CT Guided Percutaneous Lung Biopsy

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Title: A Self-Audit of CT-Guided Percutaneous Lung Biopsies Performed by Myself (August 2023 – October 2025)

1. Background:

CT-guided percutaneous lung biopsy is a widely practiced interventional radiology procedure for obtaining tissue samples from pulmonary lesions. Regular self-audit of such procedures is good clinical practice and is recommended to ensure high diagnostic adequacy and low complication rates, in line with national benchmarks.

In the UK, the British Thoracic Society (BTS) and the Royal College of Radiologists (RCR) recommend regular audits to evaluate local diagnostic yield and complication rates and compare them with national standards.

2. Objectives

i. To evaluate the diagnostic adequacy and safety outcomes of CT-guided percutaneous lung biopsies performed by the operator.

ii. To identify areas for improvement, reflect on procedural outcomes, and implement measures to minimise complications and optimise patient care.

3. Standards

Based on UK national standards (RCR and BTS):

Parameter	National Standard / Benchmark
Diagnostic yield (core biopsy)	85–95%
Overall diagnostic accuracy	64–97%
Sensitivity for malignancy (>2 cm lesions)	85–90%
Pneumothorax (any)	<20%
Pneumothorax requiring drainage	3–4%

Diagnostic adequacy should align with published literature, and complication rates should remain low and comparable to national figures.

4. Methodology

Audit Period: August 2023 – October 2025

Design: Retrospective self-audit of all CT-guided lung biopsies performed by the operator.

Data Collection: Cases were identified using the departmental database. Patient records were reviewed for:

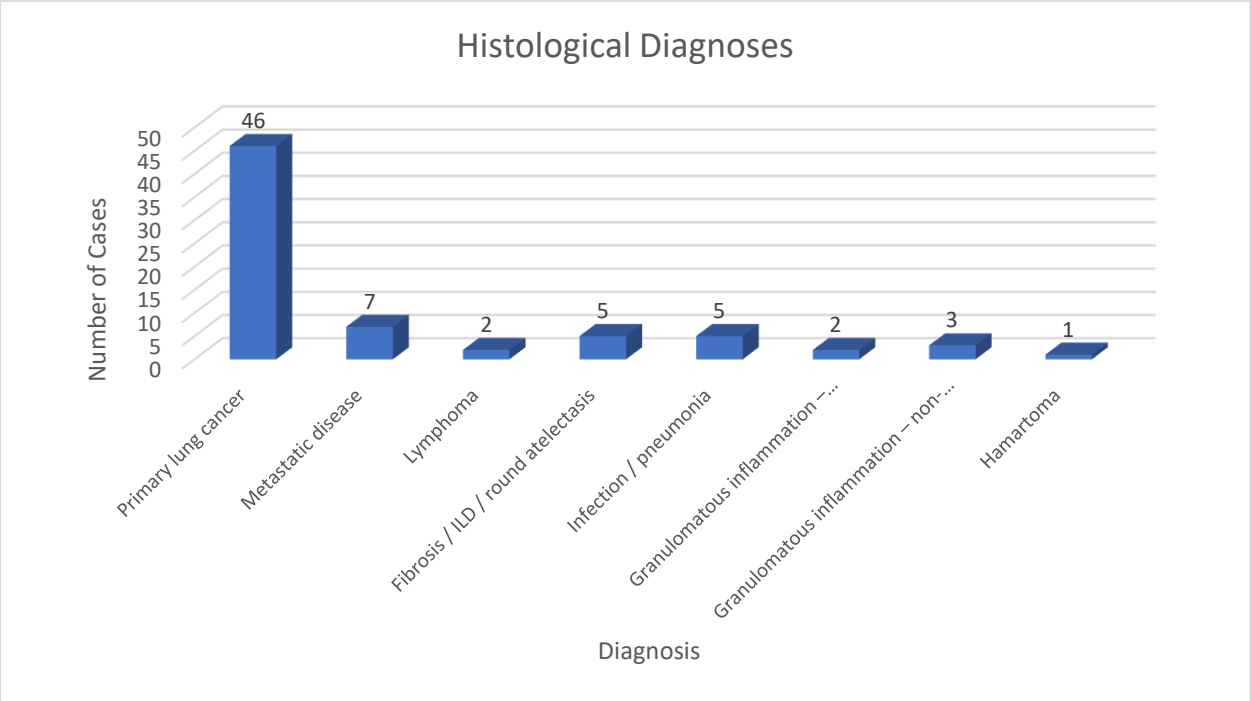
- Clinical presentation and pre- procedure imaging
- Procedural details
- Documentation of any complications and their management
- Correlation with final histopathology and clinical outcomes

