Original Research Paper

Respiratory Medicine

# "DIAGNOSTIC YIELD OF LINEAR ENDOBRONCHIAL ULTRASOUND IN ASSESSING THE NATURE OF LYMPH NODES"

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**ABSTRACT** Endo-bronchial Ultrasound features are useful in predicting the etiology of enlarged lymph nodes. We assessed the EBUS characteristics across various mediastinal & hilar lymphadenopathies. **Aim & Objective:** To study the features of non malignant & malignant lymphnode & to correlate clinical history with lymphnode features on EBUS. **Materials and Methodology:** This was a prospective study performed at tertiary care centre over period of 1.5 year. **Conclusions:** The identification of lymph nodal characteristics on EBUS is helpful in decision making in the background of non-diagnostic EBUS, whether to resample or not.

**KEYWORDS :** EBUS- TBNA, Mediastinal lymphadenopathy

## INTRODUCTION

Endoscopic ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) are nonsurgical techniques for the sampling and diagnosis of mediastinal lymphadenopathy. Convex probe endobronchial ultrasound allows characterization of the lymph node. The round shape, distinct margin, heterogenous echogenicity, absence of central hilar structure (CHS), and the presence of coagulation necrosis sign (CNS) may help to differentiate benign from malignant lymph nodes.

This will assist in identifying the target lymph nodes with the highest pre-test probability, thus reducing the number of lymph nodes requiring sampling, especially in resource-limited settings. In the present study, we prospectively evaluated the ultrasonographic features of lymph nodes during EBUS and compared them with the final outcome, whether benign or malignant.

## AIM AND OBJECTIVE:

1. To study the features of benign and malignant lymph node
2. To correlate clinical history with lymph node features on EBUS
3. To assess ultrasound features and ROSE (rapid on site evaluation)

## MATERIAL & METHODS:

This was a prospective study performed at tertiary care centre over period of 1.5 year.

1. Data was collected from the patients admitted in respiratory medicine department with chief respiratory complaints, in SAMC and PGI, Indore.
2. Thorough history taking and physical examinations, radiological findings, hematological and serum biochemical profiles were recorded.
3. CT- CHEST/PET CT were collected from all patients.

## RESULTS:

In the present study, a total of 144 patients were included; 92 were males, and the mean age was 54.9 ±316.09 years. The inter-observer variability interclass coefficient was 0.9. Overall, 202 lymph nodes were assessed. Eighty seven cases (117 lymph nodes) were malignant, and fifty seven cases (85 lymph nodes) were benign. A total of 202 lymph nodes were assessed during EBUS and sampled. Among 202 lymph nodes, lymph nodes at station 7 were maximum (114). Further, multivariate logistic regression analysis revealed that

heterogeneous echogenicity was an independent predictor for malignancy (p-value < 0.001). The diagnostic yield of various EBUS ultrasonographic characteristics for malignant lymph nodes is represented in table The sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and diagnostic accuracy of heterogenous echogenicity for malignancy were 78.49%, 11.90%, 66%, 20% & 57.78% respectively.
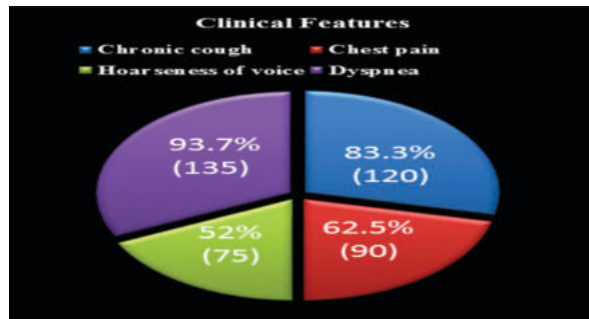


Graph 1: Pie chart showing frequency of symptoms.
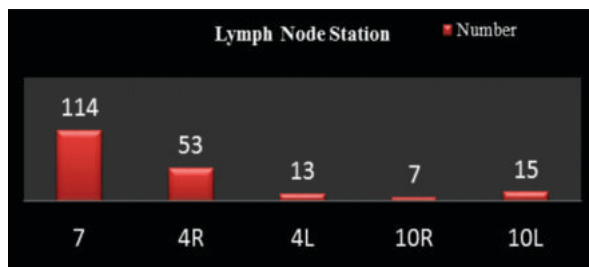


Graph 2: Bar graph showing lymph node stations.
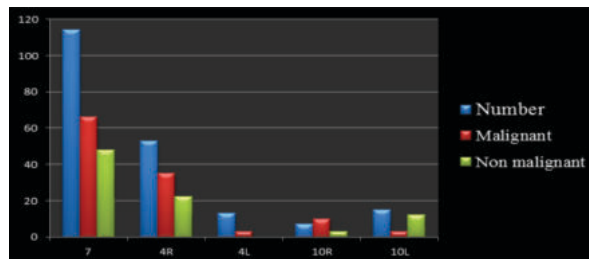


Graph 3: Bar gram showing number of patients with malignant & non-malignant nodes at different lymph node station.

