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Evaluating the Diagnostic Accuracy of EBUS-Guided FNA for FDG-PET-Avid Lymph Nodes in Patients with Extrapulmonary Cancers

Abdul Nasir[1], Rabia Akbar[2], Shauqat Ali[1] ✉, Muhammad Aman[3], Javed Iqbal[3]

[1]Department of Respiratory Medicine, Shaukat Khanum Memorial Cancer Hospital, Peshawar – Pakistan [2]Department of Obstetrics Medicine, Shaukat Khanum Memorial Cancer Hospital, Peshawar – Pakistan [3]Department of Gastroenterology, Shaukat Khanum Memorial Cancer Hospital, Peshawar – Pakistan

Corresponding Author:
Shauqat Ali
Department of Respiratory Medicine, Shaukat Khanum Memorial Cancer Hospital,
Peshawar – Pakistan
Email: drshauqat.ali12@gmail.com

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ABSTRACT

Background: Finding fluorodeoxyglucose (FDG)-avid mediastinal and hilar lymphadenopathy on positron emission tomography-computed tomography (PET-CT) in patients with extrapulmonary malignancies is a concern for metastatic disease. Yet PET-CT is not specific enough to differentiate malignant from benign etiology of lymphadenopathy.

Objective: To evaluate the diagnostic performance of Endobronchial Ultrasound-Guided Fine Needle Aspiration (EBUS-FNA) in the assessment of FDG-PET-avid lymph nodes in patients with established extrapulmonary malignancies.

Methodology: A retrospective study was done in 145 patients with extrapulmonary cancers who were subjected to EBUS-FNA for FDG-PET-avid mediastinal or hilar lymph nodes. Demographic information, initial cancer diagnoses, PET-CT results, lymph node features, EBUS-FNA cytology findings, and discharge diagnoses were retrieved and compared.

Results: In the present study182 lymph nodes were sampled in 145 patients. The average age was 58.6 ± 10.4 years, with a male predominance (60%). The most frequent primary malignancies were gastrointestinal (26.2%), breast (22.8%), and genitourinary (16.6%) cancers. Malignant cytology was obtained with EBUS-FNA in 81 cases (55.9%), benign reactive lymphadenopathy in 35 (24.1%), granulomatous inflammation in 17 (11.7%), and was non-diagnostic in 12 (8.3%). Final diagnoses were confirmed by EBUS-FNA alone (82.8%), mediastinoscopy (7.6%), or clinical/radiologic follow-up (9.6%).

Conclusion: EBUS-FNA has excellent specificity and high diagnostic accuracy in assessing FDG-PET-avid lymphadenopathy in patients with extrapulmonary malignancies. It facilitates accurate and minimally invasive tissue sampling, decreasing the requirement for surgical procedures and facilitating proper staging and treatment planning. EBUS-FNA is the first-line diagnostic tool in this clinical setting.

Keywords: Endobronchial Ultrasound (EBUS); Fine Needle Aspiration (FNA); FDG-PET Avid Lymph Nodes; Extrapulmonary Malignancies

Introduction

Accurate staging and diagnosis are critical components in the management of malignancies, directly influencing treatment decisions and prognostic outcomes. While primary tumors often guide the initial clinical approach, the presence of lymph node metastases particularly in the mediastinal and hilar regions can significantly alter staging, therapeutic strategies, and prognosis. This becomes even more complex in patients with known extrapulmonary malignancies who present with fluorodeoxyglucose (FDG) positron emission tomography (PET)-avid intrathoracic lymph nodes. In such cases, distinguishing between benign, reactive, or malignant causes of lymphadenopathy is crucial, as radiological imaging alone may be insufficient to provide a definitive diagnosis.[1]

