Visualized Surgery

Resection with preserved histologic morphology of a rare tumour via bronchoscopic cryosurgery

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Abstract: Tracheobronchial leiomyoma is a rare pulmonary neoplasm accounting for <2% of benign tumours of the lower airway. Published case series reported bronchoscopic resectability with laser ablation for lesions located in the large airway. Surgery was performed for tumours with wide-based and tumours located in segmental bronchus or lung parenchyma. This is the first reported case of complete bronchoscopic cryoresection of leiomyoma arising from the subsegmental bronchi and illustrating the cryopreservation of its histologic morphology. A 55-year-old Chinese male who was a life-long non-smoker presented with chronic cough, left-sided chest pain and loss of weight. Chest radiograph showed left lower lobe (LLL) collapse, with the accompanying computed tomography scan of the thorax showing a non-enhancing soft tissue lesion in the LLL bronchus. Rigid bronchoscopy was performed, with rigid forceps resection followed by cryosurgery of the tumour to its base. Histology was consistent with a primary bronchial leiomyoma. Surveillance bronchoscopy performed 6 months later revealed no tumour recurrence. The patient also had complete resolution of his symptoms. Cryosurgery is a promising treatment modality, in complement with conventional forceps resection, for benign airway neoplasms.

Keywords: Bronchial leiomyoma; cryosurgery; cryopreservation; rigid bronchoscopy

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Introduction

Tracheobronchial leiomyoma is a rare pulmonary neoplasm accounting for <2% of benign tumours of the lower airway (1). Published case series (2) reported bronchoscopic resectability with laser ablation for lesions located in the large airway. Surgery was performed for tumours with wide-based and tumours located in segmental bronchus or lung parenchyma (2-6). Excellent prognosis was observed after complete resection with rare recurrence of only three cases reported (2-4). This is, to the best of our knowledge, the first reported case of bronchoscopic cryoresection of leiomyoma arising from the subsegmental bronchus and illustrating the cryopreservation of its histologic morphology.

Case summary

A 55-year-old Chinese male sought consult for chronic cough, left chest pain with a pain score of 7 out of 10 and significant weight loss of 5 kg over 3 month period. He was a never smoker. Clinical examination was unremarkable except for reduced breath sounds over the left lower chest. Chest X-rays and computed tomography showed collapse of the left lower lobe (LLL) and poorly enhancing soft tissue in the LLL bronchus (*Figures 1*,*2*) respectively. Notably, perfusion to the LLL was preserved. Increased uptake of the left 5th, 6th and 9th to 11th ribs was reported on the bone scan. Bronchoscopy revealed a well-defined tumour obstructing the orifice of the LLL bronchus (*Figures 3*,*4*). The patient was referred to a thoracic surgeon for surgical

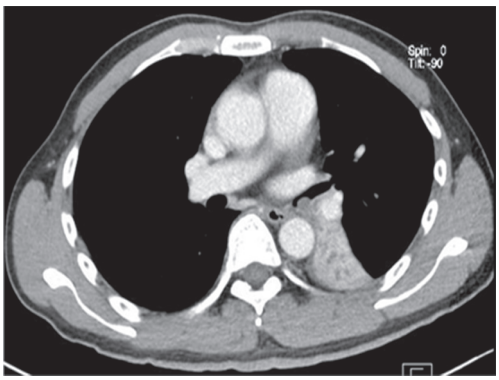

Figure 1 Computed tomography revealed poorly enhancing indeterminate soft tissue in left lower lobe bronchus extending into the distal left main bronchus and causing collapse of the left lower lobe.

Figure 2 CXR, CT thorax and bone scan images of a 55-year-old man who presented with chronic cough, chest pain and weight loss (7). Available online: http://www.asvide.com/articles/1188

