ROLE OF TRANSBRONCHIAL LUNG BIOPSY IN DIFFUSE PARENCHYMAL LUNG DISEASES

Methuku Narender¹, Manikanta Dhanamurthy Koppu², Vavilala Satish Kumar Rao³, Auzumeedi Sai Kumar⁴, Subhakar Kandi⁵, Surya Kiran Pulivarthi⁶

HOW TO CITE THIS ARTICLE:
Methuku Narender, Manikanta Dhanamurthy Koppu, Vavilala Satish Kumar Rao, Auzumeedi Sai Kumar, Subhakar Kandi, Surya Kiran Pulivarthi. “Role of Transbronchial Lung Biopsy in Diffuse Parenchymal Lung Diseases”. Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 69, August 27;
Page: 11924-11930, DOI: 10.14260/jemds/2015/1721

ABSTRACT: Diffuse parenchyma lung disease (DPLD) encompasses a hetero-geneous group of disorders, characterized by a spectrum of inflammatory and fibrotic changes affecting alveolar walls and air spaces. They comprise over 200 entities and include a wide spectrum of diseases, many uncommon and many of unknown etiology. The incidence and prevalence rates of DPLD have not been precisely estimated due to difficulties in ascertaining a specific diagnosis on a specific disease.

MATERIAL & METHODS: Prospective observational study done on 20 adult patients with radiologically diffuse parenchymal lung disease admitted between January 2010 and May 2015 in Govt. General & Chest Hospital, Hyderabad were subjected for Transbronchial Lung Biopsy via flexible fiberoptic bronchoscopy, without fluoroscopic guidance. RESULTS: Out of 20 patients studied adequate lung tissue was obtained in 15 patients, yield of the procedure was 75%. Out of 15 patient's histopathological diagnosis of chronic interstitial pneumonia is seen in 5 members, interstitial fibrosis is seen in 4 members, non caseating granulomas seen in 4 members, pulmonary alveolar protenosis was seen in 1 member and normal lung histopathology was seen in 1 members. Diagnostic yield of the procedure was 93.3% and overall diagnostic yield was 70%. Two patients developed post procedure pneumothorax. Both of them underwent closed-tube thoracostomy, lung expanded well and ICD was removed in 4 days. No significant bleeding was observed in any patient. No mortality was observed after the procedure. CONCLUSIONS: Transbronchial lung biopsy through flexible bronchoscopy is a simple, safe and effective procedure for the diagnosis of diffuse parenchymal lung diseases. Complications were observed in only few patients out of twenty, which were successfully managed with ICD.

KEYWORDS: Diffuse parenchyma lung disease (DPLD), HRCT, Flexible fiberoptic bronchoscopy (FOB), trans bronchial lung biopsy (TBLB).

INTRODUCTION: Diffuse parenchyma lung disease (DPLD) encompasses a heterogeneous group of disorders, characterized by a spectrum of inflammatory and fibrotic changes affecting alveolar walls and air spaces.(¹) They comprise over 200 entities and include a wide spectrum of diseases, many uncommon and many of unknown etiology.(²) The onset, rate of progression and duration of symptoms are extremely variable, however, and presentations range from and asymptomatic patient with long standing radiological changes to an acute onset of breathlessness over days leading rapidly to respiratory failure and death. DPLDS account for 15% of diseases seen in Pulmonary Medicine practice. The incidence and prevalence rates of DPLD have not been precisely estimated due to difficulties in ascertaining a specific diagnosis on a specific disease. Moreover ILD usually remains a diagnosis of exclusion requiring extensive investigations to differentiate ILD from other diseases.(³) In a study undertaken in the Bernalillo county, New Mexico, USA, data from a dedicated ILD registry
estimated the incidence of ILD at 30 per 100,000 per year, with approximately one-third in the idiopathic pulmonary fibrosis (IPF) category. The estimated incidence was higher for men than women.\textsuperscript{[6]} International differences in the prevalence of DPLD exist: in Japan it was estimated to be 4.1 per 100,000,\textsuperscript{[5]} where as in Finland it was estimated to be 7-12 per 100,000.\textsuperscript{[6]}