FDG-PET/CT is widely recognized for its ability to detect metabolically active tissues and is commonly employed in cancer staging, restaging, and surveillance. However, its specificity remains limited in the context of lymphadenopathy. FDG uptake is not unique to malignancy; inflammatory, infectious, and granulomatous conditions such as tuberculosis and sarcoidosis can also demonstrate high FDG avidity, leading to false-positive results. Consequently, histopathological confirmation of FDG-avid lymph nodes is often warranted, particularly in regions where granulomatous diseases are endemic. This is especially important for extrapulmonary malignancies, where unsuspected mediastinal lymph node metastases may upstage the disease or suggest metastatic dissemination.[2]

Endobronchial ultrasound-guided fine needle aspiration (EBUS-FNA) has emerged as a minimally invasive, safe, and highly effective modality for sampling mediastinal and hilar lymph nodes. Initially introduced for lung cancer staging, its application has rapidly expanded to include evaluation of lymphadenopathy in a broad range of oncologic and non-oncologic conditions. EBUS-FNA allows for real-time visualization and needle aspiration of lymph nodes adjacent to the tracheobronchial tree under ultrasound guidance, offering high diagnostic yield with minimal morbidity.[3] In patients with extrapulmonary malignancies, the presence of FDG-PET-avid thoracic lymph nodes presents a diagnostic dilemma. While these may represent metastatic spread, they could also reflect a benign reactive process or an unrelated pathology. Relying solely on imaging could lead to over- or under-treatment. For example, assuming malignancy in all FDG-avid nodes may prompt unnecessary systemic therapy, while underestimating disease spread could result in inadequate treatment. Therefore, histologic confirmation via EBUS-FNA can help differentiate malignant involvement from benign conditions, guiding clinicians toward more precise and individualized therapeutic decisions.[4]

Several studies have investigated the performance of EBUS-FNA in diagnosing mediastinal lymphadenopathy in patients with known extrapulmonary cancers. The sensitivity and specificity of EBUS-FNA in this context are generally high, though they can vary depending on the primary tumor type, lymph node characteristics, operator experience, and the availability of rapid on-site evaluation (ROSE). Nevertheless, EBUS-FNA has been shown to be a valuable diagnostic tool that can prevent unnecessary surgical interventions such as mediastinoscopy and thoracotomy, particularly in resource-limited settings.[5]

Moreover, the integration of cytological findings with immunohistochemistry and molecular markers has further improved the diagnostic accuracy of EBUS-FNA in identifying metastatic lesions from various primary sites, including breast, gastrointestinal, genitourinary, and head and neck cancers. The increasing use of ancillary techniques on aspirated samples allows for better tumor characterization, helping to differentiate metastases from primary pulmonary neoplasms or benign conditions.[6]

Despite its proven utility, EBUS-FNA is not without limitations. Sampling errors, inadequate specimens, and false-negative results can occur, especially in small or necrotic lymph nodes. The absence of a core biopsy may also limit the ability to perform complete histopathological assessment in certain cases. As such, proper patient selection, operator training, and multidisciplinary collaboration are essential to maximize the benefits of EBUS-FNA. The Objective of the study is to explore the diagnostic value of EBUS-guided FNA in evaluating FDG-PET-avid lymph nodes in patients with extrapulmonary malignancies.

Objective

To evaluate the diagnostic performance of Endobronchial Ultrasound-Guided Fine Needle Aspiration (EBUS-FNA) in the assessment of FDG-PET-avid lymph nodes in patients with established extrapulmonary malignancies.

Methodology

The retrospective observational study was conducted at Shaukat Khanum Memorial Cancer Hospital, Peshawar, between January 2022 to December 2023. The study was approved by the Institutional Ethics Committee, SKMC, and patient confidentiality was maintained throughout the process. Informed consent was obtained from all patients prior to EBUS-FNA procedures. A total of 145 patients with histologically confirmed extrapulmonary malignancies and FDG-PET-positive intrathoracic lymphadenopathy were included in the study. Inclusion criteria were Age ≥18 years, known primary extrapulmonary malignancy (e.g., breast, gastrointestinal, genitourinary, head and neck, or gynecologic cancers), Presence of at least one mediastinal or hilar lymph node with increased FDG uptake on PET-CT (SUV >2.5) and Underwent EBUS-guided fine

needle aspiration for tissue diagnosis. Exclusion criteria include Primary lung malignancy, History of thoracic surgery or mediastinal radiation affecting lymph node architecture and Incomplete clinical or follow-up data. Demographic and clinical data were extracted from medical records and imaging databases. Variables recorded included age, sex, primary tumor site, previous treatment (surgery, chemotherapy, radiotherapy), lymph node size and location, standardized uptake values (SUV) on PET-CT, number of lymph nodes sampled, and EBUS procedural details. Statistical Analysis

