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Failed Supraglottic Airway Placement in a Patient with Obstructive Sleep Apnea – A Case Illustration

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Abstract

The supraglottic airway (SGA) or laryngeal mask airway (LMA) has been used with success and relative ease since its invention. The SGA is our rescue device for patients whom we cannot ventilate or intubate. However, there are some cases of SGA failure, especially in the obese or those with obstructive sleep apnea (OSA). Our case report and illustrations demonstrate such failure of the SGA in an obese patient with OSA.

Keywords

Supraglottic airway; Laryngeal mask airway; Obstructive sleep apnea; Obesity; Bronchoscopy

Case Presentation

Our patient was a 73 year old male with a body mass index (BMI) of 44who presented for bronchoscopic evaluation of tracheal stenosis. His medical history consisted of long standing obstructive sleep apnea (OSA), hypertension, coronary artery disease and morbid obesity. The patient had been diagnosed with severe OSA that was recalcitrant to standard CPAP. For that reason, approximately 5 years prior, he underwent a tracheotomy that was to be used as a conduit for his continuous positive airway pressure (CPAP). Unfortunately, he had complications from the onset, which included aspiration, increased secretions and pneumonia. These secretions were consistently obstructing his tracheostomy which led to its removal after only three months. This left him with a persistent small tracheostomy stoma (Figure 1). Years later, he began to develop worsening dyspnea and was found to have an "A shaped" tracheal stenosis on CT scan. He presented to us for a diagnostic bronchoscopy to further evaluate and possibly treat the stenosis.

Upon examination, he was a morbidly obese male who was in no obvious distress. The airway exam revealed a normal mouth opening, normal dentition, a large tongue, mallampati grade 4, increased neck circumferenceand a short thyromental distance. As mentioned above, he had an existing small tracheostomy.

The initial plan was to perform the bronchoscopy through the tracheostomy to evaluate the stenosis. This was to be done under conscious sedation with topical anesthesia given via the stoma. If further intervention was needed, general anesthesia with a supraglottic airway (SGA) would have been performed to assist with ventilation and to serve as a conduit for the bronchoscope. Our other options for anesthesia included topicalization of the upper airway and examination through the mouth under conscious sedation for the initial evaluation and conversion to general anesthesia after an awake fiberoptic intubation if further treatment of the stenosis was required. The patient was reluctant to have anything placed in his small tracheostomy, even a pediatric bronchoscope, as he was afraid that any dilation of his stoma would affect his voice. We therefore elected to proceed with the bronchoscopy under general anesthesia with placement of an IGEL™ laryngeal mask airway (Intersugical ltd.) after induction as we had no reason to believe that LMA placement would be unsuccessful.

Anesthesia was induced with 2 milligrams of midazolam, 50 milligrams of lidocaine and 200 mg of propofol intravenously after adequate preoxygenation. A BIS monitor was placed which revealed a measurement between 30 and 50 for the entire procedure. We were unable to mask ventilate the patient, thus we proceeded with IGEL™ laryngeal mask airway (LMA) placement. After placement of a size 4 IGEL™ LMA we were still unable to ventilate. This was replaced with a size 5 IGEL™ LMA, however, we were still unable to ventilate. The bronchoscope was inserted to assess position of the LMA. Excessive redundant tissue was seen obstructing the glotticopening despite the presence of the LMA (Figures 2, 3). We attempted to reposition the LMA with the aid of the bronchoscope, however,this was unsuccessful (Figure 4). Please compare figures 2, 3 and 4 with figure 5- an illustration of a correctly seated LMA.

The patient's oxygen saturation began to decrease, thus we placed a size 4.5 microlaryngeal endotracheal tube (MLT) at the opening of the small tracheostomy and were able to successfully ventilate him (Figure 6)after removing the LMA. The flexible bronchoscope was then passed via his mouth and through the vocalcords (Figure 7)to assess the tracheal stenosis. The bronchoscopy was completed with no intervention as the stenosis was not amenable to repair. The patient was awakened uneventfully and brought to the recovery room.