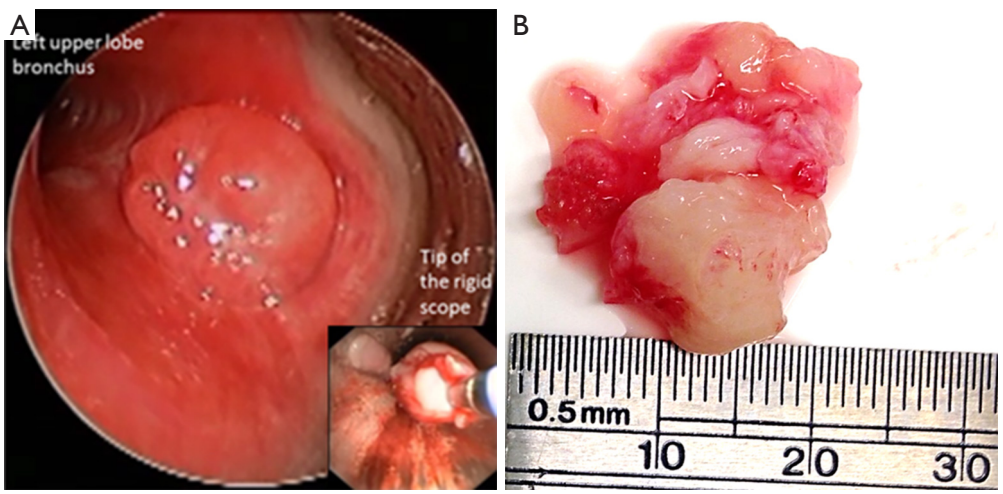

Figure 3 Bronchoscopic and macroscopic appearance of tumour. (A) A well-defined, smooth tumour completely occluding the left lower lobe bronchus. Large tissue fragment frozen and adherent to cryoprobe tip, 2 mm in diameter, transgressing the rigid bronchoscope (insert); (B) multiple large fragments of the cryoresected whitish firm tumour measuring 2 cm by 2.5 cm.

Figure 4 Bronchoscopic view of the well-defined tumour in the left lower lobe bronchus (8).
Available online: http://www.asvide.com/articles/1189

resection. Following discussions at the chest tumor board meeting, the decision was to attempt resection with interventional bronchoscopy as the bronchial biopsy was consistent with a benign neoplasm. The aim of resection was to relieve the bronchial obstruction and to allow re-expansion of the collapsed LLL.

Operative techniques

The LLL tumour was approached by the rigid bronchoscope and coagulation of the tumour was applied using Nd-YAG laser. Rigid forceps resection followed by cryosurgery of the tumour via the rigid bronchoscope was performed (*Figure 5*). The tumour was resected to its base at the

Figure 5 Video of the rigid bronchoscopy procedure with cryosurgery of the endobronchial tumour (9).
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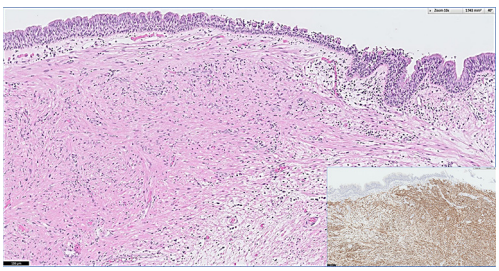

Figure 6 Histology (magnification scale 10×) depicting a nodular lesion composed of proliferation of bland spindled cells with abundant eosinophilic fibrillary cytoplasm arranged in bundles and lined by intact columnar ciliated epithelium of the bronchus with minimal lymphoplasmacytic infiltration in the submucosa. Staining was positive for desmin (insert).

carina of the dilated apical subsegmental bronchi of the LLL. The rapid cooling of the probe tip to –79 to –89 ℃ within seconds, allows for the adhesion of the probe to any material containing water and retrieval of clot or avulsing of the frozen material or tumour. The advantages of the cryoprobe are that a large amount of material or tissue can be extracted during the freeze-thaw cycle from both the larger and the smaller segmental bronchi with complete preservation of the histologic morphology. In addition, cryoresection, compared to Nd-YAG laser, has lower risk of airway perforation or damage to nearby blood vessels, as it has a lower depth of tissue penetrance of 3 mm (10) coupled with the cryoresistive nature of cartilage within the airway walls.

Histology depicted proliferation of bland spindled cells with abundant eosinophilic fibrillary cytoplasm arranged in bundles and lined by intact columnar ciliated epithelium (*Figure 6*). Staining was positive for smooth muscle actin and desmin. These findings were consistent with a diagnosis of primary bronchial leiomyoma.

Comments

Flexible bronchoscopy and bronchial biopsy of the LLL apical segmental bronchi performed 6 months later revealed no residual tumour or recurrence. The patient's chest pain and cough resolved completely. He regained his weight and remained well a year after tumor resection. Interestingly this patient presented with features of a malignant bronchial tumor, the significant weight loss and severe chest pain with increased uptake on the bone scan were of concern initially. Retrospectively, the increased uptake on the bone scan was consistent with rib fracture secondary to chronic 'forceful' cough especially in males.

This case illustrates the potential for bronchoscopic cryosurgery as a lung-preserving operative technique in the treatment of benign airway neoplasms.

Acknowledgements

None.

Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

Informed Consent: Written informed consent was obtained from the patient for publication of this manuscript and any accompanying images

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