



**ORIGINAL RESEARCH PAPER**

**Pathology**

**DIAGNOSTIC UTILITY OF BRONCHOALVEOLAR LAVAGE (BAL) AND COMPARISON OF THE BAL AND TRANS BRONCHIAL LUNG BIOPSY (TBB) IN DIAGNOSIS OF LUNG CARCINOMA**

**KEY WORDS:**

Bronchoalveolar lavage (BAL), Transbronchial lung biopsy(TBB), Lung malignancy

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**ABSTRACT**

**Background:** Lung cancer is the leading cause of death in developed countries and is increasing at alarming rates in developing countries also. This study is designed to determine accuracy of bronchoalveolar lavage (BAL) as compare to the gold standard histology examination of lung biopsy. **Materials and Methods:** A retrospective study was conducted, total 46 cases of BAL which were suspected for lung carcinoma and 17 cases of lung biopsy (cases who need confirmation after BAL) were received at G.K general hospital, Bhuj from a period of 2.5 years. **Conclusion:** Our study conclude that BAL cytology has diagnostic yield of 50%, sensitive of 66.67%, specificity of 100% and efficacy of 64%.

**INTRODUCTION**

Lung cancer is one of the most prevalent cancers, accounting for 17.8% of all cancer deaths.<sup>1</sup> These tumors have been clearly associated with the use of tobacco and an increase in their number has been observed in female patients in recent years. The five year survival rate of lung cancers is only 15.6%.<sup>2</sup> The increase in lung carcinoma cases is seen in the developing countries like India. In India, lung cancer which was initially thought to be infrequent, now it is fifth common cancer.<sup>3</sup> Among the all lung carcinoma, squamous cell type is the most common cell type in smokers and adenocarcinoma in nonsmokers.<sup>4</sup> Symptoms such as fever, cough, expectoration, hemoptysis, weight loss, and anorexia are common to both tuberculosis (TB) and lung cancer. So a significant number of lung cancer cases are initially misdiagnosed as TB which is the main culprit for delay in diagnosis and treatment of lung cancer.<sup>5</sup> To diagnose lung carcinoma different methods are used including radiology, bronchoscopy, bronchial brushing, broncho-alveolar lavage cytology and bronchial biopsy. Bronchial lavage was mainly used as therapeutic tool in conditions like pulmonary proteinosis and cystic fibrosis. BAL has gradually emerged and has been accepted as a tool for diagnosing lung carcinoma. With increasing incidence of peripheral adenocarcinoma, BAL has begun to play a more important role in the diagnosis of lung cancer. It is relatively safe procedure and is well tolerated. One major limitation of BAL is a large range of normal values.<sup>6</sup> However bronchial biopsy cannot be obtained in all cases, especially in peripheral lung tumors and in patients at risk of hemorrhage. Bronchial washing and bronchial brushing can be used as complementary tools to biopsy in the diagnosis of lung lesions<sup>7</sup>. The efficacy of BAL is comparable with transbronchial biopsy (TBB) both in central and peripheral lesion.

**AIMS AND OBJECTIVES**

1. To find out diagnostic yield of bronchoalveolar lavage in diagnosis of lung malignancy.
2. To compare utility of bronchoalveolar lavage (BAL) cytology and transbronchial biopsy in the diagnosis of carcinoma lung.
3. To compare various statistics parameters for BAL and lung biopsy.

**MATERIALS AND METHODS**

Study was carried out in the Department of Pathology, GAIMS,

Bhuj (Gujarat) from a period of January 2018 – July 2020 (2.5 years). 46 cases of suspected lung carcinoma were selected. Informed consent was taken from patients who underwent bronchoscopy with collection of BAL fluid as well as biopsy in Department of Pulmonary Medicine. The samples were obtained by the pulmonologist with the help of flexible fiber optic bronchoscopy. The clinical, radiological and bronchoscopic information was noted in the predefined performa. BAL samples were received as in sterile vials. BAL fluid was centrifuged, smears were made and wet fixed in methanol and stained with Papanicolaous (PAP) and Hematoxylin and Eosin (H&E) stains. Special stains were done if further required. Biopsy was fixed in formalin and processed in automatic tissue processor. Three micron sections were cut and stained with H&E. The exclusion criteria are paucity of alveolar macrophages <10/10 hpfs, extensive epithelial cells, mucopurulent exudates, numerous red blood cells and degenerating changes.

