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OUTCOME OF TRANSBRONCHIAL LUNG BIOPSY IN PARENCHYMAL LUNG DISEASES IN DEPARTMENT OF TERTIARY CARE HOSPITAL.

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ABSTRACT

Background of study; Diffuse parenchymal lung diseases (DPLDs) are complex conditions that often require histological confirmation for accurate diagnosis. While video-assisted thoracoscopic surgery (VATS) is the gold standard, transbronchial lung biopsy (TBLB) offers a less invasive alternative. This study evaluates the diagnostic yield and complications of TBLB in DPLD patients at Sir Ganga Ram Hospital.

Objective; To evaluate the outcome of Transbronchial lung biopsy in parenchymal lung diseases in department of tertiary care hospital.

Methods; This prospective study included 48 patients with HRCT features of DPLD who underwent TBLB at Sir Ganga Ram Hospital from January to December 2019. Biopsies were taken from middle or lower lobe segments using a 6 mm channel Fujinon therapeutic bronchoscope under sedation and analgesia. Patients with significant comorbidities or bleeding risk were excluded. Histological samples were sent for analysis.

Results; Of 48 enrolled patients (mean age 53 ± 12 years; 28 males, 20 females), the most common HRCT finding was bilateral ground glass opacities (30.2%). Adequate histological samples were obtained in 90% of cases. The most frequent diagnoses were nonspecific interstitial pneumonitis (27.3%), usual interstitial pneumonia (24.2%), and sarcoidosis/hypersensitivity pneumonitis (18.2% each). Pneumothorax occurred in 8 patients; 6 resolved conservatively, while 2 required tube thoracostomy.

Conclusion: TBLB is a safe, effective diagnostic option for DPLD, offering good yield with fewer risks, especially in resource-limited settings. Advances in technique may further enhance its accuracy.

Key Words; Diffuse Parenchymal Lung Disease **(DPLD),** Transbronchial Lung Biopsy **(TBLB),** High-Resolution Computed Tomography **(HRCT),** Nonspecific Interstitial Pneumonitis **(NSIP),** Video-Assisted Thoracoscopic Surgery **(VATS)**

INTRODUCTION

Diffuse parenchymal lung diseases (DPLDs) are frequently encountered in pulmonology practice, often involving both lungs and presenting diagnostic challenges[1] . While some cases are linked to systemic diseases or occupational exposures, others remain idiopathic and are classified as idiopathic interstitial pneumonitis (IIP)[2] . Although clinical history and radiological findings can aid diagnosis, many cases require histological confirmation via lung biopsy for definitive differentiation[3] .
Traditionally, video-assisted Thoracoscopic surgery (VATS) under general anesthesia has been the gold standard for obtaining lung tissue (open lung biopsy)[4]. However, Transbronchial lung biopsy (TBLB) via flexible bronchoscopy performed under sedation and analgesia in a bronchoscopy suite has emerged as a less invasive alternative in some centers[5].

This study aims to retrospectively evaluate the diagnostic yield and procedural complications of TBLB in patients with DPLD at the Pulmonology Department of Sir Ganga Ram Hospital.

Methodology:

This prospective study includes forty-eight patients of Pulmonology department from January 2019 to December 2019.

Ethical Clearance:

This study was approved by ethical review committee of Fatima Jinnah Medical University/Sir Ganga Ram Hospital via letter No.18-Art/Pulmon-IRB/FJ.

Inclusion Criteria:

Patients who had features of diffuse parenchymal lung disease on High resolution CT scan and gave consent for procedure.

Exclusion Criteria:

1-Traction bronchiectasis involving more than half of lung or more than two segments.
2-Comorbid Unstable Angina
3-Hypoxic patients whose hypoxia did not correct even by 6 L/min of Oxygen
4- Patients with bleeding diathesis either due to prolonged PT, APTT or thrombocytopenia

Setting; Informed consent taken from patients and complication of procedure explained. Patients were sedated with intravenous midazolam 5 mg and analgesia via intravenous nalbupriphene in divided doses. Supplemental oxygen given via oxygen nasal cannula before and during the procedure. Video Bronchoscopy done by Fujinon Therapeutic Bronchoscope of 6 mm channel diameter. Some biopsy forceps introduced via biopsy channel till blind end of segments reached.
Three to four biopsies taken only from middle and lower lobe segments of only one lung. Upper lobe segments were avoided due to complexity and damage to bronchoscope. Tissue sent to histopathology lab in formalin container. Data was analyzed using SPSS 27.

Results:

In this study forty-eight patients were enrolled who fulfil the inclusion criteria and gave consent for this procedure. Twenty-eight patients were male while twenty were female. Their mean age was 53(±12) years. Their radiological features on HRCT are mentioned in Table 1. Thirteen patients had

ground glass opacity which is most common feature on HRCT. Seven patients had a micro or macronodular pattern, and another seven had a mosaic pattern. Histopathology of five patients was inconclusive due to inadequate sample so over all positivity of sample is ninety percent.

Eight patients developed pneumothorax in which border of lung was less than one centimeter from rib cage. Six patients were managed conservatively with oxygen via nasal cannula and their pneumothorax resolved after twenty-four hours. Two patients need tube thoracostomy for five days to resolve pneumothorax. Nonspecific interstitial pneumonia was the most common histopathological diagnosis in eleven patients, followed by usual interstitial pneumonia in eight.