**MATERIAL & METHODS:** Prospective observational study done on 20 adult patients with radiologically diffuse parenchymal lung disease admitted between January 2014 and May 2015 in Govt. General & Chest Hospital, Hyderabad were subjected for Transbronchial Lung Biopsy via flexible fibreoptic bronchoscopy, without fluoroscopic guidance. The study was commenced after obtaining approval from the institution’s ethical committee. All adult patients having radiologically (chest x-ray PA view and HRCT - chest) diffuse parenchymal lung disease, who were not diagnosed by clinical, radiological and routine laboratory investigations were included in the study. Patients having Obvious lung mass, Sputum for AFB (D/S) positive, Not willing to give informed consent, Unfit for bronchoscopy are excluded from the study. After obtaining informed consent from the patients, the procedure was performed using flexible fiber optic bronchoscope (Olympus BFTE2 & Fujinon). Pre-medication was done with atropine 0.6mg i.m and 2% lignocaine spray was done through atomizer in patient’s mouth in the direction of fauces and transnasal topical 2% lignocaine gel was given into each nostril.

The lung lobe having the maximum radiological abnormality was chosen and FOB wedged into the bronchus of that segment. When the pulmonary disease was equally distributed in both lungs, the basal segments of lower lobes were selected for TBLB. Biopsy forceps was advanced beyond the tip of the scope until resistance was met. The forceps was then withdrawn by 1 to 2 cm and cup of the forceps was opened. The patient was then asked to inhale deeply and the forceps was re-advanced during inhalation for 2-3 cms or till resistance was met. The patient was asked to exhale and forceps was closed at the end of expiration and the biopsy forceps was withdrawn and the sample was collected. An average of four lung biopsy samples were taken (Ranging between 3 to 6) and kept in 10% formalin and were subjected for histopathological examination. Chest X-ray P-A view in expiration was taken for all patients within 4-6hrs of the procedure to check for post-procedure pneumothorax. Patients were kept under observation for dyspnoe and hemoptysis.

**RESULTS:** Out of 20 patients studied 12 were males and 8 were females. 5 patients were aged between 15-30 years, 9 were aged between 31-45 years and 6 were aged more than 46 years. Results are shown in table 1&2. More than half of the patients in the study were house wife’s (11), 3 were business men, 3 were daily wage labor, 1 security guard 1 farmer and 1 politician shown in table 3. Chet x-rays in study group include reticulonodular in 7 patients, micronodular in 5 patients macronodular in 1 patient, ground glass in 4 patients and consolidation in 3 patients was shown in table 4. HRCT findings include ground glass in 5 patients airspace consolidation in 5 patients, reticular in 4 patients, nodular in 4 patients and Honey combing/ traction bronchiectasis/cystic changes in 2 patients was shown in table5. Out of 20 patients studied adequate lung tissue was obtained in 15 patients, yield of the procedure was 75%. Out of 15 patient’s histopathological diagnosis of chronic interstitial pneumonia is seen in 5 members, interstitial fibrosis is seen in 4 members, non caseating granulomas seen in 4 members, pulmonary alveolar protenosis was seen in 1 member and normal lung histopathology was seen in 1 members results were shown in table1. Diagnostic yield of the procedure was 93.3% and overall diagnostic yield was 70%.
Two patients developed post procedure pneumothorax. Both of them underwent closed-tube thoracostomy, lung expanded well and ICD was removed in 4 days. No significant bleeding was observed in any patient. No mortality was observed after the procedure.

**DISCUSSION:** The diagnosis of diffuse parenchymal lung disease is often challenging due to wide variety of causes included in the group and their varied presentations. Chest radiograph is an essential test, diagnostic in at least 50% of cases. It has limited sensitivity and specificity in diagnosis of DLD. Up to 10% patients of biopsy proven DPLD have normal chest X-Ray.\[^7\] Regardless of the initial insult, the repertoire of histopathological responses in the lung is relatively restricted and therefore, the spectrum of patterns on chest radiography is generally narrow. Radiological patterns include Reticular (Fine net like appearance), nodular, linear (Fine lines), ground-glass opacification (Veil-like opacification of the lungs that renders vessels indistinct), and airspace opacification or consolidation (poorly defined areas of increased density in which an airbronchogram may or may not be visible). HRCT has evolved into a standard procedure during the evaluation of almost all patients with ILD.

