

A Comparative Evaluation of Efficacy of Bronchoalveolar Lavage and Transbronchial Lung Biopsy at a Tertiary Care Hospital

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ABSTRACT

Background: Bronchoalveolar lavage (BAL) has become a widely accepted procedure for safely obtaining respiratory secretions, facilitating the analysis of both cellular and acellular components for diagnostic and research applications. Hence; the present study was conducted for evaluating and comparing the efficacy of bronchoalveolar lavage and transbronchial lung biopsy.

Materials & Methods: A total of 100 patients were enrolled. Only those patients were included which were scheduled for transbronchial lung biopsy. Complete demographic and clinical details of all the patients were obtained. All the patients underwent BAL. All lavage specimens submitted for cytological analysis, as well as all transbronchial lung biopsy specimens submitted for histopathological evaluation, were evaluated. The bronchoalveolar lavage fluid was collected in containers specifically designed to minimize cell adherence to their surfaces, such as silicone-coated glass, polypropylene, or other plastics intended for suspension tissue culture. The transbronchial specimens were fixed in 10% buffered formalin. Following fixation, the specimens underwent gross examination to assess size and external characteristics. Multiple sections were taken from each specimen for processing, and hematoxylin and eosin (H&E) staining was performed on the sections.

Results: Mean age of the patients was 49.2 years. Among all the 100 patients, on histopathological examination, 42 patients were found to be having malignant pathologies while 58 patients were found to have non-malignant pathologies. Sensitivity, specificity and diagnostic accuracy of BAL for assessing malignant lesions was 72.3%, 88.9% and 79.1% respectively. Sensitivity, specificity and diagnostic accuracy of BAL for assessing non-malignant lesions was 88.9%, 72.3% and 79.1% respectively.

Conclusion: The integration of these two techniques will result in both a quantitative and qualitative enhancement of the diagnostic efficacy of bronchoscopy.

KEYWORDS: Bronchoalveolar Lavage, Transbronchial Lung Biopsy.

INTRODUCTION

Bronchoalveolar lavage (BAL) has become a widely accepted procedure for safely obtaining respiratory secretions, facilitating the analysis of both cellular and acellular components for diagnostic and research applications. Originally developed to sample respiratory secretions in animal models of lung disease, BAL was later adapted for clinical use in the investigation of interstitial lung disease (ILD). It was initially regarded as a promising method for diagnosing and managing various ILDs, including sarcoidosis, idiopathic

pulmonary fibrosis (IPF), and hypersensitivity pneumonitis (HP). Over the decades, numerous articles have emerged in medical literature as institutions globally adopted BAL to identify pathogens responsible for respiratory infections and to explore the changes in the airspace environment linked to noninfectious parenchymal lung diseases.

Today, BAL is routinely employed to diagnose respiratory infections, assess patients experiencing acute respiratory failure or showing signs of diffuse

parenchymal lung diseases, and to monitor the condition of transplanted lung allografts.¹⁻³

Bronchoalveolar lavage (BAL) is a non-invasive technique conducted using a fiberoptic bronchoscope positioned in a wedge configuration within a designated bronchopulmonary segment. The analysis of cellular components and solutes obtained from the lower respiratory tract offers critical diagnostic information and enhances understanding of immunological, inflammatory, and infectious mechanisms occurring at the alveolar level. Cytological examination of BAL fluid is frequently employed in the clinical management of various pulmonary disorders.⁴⁻⁶ Hence; the present study was conducted for evaluating and comparing the efficacy of bronchoalveolar lavage and transbronchial lung biopsy.

MATERIALS & METHODS

The present study was conducted for evaluating and comparing the efficacy of bronchoalveolar lavage and transbronchial lung biopsy. A total of 100 patients were enrolled. Only those patients were included which were scheduled for transbronchial lung biopsy. Complete demographic and clinical details of all the patients were obtained. All the patients underwent BAL. All lavage specimens submitted for cytological analysis, as well as

all transbronchial lung biopsy specimens submitted for histopathological evaluation, were evaluated. The bronchoalveolar lavage fluid was collected in containers specifically designed to minimize cell adherence to their surfaces, such as silicone-coated glass, polypropylene, or other plastics intended for suspension tissue culture. The transbronchial specimens were fixed in 10% buffered formalin. Following fixation, the specimens underwent gross examination to assess size and external characteristics. Multiple sections were taken from each specimen for processing, and hematoxylin and eosin (H&E) staining was performed on the sections. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software.

