J Anesth (2011) 25:294–297
DOI 10.1007/s00540-011-1094-7

CLINICAL REPORT

Epiglottic prolapse induced by lighted stylet tracheal intubation

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Received: 3 October 2010 / Accepted: 4 January 2011 / Published online: 2 February 2011

Abstract We report a case of epiglottic prolapse induced by lighted stylet tracheal intubation perceived by following upper gastrointestinal endoscopy. A 68-year-old male was to undergo endoscopic mucosal resection (EMR) under general anesthesia for a superficial orolarynx cancer spreading over the root of the tongue. Because the mucosal change was so minimal, intubation was performed with a lighted stylet instead of a direct laryngoscope, to prevent its metal blade spoiling the delicate endoscopic findings. After intubation, endoscopy revealed that the epiglottis folded down completely into the laryngeal vestibule. Immediate extubation with a ventilating tube exchanger failed to turn the entrapped epiglottis back to normal, and the inlet of the larynx remained obstructed. After reintubation, the epiglottis was restored to its normal position with endoscopic forceps. The postoperative course was uneventful and he was discharged on the sixth postoperative day. Retrospective evaluation of preoperative gastrointestinal endoscopy showed the epiglottis was flat and thin enough to have a tendency to become attached to the posterior pharynx wall, even though the procedure was performed in the decubitus position. Epiglottic prolapse induced by lighted stylet tracheal intubation is a quite rare complication but we should be aware of it as a potential injury which could cause upper airway obstruction if not recognized before extubation.

Keywords Lighted stylet · Trachlight · Tracheal intubation · Epiglottic prolapse

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Introduction

Use of a lighted stylet is one option for facilitating tracheal intubation when direct visualization of the glottis by conventional laryngoscopy is insufficient or inappropriate. However, such a technique with an indirect indicator has some risks of unrecognized injury.

Case report

A 68-year-old male who was to undergo endoscopic mucosal resection (EMR) for a superficial orolarynx cancer was sent to us for general anesthesia. In the previous 2 years he had suffered from metachronous multiple cancers of the orolarynx and esophagus, and was treated with concurrent chemoradiotherapy and repeated EMR.

He was 166 cm in height and weighed 61.7 kg. No history of other diseases was elicited. The field of preceding radiation therapy for the esophageal cancer did not include the larynx. There were no physical signs predicting difficulty with airway management. The last EMR he had undergone 7 months previously was performed under general anesthesia. At that time orotracheal intubation was completed on the first attempt with a Macintosh laryngoscope by a resident anesthesiologist. The new lesion was spreading over the root of tongue and completely superficial. There was no tumor mass disturbing intubation and repeated endoscopic findings showed no other changes in the airway since the previous operation, so we did not expect a difficult airway case. The mucosal change of the lesion was so minimal it could be detected only by careful endoscopic examination. Because a conventional laryngoscope would be strongly attached to the site, we were afraid that unwanted mucosal injury with its metal blade would

spoil the delicate endoscopic findings. So we decided to perform orotracheal intubation with a lighted stylet (Trachlight™).

