

False-positive Cuff Leak Test Due to Glossoptosis: A Case Report

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Case report

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Abstract

Background

The cuff leak test (CLT) can sometimes be falsely positive. We report a case with a visually confirmed false-positive cuff leak test caused by upper airway obstruction due to glossoptosis.

Case presentation

A 62-year-old woman was diagnosed with subarachnoid hemorrhage due to a ruptured aneurysm and underwent high-flow bypass and trapping. Postoperatively, she was admitted to our intensive care unit under mechanical ventilation. On postoperative days 11 and 13, she had positive CLTs under sedation. We observed only mild to moderate edema around the vocal cords and tracheal tube cuff using a bronchoscope and muscle relaxant. Bronchoscopy showed glossoptosis; hence, a jaw-lift maneuver was performed and the CLT turned negative. The false-positive CLT was thought to be due to glossoptosis. She was extubated on postoperative day 15 without post-extubation stridor. She was discharged on postoperative day 41.

Conclusions

Upper airway obstruction due to glossoptosis can cause false positive CLT. We should consider a jaw-thrust maneuver to avoid a false positive when performing CLT on a sedated patient.

Background

Laryngeal edema and post-extubation stridor are related to reintubation, and the incidence of post-extubation stridor is reported to be 2–26% [1]. The cuff leak test (CLT) is conducted to predict the presence of laryngeal edema and post-extubation stridor [2, 3], and the sensitivity and specificity of the CLT were reported as 0.62 and 0.87 [3], respectively. The CLT can sometimes be falsely positive. It has been previously reported that cuff leak volume is affected by lung mechanics [4], but there are few reports detailing the causes of false positives. We report a case with a visually confirmed false-positive CLT caused by upper airway obstruction due to glossoptosis.

Case Presentation

A 62-year-old woman was diagnosed with subarachnoid hemorrhage due to a ruptured right internal carotid artery aneurysm and underwent high-flow bypass and trapping. Postoperatively, she was admitted to our intensive care unit under mechanical ventilation to manage her cerebral edema and vasospasm under deep sedation. On postoperative day 11, she had positive CLTs (ventilator settings: volume control ventilation, tidal volume: 500 mL) under sedation (propofol: 150 mg/h, fentanyl: 30 µg/h, and her Richmond Agitation-Sedation Scale: -4). On postoperative day 13, she once more had positive CLTs under sedation (propofol: 40 mg/h, midazolam 5 mg/h, fentanyl 30 µg/h, and her Richmond Agitation-Sedation

Scale: -4). We evaluated her laryngeal edema by bronchoscopy with the addition of muscle relaxant (rocuronium: 50 mg) to the sedatives, and we observed only mild to moderate edema around the vocal cords and tracheal tube cuff. Since bronchoscopy showed glossoptosis, we performed the CLT again with jaw-thrust maneuver (Fig. 1). This time air leak was found and CLT turned negative (mean of three lower tidal volumes from six consecutive cycles: 291 mL). Since her upper airway space was compressed by the epiglottis and tongue base, the leak disappeared again without the jaw lift (Fig. 2). The false-positive CLT was thought to be due to glossoptosis, and we diagnosed that she had no laryngeal edema causing post-extubation stridor. She was extubated on postoperative day 15; post-extubation stridor was not observed, and reintubation was not required. She was discharged on postoperative day 41.

Discussion And Conclusions

Based on the findings of this case, we have identified valuable clinical implications. Upper airway obstruction due to glossoptosis can cause a false positive CLT result; therefore, a jaw-thrust maneuver should be considered as a means to avoid a false positive result in a patient under sedation.

Upper airway obstruction due to glossoptosis can cause false-positive CLT, as shown using bronchoscopic images and ventilator values. Although cuff leak volume has been noted to be affected by lung mechanics [4], upper airway obstruction due to glossoptosis has never been reported as a cause of false-positive CLT. To date, this is the first report of such an incidence.