RESULTS

The mean age of the patients was 49.2 years. Among all the 100 patients, on histopathological examination, 42 patients were found to be having malignant pathologies while 58 patients were found to have non-malignant pathologies. Sensitivity, specificity and diagnostic accuracy of BAL for assessing malignant lesions was 72.3%, 88.9% and 79.1% respectively. Sensitivity, specificity and diagnostic accuracy of BAL for assessing non-malignant lesions was 88.9%, 72.3% and 79.1% respectively.

Table 1: Distribution of patients according to final diagnosis

Histopathological diagnosis	Number	Percentage
Malignant	42	42
Non-malignant	58	58
Total	100	100

Table 2: Sensitivity and specificity of BAL cytology in diagnosis of malignant lesions

Variable	Value
Sensitivity	72.3%
Specificity	88.9%
Diagnostic accuracy	79.1%

Table 3: Sensitivity and specificity of BAL cytology in diagnosis of non-malignant lesions

Variable	Value
Sensitivity	88.9%
Specificity	72.3%
Diagnostic accuracy	79.1%

DISCUSSION

Early diagnosis and proper choice of antimicrobials are crucial for successful management of lung pathologies. Cellular analysis of BAL fluid, including total and differential cell counts and the CD4+:CD8+ T-

lymphocyte ratio, is useful for the diagnosis of various interstitial lung diseases. Under an appropriate clinical setting, BAL fluid analysis can provide highly suggestive or even diagnostic information for specific interstitial lung diseases in the absence of a lung biopsy.

However, only a few previous studies with limited patient populations have evaluated the role of cellular analysis of BAL fluid.⁷⁻¹⁰ Hence; the present study was conducted for evaluating and comparing the efficacy of bronchoalveolar lavage and transbronchial lung biopsy.

The mean age of the patients was 49.2 years. Among all the 100 patients, on histopathological examination, 42 patients were found to be having malignant pathologies while 58 patients were found to have non-malignant pathologies. Sensitivity, specificity and diagnostic accuracy of BAL for assessing malignant lesions was 72.3%, 88.9% and 79.1% respectively. Sensitivity, specificity and diagnostic accuracy of BAL for assessing non-malignant lesions was 88.9%, 72.3% and 79.1% respectively. Ahmed A et al compared bronchoalveolar lavage (BAL) cytology and transbronchial biopsy in the diagnosis of carcinoma lung and determined accuracy of BAL cytology using histopathologic examination of transbronchial biopsy as gold standard. BAL fluid and bronchial biopsy were received and processed simultaneously. Four cytology and a set of histopathology slides were prepared. These were screened and diagnosis recorded. Sensitivity, Specificity, False Positive, False Negative, Positive predictive value and Negative predictive value of BAL cytology were determined using histopathology of transbronchial biopsy as gold standard. They found the sensitivity of BAL cytology to be 93.44% as compared with transbronchial biopsy. The specificity was 100%. There was no false positive while false negative results were 6.55%. The positive predictive value was 100%, while the negative predictive value was 75%. The overall diagnostic efficacy of BAL cytology was 94.52%. BAL cytology is a highly sensitive and specific test for diagnosis of carcinoma lung. It can be used as a quick and reliable diagnostic method for diagnosis of lung malignancy.¹¹

Bulpa PA et al in 2003 evaluated the safety and diagnostic yield of bedside bronchoalveolar lavage (BAL) combined with fibroscopic transbronchial lung biopsy (TBLB) in determining the aetiology of pulmonary infiltrates in mechanically ventilated patients. The records of 38 mechanically ventilated patients who underwent BAL/TBLB to investigate unexplained pulmonary infiltrates were retrospectively reviewed. Patients were divided into two groups: immunocompetent (group 1: n=22; group 1a: n=11, late acute respiratory distress syndrome (ARDS); group 1b: n=11, no ARDS) and immunocompromised (group 2, n=16). The procedure allowed a diagnosis in 28 patients (74%), inducing therapeutic modification in 24 (63%) and confirmation of clinical diagnosis in four (11%). In groups 1a, 1b and 2, diagnosis was obtained in 11 out of 11 (fibroproliferation), seven out of 11 and 10 out of 16 patients, and therapy changed in 11 out of 11 (administration of steroids), six out of 11 and seven out

