for the mediastinal emphysema was hypothesized to be weakening of the alveolar walls caused by the anti-cancer medicines and a severe vomiting reflex that caused an increase in the airway pressure. The cause of mediastinal emphysema in our patient was considered to be 1) a severe vomiting reflex caused by the intraoral topical anesthetic, which subsequently resulted in an increase in airway pressure, and 2) due to the increase in airway pressure, air leaked readily from the injured pharyngeal mucosa to the mediastinum. Upon insertion of the AWS into the oral cavity, a resistance was felt by the hands. However, as the patient was sedated with propofol, the vomiting reflex did not occur, and there was no increase in airway pressure. Therefore, it is unlikely that air leakage to the mediastinum occurred owing to injury of the pharyngeal mucosa to upon insertion of the AWS. In reports of cases of mediastinal emphysema caused by repeated direct laryngoscope insertion, increases in blood pressure or tachycardia were observed during the surgery [10]. In our present case, insertion of the direct laryngoscope by the otolaryngologist was

unproblematic, and the patient's blood pressure and pulse were stable during the surgery. Therefore, in our case, it is unlikely that insertion of the direct laryngoscope was the cause. We concluded that laryngoscope insertion should be avoided in patients with a strong pharyngeal reflex.

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