

## Introduction

Malignant central airway obstruction (MAO) can be a life-threatening emergency. Symptoms depend on the location of the obstructing lesion. Masses in the trachea or carina lead to progressive dyspnea and stridor, while lesions in the bronchi or bronchus intermedius, lead to loss of unilateral lung function and frequent episodes of post-obstructive pneumonia.<sup>1</sup>

The most frequent cause of MAO, lung cancer, results in more deaths per year than the next four leading cause of cancer death combined.<sup>1,2</sup> In fact, one third of patients with lung cancer will develop complications associated with airway obstruction.<sup>2</sup> Other adjacent primary tumors, such as esophageal, thyroid and mediastinal malignancies can also cause MAO. Primary tumors such as squamous cell carcinoma and adenoid cystic carcinoma, as well as metastatic disease from remote tumors, less commonly cause MAO.

We present a case of malignant airway obstruction occurring in the subglottis. While obstruction often occurs in the trachea, there are no reports in the literature describing a laryngeal metastasis from an adjacent lung cancer.

## Case Presentation

A 64-year-old female, with a history of squamous cell carcinoma of her lung, was referred to our tertiary care otolaryngology practice for airway evaluation. Her cancer was diagnosed five years prior and was treated with radiation and chemotherapy. Soon after initial treatment, she developed a local recurrence and underwent left pneumonectomy. Subsequently, she developed further recurrence at the bronchial stumps and in the right lower lobe, which was treated with chemotherapy.

At our evaluation, she reported progressive hoarseness and difficulty breathing that was worse when supine. On exam, her voice was mildly hoarse with inspiratory stridor evident during heavy breathing. Flexible stroboscoped laryngoscopy revealed a multi-lobulated, red mass in the subglottic larynx that appeared to be arising from the posterior and left lateral walls (see Figure 1). The mass prolapsed within the airway during heavy breathing and had the appearance of a primary subglottic cancer. However, comparison to pictures of her endobronchial tumor taken at the time of recent bronchoscopy showed a striking similarity in surface appearance of the mass. The exam also identified a right true vocal fold polyp with a posterior glottic gap. Computed Tomography (CT) scan of her neck confirmed the presence of a subglottic mass without any cervical adenopathy (see Figure 2).

For these findings, she was taken to the operating room. Without sedation, the oral cavity, throat and larynx were anesthetized with topical lidocaine, and a video bronchoscope was passed transnasal identifying an irregular, red, friable mass arising from the posterior left surface at the level of the cricoid cartilage and blocking approximately 50%-60% of the glottic airway (see Figure 3). The bronchoscope was passed adjacent to the mass, and an irregular red mass at the proximal left mainstem bronchus that occluded approximately 80% of the lumen was visualized. The patient was intubated over the bronchoscope and tube position was confirmed prior to induction of general anesthesia. Tube placement cord out a large piece of tumor, which was sent to pathology. Laryngoscopy was carried out to resect the remainder of the subglottic mass, followed by extubation and rigid bronchoscopy to resect the left mainstem mass. Finally the vocal cord lesion was resected. Final pathology revealed invasive squamous cell carcinoma in both the subglottic and the left mainstem masses, consistent with the primary lung cancer.

She is currently 9 months status post surgery with no evidence of recurrent subglottic mass. She is being treated with nivolumab every two weeks, shows no progression of her disease, and maintains a good functional status.