We should consider a jaw-thrust maneuver to avoid a false positive test when performing CLT on a sedated patient. Neither Miller and Cole, who first proposed CLT, nor the researchers who later studied CLT, stated in their study methods that a jaw-thrust maneuver was necessary [2]. However, patients often cough when the cuff is deflated; this cough must be suppressed for CLT to be performed properly. This often requires sedatives. Indeed, intubated patients are often sedated even before CLT is performed. Glossoptosis is observed in 70% of sedated patients [5], and upper airway obstruction due to glossoptosis may account for a significant proportion of false-positive results when CLT is performed under sedation. Therefore, we should consider a jaw-thrust maneuver to avoid a false positive when performing CLT on a sedated patient, otherwise a false-positive CLT may cause unnecessary prolongation of the duration of mechanical ventilation [4, 6].

We report the first case of a visually confirmed false-positive CLT caused by upper airway obstruction due to glossoptosis, and the false-positive CLT could be avoided using the jaw-thrust maneuver. A false-positive CLT may cause unnecessary prolongation of the duration of mechanical ventilation, and upper airway obstruction due to glossoptosis can be observed in sedated patients. Thus, we suggest to consider performing a jaw-thrust maneuver to release the upper airway obstruction due to glossoptosis when conducting a CLT in a sedated patient.

Abbreviations

CLT: cuff leak test

Declarations

Ethics approval and consent to participate

Not applicable

Consent for publication

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editors-in-Chief of this journal.

Availability of data and materials

Not applicable due to patient privacy concerns.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

The Cuff leak test and bronchoscopy were performed by SG, JI, and MI. SG drafted the manuscript. JI, MI, and TN helped to revise the manuscript and approved the final manuscript. All the authors read and approved the final manuscript.

