

Metachronous tracheal squamous cell carcinoma treated with Nd: YAG laser

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Abstract

Tracheal squamous cell carcinoma detected early in a high-risk patient has been treated twice with local neodymium-yttrium aluminium garnet laser therapy with good result so far. Ongoing bronchoscopic monitoring continues.

Introduction

Our patient developed multiple tracheal squamous cell carcinomas (SCCs) after right upper lobectomy for SCC in 2012. Two years later, he remains in remission on regular bronchoscopic surveillance with no visible tracheal tumor after two therapeutic laser ablation sessions using the neodymium-yttrium aluminium garnet (Nd: YAG) laser.

Case Report

A 62-year-old man with a 60 pack-year smoking history, having quit 15 years earlier, developed hemoptysis in mid-2012. Past history included ischemic heart disease with two prior myocardial infarcts requiring coronary artery stenting, the most recent a few months earlier. Ear nose and throat review found no cause and initial chest computed tomography (CT) scan was normal. Significant further hemoptysis in November 2012 resulted in temporary cessation of antiplatelet agents. Progress CT showed right upper

lobe changes. Bronchoscopy revealed SCC in the posterior segment of the right upper lobe. Spirometry showed a mild restrictive ventilatory defect and did not preclude surgery. Positron emission tomography (PET) scan did not show metastatic disease. He underwent radical right upper lobectomy with mediastinal lymph node dissection in early December 2012.

The pathology of the resected specimen showed moderately differentiated SCC with no nodal or parietal pleural disease. However, at the bronchial excision margin, there was a small focus of SCC in situ. Long-term bronchoscopic follow-up was advised.

Hemoptysis recurred 2 months later in February 2013 but bronchoscopy was unremarkable. Follow-up bronchoscopy in June 2013 showed two 2–3 mm mucosal polypoid lesions in the distal right trachea, but no other abnormality, including at the bronchial resection margin (Fig. 1). Biopsies confirmed poorly differentiated SCC. In view of the lack of disease 3 months earlier, an opinion about local therapy was sought.

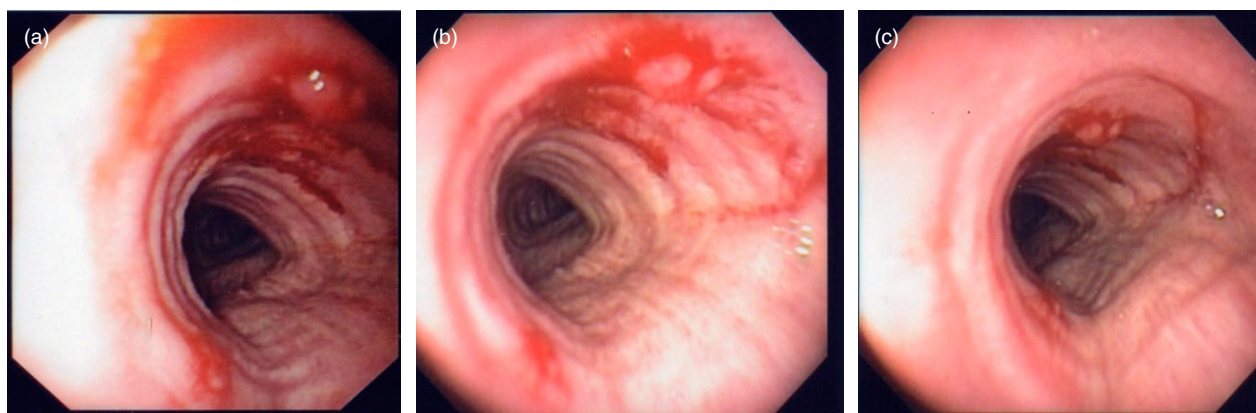


Figure 1. (a, b and c) Bronchoscopic views of tracheal lesions shown to be due to squamous cell carcinoma on biopsy.