The stylet was inserted into a size 7.5 mm cuffed Portex tracheal tube with the apex of the light bulb just emerging but not protruding from the distal end of the tube. It was then bent at almost the center of the words "bend here", on itself, by approximately 90°. The external wall of the tube was lubricated with water-soluble lubricant. The patient was supine and the head was in a neutral position. General anesthesia was induced by use of thiamylal sodium, remifentanyl, and vecronium. The intubate procedure was performed by a resident anesthesiologist under the supervision of an experienced anesthesiologist. Mask ventilation was rather difficult and insertion of an oropharyngeal airway was needed. The insertion procedure was performed gently enough to avoid mucosal damage. After muscle relaxation, the thumb of the left hand of the intubator was placed in the patient mouth, and the mandible was grasped and lifted ventrally. The tube was inserted into the oropharynx and positioned in the midline. Soon a bright circle of light appeared through the neck above the level of the laryngeal prominence, but it ran off the midline. A series of rocking or scooping movements did not redirect the glow to the midline. When a second attempt failed, the resident was relieved by the supervisor. The tube was inserted in a similar way and, when the glow appeared just below the level of the hyoid, the device was pressed caudally in the midsaggital plane. The gentle pressure advanced the glow below the level of the laryngeal prominence with little resistance. After pulling out the rigid inner stylet half way, the device was advanced until the glow reached the suprasternal fossa and it was removed from the tube. Good ventilation was confirmed and a direct laryngoscope was inserted shallowly to lift up the mandible ventrally to make space for endoscopy. When the endoscope was inserted, a strange view appeared. The epiglottis was obscured and at first glance we thought the tube was buried in the edematous larynx (Fig. 1a). Close inspection revealed, however, that the epiglottis was folded down completely into the laryngeal vestibule (Fig. 1b). Immediate extubation with a ventilating tube exchanger failed to turn the epiglottis back to normal. It was entrapped by the posterior wall of the vestibule, and the inlet of the larynx remained obstructed (Fig. 1c). After reintubation, the edge of epiglottis was grasped with endoscopic forceps and pulled back. The epiglottis was restored to its normal position by this manipulation, with no damage. The operation was performed successfully and the patient woke up and was extubated normally. He was observed closely overnight, but no symptom and sign of dyspnea was found. There was no complaint of either hoarseness or dysphagia. The postoperative course was uneventful and he was discharged on the sixth postoperative day on foot. Retrospective evaluation of preoperative gastrointestinal endoscopy showed that the epiglottis was flat and thin enough to have a tendency to become attached to the posterior pharynx wall even though the procedure was performed in the decubitus position (Fig. 2).

Discussion

Determination of endotracheal tube position by transillumination of neck tissues was first reported by Yamamura et al. [1]. Development of commercial devices resulted in the technique being widely used, and it is now listed as a suggested option in practice guidelines for difficult airway management by the American Society of Anesthesiologists Task Force [2]. Its unique property makes the device useful not only in a unexpected difficult airway case but also when the downside of the direct laryngoscope intubation must be avoided.

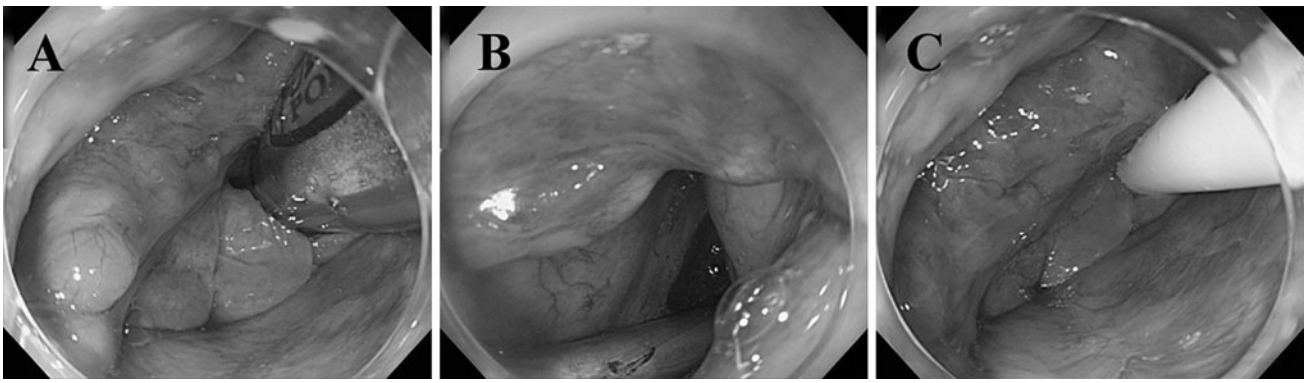

Fig. 1 Endoscopic view of the larynx after tracheal intubation. The epiglottis was obscured (**a**), and close inspection revealed it was invaginated into the laryngeal vestibule (**b**). It remained entrapped after extubation with a ventilation tube exchanger, and the inlet of larynx was obstructed (**c**)

