JKBMS, Vol.5, No.1, P.73-77, 2019 https://doi.org/10.56056/amj.2019.84

# Outcome of Transbronchial Lung Biopsy for Patients with Respiratory Symptoms

**Hadi Mohammed***
**Kosar Mohammed Ali****
**Kamaran Karadakhy*****

## Abstract

**Background and objectives:** Transbronchial lung biopsy was introduced into clinical practice as a diagnostic procedure in the evaluation of diffuse lung diseases and it is relatively noninvasive and safe to obtain tissue lung biopsies. Our aim was to evaluate this procedure for the diagnosis of patients with different lung pathologies. **Methods:** A prospective study of 50 cases with a variety of respiratory symptoms and chest imaging findings like mass lesions, infiltrations and consolidations, referred to our respiratory center from august 2017 to august 2018. Flexible bronchoscope and C-arm fluoroscope had been. **Results:** The most common radiological findings were consolidations (34%), masses (16%) and cavitation (10%). The diagnostic yield of Transbronchial lung biopsy was 50 % of the cases, 8 cases (16 %) out of these were mycobacterium tuberculosis, 6 cases (12%) were cryptogenic organizing pneumonia ,5 cases (10%) were bronchogenic carcinoma,3 cases (6%) were usual interstitial pneumonia, 1 case (2%) was anthracosis, 1 case (2%) was sarcoidosis and 1 case (2%) was silicosis. There were just two complications,1 case (2%) developed pneumothorax and another one (2%) developed surgical emphysema. **Conclusions:** Transbronchial lung biopsy is still a very useful safe and necessary procedure, In the absence of the new technical procedures like endobronchial ultrasound or radial probe- endobronchial ultrasound, it remains an important step in the diagnosis of various lung diseases with a minimal complication.

**Keywords:** Transbronchial lung biopsy; Flexible bronchoscopy; C-arm fluoroscopy.

## Introduction

Transbronchial lung biopsy (TBLB) was introduced into clinical practice as a diagnostic procedure in the evaluation of diffuse lung diseases in the mid-60s and early 1970 and has been widely used by pulmonologists to evaluate diseases of the chest and it is relatively noninvasive and safe method to obtain lung tissue biopsies[1-3] and using a flexible bronchoscope for TBLB has reduced the significant major complications .The diagnostic yield of TBLB varies among various parenchymal lung diseases3. Diagnosis of a peripheral lung lesion remains a clinical challenge to the pulmonologists in the accuracy and efficacy of the correct diagnosis. For the diagnosis of the these lesions, peripheral parenchymal lung lesions and infiltrations, different procedures have been used, and one of them is TBLB with or without using fluoroscopy with minimal risk to the patient[4] taking into consideration that several conditions have been reported to increase the risk of serious complications, including refractory hypoxemia, mechanical ventilation, coagulopathy, uremia, pulmonary hypertension, and superior vena cava syndrome[5].

Flexible bronchoscopy has been used for several purposes mainly for the diagnostic and therapeutic reasons and its uses have been increasing in advanced invasive intra bronchial interventions. For the last two decades, there have been changes in the diagnostic methods specially intra bronchial intervention including endobronchial ultrasound (EBUS) and radial probe endobronchial ultrasound (RP-EBUS) which represent the last version of bronchoscopy in the favor of the better and correct diagnosis.

The technical developments and methods inside this field, intrabronchial intervention, using flexible bronchoscope minimized the use of the standard procedure like TBLB which is related to the operators experience and authors, the number of samples obtained per TBLB and the overall diagnostic yield (i.e. 38% with one to three tissue frag-

* MBChB. FIBMS (Internal medicine), Respiratory Medicine Board Candidate. School of Medicine. College of Medicine. Dean of the Faculty.
** Assistant professor. MBChB, MRCP (UK), FRCP. Consultant Pulmonologist. University of Sulaimnyia.
*** MBChB. MD.FCCP. FRCP. Consultant Pulmonologist. University of Sulaimnyia. School of Medicine. college of Medicine
* Corresponding author: Hadi Mohammed. Email: hadima982@gmail.com.

ments vs 69% with six to ten)[3].