Figures

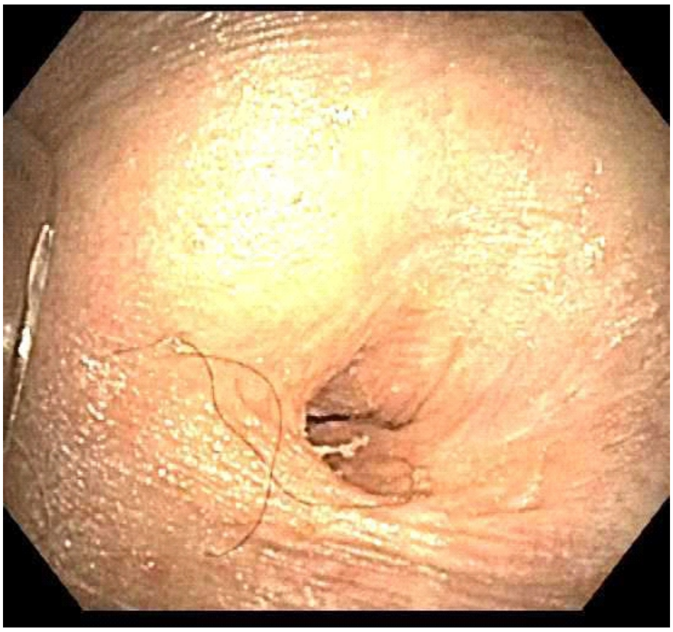

Figure 1. Small tracheostomy site

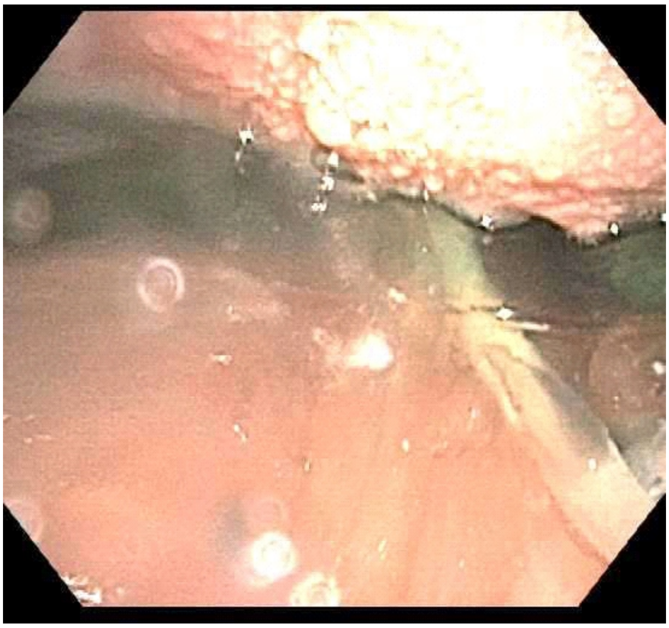

Figure 2. IGEL™ LMA in place with excessive redundant soft tissue surrounding

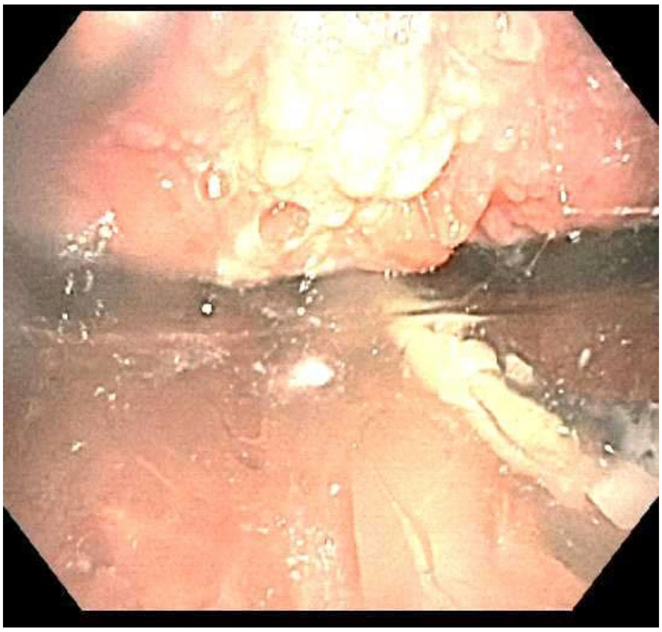

Figure 3. IGEL™ LMA in place with excessive redundant soft tissue surrounding.