**RESULTS**

In our study of 46 cases suspected of lung cancer were included, among which 37 were males whereas 9 were females. The age ranged between 28 and 88 years, mean age of the patients at presentation was 53 years. Maximum cases were seen between the fifth and seventh decade. Out of 46 cases, 23 cases were negative for malignancy, 9 were having inflammatory pathology and malignancy was found in 14 cases. Among these 14 cases, 6 were atypical cells, 3 were non small cell carcinoma, 2 were adenocarcinoma, 2 were suspicious for malignancy and 1 was diagnosed as undifferentiated carcinoma. Out of 46 BAL specimens, only 17 lung biopsy were received. So in this study total 17 cases were included with both BAL and lung biopsies available for examination.

**Table 1: Comparison of BAL cytology with the gold standard lung biopsy**

BAL	Lung biopsy		Total
	Malignant	Non malignant	
Positive	8(a)	0(b)	8(a+b)
Negative	4(c)	5(d)	9(c+d)
Total	12	5	17(N)

**Table 2: Test performances characteristics of BAL cytology as compared with lung biopsy**

Characteristics	Score
Sensitivity	66.67%
Specificity	100%
False positive	0%
False negative	33.33%
Positive predictive value	100%
Negative predictive value	55.56%
Diagnostic efficacy	64%
Diagnostic yield	50%
Diseases prevalence (hospital based)	70.59%

**DISCUSSION**

This article was designed to find out diagnostic yields of bronchoalveolar lavage in diagnosis of lung malignancy and compare utility of bronchoalveolar lavage (BAL) cytology and transbronchial biopsy in the diagnosis of carcinoma lung. The diagnostic rate of peripheral lung cancer applied by transbronchial lung biopsy is still low. For peripheral pulmonary lesions TBLB has a sensitivity that varies pursuant to the number of biopsy specimens taken and to the size of the lesion.<sup>8</sup> BAL is a noteworthy diagnostic and research instrument in pulmonology. It is an easily performed and well tolerated procedure that is useful in routine evaluation of patients with lung cancer. A number of studies have examined various combinations of assays with BAL to improve its diagnostic precision, but this does not mean that BAL alone is invaluable. In the current study the sensitivity of BAL was 66.67% and its specificity was 100%. Our study is comparable with contemporary studies from various centers discussed below. The sensitivity of BAL in various other studies from literature varies from 21-78%.<sup>8</sup> In a recent study BAL showed the sensitivity of (69.6%).<sup>10</sup> Ahmed et al. (2004)<sup>11</sup> found the sensitivity of BAL cytology to be 93.44% as compared with transbronchial biopsy and specificity was 100%. Fariba et al. (2015)<sup>8</sup> found the sensitivity of BAL 46.9% and its specificity was 91.6%. In recent study of Manish A et al. (2018)<sup>12</sup> found sensitivity 76% and specificity 100%. In the current study luckily there was 0% false positivity which is matched with other studies (Ahmed et al, Pradeep et al)<sup>11,10</sup> had no false positivities. There were no false positivities conducted by Manish et al(2018).<sup>12</sup> There was 16.50% false positivity found in a study by Fariba et al. (2015).<sup>8</sup> The reasons for false positive results in their study was because of misinterpretation of the cytological findings due to cellular changes in inflammatory diseases, squamous metaplasia and epithelial cell atypia in the background of fibrosis. However, in our study there was 33.33% false negativity. False negativity in another study was 6.55% Ahmed et al. (2004),<sup>11</sup> 23% in study conducted by Manish et al. (2018)<sup>12</sup> and 33.8% in study by Fariba et al. (2015)<sup>8</sup> which is quite close to our study result. The study of Wongsurakiat et al. (1998)<sup>13</sup> had a lot of significant false negative result. The reasons for false negative results can be specimen taken from non-representative area, hypo cellular lavage and superadded inflammation. In the present study BAL had a positive predictive value of 100%. The positive predictive value of BAL cytology in one study was 100 % Ahmed et al. (2004),<sup>11</sup> similar findings are seen in others studies by Fariba et al. (2015),<sup>8</sup> Manish et al. (2018)<sup>12</sup> and Saenghirunvattana et al. (1991).<sup>14</sup> In the present study BAL had a negative predictive value of 55.56%. The negative predictive value of another study was 75 %, while the diagnostic efficacy was 94.5% Ahmed et al. (2004).<sup>11</sup> In our study the diagnostic efficacy was 64%.

**CONCLUSION**

Our study showed that BAL cytology is not sensitive but is a specific tool for diagnosis of lung carcinoma. The results and their comparison indicate that BAL cytology carried out at our center for the diagnosis of lung carcinoma is comparable with the result of other centers. In developing country like India there is an enormous burden of TB in the general population,

there is great risk of missing the diagnosis of cancer; therefore it is prudent to use BAL which is quick, reliable and affordable in suspected cases.

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