Original Research Paper

Volume-8 | Issue-6 | June-2018 | PRINT ISSN No 2249-555X

Pulmonary Medicine

DIAGNOSTIC UTILITY OF BRONCHOALVELAR LAVAGE (BAL) IN LUNG DISEASES (STUDY OF 438 CASES IN 2 YEAR PERIOD AT RURAL MEDICAL COLLEGE)

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ABSTRACT

Introduction: Bronchoalveolar lavage (BAL) is an important clinical and investigational tool. It is a standard diagnostic procedure in all patients with diffuse lung abnormalities like infectious, noninfectious, immunologic, or malignant etc.

Materials and methods: This study was carried out in the Pulmonary Medicine department of RDGMC Ujjain MP. 438 AFB negative cases were included.

Results: 83% male,17% female.77% were above 40 yrs age .Cell cytology 13.9% (61) neoplastic, 36.99% non neoplastic,42.23% normal and 7.32% no definite diagnosis. Detailed report revealed 42.23% normal pattern, 29.43% inflammatory smear,7.53% granulomatous pattern,7.99% adenocarcinoma, 2.05% malignancy suspects, 2.05% interstitial lung disease ILD,0.91% squamous cell carcinoma,0.46% dysplasia and 7.31% no definite opinion was made. On BAL microscopy 16.43% pseudomonas,3.42% klebisiella,2.73% E coli, 2.28% staphylococcus and 75.11% no organism detected.

Conclusion: BAL is a valuable tool for diagnosis of lung parenchymal diseases. Cell cytology and histopathology enhances the diagnostic yield.

KEYWORDS : Bronchoalveolar lavage (BAL),Diagnostic yield.

Introduction- Bronchoalveolar lavage (BAL) has become an important clinical and investigational tool.(1) It is a standard diagnostic procedure in all patients with diffuse lung abnormalities of unknown cause whether an infectious, noninfectious, immunologic, or malignant cause is suspected.(2) BAL allows the recovery of both cellular and non-cellular components of the epithelial (alveolar) lining fluid and epithelial surface of the lower respiratory tract. Components of the BAL fluid represent the inflammatory and immune status of the lower respiratory tract and the alveoli (3) . BAL, which samples the distal air spaces, differs significantly from a bronchial washing, which samples the large airways via aspiration of small amounts of instilled saline.(4) BAL should be considered a standard procedure in the evaluation of diffuse lung diseases, suspected infection, or malignancy, especially when the bleeding risk prohibits either bronchial brushing, trans bronchial biopsy (TBB), or trans bronchial needle aspiration (TBNA). Either the right middle lobe or the lingula is preferred for BAL collection because, in a supine patient, gravity assists the recovery of a maximal amount of BAL fluid return. (5) In the case of localized disease, lavage should be performed in the area of focal radiographic abnormality, in optimal position, a slow, manual gentle aspiration, without allowing the airway walls to collapse, tends to maximize the lavage return. BAL has significantly improved the diagnostic workup of lung diseases, whether diffuse or localized. In pulmonary alveolar proteinosis, it has both diagnostic and therapeutic value (6). In interstitial lung diseases, BAL is considered to be helpful in strengthening the diagnosis of sarcoidosis in the absence of a tissue diagnosis, by finding a lymphocytosis (>25%) and a CD4/CD8 ratio greater than 4.(7) BAL may be a useful tool in the diagnosis of peripherally located primary lung cancer, with an overall diagnostic yield range of 33% to 69%, being exclusively diagnostic in 9% to 11% of cases (8). BAL can diagnose leukemia and lymphomatous pulmonary involvement as well as plasma cell dyscrasia .(9) Finding asbestos bodies in BAL fluid may correlate with occupational exposure (10). The presence of more than 25% eosinophils in the BAL fluid confirms the diagnosis of eosinophilic lung diseases, and the presence of more than 4% CD1+ Langerhans cells confirms a diagnosis of Langerhans cell histiocytosis, albeit with low sensitivity (11). In chronic beryllium disease, lymphocytes from the BAL proliferate when stimulated in vitro with soluble beryllium salts, with a sensitivity and specificity approaching 100%; this lymphocyte test has become a valuable diagnostic tool for this condition and has replaced open-lung biopsy (12). In ventilator-associated pneumonia, a positive quantitative culture (>104 colony-forming units (CFU)/ mL) on BAL fluid may be clinically useful with a sensitivity of 22% to 93% and a specificity of 45% to 100% (13-14). BAL is also a useful tool in the diagnosis of pulmonary infections in immune compromised patients, with the reported yield as high as 93% (15) . Thus, in certain conditions, BAL findings can be diagnostic and thereby avoid the need for either TBB or open-lung biopsy . In other settings, although not diagnostic, BAL can be used as an adjunct to the diagnosis when interpreted in the context of the entire clinical picture. While performing BAL in an immune compromised host and invasive Aspergillus infection is suspected, the fluid should be submitted for galactomannan cell wall antigen detection using an enzyme immunoassay.. According to a recent meta analysis, the sensitivity, specificity, and accuracy are reported to be 79%, 86%, and 89%, respec- tively. It needs to be pointed out that concomitant use of certain antibiotics such as piperacillin-tazobactam, amoxicillin, or amoxicillin-clavulanate and all fermentation products of Penicillium species may produce false- positive results. Besides, the test may also have cross reactivity with Histoplasma capsulatum cell wall antigen. Hence the results should be interpreted in the context of the total clinical picture and rechecked periodically (16). The most common complications associated with BAL are fever, seen in up to 30% of patients, and transient hypoxemia, which is readily corrected with supplemental oxygen.