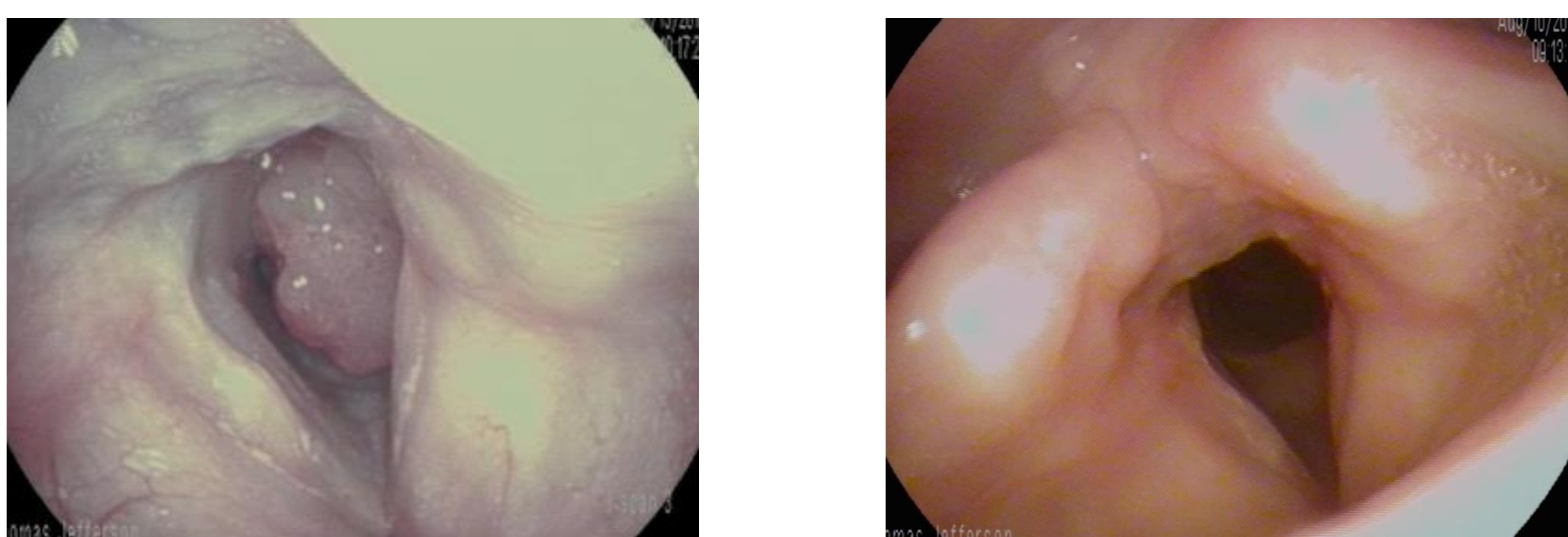


Figure 1. Flexible stroboscoped laryngoscopy images of the larynx reveal the A) subglottic mass preoperatively and B) no evidence of the mass three weeks postoperatively.

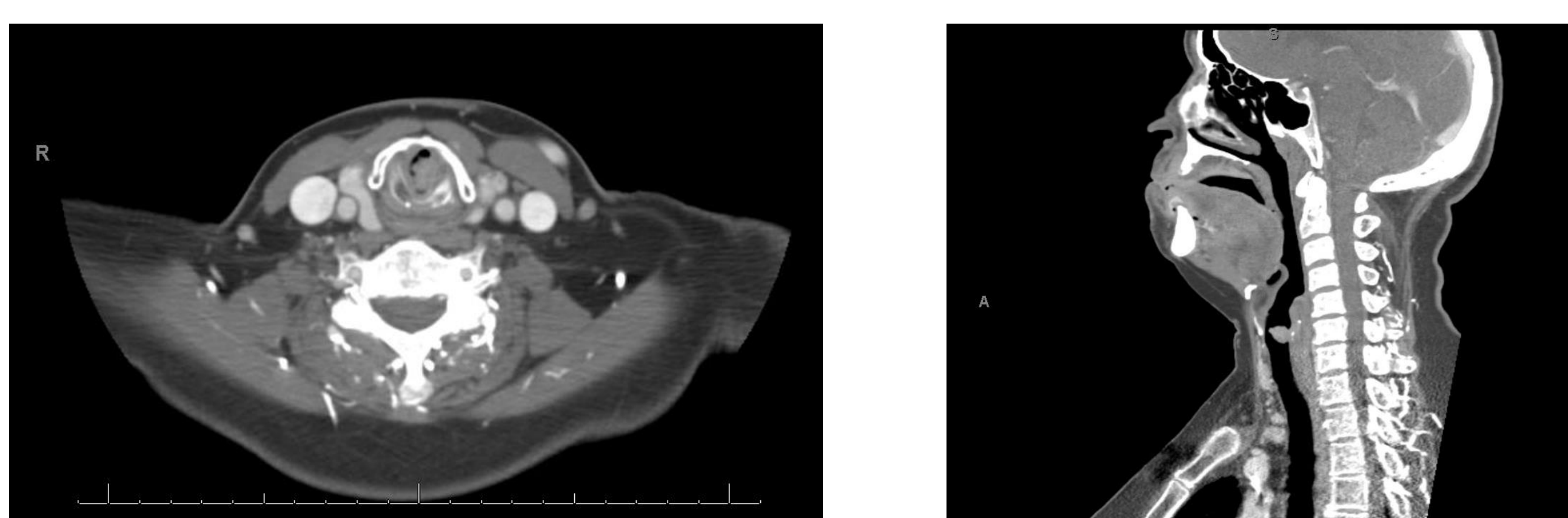


Figure 2. CT neck demonstrates a 13 x 9 x 9 mm mass in the left subglottic region that originates just below the left true vocal fold. A) Axial view. B) Sagittal view.

