Lung Squamous Cell Carcinoma with Tumor Overgrowing End of Stent

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Patient History

A 77-year-old male presented with dyspnea and hemoptysis and was found to have a squamous cell carcinoma of the right upper lobe of the lung, obstructing the lobar bronchus. He was clinical stage 3A and considered not a candidate for surgical resection because of his cardiopulmonary status. Treatment consisted of definitive chemoradiation using Carboplatinum-Paclitaxel and Intensity-Modulated Radiation Therapy to 6600 cGy, followed by Durvalumab. He obtained a partial response but on follow-up was found to have progressive dyspnea associated with right upper lobe atelectasis.

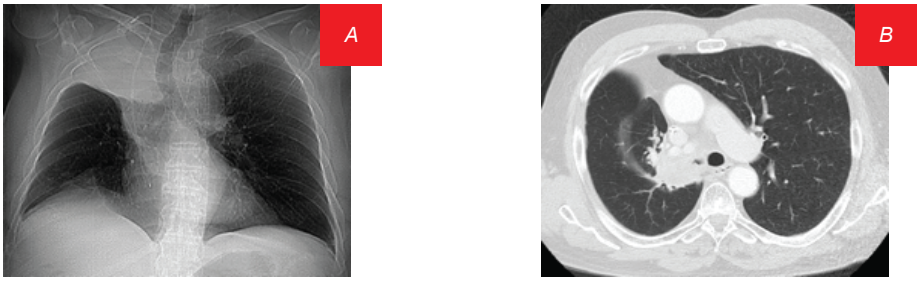

Figure 1 – A) Chest CT scout film and axial cut demonstrating atelectasis B) Severe narrowing of right main bronchus.

Examination

Bronchoscopy was done with expected findings of severe narrowing of right mainstem bronchus from a tumor growing out of the right upper lobe bronchus. Debridement was done to open up a large enough channel to allow for bronchial stenting, using a 12 x 30 mm covered expandable stent to prevent total occlusion of the lower lobe bronchi. The right upper lobe bronchus was already occluded, and the stent would also occlude the patent middle lobe bronchus because of the anatomy. This intervention resulted in improvement of dyspnea, but 2 months later dyspnea progressed again, with bronchoscopy showing tumor overgrowing both ends of the stent.

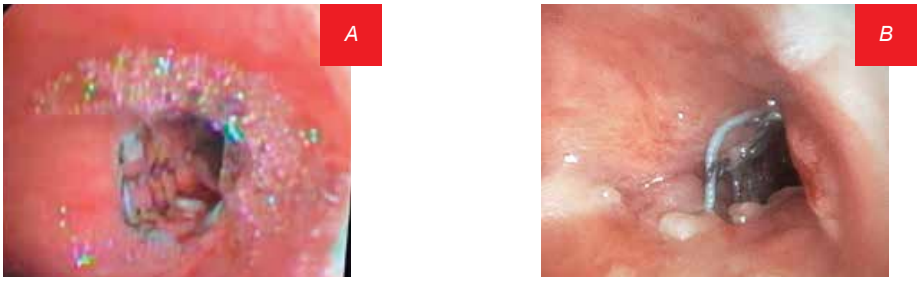

Figure 2 – Bronchoscopic images of: A) proximal end of stent at right main bronchus at initial deployment, and B) tumor overgrowing end of stent 2 months later

Diagnostic Evaluation

Treatment options were limited, as radiation therapy has been maximized, and it was doubtful if systemic therapy would result in prompt relief of stenosis. Tolerance of systemic therapy was a concern as well. The area of stenosis stretched from the right main bronchus to the proximal lower lobe, and it would have required a very extensive and repetitive debridement with conventional energy sources such as Nd-YAG Laser or Argon Plasma Coagulation, which are better strategies for more localized rather than diffuse areas. Photodynamic Therapy could more effectively ablate endobronchial tumor over a larger, or more diffuse area. PDT also can be administered without removal of the stent; because there was concern about complete airway occlusion with edema and necrosis after any ablation procedure, the use of PDT with the stent kept in place would enhance post-procedure safety and outcomes.

Course of Treatment

The patient received 2 mg/kg IV infusion of Photofrin (porfimer sodium) for Injection 2 days prior to activating tumor lysis with 200 joules of energy via a 630 nm excimer laser with 2.5 cm fiber,100 joules given distally and another 100 joules proximally, with the stent in place.

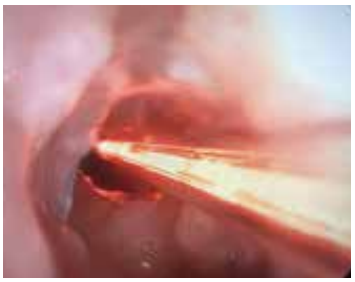

Figure 3 – Laser fiber in right lower lobe bronchus.