It is more sensitive than plain chest radiograph in identifying ILD (Sensitivity greater than 90%) and the image pattern of parenchymal abnormalities on HRCT often suggest a particular set of diagnostic abnormalities. HRCT is often in itself diagnostic, and should always precede biopsy in the investigation of DPLD. HRCT also identifies 'mixed' patterns of disease (ILD and emphysema) or additional pleural, hilar or mediastinal abnormalities. It has a better correlation with physiologic impairment and is especially useful in guiding the site of BAL or lung biopsy. Normal HRCT essentially rules out IPF but does not rule out microscopic inflammation and granulomatous changes. HRCT makes a greater diagnostic contribution in the IIPs because an obvious etiological factor is lacking.

In many cases, the diagnosis is obvious clinically an HRCT is merely confirmatory. However, in an important subset, the clinical presentation is not definitive and diagnostic HRCT findings are extremely influential. HRCT plays an important diagnostic role in LCH, LAM, alveolar proteinosis and lymphangitis carcinomatosis. Fiber optic bronchoscopy with BAL or TBLB may substantiate specific diagnosis in some patients (eg sarcoidosis, LCG, LAM. CEP, COP). BAL may be adequate in to diagnose specific infections (TB, Histoplasmosis, coccidioidomycosis, endemic fungal infections) and selected non-infections disease – e.g., LCG, LAM.\[^8\] BAL cell profiles may narrow the differential diagnosis.\[^9\] Increase in BAL lymphocytes suggests sarcoidosis HP,\[^10\] or other granulomatous processes. TBLB achieves a high diagnostic yield in DPLDs with centrilobular attenuation, such as granulomatous and metastatic diseases, infection, alveolar proteinosis and eosinophilic pneumonias.\[^11\]

This study was undertaken to evaluate the diagnostic yield of transbronchial lung biopsy in diffuse parenchymal lung disease in this institution. The present study has a diagnostic yield of 70%, which is comparable with many other studies which are shown in table 2. In the present study, two patients developed pneumothorax, which was treated with closed tube thoracostomy and is comparable with other studies which are shown in table 3. In the study done by Prakash et al,\[^12\] transbronchial lung biopsy was done with the aid of fluoroscopy with a diagnostic yield of 75.9% and complications (pneumothorax) were observed in 1.26% patients. Transbronchial lung biopsy can be performed safely and effectively on out-patient basis in selected cases as done by Suri et al and Hernández Blasco et al.\[^13,14\]
CONCLUSIONS: Transbronchial lung biopsy through flexible bronchoscopy is a simple, safe and effective procedure for the diagnosis of diffuse parenchymal lung diseases. Complications were observed in only few patients out of twenty, which were successfully managed with ICD.

