



OSF[®]
HEALTHCARE



UNIVERSITY OF ILLINOIS
COLLEGE OF MEDICINE
PEORIA

Percutaneous Transthoracic Needle Lung Biopsy A Single-Institution Review

F. Al-Qawasmī¹, L. Alkhani², Y. Wang¹ PhD, D. Gans¹ MD, O. Ahmed³ MD, A. Tu¹ MD
1. University of Illinois College of Medicine - Peoria 2. Stanford University 3. University of Chicago
Medical Center

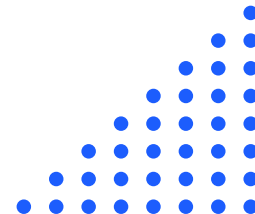
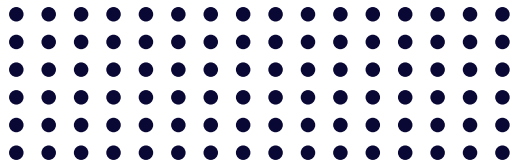




Table of contents

01 Background

04 Results

02 Purpose

05 Discussion

03 Methods

06 Next Steps



Background

Importance of assessing risk factors for complications in CT-guided percutaneous transthoracic lung biopsy

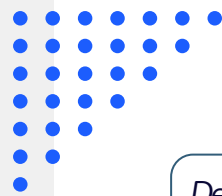


Background

Lung cancer is the leading cause of cancer mortality globally, accounting for 18% of 1.8 million deaths annually. Early detection is critical for better patient outcomes and recent cancer screening advancements have dramatically improved lung cancer detection. However, they have also increased the demand for invasive diagnostic methods—such as PTLB.

Importance

Despite the benefit of PTLB in analyzing newly discovered lung nodules, the intervention is associated with numerous hazards such as pneumothorax, pulmonary bleeding and other problems.



Purpose

Determine the Incidence of Complications

To analyze the overall rates and types of complications associated with CT-guided percutaneous transthoracic lung biopsies (PTLB).

Identify Patient-Specific Risk Factors

To assess how individual patient characteristics (age, underlying health conditions, etc.) contribute to the likelihood of developing complications during CT-guided PTLB.

Evaluate Procedural Risk Factors

To examine how specific aspects of biopsy procedures (e.g., needle size, lesion location, technique) influence the risk of complications.

Guide Future Procedures to Improve Patient Outcomes

To utilize the findings on risk factors to inform and refine procedural protocols, aiming to reduce complication rates and enhance patient care in future CT-guided.

Retrospective analysis of 620 patients undergoing CT-guided PTLB at OSF St. Francis' Radiology Department from January 2017 to December 2019.

Patient Cohort

Data Analysis

Data analysis involved interpreting statistical outcomes to identify trends, assess complication predictors, and draw conclusions on patient risk factors.

1

Methods

2

Data was gathered from electronic medical records, which included patient demographics, lesion characteristics, needle size, and complications rates.

Data Extraction

Statistical Tests

Statistical methods like chi-square, Wilcoxon rank-sum tests, and logistic regression assessed relationships between risk factors and complication rates.

4

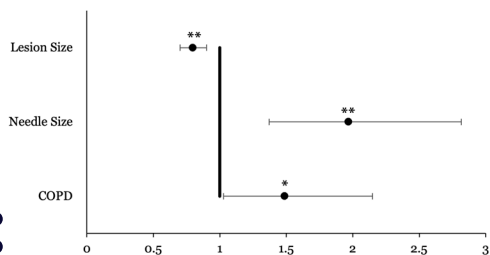
3

Results

Lesion-Related Factors

- Larger lesions correlated with fewer overall complications ($P = .0001$).
- Larger lesions were inversely associated with pneumothorax ($P = .0015$) and hemorrhage rates ($P = .0046$).
- Larger lesions resulted in a 0.675 times lower likelihood of hemorrhage ($P = .0065$).

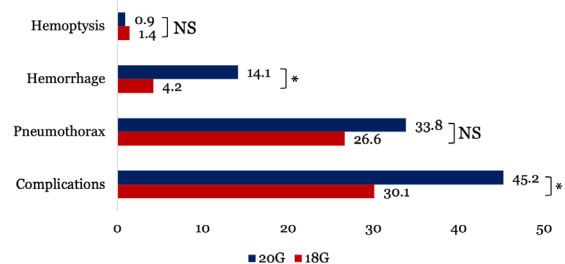
Risk Factors (Odds Ratio)



Needle-Related Factors

- 20G needles increased overall complication rates ($P < .001$).
- 20G needles were associated with a 1.965-fold increase in complication likelihood ($P = .0002$).
- 20G needles resulted in 3.889 times higher hemorrhage rates ($P = .0002$).

Outcomes by Needle Gauge



Technical Risk Factors

Results

Pulmonary Comorbidities

- COPD was associated with higher overall complication rates (P = .015).
- Patients with COPD were 1.497 times more likely to experience complications (P = 0.0152).
- COPD was identified as an independent predictor of complication rates in multivariate analysis.

Effect	Odds Ratio	95% CI		P value
Hypertension Yes vs No	0.838	0.614	1.199	0.3700
Diabetes Yes vs No	0.836	0.565	1.239	0.3724
COPD Yes vs No	1.497	1.081	2.073	0.0152
Smoker				0.3168
Current smoker	1.382	0.863	2.215	0.1783
Former smoker	1.380	0.886	2.150	0.1538
Non-smoker	Referent			
Age group				0.2436
55-64	1.417	0.827	2.425	0.2044
65-74	1.017	0.600	1.724	0.9492
75-84	0.844	0.481	1.481	0.5549
85-94	1.306	0.548	3.115	0.5466
20-54	Referent			
Needle size 20G vs 18G	1.894	1.356	2.646	0.0002
Lesion size	0.794	0.705	0.893	0.0001
Lesion location				0.1094
Left upper lobe	1.579	0.959	2.600	0.0726
Right lower lobe	0.989	0.593	1.649	0.9662
Right middle lobe	2.308	1.008	5.282	0.0478
Right upper lobe	1.281	0.801	2.048	0.3016
Left lower lobe	Referent			

Demographic and Other Comorbid Factors

- Age, sex, smoking history, diabetes, and hypertension underlying conditions were not found to be statistically significantly correlated with complication rates

Patient Risk Factors

Discussion

Our findings are in agreement with prior studies showing the following:

COPD carries an inherent added risk to lung biopsies, patients with COPD should be observed more closely.

Larger lesions pose less risk due to the ease in biopsying.

Our findings are in disagreement with prior studies regarding the following:

Location of lesion does not significantly increase complication rates, nor do most demographic variables.

Further research is necessary to see if smaller needles cause more complications in lung biopsies.

Severe cases may require 20G biopsies, more passes, and higher aspirational force, increasing complications.

What's Next?

Quality Improvement in Biopsy Procedures