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Figures

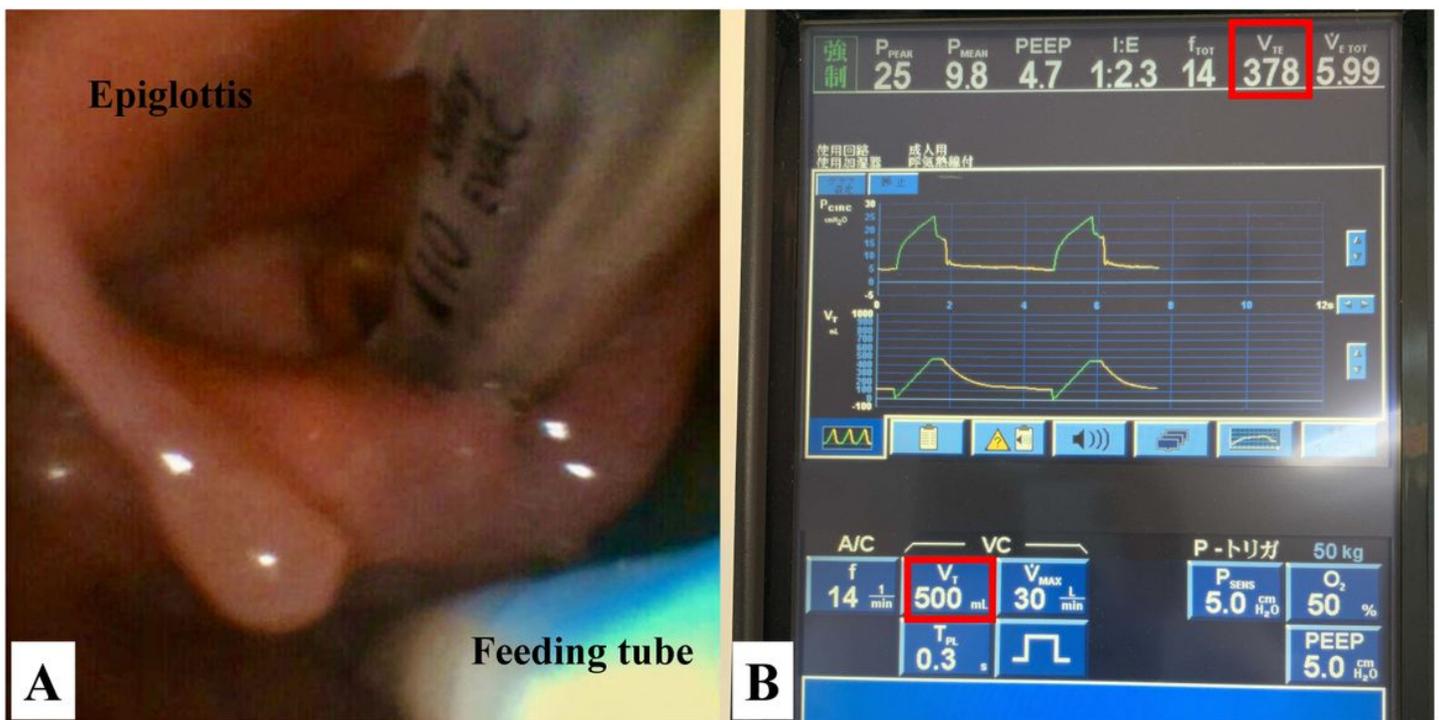


Figure 1

Bronchoscopic image and ventilator display under the jaw-thrust maneuver A: The bronchoscopic image under the jaw-thrust maneuver, B: The ventilator displaying a negative cuff leak test. A and B are images from the same point in time.