Descriptive statistics were used to summarize demographic and clinical variables. Diagnostic parameters of EBUS-FNA including sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and overall diagnostic accuracy were calculated using standard formulas. Subgroup analysis was conducted based on primary tumor type and lymph node location. Data were analyzed using [specify software, e.g., SPSS version 27].

Results

A total of 145 patients with known extrapulmonary malignancies and FDG-PET-avid mediastinal or hilar lymph nodes underwent EBUS-guided FNA. The mean age of the cohort was 58.6 years with a standard deviation of 10.4 years, indicating that most patients were middle-aged to older adults, which aligns with the typical age distribution for most solid organ malignancies. In terms of gender distribution, the study population comprised 60% males (n = 87) and 40% females (n = 58). This gender variation likely reflects the underlying prevalence of certain malignancies, such as gastrointestinal and genitourinary cancers, which are more common in males, whereas breast and gynecologic malignancies account for the female cohort. When analyzing the primary site of extrapulmonary malignancy, gastrointestinal cancers were the most common (26.2%), including cancers of the esophagus, stomach, colon, rectum, and pancreas. Breast cancer was the second most prevalent, accounting for 22.8% of cases. Genitourinary malignancies (e.g., prostate, bladder, kidney) made up 16.6%, followed by head and neck cancers at 13.8%. Gynecological cancers, including cervical and ovarian malignancies, contributed to 11% of the cohort. The “Other” category, which included less frequent primary cancers such as thyroid carcinoma, melanoma, and skin cancers, made up the remaining 9.6%.

A total of 182 lymph nodes were sampled, with each patient having a median of 1 node sampled (range 1–3). The relatively low number of nodes sampled per patient reflects a targeted approach, focusing on the most suspicious or accessible FDG-avid lymph nodes as identified on PET-CT scans. The mean standardized uptake value (SUVmax) of the nodes was 6.9 ± 3.5,

Table 1. Patient Demographics and Primary Malignancy (n = 145)

Variable	Number (%) or Mean ± SD
Age (years)	58.6 ± 10.4
Gender	
Male	87 (60%)
Female	58 (40%)
Primary Site of Extrapulmonary Cancer	
Breast	33 (22.8%)
Gastrointestinal (GI)	38 (26.2%)
Genitourinary (GU)	24 (16.6%)
Gynecological	16 (11%)
Head and Neck	20 (13.8%)
Other (thyroid, skin)	14 (9.6%)

Table 2. PET-CT Findings and Lymph Node Characteristics

Variable	Value
Total FDG-PET-Avid Lymph Nodes Sampled	182
Mean SUVmax of Nodes	6.9 ± 3.5
Median Short Axis Diameter (mm)	14.2 (range: 8–28)
Number of Nodes Sampled per Patient	1 (range: 1–3)
Most Common Lymph Node Stations	
Station 7 (Subcarinal)	56 (30.8%)
Station 4R	45 (24.7%)
Station 4L	38 (20.9%)
Station 2R/2L	21 (11.5%)
Others	22 (12.1%)

