

Cavitary lung disease following transbronchial biopsy using cryoadhesion in a patient with diffuse parenchymal lung disease

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ABSTRACT

Transbronchial lung biopsy using cryoadhesion is a diagnostic technique gaining in popularity. Several studies have been performed on its diagnostic yield and safety profile. However, definitive conclusions are limited due to the heterogeneity of results. The most common complications described in the current literature are pneumothorax and hemorrhage. This case describes a 60-year-old female who developed a cavitary lung lesion shortly after undergoing transbronchial lung cryobiopsy, highlighting the need for further research on the rarer complications that may be associated with this promising procedure.

KEY WORDS: Cryoadhesion, cryobiopsy, diffuse parenchymal lung disease, interstitial lung disease, transbronchial biopsy

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INTRODUCTION

Traditionally, transbronchial lung biopsies (TBLBs) have been performed using forceps to obtain a tissue sample. If the tissue provided from TBLB is nondiagnostic, a surgical lung biopsy (SLB) may be performed to obtain a larger sample.^[1] Transbronchial lung cryobiopsy (TBLC) is a relatively new diagnostic technique that has been increasingly used as an alternative to SLB in the diagnosis of diffuse parenchymal lung disease.^[1,2] TBLC provides a larger specimen than conventional transbronchial biopsy through use of a cryoprobe tip to flash-freeze sections of tissue.^[3] The most common complications of this procedure are pneumothorax and hemorrhage although more severe complications have also been reported, such as acute respiratory failure.^[2] Here, we present a unique complication of a new cavitary lung lesion after TBLC.

CASE REPORT

A 60-year-old female on prednisone 60 mg daily for a medical history of unspecified rheumatologic disorder was suspected to have interstitial lung disease seen on computed tomography scan of the chest [Figure 1]. She underwent bronchoscopy with bronchoalveolar lavage and TBLC. Her steroids were not held before the procedure. Bronchoalveolar lavage was done in the right upper lobe posterior segment, with 150 mL instilled and 120 mL recovered. A biopsy was obtained with the cryoprobe from the superior segment of the right lower lobe. One sample was obtained with one pass, complicated only by mild bleed that resolved after administration of cold saline and 3 mL epinephrine. She was discharged home several hours later without further complication.

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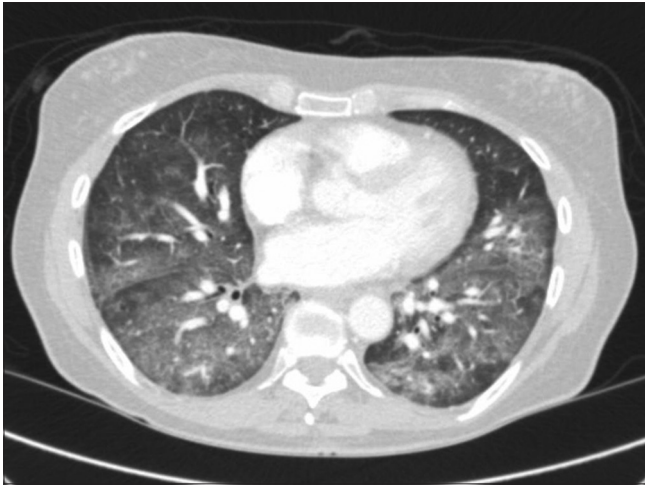


Figure 1: Computed tomography chest before bronchoscopy demonstrating widespread airspace disease in the lower lobes bilaterally without volume loss, air bronchograms, or cavitation

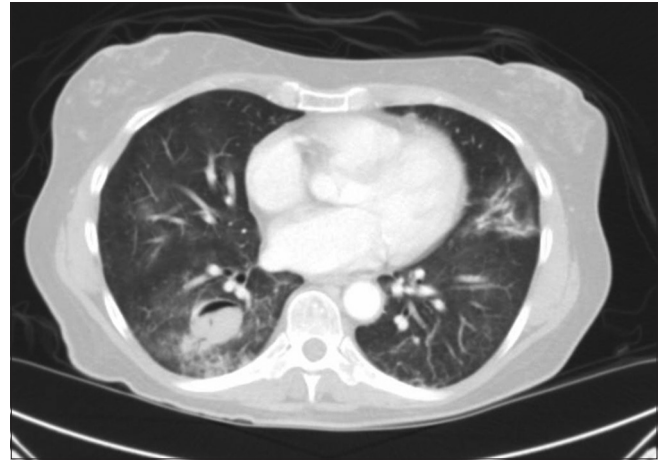


Figure 2: Computed tomography chest showing cavitation in the right lower lobe with an air-fluid level that measures 2.6 cm x 3.2 cm, highly suggestive of lung abscess

Nine days later, the patient was admitted to the hospital with right upper quadrant abdominal pain, fever, and leukocytosis with a white blood cell count of 31,000. Computed tomography scan of the chest revealed right lower lobe cavitary lesion measuring 2.6 cm x 3.5 cm x 4 cm in the superior segment where the cryobiopsy was taken [Figure 2]. This lesion was new compared to imaging from 2 weeks prior. The patient was empirically placed on vancomycin and piperacillin-tazobactam with continuation of steroids. The fungal culture from prior bronchoscopy grew *Fusarium* species, and cryobiopsy tissue revealed only sparse chronic inflammation.