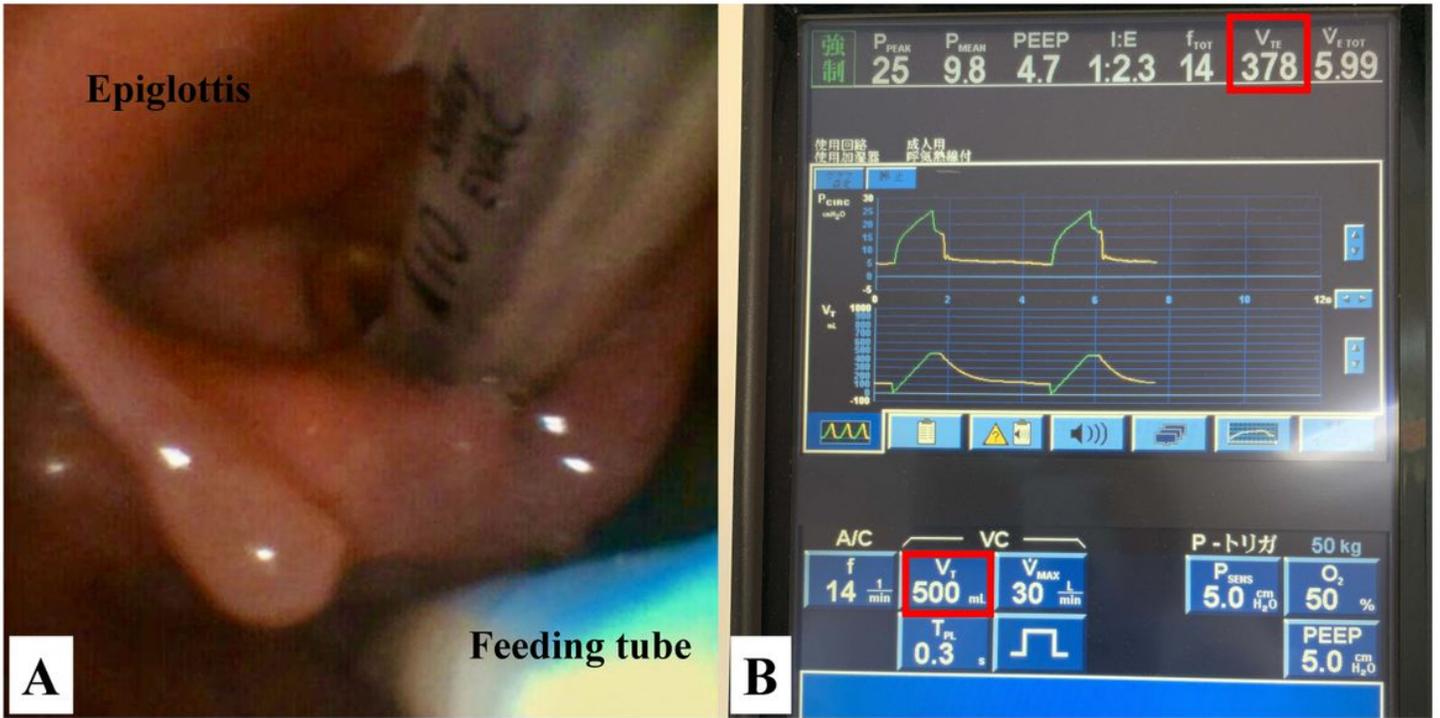


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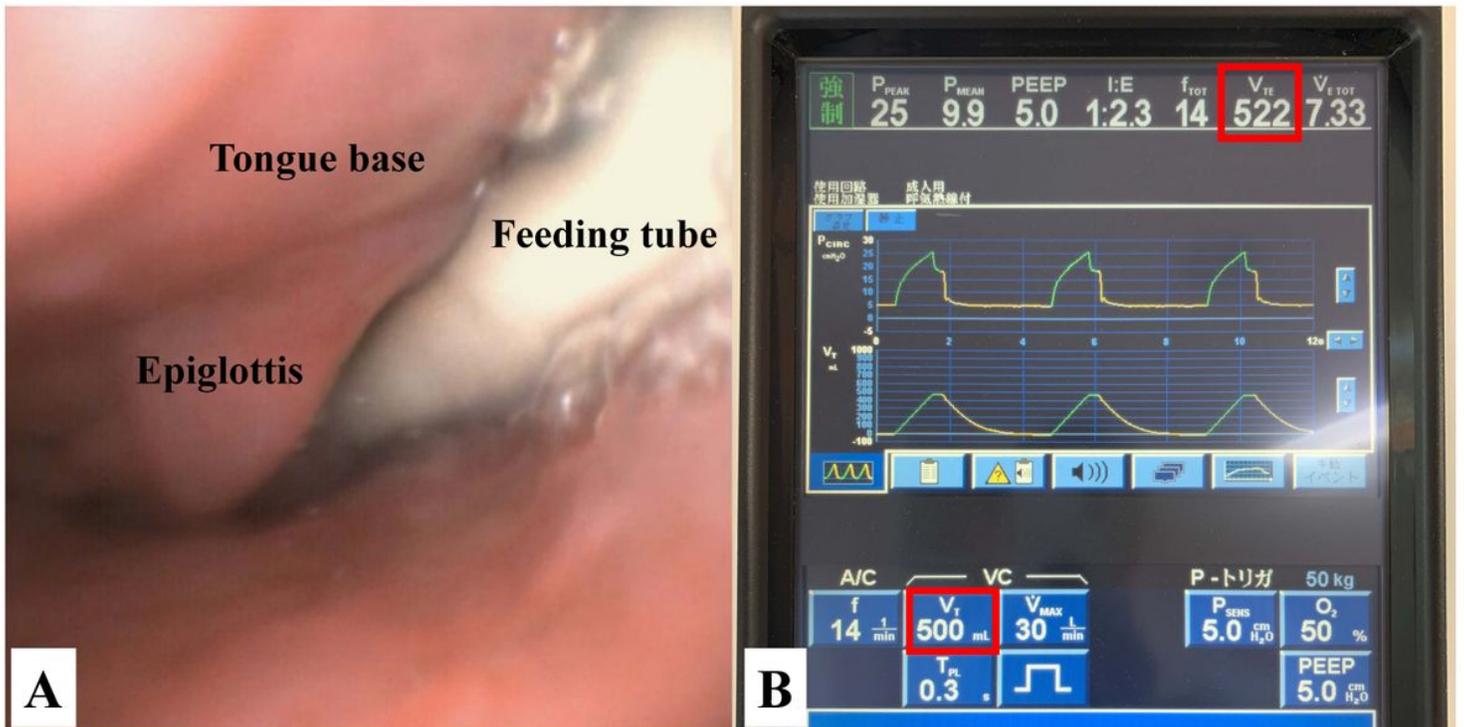


Figure 2

Bronchoscopic image and ventilator display without the jaw-thrust maneuver A: The bronchoscopic image without the jaw-thrust maneuver. The endotracheal tube was situated behind the epiglottis and the feeding tube was attached to the posterior pharyngeal wall. B: The ventilator displaying a positive cuff leak test. A and B are images from the same point in time.

