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Use of endobronchial ultrasound to assess vascular involvement of a broncholith prior to removal

Roy Joseph Cho, Elliot Backer, Amit Bhargava

CASE REPORT

A 53-year-old gentleman was referred to our interventional pulmonology clinic with 12-weeks of non-resolving pneumonia of the left lower lobe. Non-contrast enhanced computed tomography (CT) of the chest demonstrates a diffusely calcified, 7-mm nodule obstructing the lateral basilar segment of the left lower lobe. In addition, there are non-enlarged, calcified, ipsilateral mediastinal lymph nodes. The radiographic appearance, coupled with a high geographic prevalence of histoplasmosis, was suspicious for broncholithiasis. History reveals remote tobacco use and asbestos exposure without other concerning comorbidities, and the physical examination is unremarkable.

On the day of surgery, we obtained a high-resolution CT angiography (CTA) of the chest that confirmed the broncholith in the left lower lobe segment near a sub-segmental pulmonary artery (Figure 1). On direct inspection, the broncholith was non-mobile, 100% occlusive and located in the lateral basal segment of left lower lobe (Figure 2). Given the information obtained by pre-operative CTA chest, we decided to further evaluate the vascular proximity to the broncholith with linear probe endobronchial ultrasound (EBUS) using color-Doppler imaging prior to extraction. This demonstrated the broncholith as a hyperechoic structure appearing to invade into the adjacent basilar segmental pulmonary artery under color-Doppler imaging (Figure 3). Given these findings, we aborted the extraction procedure as we perceived that there would be risk for life-threatening bleeding. We did obtain intra-operative consultation with our thoracic surgeon who agreed and recommended

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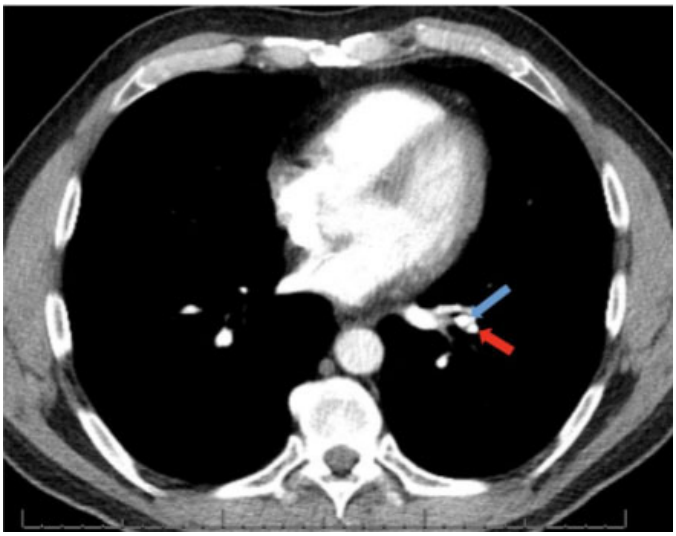

Figure 1: Axial CT-chest image demonstrating broncholith in segmental branch of the left lower lobe (blue arrow) in close proximity to a segmental pulmonary artery (red arrow).

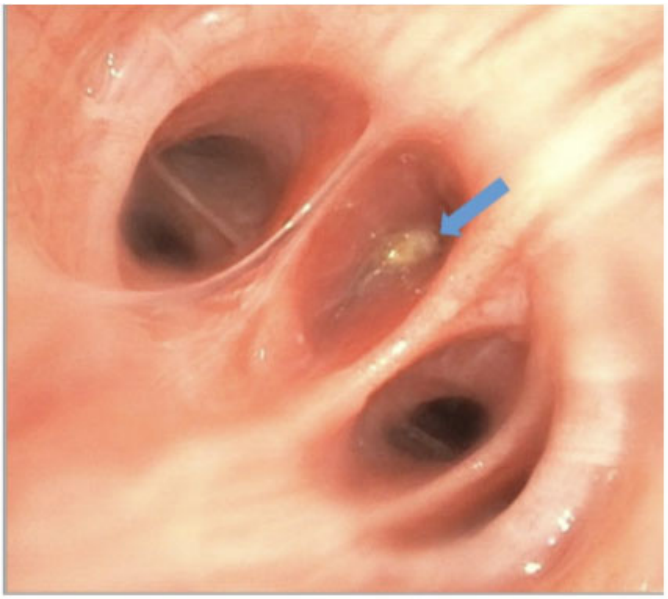

Figure 2: Bronchoscopic visualization of the broncholith in the lateral segment of left lower lobe bronchus.

