


Delayed pneumothorax after transbronchial lung biopsy

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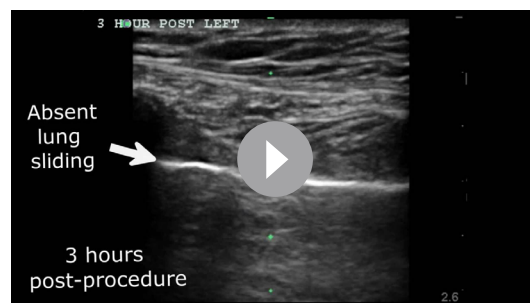
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DESCRIPTION

A 56-year-old woman underwent a bronchoscopy with transbronchial biopsy for work up of interstitial lung disease. The procedure was uneventful and preprocedure and immediately postprocedure lung ultrasound examinations demonstrated no evidence of pneumothorax ([video 1](#)). Per hospital protocol, a postprocedure portable chest X-ray (CXR) was obtained but was delayed by 2 hours. The CXR revealed a moderate-sized left pneumothorax ([figure 1](#)). A repeat lung ultrasound demonstrated absence of lung sliding and presence of lung point confirming development of pneumothorax ([video 1](#)). The pneumothorax was successfully treated with a small-bore tube thoracostomy. The patient was discharged home the next day without further complications.

Pneumothorax complicates approximately 0.63%–0.97% of transbronchial biopsies based on large series conducted in the modern era, but complicates 7.2% of transbronchial biopsies in patients with interstitial lung disease.^{1–3}

In clinical practice, many believe postprocedure pneumothoraces develop quickly (ie, within 1 hour following the procedure), but few studies have reported the time course of post-bronchoscopy pneumothoraces.⁴ However, many reports of delayed pneumothorax have been described.^{5–7} No universal definition of delayed pneumothorax exists, but it is often defined as being absent on initial postprocedure imaging but present on subsequent imaging. The time interval to develop a delayed pneumothorax varies between initial and subsequent imaging and ranges from 1 hour to approximately 5 days.^{4,7,8} Intervals as long as 5 months have been reported; however, in those cases



Video 1 Preprocedure and postprocedure lung ultrasound exam. Lung sliding is seen on ultrasound during the preprocedure and immediate postprocedure evaluation. The 3-hour postprocedure evaluation of the left upper lobe clearly demonstrates a moderate-sized pneumothorax.

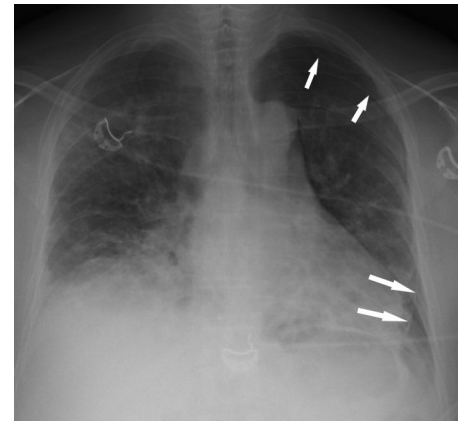


Figure 1 Postprocedure chest X-ray. A chest X-ray acquired approximately 2 hours postprocedure demonstrated a moderate-sized left pneumothorax (arrows).

unrelated secondary spontaneous pneumothorax cannot be completely excluded.^{6,9}

Literature on delayed pneumothorax following transbronchial biopsy is limited to case reports.^{5–7} In contrast, the literature on delayed pneumothorax following transthoracic needle biopsy is more robust. Approximately 20% of transthoracic needle biopsies are complicated by pneumothorax, a rate up to 20 times that of transbronchial biopsy.^{1,8} Thus, transthoracic needle biopsy cases may serve as a better model to study the timing of iatrogenic pneumothoraces due to the overall increased frequency. In such studies, 15%–18% of pneumothoraces that occurred were considered to be delayed.^{10,11} Furthermore, delayed pneumothoraces are likely under-reported due to patients being asymptomatic and institutional protocols requiring only an immediate postprocedure imaging study.

Despite being relatively uncommon, a delayed pneumothorax following transbronchial biopsy can evolve into a life-threatening situation, particularly in patients travelling to remote locations, flying by plane soon after bronchoscopy or using non-invasive positive pressure ventilation at home.