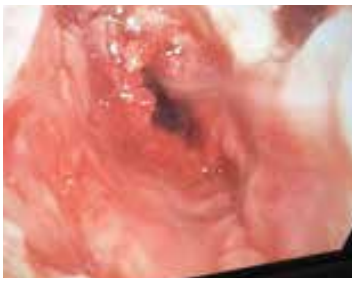

Figure 4 – Bronchus intermedius after removal of a stent at Day 2

The patient was brought back 2 days later for debridement and stent removal, with a note of extensive fibrinous membranes and marked inflammation.

Clinical Outcomes

No retreatment was done, and other two debridements were done on Day 7 and Day 12, with findings of significant tumor regression and opening up of the bronchus intermedius. The area of the right upper lobe bronchus from which the tumor was protruding now appeared like a large ulcer, and we suspected that the cavity extended beyond the borders of the lobar bronchus; but since the mediastinum was fibrotic and contained tumor, this was still a well-contained area.

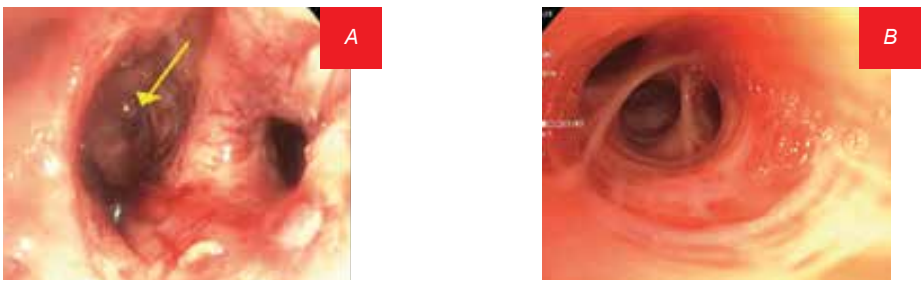

Figure 5 – Day 12 post-therapy, showing A) bronchus intermedius and B) lower lobe basal segments. Arrow points to lower lobe.

The patient had an episode of hemoptysis requiring intubation on Day 12, from which he recovered promptly with extubation the day after. Bronchoscopy findings were as above. Though hemoptysis did not recur, the patient requested no more interventions and went home with hospice two days later.

Discussion

Interventional Pulmonologists and Thoracic Surgeons should have an array of technologies available for endobronchial tumor ablations, as each of these has its strengths and weaknesses, and the choice of ablation device depends on individual circumstances. PDT is beneficial for patients who have exhausted radiation options, who have disease over a diffuse rather than a localized area, and also quite unique to PDT is that it can be used even when an endobronchial stent is in place. Alternatives such as Nd-YAG laser and Argon Plasma Coagulation are more useful for localized tumors, and both cannot be used effectively in the presence of a stent.

The information contained in this case study has been supplied by the medical professional whose name appears here. The advice, opinion, statements, materials, and other information expressed and contained in this case study are from the authors and reflect their personal experience with the specific patient. Results may vary. Pinnacle Biologics, Inc. makes no claim that similar treatment will result in a similar outcome.

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- Palliation of patients with completely obstructing esophageal cancer, or of patients with partially obstructing esophageal cancer who, in the opinion of their physician, cannot be satisfactorily treated with Nd:YAG laser therapy.

- Treatment of microinvasive endobronchial non–small cell lung cancer (NSCLC) in patients for whom surgery and radiotherapy are not indicated.

- Reduction of obstruction and palliation of symptoms in patients with completely or partially obstructing endobronchial NSCLC.

- Ablation of high-grade dysplasia (HGD) in Barrett's esophagus (BE) patients who do not undergo esophagectomy.

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Tracheoesophageal or bronchoesophageal fistula can occur if esophageal tumor is eroding into trachea or bronchial tree. Gastrointestinal perforation can occur. There is a high risk of bleeding in patients with esophageal varices and for fatal massive hemoptysis with endobronchial tumors that are: large, centrally located; cavitating; extensive, extrinsic to the bronchus. After treatment of high-grade dysplasia (HGD) in Barrett's esophagus (BE), monitor endoscopic biopsy every three months, until four consecutive negative evaluations for HGD have been recorded. Photosensitivity can be expected; ocular sensitivity is possible. Allow 2-4 weeks between PDT and subsequent radiotherapy. Substernal chest pain may occur after treatment. Treatment-induced inflammation can cause airway obstruction. Administer with caution to patients with tumors in locations where treatment-induced inflammation can obstruct the main airway. Esophageal stenosis occurs frequently after treatment of HGD in BE. Patients with hepatic or renal impairment may need longer precautionary measures for photosensitivity (possibly more than 90 days). Thromboembolic events can occur following photodynamic therapy with PHOTOFRIN. May cause embryo-fetal toxicity; advise females of reproductive potential of the potential risk to a fetus and to use effective contraception.

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Obstructing Endobronchial Cancer: Dyspnea, photosensitivity reaction, hemoptysis, pyrexia, cough, pneumonia.
Superficial Endobronchial Tumors: Exudate, photosensitivity reaction, bronchial obstruction, edema, bronchostenosis.
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