of 16 patients, respectively. Pneumothorax occurred in nine patients (four of group 1a), bleeding in four (v35 mL), and transient hypotension in two. No fatalities were procedure related. Combined bronchoalveolar lavage/transbronchial lung biopsy is of diagnostic and therapeutic value in mechanically ventilated patients with unexplained pulmonary infiltrates, excluding those with late acute respiratory distress syndrome. Although complications are to be expected, the benefits of the procedure appeared to exceed the risks in patients in whom a histological diagnosis was deemed necessary.¹²

CONCLUSION

The integration of these two techniques will result in both a quantitative and qualitative enhancement of the diagnostic efficacy of bronchoscopy.

REFERENCES

1. Mathieson JR, Mayo JR, Staples CA, et al. Chronic diffuse infiltrative lung disease: comparison of diagnostic accuracy of CT and chest radiography. *Radiology* 1989; 171: 111–16.
2. Raghu G, Collard HR, Egan JJ, et al. An official ATS/ERS/JRS/ALAT statement: idiopathic pulmonary fibrosis: evidence-based guidelines for diagnosis and management. *Am J Respir Crit Care Med* 2011; 183: 788–24.
3. Raghu G. Idiopathic pulmonary fibrosis: guidelines for diagnosis and clinical management have advanced from consensus-based in 2000 to evidence-based in 2011. *Eur Respir J* 2011; 37: 743–6.
4. Ohshimo S, Bonella F, Cui A, et al. Significance of bronchoalveolar lavage for the diagnosis of idiopathic pulmonary fibrosis. *Am J Respir Crit Care Med* 2009; 179: 1043–47.
5. Haslam PL, Dewar A, Butchers P, et al. Mast cells, atypical lymphocytes, and neutrophils in bronchoalveolar lavage in extrinsic allergic alveolitis. Comparison with other interstitial lung diseases. *Am Rev Respir Dis* 1987; 135: 35–47.
6. Drent M, van Velzen-Blad H, Diamant M, et al. Bronchoalveolar lavage in extrinsic allergic alveolitis: effect of time elapsed since antigen exposure. *Eur Respir J* 1993; 6: 1276–81.
7. Anand NJ, Zuick S, Klesney-Tait J, Kollef MH. Diagnostic implications of soluble triggering receptor expressed on myeloid cells-1 in BAL fluid of patients with pulmonary infiltrates in the ICU. *Chest* 2009; 135: 641–7.
8. Oudhuis GJ, Beuving J, Bergmans D, Stobberingh EE, ten Velde G, et al. Soluble Triggering Receptor Expressed on Myeloid cells-1 in bronchoalveolar lavage fluid is not predictive for ventilator-associated pneumonia. *Intensive Care Med* 2009; 35: 1265–70.
9. Palazzo SJ, Simpson TA, Simmons JM, Schnapp LM. Soluble triggering receptor expressed on myeloid cells-1

- (sTREM-1) as a diagnostic marker of ventilator-associated pneumonia. *Respir Care* 2012; 57: 2052–58.
10. Horonenko G, Hoyt JC, Robbins RA, Singarajah CU, Umar A, et al. Soluble triggering receptor expressed on myeloid cell-1 is increased in patients with ventilator-associated pneumonia: a preliminary report. *Chest* 2007; 132: 58–63.
11. Ahmed A, Ahmed S. Comparison of bronchoalveolar lavage cytology and transbronchial biopsy in the diagnosis of carcinoma of lung. *J Ayub Med Coll Abbottabad*. 2004 Oct-Dec;16(4):29-33.
12. Bulpa PA, Dive AM, Mertens L, Delos MA, Jamart J, Evrard AP et al. Combined bronchoalveolar lavage and transbronchial lung biopsy: safety and yield in ventilated patients. *Eur Respir J* 2003; 21: 489–94.

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