5. Results

Total number of biopsies: 86

Histological Diagnoses

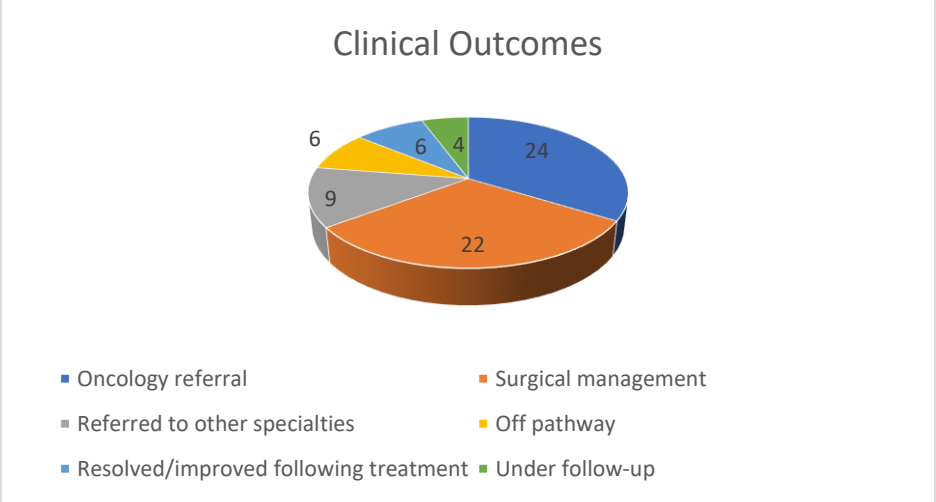
Diagnosis	Number of Cases
Primary lung cancer	46
Metastatic disease	7
Lymphoma	2
Fibrosis / ILD / round atelectasis	5
Infection / pneumonia	5
Granulomatous inflammation – necrotising	2
Granulomatous inflammation – non-necrotising	3
Hamartoma	1



6. Clinical Outcomes

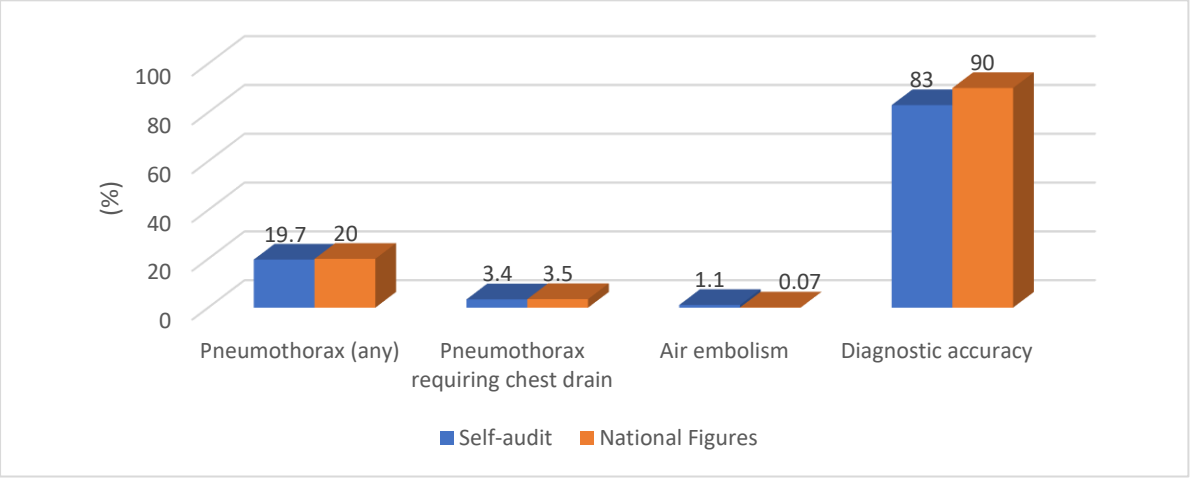
Outcome	Number of Patients
Oncology referral	24
Surgical management	22
Referred to other specialties	9

