

**Original article:**

## **Study of Utility of Fine Needle Aspiration Cytology in the Evaluation of Lymphadenopathy**

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### **Abstract:**

*Background:* This retrospective study aimed to assess the utility of Fine Needle Aspiration Cytology (FNAC) in the evaluation of lymphadenopathy, focusing on diagnostic accuracy, demographic characteristics, and procedure-related complications.

*Methods:* A total of 40 patients with lymphadenopathy underwent FNAC over a one-year duration. Demographic data, lymphadenopathy causes, and FNAC outcomes were analyzed. Diagnostic accuracy metrics, including sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV), were calculated. Complications related to FNAC were documented.

*Results:* The study population exhibited a diverse age range ( $45.2 \pm 12.3$  years) and an equal gender distribution. Benign causes constituted 62.5%, malignancies 30.0%, and inconclusive results 7.5%. FNAC demonstrated high diagnostic accuracy with sensitivity of 85%, specificity of 92%, PPV of 78%, and NPV of 94%. Complications included hematoma (5%) and infection (2.5%).

*Conclusion:* FNAC proves to be a reliable diagnostic tool for lymphadenopathy, offering high accuracy and a favorable safety profile. While contributing valuable insights, the study advocates for further research to refine diagnostic techniques and explore complementary modalities.

**Keywords:** Fine Needle Aspiration Cytology, Lymphadenopathy, Diagnostic Accuracy.

### **Introduction:**

Fine Needle Aspiration Cytology (FNAC) stands as a pivotal diagnostic tool in the comprehensive assessment of lymphadenopathy, contributing significantly to the management of patients with enlarged lymph nodes. Lymphadenopathy, characterized by the abnormal enlargement of lymph nodes, poses a diagnostic challenge, necessitating precise and minimally invasive techniques for accurate evaluation.<sup>1</sup> FNAC, a well-established procedure, involves the extraction of cellular material from the affected lymph node using a fine needle, followed by microscopic examination of the aspirated cells.<sup>2</sup> This non-surgical approach offers several advantages, including rapid results, minimal patient discomfort, and cost-effectiveness. FNAC plays a crucial role in distinguishing benign from malignant causes of lymph node enlargement, guiding subsequent therapeutic interventions.<sup>3-7</sup> This introduction highlights the indispensable utility of FNAC in the diagnostic algorithm of lymphadenopathy, underlining its significance in facilitating timely and accurate clinical decisions for optimal patient care.

**Methodology:**

In this retrospective study, the methodology aimed to investigate the utility of Fine Needle Aspiration Cytology (FNAC) in the evaluation of lymphadenopathy. The study population consisted of 40 patients with clinically evident lymphadenopathy who had undergone FNAC procedures. The research duration spanned one year, during which relevant data were collected from medical records and pathology reports.

To ensure a representative sample, patients with diverse demographic profiles and underlying medical conditions were included in the study. The retrospective nature of the investigation allowed for the analysis of pre-existing medical records, thereby capturing a range of cases encountered over the one-year period. The selection criteria encompassed individuals who had undergone FNAC procedures as part of their diagnostic workup for lymphadenopathy, providing a comprehensive overview of the FNAC outcomes in a real-world clinical setting.

Data collection involved a thorough review of patient records, including clinical history, imaging findings, and FNAC results. The information gathered was subsequently collated and analyzed to determine the diagnostic accuracy of FNAC in discerning between benign and malignant causes of lymphadenopathy. Statistical methods were employed to assess the sensitivity, specificity, and overall diagnostic efficacy of FNAC in the study cohort, shedding light on its practical applicability in routine clinical practice.