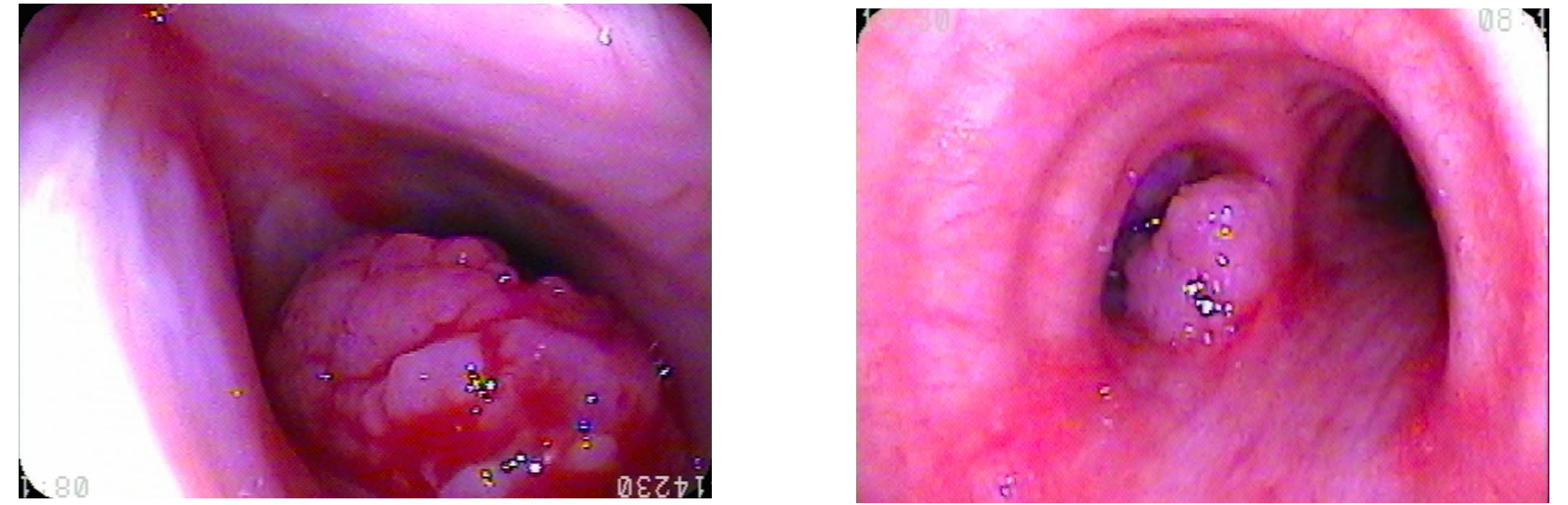


Figure 3. Intraoperative bronchoscopic images show A) the subglottic mass at the level of the cricoid cartilage emanating off the left posterior-lateral tracheal wall, and B) the proximal left mainstem mass occluding approximately 80% of the lumen.

## Discussion

Malignant airway obstruction requires prompt treatment from skilled and experienced physicians. Death from suffocation is not an uncommon outcome if left untreated. Most patients with MAO have unresectable lesions. However, therapeutic bronchoscopy provides airway stabilization and palliation that serves as a bridge to allow time for further treatment.

In a retrospective review of 36 patients undergoing bronchoscopy for MAO, patients who received additional definitive treatment, consisting of surgical resection, palliative radiation or palliative chemotherapy and radiation, had a longer survival time (median 38.2 months) compared to patients who did not receive further treatment (median 6.2 months).<sup>3</sup> Among all patients in the study, 75% had tracheal involvement, but location within the trachea was not further delineated.<sup>3</sup> Other studies indicate the trachea as more commonly involved than the carina or mainstem bronchi, but no study further describes location within the trachea.<sup>4,5</sup> Our case is the first report of malignant airway obstruction occurring in the larynx from a lung cancer.

Rigid bronchoscopy permits the use of many treatment modalities. Coring out the lesion, such as done in our study with the endotracheal tube, is the simplest method. Laser, electrocautery, microdebrider, and argon plasma coagulation can also be employed for immediate relief of obstruction.<sup>1,2,6</sup> Cryotherapy and brachytherapy provide a delayed effect; while various covered stents help maintain airway patency. While interventional pulmonologists and thoracic surgeons have customarily performed bronchoscopic intervention for MAO, the otolaryngologist also has bronchoscopy expertise. The first report describing a bronchoscope dates back to 1898 when Gustav Killian, a German laryngologist, removed a foreign body from a farmer's trachea.<sup>7</sup> Chevalier Jackson, known in the otolaryngology field as the father of modern laryngology and endoscopy, developed the first rigid bronchoscope. Otolaryngologists have since become experts at direct laryngoscopy and bronchoscopy and have a host of instruments at their disposal.

Patients with MAO are often critically ill, with an obstructed airway, poor functional status and metastatic disease. The choice of intervention must be made based upon the patient's stability and location of the obstruction, but also based upon the available physicians and technology. Many reports emphasize the multidisciplinary approach citing essential team members including medical oncologists, thoracic surgeons, interventional pulmonologist, radiologists and anesthesiologists.<sup>2,6</sup> The otolaryngologist has endoscopic expertise with bronchoscopy, as well as with laryngoscopy with or without jet ventilation. Furthermore, otolaryngologists have critical experience with the obstructed airway and are trained at securing the difficult airway, often with awake fiberoptic intubation. Lastly, the otolaryngologist can evaluate these patients with nasopharyngolaryngoscopy in the office or emergency room setting to determine if the tumor involves the upper airway. For these reasons, the otolaryngologist makes an excellent team member for select patients with MAO.

## Conclusion

Lung cancers, as well as other many other cancers, may have endobronchial metastases that obstruct the airway. While often treated by the thoracic surgeon or interventional pulmonologist, these masses may occur in the proximal airway as high as the larynx. Their presentation may be remarkably similar to that of a primary laryngeal tumor, making the patient history essential in the evaluation. The airway expertise of otolaryngologists makes them key team members in caring for select patients with end stage lung cancer.

## References

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