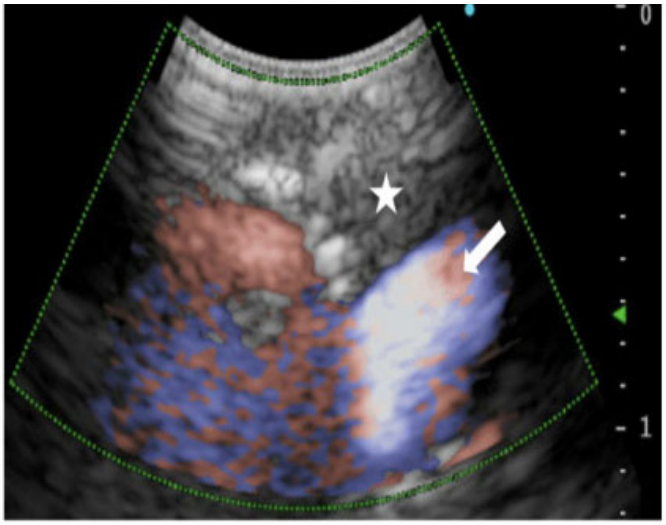

Figure 3: Bronchoscopic ultrasound and color-Doppler flow images of the broncholith. The broncholith (star) is seen as a hyperechoic structure invading into the segmental pulmonary artery (arrow) confirmed with color Doppler.

video-assisted thoracoscopic surgery (VATS) lobectomy. The patient later underwent robot-assisted left lower lobectomy and was discharged on post-operative day one. Final pathology of the lesion yielded yeast morphology consistent with histoplasmosis and harvested hilar lymph nodes demonstrated the same with a background of necrotizing granulomatous lymphadenitis.

DISCUSSION

Broncholithiasis is a well described but rare phenomena referring to the erosion of peribronchial lymph nodes into the bronchial lumen [1]. Histology typically reveals dystrophic calcifications and granulomatous inflammation [2]. Typical etiologies include sequelae of fungal (particularly histoplasmosis) or mycobacterial lymphadenitis, and rarely silicosis [3–5]. Bronchial distortion or obstruction by a broncholith produces a spectrum of symptom severity and sequelae, ranging from the asymptomatic to potentially life-threatening. Common clinical features of broncholithiasis include cough (67%), hemoptysis (38–66%), lithoptysis (13–19%), fever and sputum production (6–15%), dyspnea (15%), focal wheezing (11–15%), and chest pain (4%) [6]. Management likewise varies and may include watchful waiting, bronchoscopic removal, or surgical management. Observation is preferred for those who are asymptomatic or with mild symptoms. Bronchoscopic or surgical management is considered for those with more severe or intractable symptomatology [7].