Endobronchial intervention has showed a great development in the last decades from cytology, biopsy, and ultrasound guided and navigation like electromagnetic navigational bronchoscopy, radial probe ultrasound bronchoscopy, ultrathin bronchoscopy and a major factor determining the choice of modality will be the ability to obtain enough tissue for molecular markers[6]. Bronchoscopy with fluoroscopy increased the diagnostic yield of bronchoscopy for localized lesions with nonspecific findings, regardless of etiology[7].

Our aim was to diagnose those patients within a short period of time, suffering from different lung pathologies who either did not tolerate invasive procedures like open lung biopsy or needs some procedures not available in our country like video assisted thoracoscopic surgery.

## Patients and methods

A prospective study of 50 cases with a variety of respiratory symptoms like cough and dyspnea and chest radiological findings like mass and consolidations were referred to our respiratory center at SHAR Hospital –Slemani city, including all age groups above 12 years, chronic respiratory complaint more than 6 weeks and chest imaging abnormalities and excluding those cases with bleeding disorders, profound hypoxia, uncooperative patients and patients on clopedogril and anticoagulants in a period of one year from august 2017 to august 2018. Formal written consent was taken, and all cases had been informed about the procedure and its complications before starting the procedure and approved by the ethical committee of faculty of medicine, Slemani University. Flexible bronchoscopy and C-arm fluoroscope with double monitors had been used. Midazolam 0, 5 mg - 1 mg (maximum 5 mg, with Flumazenil injection on need) intravenous and local anesthesia in the form of Lidocaine spray, nasal gel and solution over vocal cord, endo-tracheal and –bronchial infiltration when the patient in the supine position, head and trunk elevation with 45 degrees. We did not use Atropine, antitussive and painkiller. The flexible bronchoscope introduced trans nasally (96%of cases) or trans orally (4%). The biopsy forceps were visible to enter the suspected pathological area under the guidance of fluoroscope to visualize the forceps, Figure 1. The samples were placed in formalin and sent to the pathological laboratory. Chest X Ray was done 1-2 hours after the procedure to exclude pneumothorax.

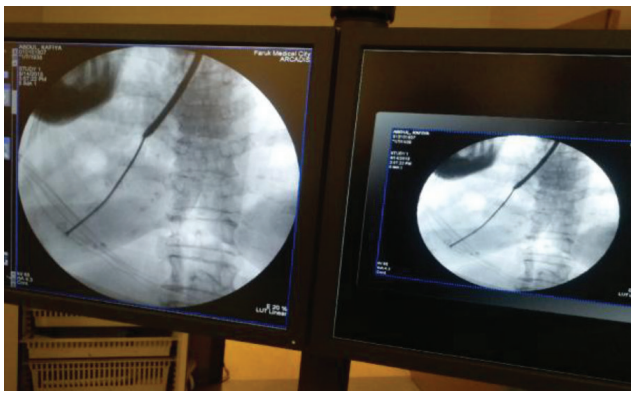

**Figure (1):** Biopsy forceps in the right lower lobe during taking biopsy.

## Results

Twenty-seven cases (54%) were females and 23 cases (46%) were males and their age ranged between 28 to 83 years with mean of 62.14+-13. Among females; 21 (42 %) were house wives Table(1) and they had cough 17 cases (36 %) and shortness of breath 14 cases (28 %) and both symptoms together 18 cases (36%). The most common radiological findings were consolidations 17 cases, masses 8 cases and lung cavitation 5 cases. The diagnostic yield of the study was 50 % i.e. we reached a diagnosis just in 25 cases, 8 cases (16 %) out of these 50 cases, were mycobacterium tuberculosis (MTB),6 cases (12%) were cryptogenic organizing pneumonia (COP),5 cases (10%) were bronchogenic carcinoma, 3 cases (6%) were usual interstitial pneumonia (idiopathic pulmonary fibrosis), 1 case (2%) was anthracosis, 1 case (2%) was sarcoidosis and 1 case (2%) was silicosis. These cases were diagnosed on the base of histopathological report. One case (2%) had pneumothorax and 1 case (2%) had surgical emphysema.