Hypersensitive pneumonitis was identified in seven cases, followed by sarcoidosis and tuberculosis based on histological diagnosis. Additionally, four cases showed bronchoalveolar carcinoma on histological examination.

Table 1: Radiological findings of study subjects

Radiological finding on HRCT CHEST	No. of patients(%)
Bilateral ground glass opacities	13 (30.23)
Bilateral reticulo nodular opacities	9 (20.93)
Bilateral micro or macro-nodules	7 (16.27)
Mosaic pattern	7 (16.27)
Bilateral milliary mottling	3 (6.97)
Bilateral patchy consolidation	2 (4.65)
Bilateral crazy paving pattern	1 (2.32)

Table 2: Distribution of Cases according to histological results of TBLB

Histological diagnosis	No. of patients (%)
Non-specific interstitial pneumonitis	9 (27.27)
Usual Interstitial pneumonia	8 (24.24)
Sarcoidosis	6 (18.18)
Hypersensitive Pneumonitis	6 (18.18)
Tuberculosis	4 (12.12)
Broncho-alveolar carcinoma	4 (9.30)

Discussion:

Transbronchial lung biopsy (TBLB) serves as a less invasive option compared to surgical biopsy for diagnosing diffuse parenchymal lung diseases (DPLD). Although the American Thoracic Society relies on radiological diagnosis and does not strictly recommend transbronchial lung biopsy for idiopathic pulmonary fibrosis[(2)] . Tomassetti S et al elaborate the significance of lung biopsy in diffuse parenchymal lung diseases which in some cases had changed the treatment[(6)].

The introduction of new IPF treatments now requires histological diagnosis. Without it, patients may suffer due to delays in receiving drug-specific therapy[(7)].

The effectiveness of TBLB differs based on disease pathology. Ravaglia C et al. demonstrates particular value in diagnosing sarcoidosis, lymphangitic carcinomatosis, and infectious processes, where distinct histopathological features often eliminate the necessity for surgical biopsies[(5)]. Conversely, its diagnostic capacity diminishes in idiopathic pulmonary fibrosis (IPF) and similar fibrotic interstitial lung diseases (ILDs), primarily because of inadequate tissue sampling and specimen size constraints[(8)]. Our data corroborate earlier studies reporting a diagnostic success rate of 35-90% for TBLB in DPLD depending upon the experience of Bronchoscopist and technique of biopsy. Whereas better outcomes observed in granulomatous conditions than fibrotic ones[(4)]. This prospective analysis from Sir Ganga Ram Hospital assessed the efficacy and safety of TBLB, with results consistent with prior research on its selective applicability.

For undiagnosed DPLD cases, especially those with ambiguous high-resolution computed tomography (HRCT) results, video-assisted thoracoscopic surgery (VATS) continues to be the

preferred method for acquiring sufficient tissue samples[9] . Nevertheless, VATS carries greater risks, including extended hospitalization and elevated expenses relative to TBLB[10] . Our findings emphasize that TBLB, when applied to suitable candidates, can deliver adequate diagnostic data while circumventing the hazards linked to surgical procedures and anesthesia.

TBLB is generally well-tolerated, with pneumothorax representing the predominant adverse effects[11]. In our study, pneumothorax rates (1-5%) matched those documented in earlier research, with the majority resolving with oxygen inhalation via nasal cannula conservatively or minimal intervention[12]. Significant bleeding episodes were infrequent and effectively addressed using bronchoscopy techniques, mirroring outcomes from comparable studies[13]. Although cryo lung biopsies are gaining popularity due to batter size piece of biopsy but this technique is associated with significant risk of hemorrhage which is tackled by employing fluoroscopy and preemptive balloon occlusion to enhance safety by mitigating complications, underscoring the importance of technical precision but add more cost of diagnostic procedure[14].Whereas in our study there is no such added cost with good diagnostic yield.

Conclusion:

TBLB retains its diagnostic relevance in DPLD assessment, especially in settings with limited access to surgical biopsy. While VATS outperforms TBLB in fibrotic lung disorders, the latter presents a lower-risk alternative for eligible patients. Similarly, TBLB is not inferior to cryo lung biopsy histological yield where as cryo lung biopsy carry significant risk of hemorrhage. Advances in bronchoscopic methods and molecular testing may further improve TBLB's diagnostic precision moving forward.

Limitations:

Several limitations affect this study, including its possible selection bias. Patients of diffuse parenchymal lung diseases are sometimes on treatment before lung biopsy. These patients are on oral steroids with or without immunosuppressive drugs and respiratory physicians are reluctant to stop these medications due to risk of aggravation of hypoxia. But concomitant medication with these drugs may alter the histological diagnosis or made it inconclusive and these patients should be excluded from study which may reduce the size of study.

The lack of a head-to-head comparison between TBLB, VATS, and cryobiopsy limits definitive conclusions regarding their relative merits (14) . Subsequent prospective research incorporating advanced methods like transbronchial cryobiopsy (TBLC) could yield more conclusive insights.

AUTHORS' CONTRIBUTION:

MM conceptualized, did data collection & editing of manuscript MMAB conceptualized, did data collection, review and final approval of manuscript.
UA did data collection & editing of manuscript.
MY did data analysis, data interpretation, &manuscript writing.
ZN did statistical analysis & editing of manuscript.
ARZB did data analysis, data interpretation, manuscript writing.
All authors approved the final version of the manuscript.

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