suggesting moderately increased metabolic activity. This value is consistent with PET-avid nodes, but it is also within the range seen in both malignant and certain benign conditions such as infections or granulomatous diseases highlighting the need for histopathological confirmation. The median short axis diameter of the sampled nodes was 14.2 mm, with a range of 8 to 28 mm. Although many guidelines consider a short axis >10 mm as potentially suspicious, PET-avid nodes <10 mm were also sampled in this study based on FDG uptake alone, emphasizing the role of metabolic rather than just anatomical criteria in node selection. Regarding anatomical location, the most frequently sampled lymph node station was Station 7 (Subcarinal), accounting for 30.8% of all nodes. This is expected due to its central position and high incidence of metastatic involvement. This was followed by Station 4R (24.7%) and Station 4L (20.9%), both paratracheal and commonly involved in thoracic spread of malignancy. Station 2R/2L (Upper Paratracheal) nodes comprised 11.5%, and other stations, including hilar (10R, 10L) and interlobar (11), made up 12.1%.

The most frequent finding was malignant cytology, reported in 81 patients (55.9%), indicating metastatic involvement of mediastinal or hilar lymph nodes. This high proportion highlights the clinical utility of EBUS-FNA in confirming nodal metastasis from extrapulmonary primaries, thereby allowing appropriate staging and treatment planning. Benign reactive lymphadenopathy was diagnosed in 35 patients (24.1%), suggesting that not all FDG-avid lymph nodes represent malignancy. These reactive nodes may result from prior infections, inflammation, or immune responses and are especially

Table 3. EBUS-FNA Cytology Results

Cytological Diagnosis	Number of Patients (%)
Malignant (Metastatic)	81 (55.9%)
Benign Reactive Lymphadenopathy	35 (24.1%)
Granulomatous Inflammation (e.g., TB, Sarcoidosis)	17 (11.7%)
Inadequate/non-diagnostic	12 (8.3%)

Table 4. Final Diagnosis After Follow-Up or Additional Testing

Outcome	Number of Patients (%)
True Positive (TP)	81
True Negative (TN)	46
False Negative (FN)	6
False Positive (FP)	0
Final Diagnosis Based on:	
EBUS-FNA only	120 (82.8%)
Mediastinoscopy	11 (7.6%)
Radiological/Clinical Follow-up	13 (9.6%)

common in patients undergoing cancer therapy or with chronic conditions. Granulomatous inflammation, observed in 17 patients (11.7%), included findings consistent with tuberculosis (TB), sarcoidosis, or non-specific granulomas. This is a particularly important consideration in regions with high endemic rates of TB or granulomatous diseases, as these conditions can mimic malignancy on PET-CT by exhibiting high FDG uptake. Inadequate or non-diagnostic samples were encountered in 12 cases (8.3%), where aspirates were insufficient in quantity or lacked cellular material for definitive cytological interpretation. These cases typically required repeat procedures, surgical biopsy, or radiological follow-up to establish a final diagnosis. The relatively low rate of non-diagnostic results reflects the high yield and reliability of EBUS-FNA when performed by experienced operators.

A true positive (TP) result, defined as EBUS-FNA correctly identifying malignant lymph node involvement, was confirmed in 81 patients (55.9%). These patients had cytologically proven metastatic disease from their known extrapulmonary primary tumors. A true negative (TN) result was documented in 46 patients (31.7%), where EBUS-FNA showed no evidence of malignancy, and this was later confirmed either through clinical stability, imaging follow-up, or surgical sampling. These cases highlight the accuracy of EBUS-FNA in ruling out malignancy in FDG-avid lymphadenopathy. There were 6 false negative (FN) cases (4.1%), where EBUS-FNA cytology was initially benign or non-diagnostic, but later confirmed to be malignant via mediastinoscopy or disease progression during follow-up. Importantly, there were no false positive (FP) cases (0%), meaning that all EBUS-FNA results interpreted as malignant were confirmed as such. This underscores the high specificity and positive predictive value of the procedure in this patient population.

In terms of diagnostic yield, in 120 patients (82.8%), EBUS-FNA alone provided a definitive diagnosis without the need for additional invasive procedures or long-term observation. Mediastinoscopy, a more invasive surgical procedure, was performed in 11 patients (7.6%) primarily in cases of inconclusive EBUS-FNA or when additional tissue was required for further molecular analysis or confirmation. Radiological or clinical follow-up over a defined observation period confirmed final diagnoses in 14 patients (9.6%), particularly in benign or reactive lymphadenopathies where disease progression did not occur, and invasive biopsy was deferred.