After consultation with infectious disease, antimicrobial therapy was narrowed to voriconazole to cover fungal species. A steroid taper was started to allow for healing and clearance of suspected abscess. Repeat bronchoscopy performed during hospitalization revealed only mild erythema of airways and small old blood in the anterior distal trachea.

DISCUSSION

In recent years, TBLC has become an increasingly popular method of obtaining an adequate lung sample for diagnosis of parenchymal lung disease. Traditional TBLB with forceps has limited diagnostic yield, primarily due to an inability to obtain an appropriate amount of tissue required for pathologic diagnosis.^[3] On the other hand, SLB has a significantly higher complication risk compared to bronchoscopy.^[1,4] Definite conclusions are difficult to draw as few studies directly compare TBLC to the gold standard SLB. Theoretically, TBLC combines the best of both worlds: samples obtained through TBLC are generally larger than TBLB with decreased crush artifact and provide an estimated diagnostic yield similar to SLB at 83%,^[2,5] while avoiding the risks of the more invasive SLB.^[4]

Most published data thus far suggest that TBLC has a safety profile similar to TBLB. The most commonly reported complications are pneumothorax and hemorrhage.^[2,4,6] Unfortunately, there is a significant heterogeneity of reported complication rates. The reported frequency rate of pneumothorax ranges from 0% to 26% and the frequency of bleeding ranges even further from 0% to 78%.^[4] The variability of results may be due to the lack of standardization in procedure methodology. For example, the use of fluoroscopy or occlusion balloon may decrease incidence of pneumothorax and moderate/severe bleeding, respectively, but neither is routinely included in methodology of studies assessing TBLC.^[5] This suggests that the lack of clarity about the safety of TBLC may be further elucidated with investigation into the superiority of different procedural techniques.

Interestingly, pulmonary abscess is not a complication mentioned in recently published meta-analyses on the safety of TBLC^[3,2,4-6] although they have been reported as an uncommon complication after TBLB.^[7,8] In 2016, Skalski *et al.* were the first to our knowledge to document a case of TBLC complicated by pulmonary abscess.^[9] Our patient here is now the second. This raises a new concern of the possibility of other rare yet important complications of TBLC that have yet to be studied and highlights the need for continued research evaluating the risks of this promising procedure.

It should be noted that both the case reported by Skalski *et al.*^[9] and the case reported here involved the use of corticosteroids in the time around the procedure. The causative organism for this patient's infection, *Fusarium* species, is also known to cause opportunistic infections, especially in patients with an immunocompromised state.^[10] As steroids are a well-known cause of immunosuppression, it is possible that this complication is primarily contained to the subset of patients on corticosteroids at the time of procedure

or those patients who are already colonized with an opportunistic pathogen of some kind. Without further studies, no definitive correlation can be declared. Currently, there are no guidelines on the use of corticosteroids during or after bronchoscopy. However, considering this theoretical increased infection risk, the continued use of corticosteroids around the time of procedure should be monitored carefully until proven otherwise.

The most recent guidelines from the British Thoracic Society published in 2011 do not recommend the use of prophylactic antibiotics in patients undergoing bronchoscopy.^[11] A large survey performed in Japan by Asano *et al.* published in 2012 documented a rate of <0.3% for pulmonary infection as a complication of bronchoscopy,^[12] supporting this recommendation. However, Ishida *et al.* suggest that the incidence rate of lung abscess after bronchoscopy may be as high as 10% in patients with certain risk factors.^[8] Considering these two cases of abscess following TBLC in the setting of immunosuppressive factors, there may be merit in considering prophylactic antibiotics in those patients with risk factors for infection. Determination of these risk factors requires continued research.

Regardless of whether the focus is on common complications such as pneumothorax and bleeding or rare complications such as pulmonary abscess, further research is needed to clarify the safety of TBLC. Direct comparison studies between different procedural techniques may contribute to understanding of various risk factors for complications. Larger studies comparing diagnostic yield and safety of TBLC to SLB would assist in determining whether tissue samples obtained with TBLC can be considered an adequate replacement for surgically obtained tissue. Until then, increasing the usage of TBLC in diagnosing lung disease should be done cautiously, with a careful eye for possible risk factors.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will

not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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