REFERENCES:
1. American Thoracic Society/European Respiratory Society International Multidisciplinary Consensus Classification of the Idiopathic Interstitial Pneumonias: This joint statement of the American Thoracic Society (ATS), and the European Respiratory Society (ERS) was adopted by the ATS board of directors, June 2001 and by the ERS Executive Committee, June 2001. Am J Respir Crit Care Med 2002; 165: 277–304.
2. British Thoracic Society: The diagnosis, assessment and treatment of diffuse parenchymal lung disease in adults. Thorax 1999; 54(suppl 1):S1–S28.
3. Mapel DW, Hunt WC, Utton R, Baumgartner KB, Samet JM, Coultas DB: Idiopathic pulmonary fibrosis: survival in population based and hospital based cohorts. Thorax2000, 53: 469-476.
4. Coultis DB, Zumwalt RE, Black WC, Sobonya RE: The epidemiology of interstitial lung disease. Am J Respir Crit Care Med 1994; 150: 967-972.
5. Munakata M, Asakawa M, Hamma Y, Kawakami Y: present status of idiopathic interstitial pneumonia: from epidemiology to etiology. Nihon kyobu shikkan gakkai zasshi 1994; 32(suppl): 187-192.
6. Hodgson U, Laitinen T, Tukiainen P: Nationwide prevalence of sporadic and familial idiopathic pulmonary fibrosis: evidence of founder effect among multiplex families in Finland. Thorax 2000; 57: 338-342.
7. Epler GR, McLoud TC, Gaensler EA, Mikus JP, Carrington CB; Normal chest roentgenograms in chronic diffuse infiltrative lung disease. N Engl J Med 1978; 298: 934-939.
8. Johnson SR, Tattersfield AE: clinical experience of lymphangioleiomyomatosis in the UK. Thorax 2000; 55: 1052-1057.
9. Welker L, Jorres RA, Costabel U, Magnussen H: Predictive value of BAL cell differentials in the diagnosis of interstitial lung diseases. Eur Respir J 2004; 24: 1000-1006.
10. Lacasse Y, Selman M, Costabel U, Dalphin JC, Ando M, Morell F, Erkinjuntti-Pekkanen R, Muller N, Colby TV, Schuyler M, Cormier Y: Clinical diagnosis of hypersensitivity pneumonitis. Am J Respir Crit Care Med 2003; 168: 952-958.
11. Descombes E, Gardiol D, Leuenberger P. Transbronchial lung biopsy: an analysis of 530 cases with reference to the number of samples. Monaldi Arch Chest Dis 1997; 52: 324–329.
12. Prakash UB, Offord KP, Stubbs SE. Bronchoscopy in North America: the ACCP survey. Chest.1991; 100: 1668–1675.
13. Suri JC, Goel A, Bhata A, Kaushik PC. Evaluation of unguided transbronchial biopsy in the diagnosis of pulmonary disease--its safety and efficacy as an out-patient procedure. Indian J Chest Dis Allied Sci. 1992 Apr-Jun; 34(2): 57-64.
14. Hernández Blasco L, Sánchez Hernández IM, Villena Garrido V, de Miguel Poch E, Nuñez Delgado M, Alfaro Abreu. Safety of the transbronchial biopsy in outpatients. Chest. 1991 Mar; 99(3): 562-5.
15. Kalra S, D'Souza G, Bhusnurmath B, Jindal SK. Transbronchial lung biopsy in diffuse lung disease--a study of 28 cases. Ind J tuberculosis, 1993, 40,199.
16. R. K. Ailani, R. K. Isase, S. P. Shah, D. N. Koyande and J. V. Mandke. Transbronchial lung biopsy in diffuse lung disease. Chest 1978; 73: 734-736.
17. Howard A. Andersen. Transbronchoscopic Lung Biopsy for Diffuse Pulmonary Diseases: Results in 939 Patients. Respir Med. 1994 Nov; 88(10): 749-53.
18. Milman N, Faurschou P, Munch EP, Grode G. Transbronchial lung biopsy through the fibre optic bronchoscope. Results and complications in 452 examinations. Arch Pathol Lab Med. 2007 Mar; 131(3): 407-23.
19. Mitchell DM, Emerson CJ, Collins JV, Stableforth DE. Transbronchial lung biopsy with the fibreoptic bronchoscope: analysis of results in 433 patients. Br J Dis Chest 1981; 75: 258–262.
20. Szlubowski A, Soja J, Kuzdał J, Zieliński M, Papla B, Adamek L, Duplaga M, Sładek K. Transbronchial lung biopsy as a diagnostic method of diffuse pulmonary diseases. Saudi Med J. 2005 Apr; 26(4): 641-5.
21. Ibrahim AS, Allangawi MH, Sattar HA, Mobyed HS, Almohammed AA. Indications, diagnostic yields and complications of transbronchial biopsy over 5 years in the State of Qatar. Thorax 2004; 59:500-505 doi:10.1136/thx.2003.011734.
22. Szlubowski A, Soja J, Kuzdał J, Zieliński M, Papla B, Adamek L, Duplaga M, Sładek K. Transbronchial lung biopsy as a diagnostic method of diffuse pulmonary diseases. Saudi Med J. 2005 Apr; 26(4):641-5.

| Age     | Number of Patients |
|---------|--------------------|
| 15–30 Yrs | 5                  |
| 31–45 Yrs | 9                  |
| >46 Yrs   | 6                  |

Table 1: Age Distribution of Patients

| Sex     | Number |
|---------|--------|
| Male    | 8      |
| Female  | 12     |

