Chondronecrosis of the larynx following general anesthesia via laryngeal mask airway

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Abstract

Chandler Classification of Laryngeal Radionecrosis

<table>
<thead>
<tr>
<th>Grade</th>
<th>Symptoms</th>
<th>Signs</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 1</td>
<td>Slight hoarseness, slight dryness</td>
<td>Slight edema, telangiectasia</td>
<td>Symptomatic care, humidification</td>
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<tr>
<td>Grade 2</td>
<td>Moderate hoarseness, moderate dryness</td>
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<tr>
<td>Grade 3</td>
<td>Severe hoarseness with dyspnea, moderate odynophagia and dysphagia</td>
<td>Severe impairment of vocal cord mobility or fixation of one cord, marked edema, skin changes</td>
<td>Steroids, antibiotics, Tracheotomy +/- laryngeotomy</td>
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<tr>
<td>Grade 4</td>
<td>Respiratory distress, severe odynophagia, weight loss, dehydration</td>
<td>Fistula, fixation of skin to larynx, airway obstruction, fever</td>
<td>Tracheotomy +/- laryngeotomy</td>
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</tbody>
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Introduction

Chondronecrosis is a known complication of radiation, and symptoms may present years following treatment.1,2,3 It is the most common cause of chondronecrosis. Endotracheal intubation has, on occasion, been associated with chondronecrosis and is thought to be secondary to excess pressure of the tube or cuff on the cartilage itself, with the cricoid ring most commonly affected.1,4,5 The use of the laryngeal mask airway (LMA) should in theory prevent this complication, and is a reasonable choice for anesthesia in patients who have undergone prior radiotherapy for laryngeal cancer. LMA is generally effective and well-tolerated, with a low side-effect profile. We report the first case of chondronecrosis secondary to use of an LMA, which was successfully managed with hyperbaric oxygen therapy and reconstructive surgery.

Case Report

A 69 year old male underwent routine total knee replacement using general anesthesia via LMA. Of note, he had undergone radiation therapy for a T1aN0M0 squamous cell carcinoma of the larynx five years previously, receiving a total of 66 Gy. Over the ensuing three days, the patient noted progressive odynophagia, treated initially with steroids and antibiotics. The patient improved with medical therapy, but worsened following completion. He subsequently developed symptoms of aspiration, with an esophagram demonstrating a fistula (Fig 1). He was managed medically but developed progressive dyspnea and required tracheostomy for bilateral vocal fold immobility. At the time of tracheostomy, he underwent direct laryngoscopy demonstrating necrosis of the posterior cricoid plate (Fig 2-3) with a fistula into the subglottic larynx. He underwent hyperbaric oxygen therapy and intravenous antibiotics. His vocal fold mobility improved and he was decannulated. Post treatment demonstrated a persistent though small defect in the postcricoid larynx (Fig 4), which was closed endoscopically with a laterally based postcricoid mucosal advancement flap (Fig 5-6). Postoperative swallowing function improved and the patient’s gastrostomy tube was subsequently removed. Though considered as potential treatment, total laryngectomy proved unnecessary.

Discussion

Laryngeal chondronecrosis is a known but rare complication of radiation therapy4,6 and endotracheal intubation.1,2,3 Both these interventions can decrease blood supply to the laryngeal mucosa and cause local ischemia. Supraglottic airway devices such as LMAs are frequently used in airway management. The case discussed herein describes the development of chondronecrosis after LMA placement in a patient who previously underwent external beam radiation. To our knowledge, no prior reports of chondronecrosis from an LMA have been reported.

LMAs are generally considered very safe devices for airway management. The most serious reported complication of LMA use is aspiration. This complication is exceedingly rare, estimated at 0.02%,7 and is within the range of 0.01% to 0.06% of aspiration for anesthetized patients.8 When compared to endotracheal intubation, a systematic review showed that LMAs resulted in a lower incidence of hoarseness, laryngospasm during emergence, coughing, and sore throat.8

Prompt recognition of laryngeal chondronecrosis is important to prevent further sequelae. Our single report demonstrates that LMA-induced chondronecrosis can be managed with antibiotics, endoscopic repair and hyperbaric oxygen, and does not necessarily require total laryngectomy or tracheostomy.

Successful placement of the LMA is integral to its safe function. Capillary perfusion pressure of the laryngotracheal mucosa is 20-25 mm Hg.10 Manufacturer guidelines for the LMA Classic21 (Teleflex Medical, Dublin, Ireland) state that this device forms a seal of approximately 20 mm H2O around the larynx. Users are directed to “NEVER OVERINFLATE THE CUFF” and to maintain a cuff pressure of “ideally about 60 mm H2O.”11 The case presented here suggests that use of an LMA can in fact cause laryngeal chondronecrosis in an at-risk patient.

Conclusions

General anesthesia via laryngeal mask airway is a generally effective technique with a low risk of complications. When used in patients with a history of radiation therapy to the larynx and pharynx, its use should be viewed with caution, with special attention paid to correct sizing and placement so as not to induce pressure injury to surrounding structures. Any patient with progressing odynophagia, dysphagia, hoarseness or dyspnea following LMA or ETT placement in the setting of prior radiation therapy should be promptly evaluated for possible chondronecrosis and appropriate treatment instituted immediately.

References