

A novel approach to recanalization of a right middle lobe occlusion in a patient with lung cancer

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ABSTRACT

We describe a 40-year-old man who had a complete occlusion of his right middle lobe (RML) take-off secondary to radiation fibrosis for treatment of his non-small cell lung cancer. This report illustrates recanalization of this lobar segment utilizing both skillsets from interventional pulmonary and radiology. The procedure was successful; whereby, a bronchial stent was deployed to keep the RML patent. This technique is not well described in the literature and we have provided detailed instruction of our experience in this case.

Keywords: Airway contrast, Airway stent, Bronchial stenosis, Interventional pulmonary, Lung cancer

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INTRODUCTION

Lung cancer is the leading most common cause of death in the United States [1–3]. Many patients diagnosed with lung cancer present at an advanced stage. In advanced stage lung cancer, approximately 20% will have tracheobronchial disease that could require airway intervention. This report describes a novel approach for bronchial stenosis in a patient with stage IIIA non-small cell lung cancer (NSCLC) who developed right middle lobe (RML) obstruction following concurrent chemoradiation treatment.

CASE REPORT

A 40-year-old man developed symptoms of cough and shortness of breath. He had completed chemoradiation 6-months ago for stage IIIa non-small cell lung cancer. A chest computed tomography was performed and demonstrated lobar atelectasis of the RML. He underwent bronchoscopy which demonstrated total occlusion of the RML take-off (see Figure 1). Attempts at passing with a flexible scope and airway balloons were unsuccessful. We performed biopsy which was negative for malignancy; therefore, concluded that the occlusion is secondary to radiation fibrosis. We decided to treat him medically with antibiotics and steroids however he continued to develop productive cough and shortness of breath. He was not a surgical candidate for lobectomy given his recent lung cancer diagnosis and treatment. After a multidisciplinary discussion with our thoracic oncology team, we decided to proceed with a combined approach to attempt recanalization using a wire-assisted approach by interventional radiology followed by stent placement with interventional pulmonary.

Intraoperatively, the patient was placed under general anesthesia in the supine position in the hybrid operating

room-angiographic suite. He was intubated with a 12-mm rigid bronchoscope which was then advanced to the distal bronchus intermedius; whereby, the RML occlusion was visualized. The close approximation of the rigid scope to the RML take-off facilitated passage of the catheter and guidewire into the lobar segment. A combination of a 6-French angled multipurpose JB-1 catheter and a stiff angled guidewire (Glidewire, Terumo Medical Company, New Jersey) was used to provide the initial path through the occlusion. Once the catheter and guidewire had passed through, a 3 mm balloon (Metacross, Terumo Medical Company, New Jersey) was advanced toward the occlusion. Initial attempts failed due to the tight opening; therefore, a rigid forceps was used to assist in both alignment and penetration of the RML take-off (see Figure 2). Afterward, serial dilations took place with a 6-mm (Elation Balloon, Merit, USA) airway balloon. A 7×16 mm balloon expandable stent (Atrium Medical



Figure 1: Total occlusion of the right middle lobe take-off due to radiation fibrosis.

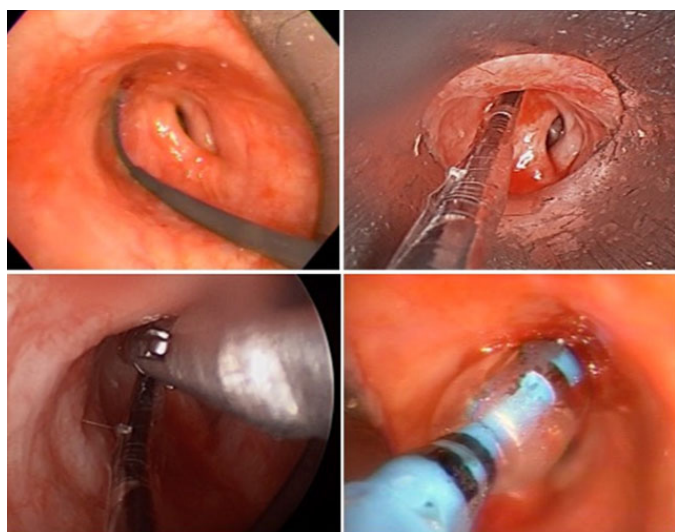


Figure 2: Recanalization of the right middle lobe. A 6-French multipurpose angled catheter and stiff wire was used to cannulate the right middle lobe. Once cannulated, a 4 mm vascular balloon was used over the guidewire to provide initial dilation. The balloon required assistance with a rigid forceps to pass through the stenosis. After initial dilation, a 6 mm airway balloon was used to dilate the stenosis a second time prior to advancement of an airway stent.