Materials and methods: This is a hospital based study which was carried out in the Pulmonary Medicine department of RDGMC Ujjain MP. All sputum negative (AFB) 438 cases were included. Bronchoscopy was done and BAL collected and sent for cell cytology & histopathology.

Results: Out of total 438, 83%(362) male and 17%(76) female. Most of the cases 77% (336) were above 40 year of age . BAL was collected and sent for cell cytology and histopathology. As per cell cytology reports 13.9% (61) neoplastic, 36.99% (162) non neoplastic, 42.23% (185) normal and 7.32% (32) no definite diagnosis. Detailed report revealed 42.23% (185) normal pattern, 29.43% (129) inflammatory smear, 7.53% (33) granulomatous pattern, 7.99% (35) adenocarcinoma, 2.05% (9) malignancy suspects, 2.05% (9) interstitial lung disease ILD,0.91% (4) squamous cell carcinoma, 0.46% (2) dysplasia and 7.31% (32) no definite opinion was made. On culture or BAL microscopy 16.43% (72) pseudomonas, 3.42% (15) klebisiella, 2.73% (12) E coli, 2.28% (10) staphylococcus and 75.11% (329) no organism detected.

Discussion-

BAL is a standardized diagnostic procedure for lung parenchymal diseases. it is often used to distinct between granulomatous lung disease (sarcoidosis, hypersensitivity pneumonitis and the fibrosing diseases likeIPF). In fibrosing disorders, a BAL neutrophilia, often associated with an eosinophilia, is common. Granulomatous disease, by contrast, is characterised by the predominance of a BAL

lymphocytosis, with a variable BAL neutrophil content and, in HP, an occasional BAL eosinophilia.. BAL is also diagnostic in alveolar proteinosis and diffuse alveolar hemorrhages. BAL is also helpful in diagnosis of eosinophilic lung diseases, chronic beryllium disease, lung infections in immune compromised groups and give initial clue about lung malignancy in adenocarcinoma. BAL is also a valuable tool in ventilator associated pneumonia as a treatment guide**. Pesci et al.** (17) study recommended that BAL should be considered in all IPF patients with suspected infection, malignancy or IPF. ***Izidor Kern et all*** *study based on cytological analysis of BAL in ILD (18).* ***A.U. wells et all study*** *was based on clinical utility of bronchoalveolar lavage in diffuse parenchymal lung diseases (19). G.S. Gaude et all study in Begluru taken 175 cases BAL results showed lung cancer 78.6% , tuberculosis in 32% sputum negative, IPF in 6.3% and diagnostic yield 81.8%.*

In present study total 438 sputum negative cases taken results shows 13.9% (61) neoplastic, 36.99% (162) non neoplastic, 42.23% (185) normal and 7.32% (32) no definite diagnosis.

Conclusion: BAL is a good valuable tool for diagnosis of malignancy. With the help of fiber optic bronchoscopy BAL is collected. Cell cytology and histopathology enhances the diagnostic yield BAL in confirmation of diagnosis. This is also helpful for plan treatment. It gives valuable diagnostic information in cases like Aspergillus infections ,atypical infection and in those cases where trans bronchial biopsy and FNAC can not be done due to risk of bleeding disorders.

Table

1. Histopathology details

Histopatholgical analysis	Percentage %	Number of cases
Malignancy suspect	2.05%	9
Dysplasia	0.46%	2
Inflammatory	29.43%	129
Interstitial lung disease ILD	2.05%	9
Granulomatous pattern	7.53%	33
Normal pattern	42.23%	185
No definite opinion	7.31%	32
Adenocarcinoma	7.99%	35
Squamous cell carcinoma	0.91%	04

2.BAL Microscopy details-

Microorganism	Percentage %	Number of cases
Staphylococcus	2.28%	10
Klebisiella	3.42%	15
Pseudomonas	16.43%	72
E. coli	2.73%	12
No organism	75.11%	329

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