



Cervical Emphysema Complicating Excision of Epiglottic Cyst with Carbon Dioxide Laser

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Cervical emphysema is not uncommon in patients following head-and-neck related surgery. Free air may enter the neck by direct opening of the potential fascia spaces, dissection within the fascia spaces from the head or mediastinum and by injury to the upper respiratory of the alimentary tracts. The sources for free air in the neck are numerous and varied, ranging from the rectum to the sinuses. The otolaryngologist should have thorough knowledge of the differential diagnosis for air in the neck since the definitive therapy depends on the etiology. Here, a case of a 55-year-old female after undergoing excision of an epiglottic cyst with carbon dioxide laser is used to illustrate this clinical situation. Postoperative cervical emphysema developed and she was managed by supportive treatment with ideal recovery. Although cervical emphysema rarely occurs after microscopic suspension laryngoscopic laser surgery, it is still important to note this complication has the potential for grave outcomes if it is not immediately recognized and addressed.

Key words: cervical emphysema, microlaryngeal surgery, epiglottic cyst, crepitation

INTRODUCTION

Epiglottic cyst is not an unusual benign disease in the larynx. It may be congenital or acquired.¹ In adults, epiglottic cysts are usually an incidental finding and small cysts are often asymptomatic. When the cysts are perceptively large, it may cause mild dysphagia with hoarseness, a muffled sound (hot potato sound), chronically irritated coughing, lump sensation in the throat or obstructive sleep apnea.² Complete airway obstruction is rare but is a clinical emergency when present.³⁻⁴ The treatment options include observation and surgical excision, depending on its size and location. Surgical removal is the treatment of choice for patients with large cysts or compression symptoms.⁵⁻⁷

Microscopic suspension laryngoscopic surgery (MLS) with carbon dioxide (CO₂) laser is a common and widely used surgical modality for lesions in the pharynx and lar-

ynx. For early tumors (Tis, T1, T2) in the aerodigestive tract, transoral dioxide laser resection has already become an established method of treatment for the purpose of organ preservation.⁸⁻⁹ However, there are still some potential complications, including postoperative bleeding, aspiration pneumonia, airway fires, laryngeal granulomas and anterior glottic webs.¹⁰⁻¹² In a study by Bernal-Sprekelsen et al.,¹² large lesions and those located in the supraglottis have a statistically higher probability of developing a complication. There are few articles mentioning cervical emphysema following the laser surgery. Here, we present our experience and hope it will be of some help for other surgeons.

CASE REPORT

A 55-year-old healthy female presented with a six-month history of lump sensation in her throat. Her past medical history was unremarkable. Physical examination and laryngoscopy revealed a cyst-like lesion with smooth surface mucosa arising from the right laryngeal surface of the epiglottis (Fig. 1A). Because there were no clinical symptoms, observation and follow-up were suggested initially. However, the patient asked for surgical intervention to relieve her illness. MLS with CO₂ laser (UltraPulse Encore Fractional CO₂, Lumenis, Israel; 10600 nm wavelength) was our chosen surgical modality. The machine had a 1 mm spot size at the 400mm focal

Received: January 6, 2010; Revised: March 5, 2010;
Accepted: March 18, 2010

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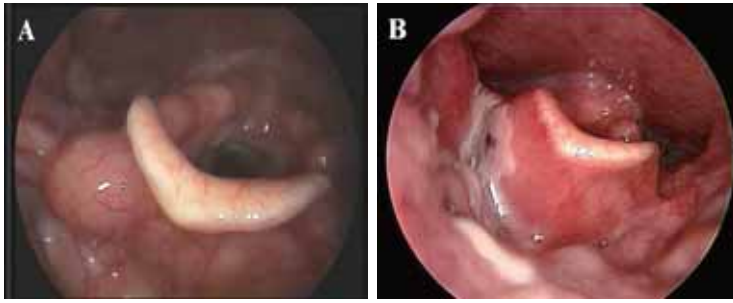


Fig. 1 Laryngoscopic view of the epiglottis: A) Pre-operative view. A right-sided sessile cyst arises from the lingual surface of the epiglottis. B) Post-operative view.

distance used for microlaryngoscopy. It was kept in the ultrapulse mode (exposure time = 10 ms/pulse; maximum energy 2 W). To avoid any charring and heat diffusion into the surrounding tissues, the laser fluence was set at 127 mJ/cm^2 with a frequency of 20 Hz. After induction of general anesthesia with an endotracheal tube, a rigid laryngoscope was placed to have the surgical field fully exposed. All the procedures mentioned above were performed smoothly without immediate complications such as mucosa tear or hematoma. The lesion was excised carefully with cold-instrument (micro scissor) and CO₂ laser. After the surgery, the extubation was performed smoothly and she was sent to the post-anesthesia room (PAR). Her recovery in the PAR was uneventful and no further positive airway pressure device was introduced.

Around 4 hours post-operatively, soft swelling with painful sensation over bilateral submandibular and submental region was noted without skin color change of the skin. After another 2 hours, difficulty in phonation developed and the affected region extended to right-sided infra-auricular region with diffuse crepitus on palpation. There was no chest wall crepitation. We carefully checked her oral cavity, pharynx and larynx with a laryngoscope. All the mucosa of those areas, except the surgical site, appeared normal without bleeding or crepitus (Fig. 1B). The X-ray of the neck soft tissue was obtained and confirmed the diagnosis of cervical emphysema (Fig. 2). The lungs were otherwise clear and there was no evidence of pneumomediastinum. Therefore, she was hospitalized for close observation and her condition had markedly improved by the next morning. She was discharged 3 days after the operation.