Corporation, Merrimack, New Hampshire) was advanced following dilation and deployed into the RML using fluoroscopic and direct visual assistance. Stent placement was confirmed to be in good position (see Figure 3). The patient tolerated the procedure well without any complications.

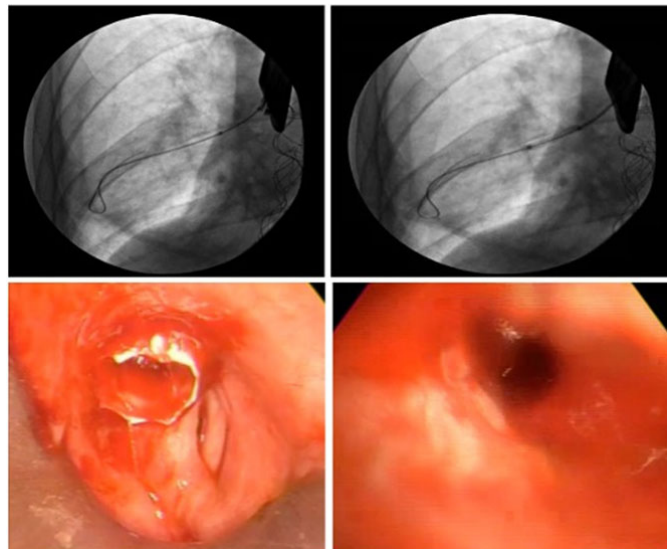


Figure 3: Stent placement. The guidewire is well visualized under fluoroscopy. A 7×16 mm iCAST stent was advanced over the guide-wire and deployed. The stent was confirmed to be in good position with luminal patency following therapeutic suctioning.

DISCUSSION

Tracheobronchial involvement in advanced stage lung cancer incurs higher morbidity and mortality; in addition, can inhibit initiation of chemotherapy and radiation [1–3]. Currently, approximately 20–30% of lung cancer patients can suffer from airway obstruction. The current approach for these patients is a minimally invasive approach usually performed by interventional pulmonologists. These approaches include mechanical, thermoelectric tumor debulking and stent placement to maintain airway patency [4]. The likelihood of restoring airway patency is determined by the ability to cross the stenosis in addition to decision making on the probability that the distal targets are available to improve ventilation to the atelectatic lung. Therefore, in patients with complete obstruction where the stenosis is unable to be traversed by our tools (i.e., flexible wire, airway balloon), the success of recanalization is much lower. In line with a previously published case from our group, the combined approach with IR allowed us to expand our toolkit to traverse a completely stenosed airway which decidedly contributed to the success of the case [5]. Additionally, the decision to perform this procedure in our operating room-angiographic suite enabled us to have both surgical and interventional components ready for potential obstacles throughout the case.

CONCLUSION

We have demonstrated in detail a case of RML obstruction that was restored in patency using a combined IR and IP approach. This case is an example of a unique approach that arrived at an effective and safe outcome.

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Author Contributions

Michael Thorpe – Conception of the work, Design of the work, Drafting the work, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Elliot Backer – Conception of the work, Design of the work, Drafting the work, Final approval of the version to be published, Agree to be accountable for all aspects of the

work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Erhan H Dincer – Conception of the work, Design of the work, Drafting the work, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Roy J Cho – Conception of the work, Design of the work, Interpretation of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Guarantor of Submission

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Conflict of Interest

Authors declare no conflict of interest.

Data Availability

All relevant data are within the paper and its Supporting Information files.

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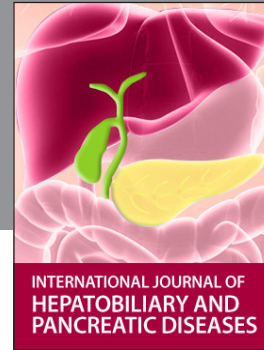
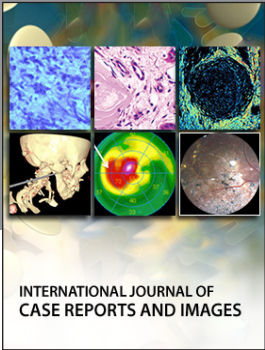
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