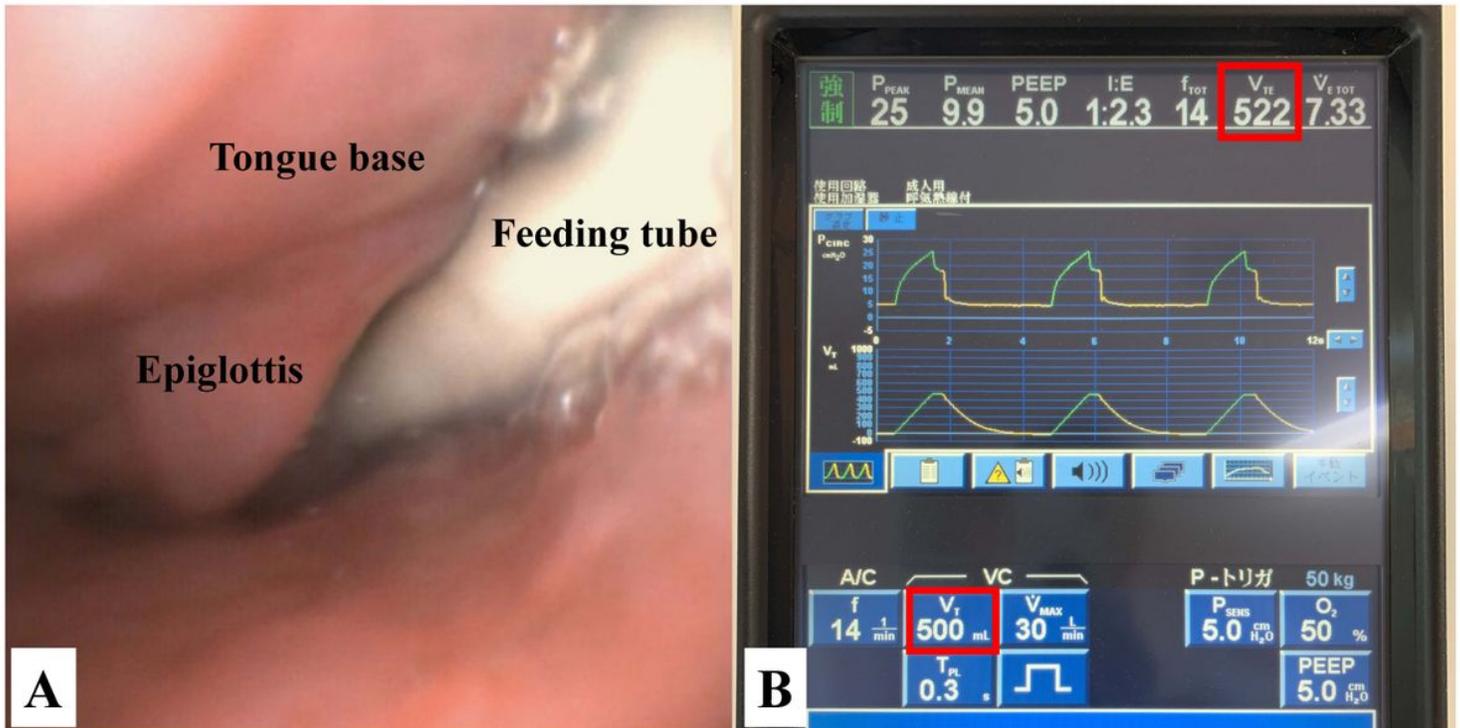


Figure 2

Bronchoscopic image and ventilator display without the jaw-thrust maneuver A: The bronchoscopic image without the jaw-thrust maneuver. The endotracheal tube was situated behind the epiglottis and the feeding tube was attached to the posterior pharyngeal wall. B: The ventilator displaying a positive cuff leak test. A and B are images from the same point in time.