Studies indicate that asymptomatic patients who, with observation alone, remain clinically stable for over three years tend to have a continued benign natural history of their disease [6]. In cases of mobile intra-luminal broncholithiasis, extraction with flexible bronchoscopy alone is efficacious (100% success). Rigid bronchoscopy is favored over flexible bronchoscopy in cases of penetrating broncholithiasis (67% vs 30% success). Adjunct debulking modalities described in the literature include the use of laser (Ho:YAG, Nd:YAG) and cryotherapy [6–9]. In our practice, we have successfully extracted dozens of obstructive broncholiths using both a flexible and rigid bronchoscopy approach with the primary indication being post-obstructive pneumonia. We routinely obtain a pre-operative contrast enhanced CT imaging of the chest to evaluate the proximity of blood vessels to the broncholith to assess fatal bleeding risk. Our practice is to avoid debulking broncholiths that are near a vessel due to the potential for life-threatening bleeding. Although we could not confirm pathological vascular invasion, we believe that our clinical decision making and use of real-time intra-operative imaging (i.e., EBUS) fundamentally allowed us to take a conservative approach in a case where life-threatening complications are conceivable. Our consideration for a surgical approach is based on patient characteristics, when bronchoscopic extraction fails, or when the potential complication risk of bronchoscopic management is felt to be high (e.g., hemoptysis, fistula, invasion into adjacent structures). Surgical options described in the literature include broncholithectomy, segmentectomy, lobectomy, bilobectomy, and pneumonectomy. Major complication rates vary widely (9–47%) with good long-term results typically observed [10, 11].

CONCLUSION

Management of broncholithiasis typically requires a thoughtful and often multidisciplinary approach in deciding upon the proper treatment strategy. Broncholith features as assessed by CTA of the chest and during bronchoscopy, coupled with a detailed history taking and examination, help inform providers when deciding between management strategies. We opted for a conservative approach in this case based on the real-time ultrasound assessment with EBUS in the setting of a preop CT image illustrating proximity of the broncholith to vessel. The patient went on to have a successful left lower lobectomy with an uncomplicated post-operative course and ultimately resolution of symptomatology. This case highlights the potential utility of EBUS color-Doppler vascular imaging to help risk stratify those patients who might potentially have a fatal bleed during extraction.

Keywords: Airway obstruction, Broncholith, Histoplasmosis, Rigid bronchoscopy

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REFERENCES

1. Dixon GF, Donnerberg RL, Schonfeld SA, Whitcomb ME. Advances in the diagnosis and treatment of broncholithiasis. Am Rev Respir Dis 1984;129(6):1028–30.
2. Seo JB, Song KS, Lee JS, et al. Broncholithiasis: Review of the causes with radiologic-pathologic correlation. Radiographics 2002;22 Spec No:S199–213.
3. Weed LA, Anderson HA. Etiology of broncholithiasis. Dis Chest 1960;37:270–7.
4. Baum GL, Bernstein IL, Schwarz J. Broncholithiasis produced by histoplasmosis. Am Rev Tuberc 1958;77(1):162–7.
5. Antão VCS, Pinheiro GA, Jansen JM. Broncholithiasis and lithoptysis associated with silicosis. Eur Respir J 2002;20(4):1057–9.
6. Colt H, Murgu S. Bronchoscopy and Central Airway Disorders E-Book: A Patient-Centered Approach: Expert Consult Online. Philadelphia, PA: Elsevier Health Sciences; 2012.
7. Olson EJ, Utz JP, Prakash UB. Therapeutic bronchoscopy in broncholithiasis. Am J Respir Crit Care Med 1999;160(3):766–70.
8. Menivale F, Deslee G, Vallerand H, et al. Therapeutic management of broncholithiasis. Ann Thorac Surg 2005;79(5):1774–6.
9. Reddy AJ, Govert JA, Sporn TA, Wahidi MM. Broncholith removal using cryotherapy during flexible bronchoscopy: A case report. Chest 2007;132(5):1661–3.
10. Cole FH, Cole FH Jr, Khandekar A, Watson DC. Management of broncholithiasis: Is thoracotomy necessary? Ann Thorac Surg 1986;42(3):255–7.
11. Potaris K, Miller DL, Trastek VF, Deschamps C, Allen MS, Pairolero PC. Role of surgical resection in broncholithiasis. Ann Thorac Surg 2000;70(1):248–52.

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Author Contributions

Roy Joseph Cho – Conception of the work, Design of the work, Acquisition of data, Analysis of data, 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

Elliot Backer – Conception of the work, Design of the work, Acquisition of data, Analysis of data, 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

Amit Bhargava – Conception of the work, Design of the work, Acquisition of data, Analysis of data, 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

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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.