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# The Validity of Computed Tomography Guided Lung Tru-Cut Biopsies in Achieving Accurate Tissue Results

Basim Mohammed Khashman[1*], Khaleel I Mohson[1], Omar Abdul Jabbar Abdul Qader[2], Kifah H. Abdul Ghafour[3]

[1]National Cancer Research Center, University of Baghdad, Baghdad, Iraq.
[2]Oral Diagnosis Department, College of Dentistry, Al Mashreq University, Baghdad, Iraq.
[3]College of Medicine, University of Baghdad, Baghdad, Iraq.
*Correspondence to: Basim Mohammed Khashman (E-mail: basim@bccru.uobaghdad.edu.iq).
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**Abstract**
**Objective:** This study aims to assess the efficacy of CT-guided true-cut biopsy as a less invasive and cost-effective diagnostic technique for peripherally placed lung lesions.
**Methods:** Fourty patients with solitary lung nodule were involved in this study, true cut biopsies under Ct guide was taken then processed for routine H&E staining.
**Results:** Different pathological features can be identified with different pathological features giving primary diagnostic screening for lung cancer.
**Conclusion:** CT guided thoracic lesion biopsy is very efficient, cost-effective and less invasive technique when compared with the thoracic surgery.
**Keywords:** Ct, biopsy, solitary nodule, lung

## Introduction

Lung cancer is the second most often diagnosed cancer and the leading cause of cancer-related death in 2020. It is the most common malignancy diagnosed in men and the second most prevalent primary cancer in women.[1] The most frequent presenting feature of lung cancer is a mass that appears as an elliptical or rounded lesion with a well-defined margin or spiculated outline, invading the nearby lung parenchyma. Another radiological feature of primary lung cancer is a central hilar mass with pulmonary collapse; additional features include pleural effusion, lymphadenopathy, and locoregional metastasis.[2-5]

There are now some reports available[1-5] on the successful diagnosis of lung nodules using CT-guided automated needle biopsy. The diagnostic accuracy for malignant lesions by automated needle biopsy in the absence of a pathologist at the time of biopsy, ranging from 82% to 97%, is comparable to that of aspiration biopsy in with the aid of a pathologist because automated needle biopsies provide core specimens from the pulmonary nodules.[1,2,5] Additionally, automatic needle biopsies have a diagnostic accuracy of 71% to 100% in benign lesion instances, which is greater than aspiration biopsies. This makes automated needle biopsies very helpful for determining specific diagnoses.[6,7,10] Additionally, the incidence of pneumothorax observed with automated needle biopsy is similar to that of aspiration biopsy (9–54%), while the factors influencing pneumothorax in lung biopsies have been the subject of numerous reports,[6-10] the factors influencing diagnostic accuracy have been the subject of relatively few studies.[8,11]

Because of its low invasiveness and excellent diagnostic precision, CT-guided cutting needle biopsy (CNB) is a useful diagnostic technique for lung nodules or masses.[12-19] The final diagnosis can be based on CNB-based malignancy results because the false-positive rate is very low (between 0–2%).[20] As a final diagnosis, a benign diagnosis unique to CNB (e.g., benign tumors, fungal infections, or tuberculosis) may also be accepted,[12-19] allowing patients with suspicious lung lesions to avoid unnecessary surgery.[20]

## Materials and Methods

**CT guide true cut biopsy:** All cases are presented with solitary lung nodule. Patients prepared for biopsy had contrast enhanced CT scan of the chest, properly read and the access site was road mapped accurately, platelets count and International Normalization Ratio (INR) should be ready at the date of biopsy, when platelets counts >50000 and INR <1.5, the patient is usually fit for procedure, patients on clopidegrol had their treatment hold for 5 days before the procedure.

In the day of the procedure, the patients were lying flat on CT couch, supine, prone or prone oblique position was utilized according to the mass location, properly draped and sterilized, a central linear metallic marker was deployed along the spine or sternum and the CT scanning was started, the requested CT slice was chosen and table moved subsequently to the desire level, using CT light marker a corresponding line on patient body was marked, then, local anesthesia was given using 5 ml–10 ml of lidocaine 2%, after that the co-axial biopsy needle G18 was introduced in steps down to pleura-chest wall interface, then gradual advancing of the needle was utilized down to the mass, three biopsy pieces was done in all patients, post-procedure check CT scan was done in all patients to evaluate for immediate complications if occurred, the patient was transferred to the recovery room for monitoring and discharged home 1 hour after the procedure if no complications, those with pneumothorax were lied biopsy site dependent and discharged home 4 hours after obtaining chest x-ray.

**Tissue preparation and staining:** All samples were fixed in 10% formalin and processed routinely into paraffin block then blocks were sectioned at 4 µm thickness then mounted on clean glass slides for routine (H&E) staining.

## Results & Discussion

The rationale of the current study starting from the fact that the bronchus & lung cancer in Iraq represent the top ten cancers in males (12.57%, 9.38/100,000 MP) and the second rank in both genders (7.82%, 6.80/1,[21] and since the Tru-cut biopsy

is a simple procedure, relatively safe, rapid, reliable technique for the diagnosis of lung mass lesions, particularly with the aid of computed tomography (CT) scan,[22-24] it is discussed here for it validity for rapid and accurate diagnostic and screening technique.

In the current study, different pathological features can be identified depending on the H&E stained tissue slides ranging from fibrosis to Large cell carcinoma of the lung and adenocarcinoma as shown in (Table 1 and Figure 1).