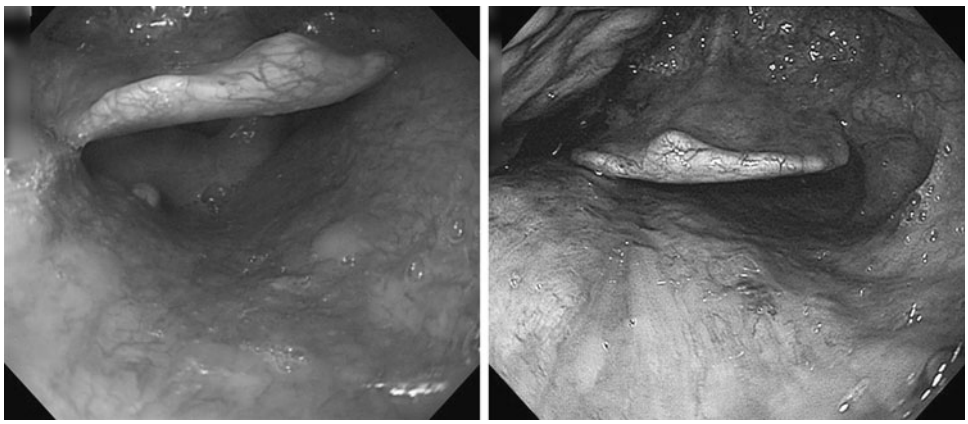

Fig. 2 Preoperative endoscopic view of the epiglottis. It was so flat and thin that it had a tendency to become attached to the posterior pharynx wall

Compared with conventional laryngoscopy, the morbidity of the lighted stylet technique is very low. Hung et al. [3] announced that not only the incidence of sore throats, but also the incidence of traumatic events was significantly lower in a lighted stylet group. They did not discuss the reason for this advantage, but it seems very possible that the lighted stylet technique does not require any force to facilitate intubation because it is not based on direct visualization of the glottis. In our case, the intubation procedure with a direct laryngoscope might damage the mucosa and make it impossible to decide extent of resection with a surgical safety margin.

On the other hand, the indirect visualizing nature of the technique makes it contraindicated when there is a suspicion of the existence of an obstacle such as a foreign body or an anatomical abnormality. In our case, we did not expect difficulty of intubation with the lighted stylet, because previous intubation by a resident had succeeded at first attempt and repeated endoscopic findings had subsequently shown no obvious change in the airway. However, we should have taken into consideration that there is no correlation between difficulty with the lighted stylet and well-known predictors of difficulty with the direct laryngoscope [3, 4]. There were no clear-cut anatomical abnormalities, but we realized retrospectively that the epiglottis was flat and thin enough to have tendency to become attached to the posterior pharynx wall. Joachim et al. [5] assessed uncommon sites of upper airway obstruction during sleep with videoendoscopy, and reported a case with a thin, floppy epiglottis closing the glottis entirely during inspiration. Although the anesthetic state is not equivalent to sleep, in our case the thin epiglottis would be more obstructive during anesthesia. So we presume that the unusual form and floppy nature of his epiglottis contributed to the prolapse with little resistance.

The incidence of severe complications of lighted stylet intubation is quite low, but some actual or potential complications have been reported. Detachment of a part or a broken piece of the device could be a foreign body in the airway [6–8]. A case of cricoarytenoid subluxation has been reported [9]. Also epiglottic prolapse is considered a potential complication but, to our knowledge, it have never been reported before. As the first visually recorded case, we emphasize that it did not become normal by extubation.

Epiglottic prolapse may be caused by different incidents. Three cases of airway obstruction because of "inverted epiglottis" after supracricoid laryngectomy with cricohyoidoepiglottopexy have been reported [10]. In that operative procedure, the thyroid cartilage is removed with its intrinsic tissues but the epiglottis and arytenoids are preserved. The author considered that extensive excision of the epiglottic petiole could result in transection of the hyoepiglottic ligament, reducing its ability to maintain the epiglottis position. The patients were only able to breathe via the tracheal stomas because of the obstruction caused by the epiglottis inversion. Maneuver through the tracheal stoma or operation under general anesthesia was needed to reduce each of them. In our case also, the epiglottis did not return to normal after extubation under general anesthesia. In the awake state, spontaneous breathing or coughing might have reduced the prolapse, but this is not certain. We are concerned that the folded and entrapped epiglottis could hardly be restored to its normal position by its elasticity, especially when it was not tough enough to interrupt passage of the tube, as in our case. This means that severe upper airway obstruction could happen if the prolapse was not recognized before extubation. We therefore believe this complication should be a need-to-know danger of potential injury for anyone who performs lighted stylet intubation. This rare complication should be taken into consideration especially when lighted stylet intubation is rather difficult. If repeated rocking or scooping movement fail to redirect the glow to the midline, we would be better off resorting to other techniques. Giving pressure intended to displace the epiglottis is discouraged even when it would enable intubation with little resistance.

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