In early July, he had flexible then rigid bronchoscopy, with application of six to eight pulses of 2 sec of 30 W Nd:YAG laser with ablation of visible tumor.

Hemoptysis settled, but further surveillance bronchoscopy in late October 2013 showed a new left lateral tracheal lesion 2–3 mm in size, 5 cm from the major carina. Further laser therapy comprising 15 pulses of 20 W and 1 sec duration was delivered in early December. Bronchoscopy in March and September 2014 showed no lesions. He continues under surveillance, remains asymptomatic and is currently well.

Discussion

Malignant tracheal tumors are rare with an annual incidence of 0.1–0.2 per 100,000 per year. Mean age at presentation is 60–67 years with 56–72% in males. Most (44–63%) are SCC with adenoid cystic carcinomas (ACC) causing 7–16%. Large and small cell carcinomas, adenocarcinomas and other types are described. Primary treatment may include surgery or radiotherapy. Chemotherapy has an uncertain benefit [1–3].

Debulking with laser, electron cautery, argon plasma coagulation, cryotherapy, or photodynamic therapy may rapidly relieve airway obstruction, and act as a bridge to surgery or radiotherapy, but these modalities are not widely available [4]. Radiotherapy can be used if unresectable, particularly after palliative procedures, including stents, have relieved airway obstruction. Even bulky SCCs may be resectable if localized, and surgery generally offers the best chances of longer term survival if possible [1–3].

The extent of the tumor as gauged by radiographic (CT) appearance, PET scan, and bronchoscopic appearance, as well as patient characteristics and available services determines the best approach.

Surgical treatment may involve segmental tracheal or cricotracheal resection and re-anastomosis, wedge and

sleeve resection, biological, or prosthetic grafts. Mortality is reported as 7–11% at 30 days [5]. Rates of attempted resection vary and challenges exist in intraoperative and postoperative management, including wound healing and preservation of blood supply.

Radiotherapy can be used as initial treatment, but survival is inferior to surgery. In one series, median survival was 11 months with a 5-year survival of only 11% [3]. It is often combined with surgery as adjuvant therapy especially if resection is incomplete, with improved survival [5].

Laser therapy has been used to help relieve malignant major airway obstruction if a patent distal airway exists and there is intrinsic airway disease rather than extrinsic compression, especially if there are no surgical options and significant symptoms. Nd:YAG laser can be delivered by flexible fibers, with a tissue penetration depth of up to 10 mm. Superficial spreading tumors require a lower wattage over a longer time period while deeper, bulkier tumors may need a higher wattage to achieve deeper penetration provided that the risk-benefit ratio of fistula formation is low.

Disadvantages include the difficulty in predicting the extent of penetration into deeper tissues, with risks of perforation, rupture, fistula formation, and hemorrhage. Air embolism has been described. High fractions of inspired oxygen cause a fire risk. Laser plume, or smoke from vaporized tissue, is irritant to the mucosal surfaces and probably lungs of staff and patient, contains carcinogens and can transmit infection. Specialized anesthetic support is required and both the operator and the center performing the procedure should adhere to strict safety criteria for staff and patient.

Local therapy as described here can be curative for early and superficial tumors of SCC type. Adenoid cystic tumors have a great propensity for submucosal spread and may be better treated with combined surgery and radiotherapy.

In selected cases, local treatment of early tracheal SCC with Nd:YAG laser can provide control and relief of symptoms. Bronchoscopic follow-up is needed every 3–6 months and allows early detection of recurrence or new lesions, thereby permitting effective laser ablation therapy. The presence of SCC in situ at the resection margin in this case has not resulted in any evidence of further tumor at that site so far, but is an indication of the widespread nature of mucosal injury associated with smoking. In these situations, surveillance bronchoscopy after surgery can detect early cancers amenable to local therapy.

Disclosure Statements

No conflict of interest declared.

Appropriate written informed consent was obtained for publication of this case report and accompanying images.

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