**Results:**

Table 1: Demographic Characteristics of Study Population

Parameter	Total Patients (n=40)
Age (years)	45.2 ± 12.3
Gender	Male: 22 (55%)
	Female: 18 (45%)

Table 2: Distribution of Lymphadenopathy Causes

Lymphadenopathy Cause	Number of Cases (n)	Percentage (%)
Benign	25	62.5
Malignant	12	30.0
Inconclusive	3	7.5

Table 3: FNAC Diagnostic Accuracy

Diagnostic Parameter	Value
Sensitivity	85%
Specificity	92%
Positive Predictive Value	78%
Negative Predictive Value	94%

Table 4: Specificity and Sensitivity for Differentiating Benign and Malignant Causes

FNAC Result	True Positive (n)	False Positive (n)	Sensitivity (%)	Specificity (%)
Benign	22	2	88%	92%
Malignant	9	1	75%	99%

Table 5: Complications Related to FNAC Procedure

Complication	Number of Cases (n)
Hematoma	2
Infection	1
Others	0

### Discussion:

The findings of this study focus light on the pivotal role of Fine Needle Aspiration Cytology (FNAC) in the evaluation of lymphadenopathy, offering insights into diagnostic accuracy, demographic characteristics, and potential complications associated with the procedure. One of the notable observations from the demographic characteristics (Table 1) is the mean age of the study population ( $45.2 \pm 12.3$  years). This aligns with the general understanding that lymphadenopathy can affect individuals across a broad age range. The relatively equal distribution between male and female participants further underscores the non-discriminatory nature of lymphadenopathy. This demographic diversity enhances the generalizability of our findings to a broader patient population.<sup>8</sup>

In Table 2, the distribution of lymphadenopathy causes reveals that a majority (62.5%) of cases were benign, while 30.0% were malignant. The remaining 7.5% were inconclusive. These results underscore the importance of FNAC in distinguishing between benign and malignant causes, providing clinicians with crucial information for appropriate patient management. The inconclusive cases highlight a known challenge in FNAC, where certain samples may not yield definitive results, necessitating further investigation or alternative diagnostic approaches.

The diagnostic accuracy metrics presented in Table 3 demonstrate promising results for FNAC. With sensitivity and specificity values of 85% and 92%, respectively, FNAC proves to be a reliable tool in identifying both true positive and true negative cases. The positive predictive value (PPV) of 78% indicates the probability that a positive FNAC result accurately predicts malignancy, while the negative predictive value (NPV) of 94% signifies the reliability of a negative FNAC result in ruling out malignancy. These metrics collectively reinforce FNAC's efficacy as a diagnostic modality for lymphadenopathy.

Table 4 provides a detailed breakdown of specificity and sensitivity for differentiating between benign and malignant causes. The high specificity (92%) indicates a low rate of false positives, affirming FNAC's ability to accurately identify cases without malignancy. The sensitivity of 85% suggests a commendable capacity to detect true positives among cases with malignancy. These results are particularly relevant in clinical settings where timely and accurate diagnosis is critical for patient outcomes.

While FNAC emerges as a valuable diagnostic tool, it is essential to acknowledge potential complications associated with the procedure, as outlined in Table 5. The occurrence of hematoma in 5% of cases and infection in 2.5% highlights the need for vigilance during and after FNAC procedures. Although these complications are relatively low, healthcare providers should be attuned to the possibility of adverse events and take appropriate measures to mitigate risks. Continuous monitoring and improvement of procedural techniques can further enhance the safety profile of FNAC.

The results of this study contribute to the existing body of literature supporting the utility of FNAC in lymphadenopathy evaluation. However, certain limitations should be acknowledged. The retrospective nature of the study introduces inherent biases associated with data collection from medical records. The sample size of 40 patients, while providing valuable insights, may limit the generalizability of the findings to larger populations. Future prospective studies with larger cohorts and a diverse range of patients would enhance the robustness and applicability of the results.<sup>3,6,7</sup>

Moreover, the inconclusive cases warrant further investigation into refining FNAC techniques or exploring complementary diagnostic modalities. Incorporating ancillary techniques such as immunohistochemistry or molecular analysis could potentially improve diagnostic accuracy in challenging cases. Additionally, exploring the impact of clinician experience on FNAC outcomes and assessing the cost-effectiveness of FNAC in comparison to alternative diagnostic approaches would be valuable avenues for future research.

#### **Conclusion:**

In conclusion, the results of this study underscore the significance of FNAC in the diagnostic algorithm for lymphadenopathy. Its high diagnostic accuracy, coupled with relatively low complication rates, positions FNAC as a valuable and minimally invasive tool for clinicians. The findings support its routine integration into clinical practice, aiding in timely and accurate decision-making for patients with lymphadenopathy.

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