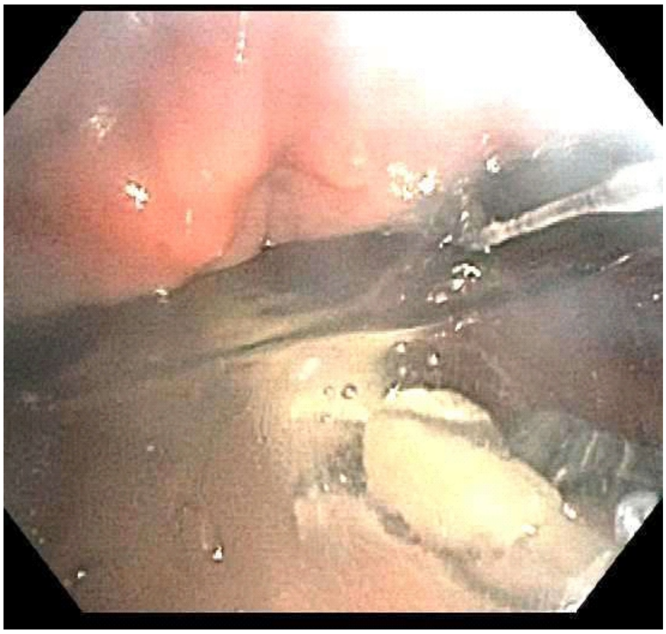

Figure 4. IGEL™ LMA after repositioning with the bronchoscope. Note excessive redundant soft tissue and small amount of glottic opening seen

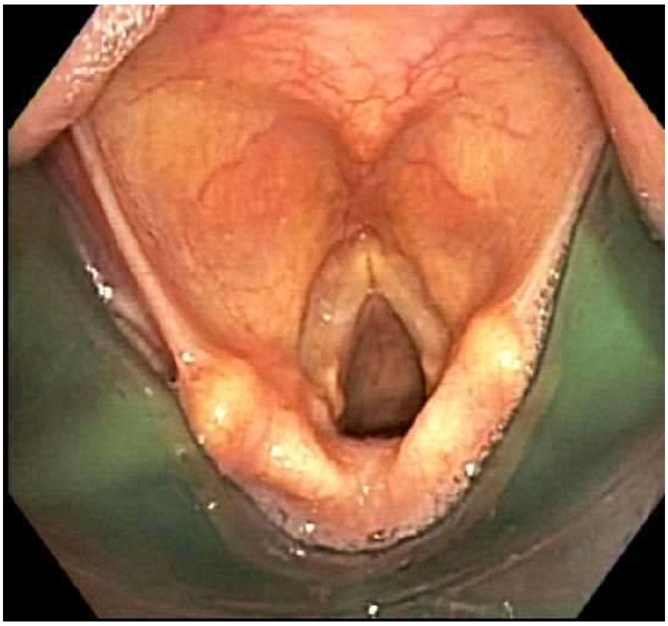

Figure 5. An example of a correctly positioned LMA on a different patient.

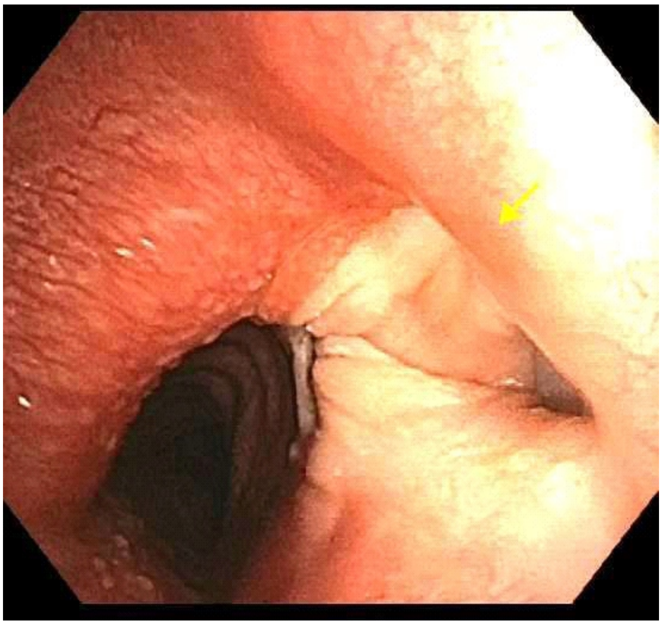

Figure 6. View of the trachea with small tracheostomy opening (3 o'clock) with size 4.5 MLT in situ.