The diagnostic difficulty of solitary pulmonary nodule (SPN) arises from its heterogeneous underlying aetiology and variable risk of cancer for doctors. Clinicians must understand how to treat solitary pulmonary nodules because the use of chest CT to diagnose respiratory conditions and stage cancers has increased the number of SPN diagnoses[25] additionally the access technique (percutaneous, bronchoscopic, and open biopsy) or the reason for the biopsy (taking a tissue sample when a tumor is suspected or sampling diffuse lung illness) and even percutaneous biopsy, depending on the kind of tissue that was obtained (cytological or histological, for example).[26]

The majority of the cases revealed neoplastic and malignant tissue lesions, this is related to the fact that all the patients were referred to the tertiary care center (Medical city complex)

Table 1. **Histological diagnoses of CT-guided lung biopsy ($n = 40$)**

| Histological diagnosis | Frequency (%) |
|---|---|
| Single tiny piece showed only fibrosis. No epithelial or neoplastic cells were seen. | 3 (7.5%) |
| Sections showed mononuclear cells infiltrate with lymphoid aggregate and vascular proliferation with clusters of atypical cells with large hyperchromatic nuclei.* | 5 (12.5%) |
| Lepidic Adenocarcinoma of the lung | 9 (22.5%) |
| Sheets of poorly differentiated malignant cells with large hyperchromatic nuclei.* | 7 (17.5%) |
| Areas of degenerated and necrotic cells with areas of fibrosis and mononuclear cells infiltrate | 2 (5%) |
| Sheets of poorly differentiated malignant epithelial cells suggestive of Large cell carcinoma of the lung.* | 6 (15%) |
| Samples with inadequate tissue | 8 (20%) |
| | Total 40 (100%) |

*Immunohistochemical marker study is advisable.

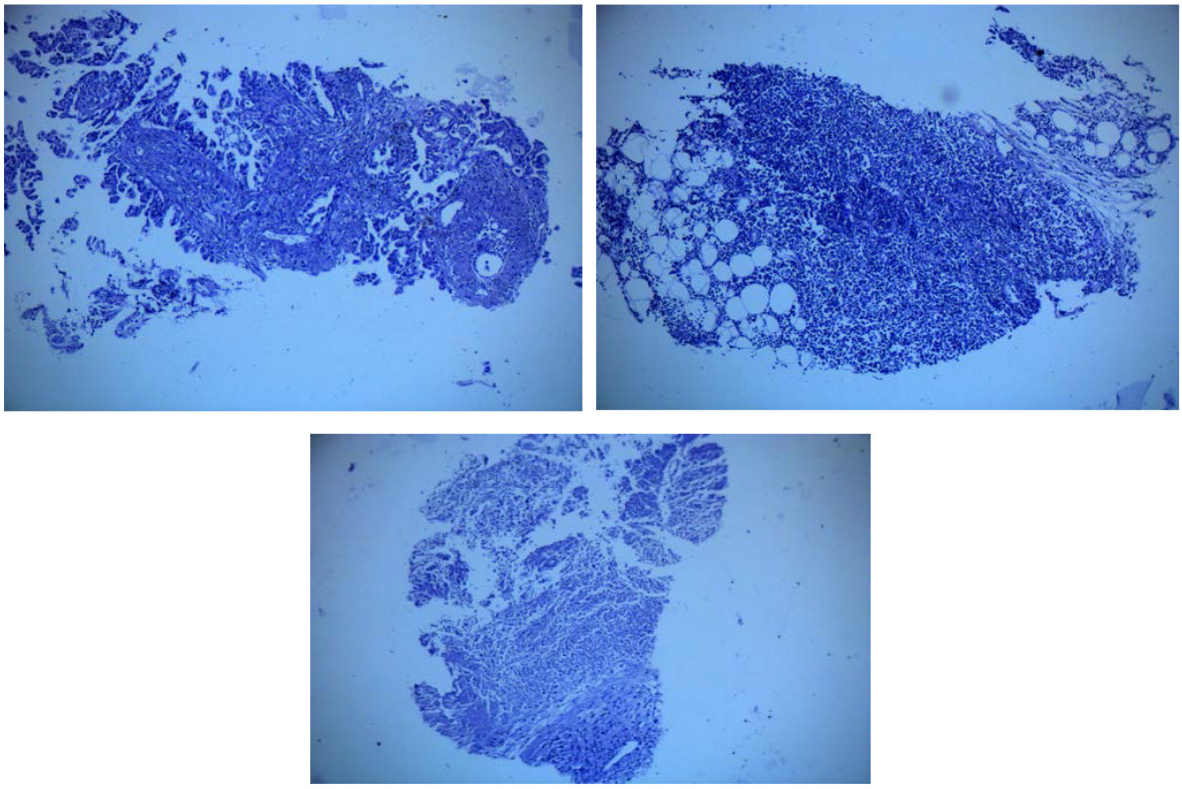

Fig. 1 **Different pathological features of True cut biopsies stained by Hematoxyline and Eiosin showing (top left) lepidic Adenocarcinoma of the lung. (top right) sheets of poorly differentiated. (bottom) sheets of poorly differentiated malignant epithelial cells suggestive of Large cell carcinoma of the lung malignant cells with large hyperchromatic nuclei.**

with progressed lung lesions probably due to the ultrasound misdiagnosed lung masses.

In conclusion which comes in parallel with Khaleel, 2022;[5] most of the studies cases provides a primary diagnostic tool for prediction allowing deeper access especially for tumor sections, further studies with larger sample size and lager needle gauge.

## Recommendation

Starting from the primary to the tertiary care centers, a national lung screening registry the management planning team should include the following specialists;

1. Respiratory physician
2. Radiologist
3. Surgeon
4. Interventional radiologist
5. Pathologist
6. Oncologist

For planning the national guideline for better diagnosis, management and early detection of lung cancers.

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## Conflicts of Interest

There are no conflicts of interest.

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