The sensitivity of EBUS-FNA was 93.1%, indicating its high ability to correctly identify patients who truly had metastatic lymph node involvement. This means that among all patients with malignant nodes, EBUS-FNA correctly diagnosed approximately 93 out of every 100 cases. The specificity reached 100%, meaning that all patients who did not have malignancy were correctly identified as such by EBUS-FNA. No false positive results were recorded, confirming that a diagnosis of malignancy via EBUS-FNA is highly reliable and definitive. The positive predictive value (PPV) was also 100%, demonstrating that every patient with a malignant EBUS-FNA result truly had metastatic disease. This high PPV is essential in oncology, where false positive diagnoses could lead to unnecessary treatment escalation. The negative predictive value (NPV) was 88.5%, reflecting the proportion of patients with a negative EBUS-FNA result who were correctly identified as not having malignant lymphadenopathy. While high, this also highlights that a small proportion of patients with initially benign cytology (about 11.5%) were later found to have malignancy underlining the importance of follow-up in selected cases.

Table 5. Diagnostic Accuracy of EBUS-FNA

Diagnostic Parameter	Value (%)
Sensitivity	93.1%
Specificity	100%
Positive Predictive Value (PPV)	100%
Negative Predictive Value (NPV)	88.5%
Overall Diagnostic Accuracy	95.2%

The overall diagnostic accuracy of EBUS-FNA in this study cohort was 95.2%, affirming its role as a highly accurate and minimally invasive diagnostic tool for evaluating PET-positive lymph nodes in patients with known extrapulmonary malignancies.

Discussion

The accurate evaluation of FDG-PET-avid intrathoracic lymph nodes in patients with known extrapulmonary malignancies remains a diagnostic challenge. FDG-PET/CT, while highly sensitive in detecting metabolically active lesions, lacks specificity in distinguishing between malignant and benign conditions such as infection, inflammation, or granulomatous diseases. As a result, tissue diagnosis remains essential to prevent misdiagnosis and inappropriate management. In this context, Endobronchial Ultrasound-Guided Fine Needle Aspiration (EBUS-FNA) has emerged as a pivotal, minimally invasive technique for assessing mediastinal and hilar lymphadenopathy.[6] Our study evaluated the diagnostic value of EBUS-FNA in this clinical scenario, using a cohort of 145 patients with extrapulmonary malignancies and FDG-avid thoracic lymph nodes. The mean age was 58.6 ± 10.4 years, and the male-to-female ratio was 60:40, consistent with previously published demographic patterns in cancer populations undergoing mediastinal lymph node evaluation. The primary malignancy sites in our study were predominantly gastrointestinal (GI, 26.2%), breast (22.8%), genitourinary (GU, 16.6%), head and neck (13.8%), and gynecologic (11%) cancers. A smaller proportion of patients had malignancies originating in the thyroid, skin, or other less common sites (9.6%). Several studies have explored the utility of EBUS-FNA in extrapulmonary cancers, and the distribution of primary tumor types in our study shows both overlap and variation like Navani et al. (2011)[7] conducted a multicenter prospective study on EBUS in patients with known extrapulmonary cancers and mediastinal lymphadenopathy. They reported breast (25%), colorectal (19%), and genitourinary cancers (15%) as the most common primaries remarkably like our population in breast and GU distribution, though we had slightly more GI cases overall. Another study by Gupta et al. (2015)[8] analyzed 85 patients and reported a dominant prevalence of GI malignancies (32%), followed by breast (20%) and head and neck cancers (15%) again aligning with our pattern and supporting the notion that these primary cancers frequently metastasize to thoracic lymph nodes detectable via PET.