CXR has been the standard modality for detecting a postprocedure pneumothorax; however, its role after transbronchial biopsy in asymptomatic patients has been questioned due to its low yield.¹² In comparison, clinicians can use bedside lung ultrasound to rapidly rule out pneumothorax by detecting lung sliding, lung pulse or comet tails. A meta-analysis found higher sensitivity (79% vs 40%) and similar specificity (98% vs 99%) of lung ultrasound compared with CXR for detection of

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pneumothorax.¹³ For detection of postprocedure pneumothorax, lung ultrasound has been shown to have a sensitivity of 88%–100% and specificity of 97%–100%.^{14–16}

Delayed pneumothorax is an underappreciated complication after transbronchial biopsy that may require tube thoracostomy as demonstrated by this case. Given the clear lung sliding seen on the immediate postprocedure lung ultrasound examination, we believe the pneumothorax was not missed but rather developed in the ensuing hours postprocedure. This case highlights that imaging done immediately after bronchoscopy may not be as sensitive for iatrogenic pneumothorax as imaging done 2 hours postprocedure.

Learning points

- ▶ Clinicians should be vigilant for the development of a delayed postprocedure pneumothorax that can manifest a few or several hours after transbronchial biopsy.
- ▶ Trained clinicians can perform serial lung ultrasound examinations to monitor for development of delayed postprocedure pneumothorax.
- ▶ Lung ultrasound has superior sensitivity but similar specificity as chest X-ray for detection of pneumothorax.

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REFERENCES

- 1 Tukey MH, Wiener RS. Population-Based estimates of transbronchial lung biopsy utilization and complications. *Respir Med* 2012;106:1559–65.
- 2 Asano F, Aoe M, Ohsaki Y, et al. Deaths and complications associated with respiratory endoscopy: a survey by the Japan Society for respiratory endoscopy in 2010. *Respirology* 2012;17:478–85.
- 3 Galli JA, Panetta NL, Gaeckle N, et al. Pneumothorax after transbronchial biopsy in pulmonary fibrosis: lessons from the multicenter comet trial. *Lung* 2017;195:537–43.
- 4 Ahmad M, Livingston DR, Golish JA, et al. The safety of outpatient transbronchial biopsy. *Chest* 1986;90:403–5.
- 5 Levy H, Kallenbach JM, Feldman C, et al. Delayed pneumothorax after transbronchial lung biopsy. *Thorax* 1986;41:647–8.
- 6 Narula N, Siddiqui F, Siddiqui AH, et al. Delayed pneumothorax: a potential complication of transbronchial lung biopsy. *Respir Med Case Rep* 2018;23:170–2.
- 7 Rajdev K, Herring DN, Lahan S, et al. Iatrogenic delayed pneumothorax after transbronchial biopsy. *J Investig Med High Impact Case Rep* 2020;8:232470962094763.
- 8 Perlmutter LM, Braun SD, Newman GE, et al. Timing of chest film follow-up after transthoracic needle aspiration. *AJR Am J Roentgenol* 1986;146:1049–50.
- 9 Kwan AC, Pipavath S, Leary PJ, et al. Delayed pneumothorax after bronchoscopy in a lung transplant patient. *Respir Care* 2013;58:e18–19.
- 10 Choi C-M, Um S-W, Yoo C-G, et al. Incidence and risk factors of delayed pneumothorax after transthoracic needle biopsy of the lung. *Chest* 2004;126:1516–21.
- 11 Byrd RP, Fields-Ossorio C, Roy TM. Delayed chest radiographs and the diagnosis of pneumothorax following CT-guided fine needle aspiration of pulmonary lesions. *Respir Med* 1999;93:379–81.
- 12 Izbicki G, Shitrit D, Yarmolovsky A, et al. Is routine chest radiography after transbronchial biopsy necessary?: a prospective study of 350 cases. *Chest* 2006;129:1561–4.
- 13 Alrajab S, Youssef AM, Akkus NI, et al. Pleural ultrasonography versus chest radiography for the diagnosis of pneumothorax: review of the literature and meta-analysis. *Crit Care* 2013;17:R208.
- 14 Kumar S, Agarwal R, Aggarwal AN, et al. Role of ultrasonography in the diagnosis and management of pneumothorax following transbronchial lung biopsy. *J Bronchology Interv Pulmonol* 2015;22:14–19.
- 15 Reissig A, Kroegel C. Accuracy of transthoracic sonography in excluding post-interventional pneumothorax and Hydropneumothorax. Comparison to chest radiography. *Eur J Radiol* 2005;53): :463–70.
- 16 Sartori S, Tombesi P, Trevisani L, et al. Accuracy of transthoracic sonography in detection of pneumothorax after sonographically guided lung biopsy: prospective comparison with chest radiography. *AJR Am J Roentgenol* 2007;188): :37–41.

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