**Table (1):** Distribution of age, sex, occupation, outcomes, and complications.

| Variables | | Numbers (%) |
|---|---|---|
| Age | (Mean±SD) | 28-83 years (62.14±13.08) |
| Sex | Male | 23(46) |
| | Female | 27(54) |
| Occupations | Framer | 3(6) |
| | House Wife | 21(42) |
| | Teacher | 4(8) |
| | Driver | 2(4) |
| | Carpenter | 1(2) |
| | Employee | 5(10) |
| | Self employed | 10(20) |
| | Officer | 1(2) |
| | Peshmarga | 1(2) |
| | Poultry breeder | 1(2) |
| | Construction worker | 1(2) |
| Indications | Cough | 18(36) |
| | Dyspnea | 14(28) |
| | Sputum | 0(0) |
| | Chest pain | 0(0) |
| | Hoarseness of voice | 0(0) |
| | Cough and dyspnea | 17(34) |
| | More than 2 respiratory symptoms | 1(2) |
| Biopsy findings | Normal | 25(50) |
| | TB | 8(16) |
| | Anthracosis | 1(2) |
| | Cryptogenic organising pneumina | 6(12) |
| | Usual interstitial pneumonia | 3(6) |
| | Malignancy | 5 (10) |
| | Sarcoidosis | 1(2) |
| | Silicosis | 1(2) |
| Complication | Normal | 48(96) |
| | Pneumothorax | 1(2) |
| | Surgical emphysema | 1(2) |

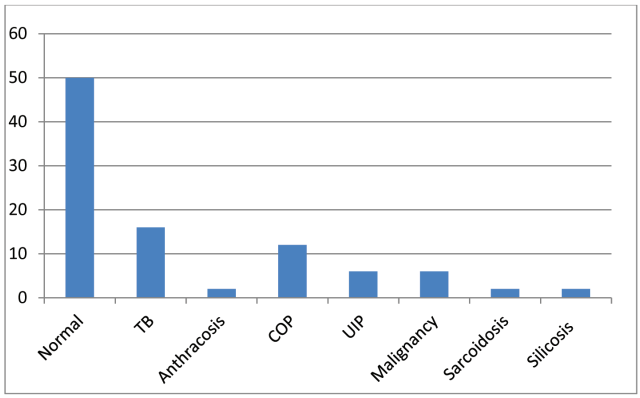


**Figure (2):** Histopathological diagnoses of the cases

## Discussion

In our study, the diagnostic benefit of 50 cases who were undergoing fluoroscopy guided transbronchial lung biopsy was 25 cases (50 %) and the rest undiagnosed cases were referred for other diagnostic procedures such as ultrasound or CT guided cytology and histology and open lung biopsy. Our results were not high if we compare them with the other selective case studies, special patient groups, like lung cancer or parenchymal lung diseases, Doanald evaluated the results of diagnostic fiberoptic bronchoscopy in 600 patients, and found that the two diseases most frequently encountered were bronchogenic carcinoma in 330 patients 55% and bacterial infection in 94 (16%)[8].

Recently a study published in Chest; Standard Bronchoscopy with Fluoroscopy (SB-F) vs Thin Bronchoscopy and Radial Endobronchial Ultrasound for Biopsy (R-EBUS) of Pulmonary Lesions[9], they showed that the diagnostic yield was higher in the TB-EBUS arm compared with the SB-F arm (49% vs 37%), this difference was not statistically significant and at the same time they concluded that bronchoscopy with or without a thin scope and R-EBUS

had a poor diagnostic yield for pulmonary lesions.Rittiark found that the overall diagnostic yield of Fluoroscopy-TBLB group was statistically significantly higher than Non-Fluoroscopy-TBLB group (43.8% vs. 32.9%; p-value= 0.003)[10]. De Roza et al found that The overall diagnostic sensitivity of conventional bronchoscopic lung biopsy in their patients, suspected to have lung cancer, is reported at approximately 57% [11]. The rate of the diagnosis of some suspected opacities depends upon the size and growth of the tumor intrabronchially and/or near the pleura.The incidence of TBLB is highly related to the size of the mass and radiologically suspected lesions. Lesions > 20 mm had a diagnostic yield of 84.9% compared to 63.0% in lesions ş 20 mm (şp-value = 0.001)[11].