Our study analyzed 182 FDG-PET-avid lymph nodes in 145 patients with known extrapulmonary malignancies. Each patient had a median of 1 lymph node sampled (range: 1–3), with a mean SUVmax of 6.9 ± 3.5, and a median short-axis diameter of 14.2 mm (range: 8–28 mm). The most frequently sampled nodal stations included the subcarinal (station 7, 30.8%), right paratracheal (4R, 24.7%), left paratracheal (4L, 20.9%), and upper paratracheal (2R/2L, 11.5%), reflecting standard accessibility via EBUS and the pattern of nodal involvement in various malignancies. These findings are consistent with previously published data on lymph node characteristics and distribution in extrapulmonary cancers evaluated using EBUS-FNA. Navani et al. (2011)[7] reported a mean SUVmax of 6.2 in their cohort of patients with extrathoracic malignancies and PET-positive nodes, closely matching our value of 6.9. They too observed that stations 7, 4R, and 4L were the most commonly sampled, supporting the notion that these sites are both frequently involved and easily accessible via EBUS. Gupta et al. (2015)[8] noted mean nodal sizes ranging between 12–15 mm, which aligns with our median short-axis diameter of 14.2 mm, and confirms that PET positivity can occur even in borderline-sized or subcentimeter nodes, further emphasizing the need for cytological evaluation regardless of size and Tournoy et al. (2009)[9] in a multicenter study of EBUS in non-lung cancer patients, found the most frequently biopsied stations to be station 7 (36%) and station 4R (28%), very similar to our distribution. Their findings underscore the fact that many

extrapulmonary tumors metastasize in a predictable pattern that mimics or overlaps with lung cancer staging pathways.

The following cytological diagnoses in 145 patients, Malignant (Metastatic) 81 patients (55.9%), Benign Reactive Lymphadenopathy 35 patients (24.1%), Granulomatous Inflammation (e.g., TB, Sarcoidosis), 17 patients (11.7%) and Inadequate or Non-diagnostic Samples, 12 patients (8.3%). Several studies have explored EBUS-FNA's cytological yield in similar patient populations, and our findings align with or improve upon previous data. Navani et al. (2011)[7] reported a malignant cytology yield of 57%, almost identical to our 55.9%, among patients with known extrapulmonary cancers and PET-positive nodes. Our finding of 24.1% benign reactive lymphadenopathy is comparable to the 20–30% range reported in earlier studies. For example, Tournoy et al. (2009)[9] noted 28% benign/reactive findings, affirming the presence of false-positive PET results even in oncologic populations. These benign findings reinforce the non-specific nature of FDG uptake in inflammatory or reactive conditions and highlight the importance of histological verification before assuming recurrence or metastasis. Granulomatous changes were seen in 11.7% of our cohort, a significant finding especially in regions with high prevalence of tuberculosis or sarcoidosis. Navani et al.7 and Gupta et al.8 both reported granulomatous inflammation in 8–10% of cases, closely mirroring our results. We encountered an 8.3% rate of non-diagnostic samples, consistent with other study like Herth et al.[10] and Tournoy et al.[9] reported non-diagnostic rates of 5–10%, depending on operator experience, node size, and number of needle passes.

In our study True Positives (TP) 81 patients, True Negatives (TN) 46 patients, False Negatives (FN) 6 patients and False Positives (FP) 0 patients whereas final diagnoses were established by EBUS-FNA alone was 120 cases (82.8%), Mediastinoscopy was 11 cases (7.6%) and Radiologic/clinical follow-up were 14 cases (9.6%). Similar to other research by Navani et al. (2011)[7] observed that EBUS-FNA in isolation was diagnostic in 83% of their group, which is very close to our 82.8%, confirming the technique's reliability and utility and Tournoy et al. (2009)[9] also identified that 80–85% of the cases were finally diagnosed with EBUS-FNA independently without additional invasive sampling, especially when real-time cytology and multiple passes were utilized. In our study, 11 patients (7.6%) required mediastinoscopy due to inconclusive or negative EBUS-FNA findings with high clinical suspicion. Gupta et al. (2015)[8] noted that 7–10% of cases typically require surgical confirmation following non-diagnostic or discordant EBUS results, supporting our data. The need for mediastinoscopy has been significantly reduced in recent years due to EBUS-FNA's reliability but remains essential in select cases to avoid missed malignancies, particularly in false-negative cases.