Outcome	Number of Patients
Off pathway	6
Resolved/improved following treatment	6
Under follow-up	4



7. Complications

Complication	Self-audit	National Figures
Pneumothorax (any)	19.7	20
Pneumothorax requiring chest drain	3.4	3.5
Air embolism	1.1	0.07
Diagnostic accuracy	83	90



Identified risk factors for major pneumothorax:

- Peri-fissural lesions
- Moderate to severe emphysema
- Post-radiotherapy bronchiectasis and fibrosis

Risk factors for air embolism:

- Lesion located above the level of the left atrium
- Presence of consolidation with air bronchograms
- Non-dependent positioning during biopsy

8. Reflection and Discussion

i. Pneumothorax

Pneumothorax remains the most common complication of CT-guided lung biopsy. The major pneumothorax rate (3.4%) aligns with national benchmarks.

Risk factors: peri-fissural trajectory, emphysema, small subpleural lesions, and post-radiation changes.

Preventive strategies:

- Careful pre-procedural planning to avoid trans-fissural approach when feasible.
- Optimised patient positioning to minimise parenchymal traversal, especially in severe emphysema.
- Anticipate and prepare for complications in high-risk cases with appropriate consent and readiness for chest drain insertion.

ii. Air Embolism

One case of systemic air embolism (1.1%) was encountered—higher than reported national incidence but rare overall.

Following literature review and multidisciplinary discussion, a case report was prepared and submitted for publication (Clinical Medicine Journal).

Learning points:

- Lesions above the left atrium, especially in non-dependent positions, increase embolic risk due to negative venous pressure gradients.
- Prone positioning may exacerbate risk in certain cases.

Preventive strategies:

- Use ipsilateral dependent positioning (lesion below the level of the left atrium).
- Thorough risk–benefit discussion with referring clinicians and patients.
- Be prepared for early recognition and prompt management if air embolism occurs.

iii. Inconclusive Samples / Diagnostic Accuracy

The overall diagnostic accuracy was **82.6%**, within national standards but with room for improvement.

Non-diagnostic samples were more common in:

- Lesions <2 cm

- Grossly necrotic or cavitating lesions

Improvement strategies:

- Optimise technique and consider multiple core samples for small or heterogeneous lesions.
- Review needle size, number of passes, and trajectory planning.
- Discuss challenging cases in MDT for alternative diagnostic approaches when appropriate.
- Ongoing skill development and maintaining adequate procedural volume to sustain proficiency.

9. Recommendations / Action Plan

- **Diagnostic yield:** Aim to improve by refining technique, especially for small or necrotic lesions.
- **Complication reduction:** Maintain awareness of patient and lesion-specific risk factors; optimise positioning and procedural planning.
- **Case review:** Continue periodic self-audits and peer reviews for continuous quality improvement.
- **Education:** Share learning outcomes with departmental colleagues.
- **Experience maintenance:** Ensure adequate annual procedural volume to maintain technical proficiency and reduce complication rates.

10. Conclusion

The audit demonstrates that personal performance in CT-guided percutaneous lung biopsy is consistent with national standards for both diagnostic adequacy and complication rates. Continuous self-audit, reflection, and targeted technical improvement are essential for maintaining high standards of patient care and procedural safety.