Cases with a positive CT-Bronchus sign had a trend towards a higher diagnostic yield (OR 1.745; 95% Cl 0.853, 3.487; şp-value= 0.1191)[11]. In the other hand it is important to take the nature of the diseases and especially parenchymal lung diseases. The diagnostic yield of TBLB depends on the skill of the operator, number of biopsies taken, and degree of interstitial involvement at the time of biopsy. The optimal results can only be achieved if up to10 biopsies are taken for stage I sarcoidosis and 4-5 biopsies are taken for stage II of sarcoidosis, however; the risk of complication increases, proportionally with the increased number of biopsies needed to be taken[12].In a study of Tsushima et al. compared bronchoscopic diagnosis for peripheral pulmonary nodule under fluoroscopic guidance with CT guidance lung biopsies and they showed that the sensitivity of Transbronchial lung biopsy for a solitary pulmonary nodule was 62.2% with CT guidance, compared with 52.6% with fluoroscopic guidance[13].Transbronchial lung biopsy may not be a reliable for intraparenchymal or heterogeneous lung diseases and it has been approved that such diseases need to be taken by large size and multiple biopsies such as usual interstitial pneumonia[14,15] . However, it has a high diagnostic yield for sarcoidosis: Sensitivity ranges from 50% to 85% in stage 1 disease and is higher if the parenchyma is involved. At least four to six biopsies are required for optimal diagnosis of sarcoidosis [16]. But Smyth in his study, did not find a comparable benefit in diffuse lung diseases such as sarcoidosis[17].In our study we had documented two cases of complications, one of them was surgical emphysema (2%) and other was pneumothorax (2%). In the second one, the procedure was done when the patient was intubated, and he was on invasive ventilator for other reason and treated with chest tube insertion. The same result confirmed in a study done by Huang , the incidence rate of pneumothorax resulted from the guided TBLB is generally less than 1-2%[18]. TBLB with fluoroscopy has not been associated with a significantly lower incidence of pneumothorax than biopsy performed without fluoroscopy[19].

Although, transbronchial biopsy under fluoroscopic guidance has been suggested as a surgical technique for obtaining histopathological tissue from suspicious pulmonary lesions, the major limitation of this procedure is a relatively lower diagnostic yield in the diagnosis of pulmonary nodules or masses[20-22] and Baaklini et al showed that the diagnostic yield was 31% when the lesion was located within the inner two thirds of the lungs versus 14% when the lesion was located in the peripheral third[23]. Lastly, Transbronchial lung biopsy with a cryoprobe, or cryobiopsy, is a promising new bronchoscopic biopsy technique capable of obtaining larger and better-preserved samples than previously possible using traditional biopsy forceps[24]. According to our knowledge, our trial is the first fluoroscopic TBLB in our region Slemani-Iraq.

## Conclusions

Transbronchial lung biopsy is still a very useful and necessary procedure, Fluoroscopy guided bronchoscopy. Transbronchial lung biopsy is safe and has very high diagnostic yield in a special group of patients. In the absence of the new technical procedures like EBUS- TBLB or RP- EBUS it remains the important step in the diagnosis of various lung diseases with a minimal complication.

Future work should focus on improvements in technique and technology advances that ensure a higher likelihood of obtaining a diagnosis.

Acknowledgments

We thank the staff of the respiratory center at SHAR Teaching Hospital/ Slemani/Iraq.

Competing interests: The authors do not have any conflict of interest.

## References


1. Levin DC, Wicks AB, Ellis JH Jr: Transbronchial lung biopsy via the fiberoptic bronchoscope. Am Rev Respir Dis 1974; 110:4–12.

2. Scheinhorn DJ, Joyner LR, Whitcomb ME: Transbronchial forceps lung biopsy through the

fiberoptic bronchoscope in Pneumocystis carinii pneumonia. Chest 1974; 66: 294-95

3. Poletti V, Casino GL, Gurioli C, Ryu JH, Tomassetti S. Lung cryobiopsies: A paradigm shifts in diagnostic bronchoscopy? Respirology (2014) 19, 645-54

4. Zavala DC. Transbronchial biopsy in diffuse lung disease. Chest. 1978; 73(Suppl:727-33)

5. Wahidi MM, Rocha JW, Hollingsworth A et al Contraindications and Safety of Transbronchial Lung Biopsy via Flexible Bronchoscopy Respiration 2005; 72:285–95.