Table 2: Sex Distribution of Patients

| Occupation      | Number |
|-----------------|--------|
| House wife      | 11     |
| Businessmen     | 3      |
| Politician      | 1      |
| Security guard  | 1      |
| Farmer          | 1      |
| Daily wage labor| 3      |

Table 3: Occupation

| Chest X-Ray Patterns | Number |
|----------------------|--------|
| Reticulo-nodular     | 7/20   |
| Micronodular         | 5/20   |
| Macronodular         | 1/20   |
| Ground-glass         | 4/20   |
| Consolidation        | 3/20   |

Table 4: Chest X-Ray Patterns
| Reticular                  | 4/20 |
|---------------------------|------|
| Ground – glass            | 5/20 |
| Air – space consolidation | 5/20 |
| Nodular pattern           | 4/20 |
| Honey combing/ traction bronchiectasis / cystic changes | 2/20 |

**Table 5: HRCT Chest–Predominant Patterns**

| Interstitial Fibrosis      | 4    |
|---------------------------|------|
| Chr. Interstitial Inflammation | 5    |
| Granuloma (Non-Caseating) | 4    |
| Pulmonary Alveolar Proteinosis | 1    |
| Normal Lung Tissue In The Specimen | 1    |
| Inadequate Lung Tissue    | 5    |
| **Total**                 | **20**|

**Table 6: Bronchoscopic Biopsy Findings**

| References                  | No. of Patients | Diagnostic Yield |
|-----------------------------|-----------------|------------------|
| Kalra et al[15]             | 26              | 76%              |
| R.K.Ailani[16]              | 30              | 77%              |
| Andersen[17]                | 939             | 79.4%            |
| Milman et al[18]            | 126             | 66.7%            |
| Mitchell et al[19]          | 183             | 61%              |
| Szlubowski et al[20]        | 123             | 65%              |
| Ibrahim AS et al[21]        | 71              | 81.7%            |
| Ahluwalia et al[22]         | 25              | 80%              |
| **Present study**           | **20**          | **70%**          |

**Table 7: Comparison of Diagnostic Yield in Various Studies**

| References                  | No. of Patients | Complication Rate (Pneumothorax) |
|-----------------------------|-----------------|----------------------------------|
| Kalra et al                 | 26              | 11%                              |
| R.K.Ailani                  | 30              | 3%                               |
| Andersen                    | 939             | 10%                              |
| Ibrahim AS et al            | 71              | 9.8%                             |
| Hanson RR et al             | 164             | 4%                               |
| **Present study**           | **20**          | **10%**                          |

**Table 8: Comparison Of complications In Various Studies**
**AUTHORS:**
1. Methuku Narender  
2. Manikanta Dhanamurthy Koppu  
3. Vavilala Satish Kumar Rao  
4. Auzumeedi Sai Kumar  
5. Subhakar Kandi  
6. Surya Kiran Pulivarthi

**PARTICULARS OF CONTRIBUTORS:**
1. Associate Professor, Department of Pulmonary Medicine, Guntur Medical College/Govt. Fever Hospital, Guntur, Andhra Pradesh.  
2. Assistant Professor, Department of Pulmonary Medicine, ASRAM Medical College, Eluru, Andhra Pradesh.  
3. Assistant Professor, Department of Pulmonary Medicine, Osmania Medical College/ Govt. General & Chest Hospital, Hyderabad.  
4. Professor & HOD, Department of Pulmonary Medicine, Osmania Medical College/ Govt. General & Chest Hospital, Hyderabad.  
5. Professor, Department of Pulmonary Medicine, Osmania Medical College/ Govt. General & Chest Hospital, Hyderabad.  
6. Post Graduate, Department of Pulmonary Medicine, Guntur Medical College Guntur/ Govt. Fever Hospital, A. P.

**FINANCIAL OR OTHER COMPETING INTERESTS:** None

**NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:**
Dr. Methuku Narender,  
Associate Professor,  
Department of Pulmonary Medicine,  
Guntur Medical College/Govt. Fever Hospital, Guntur, Andhra Pradesh.  
E-mail: naren.1967@hotmail.com

Date of Submission: 12/08/2015.  
Date of Peer Review: 13/08/2015.  
Date of Acceptance: 24/08/2015.  
Date of Publishing: 25/08/2015.