DISCUSSION

Surgical excision is one of the treatment choices for

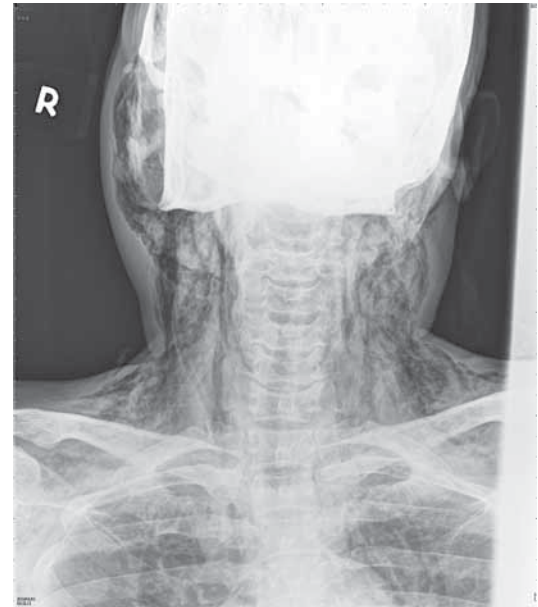


Fig. 2 6 hours post-operative postero-anterior soft-tissue neck radiograph.

epiglottic cyst, with low recurrence. The instruments that can be used include sharp knife, microdebrider¹³ and laser. The microdebrider, a one hand-powered instrument, has been widely used in treating nasal or paranasal sinus diseases but is relatively uncommon for laryngeal lesions. It is also more costly. As for laser surgery, according to tissue interactions,¹⁴ the CO₂ laser (10,600 nm) in the ultrapulse mode, is the preferred type of laser for treating benign pharynx and larynx lesions. Nd-YAG (1,064 nm), diode (980 nm) and KTP (532 nm) lasers, even in the contact mode, induce much more heat diffusion into the surrounding tissues and potentially higher rates of postoperative complications. The CO₂ laser, with power settings of 2-10 Watts, can vaporize tissue with a shallow depth of penetration. Currently, MLS with CO₂ laser and cold instruments are the standard modalities for excision of epiglottic cysts. The main advantage of CO₂ laser is its precision, leading to sparing of normal tissue. Since the view and motility is limited in the restricted working field during MLS, the CO₂ laser can offer extraordinary advantages for vision because of its hemostatic cutting properties.⁸⁻⁹

The CO₂ laser has been used since the early 1970s in treating laryngeal diseases.¹⁵ Even then, potential complications such as airway fires and anterior glottic webs were recognized.¹⁰ According to the literatures we reviewed, the laser related complication rate varied from 0.2% to 3%, while airway fires had the highest preva-

lence.¹⁰ In a study by Bernal-Sprekelsen et al.,¹² large lesions and those located in the supraglottis have a statistically higher probability of developing complications, while postoperative bleeding and aspiration pneumonia were among the most frequent complications. However, few reports mentioned cervical emphysema following laser surgery and we believed this minor complication has been under-reported.

This case highlights the non-negligible surgical complication with cervical emphysema following the MLS with CO₂ laser. The exact origin of the air in the neck in our case could have been due to the surgery itself, the anesthetic intubation or it might have been a spontaneous dissection of air. Intubation sometimes causes tracheal mucosa tearing and the air can gain access to the perivascular spaces. Then, it migrates along the adventitia directly into the mediastinum and subcutaneous tissue. This will result in pneumomediastinum accompanied by cervical emphysema. Regarding the spontaneous air dissection, which had been reported to occur only one time per 7,115 to 42,000 hospital admissions,^{11,16} it is probably related to an increased intra-alveolar pressure, combined with alveolar wall alterations, eventually leading to alveolar rupture and pneumomediastinum. Since cervical emphysema is the only presentation in the case presented here, those two assumptions seem to be unlikely and we believed the more plausible explanation would be the air entered the neck from the direct opening of potential fascia spaces during laser excision.

In our case, the device was used very carefully with the power setting at 2 Watts and the tissue was supposed to be vaporized without much thermal transfer to the surrounding structures. However, the complication still occurred. The various divisions of the deep cervical fascia compartmentalize the neck into a series of potential spaces. Those spaces are not watertight compartments and often communicate with one another. Therefore, once the gas had found entry into the soft tissue planes of the neck by dissection through the fresh surgical site, the air will obviously follow the path of least resistance. In our case, the parapharyngeal space might be the origin site where the gas entered. This space communicates with numerous other neck compartments such as the retropharyngeal space, submandibular space, parotid space and masticator space.

The management of this case was mainly intensive observation and securing the airway. Patients may be found with dramatic clinical findings but the treatment is usually still supportive. The subcutaneous air is generally limited and does not require evacuation.¹⁷ However,

sometimes more extensive gas dissection through the mediastinum may occur and lead to serious complications including pneumothorax or mediastinitis. To limit the extent of soft tissue emphysema, early recognition and avoidance of positive pressure within the oropharynx is critical. Although rare, the potential mortality rate can never be ignored and surgeons should follow the patient's condition very closely.

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