6. Kalanjeri S, Holladay R, Gildea T. State-of-the-Art Modalities for Peripheral Lung Nodule Biopsy. Clin Chest Med.2018, 39;125–38

7. Estarriol H, Goday R, Sánchez V, Padró B, Casamitjá Sot MT, Sebastián Quetglás F. Bronchoscopic lung biopsy with fluoroscopy to study 164 localized pulmonary lesions. Arch Bronconeumol. 2004; 40(11):483-8.

8. Donald C. Zavala M. Diagnostic Fiberoptic Bronchoscopy: Techniques and Results of Biopsy in 600 Patients. Chest.1975 (68);1,12-9.

9. Tanner N, Yarmus L, Chen A et al. Standard Bronchoscopy with Fluoroscopy vs Thin Bronchoscopy and Radial Endobronchial Ultrasound for Biopsy of Pulmonary Lesions. Chest 2018;154(5),1035-43.

10. Rittirak W, Sompradeekul S. Diagnostic yield of fluoroscopy-guided transbronchial lung biopsy in non-endobronchial lung lesion.Division of Respiratory Disease and Tuberculosis, Department of Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand. J Med Assoc Thai. 2007;90 (2) :68-73.

11. De Roza M, Quah K, Tay C, et al Diagnosis of Peripheral Lung Lesions via Conventional Flexible Bronchoscopy with Multiplanar CT Planning. Pulmonary Medicine 2016; 2016: 5048961.

12. Wong M. Yasufuku K. Nakajima T. et al. Endobronchial Ultrasound: New Insight for the Diagnosis of Sarcoidosis. Europian respiratory journal. 2007;29: 1182-6. doi: 10.1183/09031936.00028706.

13.Tsushima K, Sone S, Hanaoka T, et al. Comparison of bronchoscopic diagnosis for peripheral pulmonary nodule under fluoroscopic guidance with CT guidance. Respir Med. 2006;100 (4):737-45

14.Wall CP, Gaensler EA, Carrington CB, Hayes JA. Comparison of transbronchial and open biopsies in chronic infiltrative lung diseases. Am Rev Respir Dis. 1981:123 (3):280-5.

15. Shim HS, Park MS, Park IK. Histopathologic findings of transbronchial biopsy in usual interstitial pneumonia. Pathol Int. 2010: 60 (5):373-7.

16. Gilman MJ, Wang KP. Transbronchial lung biopsy in sarcoidosis. An approach to determine the optimal number of biopsies. Am Rev Respir Dis. 1980.122 (5):721-4.

17. Smyth CM, Stead RJ. Survey of flexible fibreoptic bronchoscopy in the United Kingdom. Eur Respir J. 2002:19(3):458-63

18. Huang Y, Huang H, Qiang Li et al. Transbronchial lung biopsy and pneumothorax. J Thorac Dis. 2014; 6(4): S443–S447.

19. Anders GT, Johnson JE, Bush BA, Matthews JI. Transbronchial biopsy without fluoroscopy. A 7-year perspective. Chest. 1988. 94 (3):557-60.

20. Torrington KC, Kern JD. The utility of fiberoptic bronchoscopy in the evaluation of the solitary pulmonary nodule. Chest. 1993; 104:1021Y1024.

21. Wagner U, Walthers EM, Gelmetti W. Computer-tomographically guided fiberbronchoscopic transbronchial biopsy of small pulmonary lesions: a feasibility study. Respiration. 1996; 63:181Y186.

22. Rong F, Cui B. CT scan directed transbronchial needle aspiration biopsy for mediastinal nodes. Chest. 1998; 114:36Y39.

23. Baaklini WA, Reinoso MA, Gorin AB, et al. Diagnostic yield of fiberoptic bronchoscopy in evaluating solitary pulmonary nodules. Chest. 2000; 117:1049Y1054.

24. Lentz R, Argento A, Colby T,Rickman O, Maldonado F.Transbronchial cryobiopsy for diffuse parenchymal lung disease: a state-of-the-art review of procedural techniques, current evidence, and future challenges. Journal of Thoracic Disease .J Thorac Dis 2017;9(7):2186-203