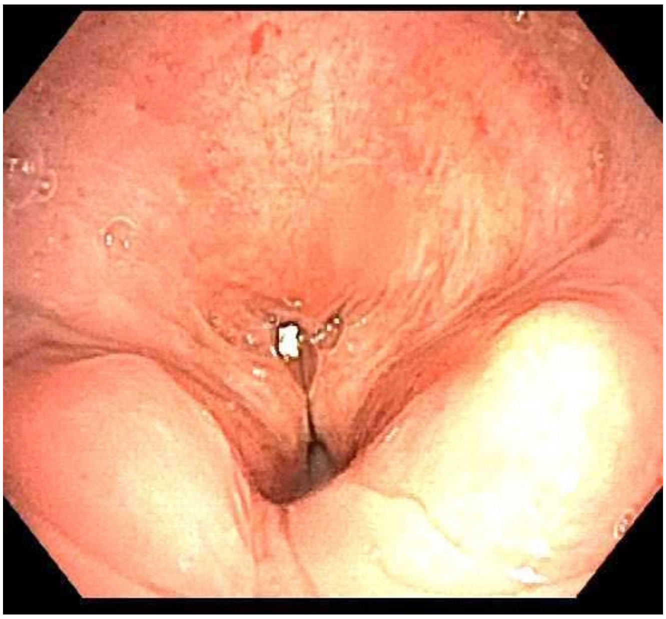

Figure 7. View of the glottis opening and arytenoids with the IGEL LMA removed. Note redundant soft tissue.

Discussion

The supraglottic airway (SGA) or laryngeal mask airway (LMA) has been used with success since its invention in 1981. Figure 5 demonstrates a well seated and positioned LMA. However, there are incidences of LMA failure ranging from 0.19% to 4.7%.[1-4] A recent observational study on 15,795 patients showed that LMA failure occurred in 1.1% of the adult surgical population. LMA failure was defined as any acute airway event occurring between insertion of the LMA and completion of the surgical procedure that required LMA removal and rescue with an endotracheal tube. It was found that four independent risk factors existed for failed LMA placement which include the following: surgical table rotation, male sex, poor dentition, and increased body mass index.[1]The link between OSA and difficult ventilation as well as difficult intubation has beenwell established.[5-7]Patients with OSA have excess redundant soft tissue (Figure 7) which collapses easilymaking mask ventilation and visualization during laryngoscopy difficult. Difficult intubation and difficult mask ventilation in the OSA patient are postulated to occur not only because of excess redundant soft tissue but also because of a common anatomic abnormality: a long mandibular hyoid distance and large hypopharyngeal tongue.[8] It would therefore be valid to assume that because of these anatomic abnormalities, LMA placement may also be difficult in the OSA patient. Two of the risk factors associated with difficult LMA placement, male sex and obesity, are also associated with OSA. Men have increased upper airway resistance compared to women resulting in airway narrowing and OSA.[9] Obesity and OSA have been clearly linked as evidenced by the fact that currently more than 70% of patients presenting for gastric bypass have OSA.[10]

If one encounters a cannot intubate andcannot ventilate situation, the ASA difficult airway algorithm states that a SGA/LMA should be placed to assist ventilation.[11] In many instances, this will rescue you from a cannot intubate/cannot ventilate situation. However, as illustrated in our case above, LMA failure may occur. In this instance we were able to visualize the reason behind our LMA failure as we had immediate access to bronchoscopic equipment. Other causes of failure to ventilate with an LMA may include laryngospasm and chest wall rigidity, however we were confident that neither of these events occurred in our patient as bronchoscopic evaluation immediately after LMA removal showed the vocal cords to be open and ventilation was easy as soon as we began to ventilate via the MLT endotracheal tube which was placed in the stoma. Our pictures (Figures 2, 3, 4 and 7)clearly demonstratethe excess redundant tissue that may cause OSA and difficulty with mask ventilation, intubation and LMA placement.We recommend that an awake fiberoptic intubation be consideredif the patient has a history of difficult LMA placement or if the clinician is highly suspicious that LMA placement or mask ventilation may be difficult. If one encounters a difficult LMA placement unexpectedly, attempting a different LMA size or brand may help as recommended by the ASA difficult airway algorithm. If endotracheal intubation has not been attempted, then one could proceed with direct laryngoscopy and intubation or an alternative approach to intubation such as video laryngoscopy. If intubation is unsuccessful and if one is still unable to ventilate despite these adjustments, then calling for help and proceeding down the “cannot ventilate, cannot intubate” portion of the difficult airway algorithm is recommended. In our reported case we could have avoided this situation by perhaps attempting the procedure under topical anesthesia with mild sedation or proceeding with an awake fiberoptic intubation from the beginning. This case serves to demonstrate that LMA placement is not always successful and this should be considered when dealing with obese patients or patients with OSA.

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