**Table 1: Table showing statistical analysis of different lymph nodal characteristics.**

| S.no | Nodal character | Sensitivity | Specificity | PPV | NPV | Diagnostic accuracy |
|---|---|---|---|---|---|---|
| 1. | Round shape | 78.21% | 12.28% | 54.95% | 29.17% | 50.37% |
| 2. | Large (>10 mm) | 96.15% | 8.77% | 59.06% | 62.50% | 59% |
| 3. | Distinct margin | 65.38% | 45.61% | 62.20% | 49.06% | 57.04% |
| 4. | Heterogeneous echogenicity | 78.49% | 11.90% | 66% | 20% | 57.78% |
| 5. | Central hilar structure – not maintained | 94% | 10.53% | 55.20% | 60% | 59% |
| 6. | Presence of coagulation necrosis sign | 32.05% | 56.14% | 50% | 37.65% | 42.22% |

**EBUS (Ultrasonographic Features) Characteristics of Lymph Nodes :**

1. Shape (oval vs round): the round shape was defined as a ratio of <1.5 between two perpendicular axes.
2. Margin (indistinct vs distinct): the distinct margin was defined as well-defined borders distinguished by a marked white line delimiting the LN.
3. Small axis <10 mm vs >10 mm.
4. Heterogeneous v/s homogeneous echogenicity.
5. Central hilar structure (central linear structure with high echogenicity) absent or present.
6. Coagulation necrosis (hypoechoic area within the lymph node without blood flow) sign: absent or present.
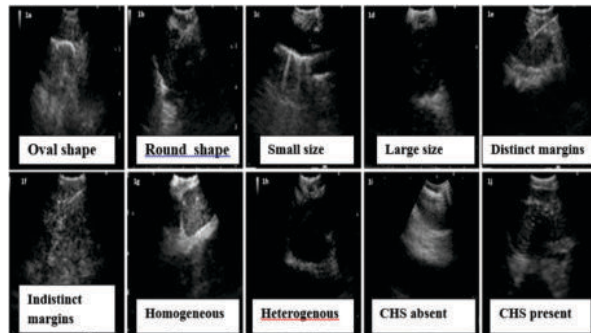


**Figure 1: EBUS images showing different lymph nodal characteristics.**

## DISCUSSION:

Heterogeneous echogenicity on EBUS was initially observed in metastasis from medullary thyroid carcinoma owing to deposits of calcium and amyloid. The heterogenous appearance of lymph nodes can be attributed to a combination of hypoechoic (areas of liquefactive necrosis) and hyperechoic (areas of fibrosis and coagulation necrosis). Notably, normal, reactive, and tuberculous lymph nodes are hypoechoic when compared with adjacent muscles .In the present study, conducted over a period of one and half years, for ultrasonographic features of mediastinal and hilar lymph nodes, heterogeneous echogenicity was the only statistically significant characteristic. These findings were consistent with previous studies.

| Bindert et al. | In 281 lymph nodes, the study reported heterogeneous echogenicity as the single best lymph node characteristic to predict malignancy |
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| Jhun et al. | In 172 lymph nodes, and on univariate analysis, lymph nodal characteristics predictive of metastasis were size greater than 10 mm, round shape, heterogeneous appearance, and absence of central hilar structure. |

| Fujiwara et al. | Showed that echogenicity, sensitivity and specificity, and diagnostic accuracy were 77.3%, 86.6%, and 83.9%, respectively in 1061 lymph nodes, for heterogenous echogenicity |
|---|---|

The systematic review and metaanalysis comprising 29 studies of lymph nodal characteristics, reported an echogenicity pooled sensitivity of 0.61 [0.59-0.63], a pooled specificity of 0.82 [0.80-0.83], a diagnostic odds ratio of 6.04 [3.07- 11.9], and a spearman's correlation coefficient of 0.77 (SE = 0.04) 0.308 (p = 0.175). However, the metaanalysis found none of the EBUS features to be consistent with a diagnosis of malignant lymph node.

## CONCLUSION:

Lymph nodes with heterogeneous echogenicity have a higher probability of being malignant. The current study documented that lymph nodes with heterogeneous echogenicity have a 7.8 times higher probability of having malignancy. Also, the identification of lymph nodal characteristics on EBUS is helpful in decision making in the background of non-diagnostic EBUS, whether to resample or not. When heterogenicity is observed on EBUS, subsequent sampling might be considered, which may yield a higher diagnostic yield and may reduce the number of lymph nodes requiring sampling and the need for further invasive procedures.

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