Other studies, including those by Yasufuku et al.(2011)[11] and Herth et al., (2006)[10] reported follow-up-based confirmation in 10–15% of cases, reflecting similar practices. This approach is reasonable in patients who are poor surgical candidates or have indeterminate but stable disease over time. Our false negative rate of 4.1% (6/145) is within the expected range for EBUS-FNA. Other studies reported an overall FN rate of 2%, which rose to 4% when considering only cases confirmed pathologically post-procedure aligning well with your 3–8% figure.[12] Turkish cohort in extrapulmonary malignancies (138 nodes) found a FN rate of 7.9%, again squarely within the 3–8% range.[13] Both above studies (46% diagnostic/staging cohort and the Turkish series) reported 100% specificity, meaning zero false positives. A larger real world cohort (948 subjects, 315 nodes analyzed) likewise found 0 false positives, confirming 100% specificity.[14]

Our study reported 93.1% sensitivity, is comparison with other studies like Navani et al. (2011)7 Sensitivity of 92%, Tournoy et al. (2009)[9] Sensitivity of 89% and Gupta et al. (2015)[8] Sensitivity of 88%. This high sensitivity suggests that EBUS-FNA is capable of detecting most true cases of nodal metastasis, especially when adequate sample acquisition and cytopathology support (e.g., rapid on-site evaluation, ROSE) are available. Our specificity of 100% is consistent with multiple other studies, which also report near-perfect specificity for EBUS-FNA in this context like Navani et al. [7]reported 100% and Jhun et al. (2014)[15] reported 100%. A specificity of 100% implies that all malignant cytology results were confirmed as true positives, with no false-positive diagnoses a critical factor in cancer staging and treatment planning. The PPV of 100% indicates that every patient diagnosed with metastatic disease on EBUS-FNA cytology truly had malignancy, which is essential in avoiding overtreatment. This value is consistent with other reports, e.g. Gupta et al.[8] reported PPV of 100% and Herth et al. (2006)[10] reported PPV of 100%. The strong PPV reflects high cytological specificity and helps clinicians confidently escalate treatment when EBUS-FNA yields malignant cells. Our NPV of 88.5% is slightly higher than the average range reported (80–90%) but remains within expectations other studies reported by Navani et al.7 NPV of 85% and Tournoy et al.[9] report NPV of 82%. The slightly lower NPV compared to specificity is expected because some benign-appearing nodes (especially with inadequate sampling or microscopic metastasis) may be false negatives. This reinforces the need for clinical judgment, radiologic correlation, or further diagnostic procedures (e.g., mediastinoscopy or follow-up imaging) when suspicion remains high despite benign EBUS-FNA findings. Our overall diagnostic accuracy of 95.2% confirms that EBUS-FNA is both effective and efficient in the real-world evaluation of PET-positive lymphadeno-pathy. This matches well with published figures like by Tournoy et al.[9] reported 92–94%, Jhun et al. (2014)[15]

reported 94.5% and Herth et al (2006)[10]. reported 96%. High overall accuracy demonstrates that EBUS-FNA can reliably differentiate malignant from benign nodes in a minimally invasive manner, reducing the need for surgical biopsy.

Conclusion

EBUS-FNA is a safe, highly accurate, and minimally invasive procedure for diagnosing FDG-PET-avid lymphadenopathy in patients with extrapulmonary malignancies. Its ability to distinguish between malignant, benign, and granulomatous conditions helps guide appropriate management, prevents unnecessary invasive procedures, and minimizes the risk of misdiagnosis based on imaging alone. Given its high diagnostic yield and excellent specificity, EBUS-FNA should be considered a first-line diagnostic modality in the evaluation of PET-positive mediastinal lymph nodes in this population.

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