

Characteristics of Patients with Lymphadenopathy Undergoing Fine-Needle Aspiration Biopsy at a Tertiary Hospital in Surabaya, Indonesia

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ABSTRACT

Background: Lymphadenopathy is a common clinical condition encountered in the outpatient clinic. The etiology of lymphadenopathy varies, including reactive lymphoid hyperplasia, infectious disease, and malignancy. Fine-needle aspiration biopsy (FNAB) is usually the first choice to diagnose superficial lymphadenopathy. The role of FNAB in the diagnosis, to point out the exact type and possible source of metastatic malignancies in the lymph node, is well recognized. **Objective:** This study aims to describe the characteristics of patients with lymphadenopathy who underwent FNAB at Dr. Soetomo General Hospital. **Material and Method:** This study is a descriptive retrospective study, using secondary data of patients with lymphadenopathy patients who underwent FNAB at the Department of Anatomical Pathology of Dr. Soetomo General Hospital (January 2019-December 2019). **Result:** This study included 945 patients, consisting of 410 males (43,4%) and 535 females (56,6%). Out of 945 cases, 499 (52.8%) cases were diagnosed as non-malignant lesions, 428 (45.3%) cases were diagnosed as malignant lesions, 11 (1.2%) cases were diagnosed as atypic cells, and 7 (0.7%) cases were inadequate. **Conclusion:** The most common patients of lymphadenopathy in Dr. Soetomo General Academic Hospital Surabaya, Indonesia, were female patients, aged 41-60, with mostly non-malignant lesions.

Keywords: lymphadenopathy; fine-needle aspiration biopsy; histopathology; cancer

INTRODUCTION

Lymphadenopathy is a frequently observed clinical presentation in outpatient settings. Lymphadenopathy may arise from various etiologies, such as reactive lymphoid hyperplasia, infectious diseases, or malignant neoplasms [1, 2, 3]. Fine-needle aspiration biopsy (FNAB) is usually the first choice to diagnose superficial lymphadenopathy [4]. Fine-needle aspiration biopsy (FNAB) has a significant role in diagnosing superficial lymphadenopathy to identify the specific type and potential origin of metastatic malignancy within the lymph node. Fine-needle aspiration biopsy (FNAB) diagnostic accuracy in metastatic malignancy is about 90–95% [5]. Compared to surgical biopsy, FNAB provides a rapid preliminary diagnosis for lymphadenopathy with minimal patient discomfort and lower cost [2, 3]. The pioneering publications by Zajicek, Franzen, Esposti, and Lowhagen from the Karolinska Hospital in Stockholm as early as 1947 have gained international recognition for the technique of aspiration cytology [6]. A large number of patients with lymphadenopathy have been investigated by FNAB at our hospital.

Neoplastic or metastatic lesions from infectious or reactive lymphadenopathies can be differentiated using FNAB [7]. Consequently, the FNAB procedure has been widely accepted and routinely implemented in the diagnostic evaluation of lymphadenopathy. Although FNAB is recommended as a first-line diagnostic tool for clinically significant lymphadenopathy, there is currently no published evidence assessing its diagnostic performance in the Surabaya region. Therefore, the objective of this study was to evaluate the diagnostic accuracy and performance of FNAB in patients with lymphadenopathy.

MATERIAL AND METHODS

Study design

This study is a descriptive retrospective study, using secondary data of patients with lymphadenopathy who underwent FNAB at the Department of Anatomical Pathology of Dr. Soetomo General Hospital, Surabaya, Indonesia (January 2019-December 2019).

Data collection

Medical records and cytology smears are reviewed. Sex and age data were collected. To ensure the accuracy of the diagnosis of fine needle aspiration biopsy, the entire smears underwent blind re-evaluation by an anatomical pathologist.

Data analysis

Categorical variables will be presented as frequencies and percentages.

RESULT

This study included 945 patients consist of 410 male (43,4%) and 535 female (56,6%) with ratio 1:1.3. The mean patient age was 39.76 years (range: 1-80), with age distribution peaking in the 41-50 year group (18.8%, n=178), followed by 51-60 year group (18.2%, n=172), 21-30 year group (16,2%, n=153), 31-40 year group (13.0%, n=123), 61-70 year group (11.9%, n=112), 11-20 year group (10.1%, n=95), 0-10 year group (8.3%, n=78), 71-80 year group (3.1%, n=29), and 81-90 year group (0.50%, n=5) as showed in Table 1.

TABLE 1: Age distribution in lymphadenopathy patients.

Age group (years old)	Total (n)	%
0-10	78	8.3
11-20	95	10.1
21-30	153	16.2
31-40	123	13.0
41-50	178	18.8
51-60	172	18.2
61-70	112	11.9
71-80	29	3.1
81-90	5	0.5
TOTAL	945	100

The most obtained lymph nodes were neck (59%, n=611), followed by axillary (11%, n=114), supraclavicular (9%, n=60), inguinal (5%, n=50), along with intraarticular (5%, n=47), and infraclavicular (1%, n=7).

TABLE 1: Location of lymphadenopathy.

Region	Total (n)	%
Neck	611	59
Axillary	114	11
Supraclavicular	93	9
Inguinal	50	5
Infraclavicular	7	1
TOTAL	945	100

Out of 945 cases, 499 (52.8%) cases were diagnosed as non-malignant lesions, 428 (45.3%) cases were diagnosed as malignant lesions, 11 (1.2%) cases were diagnosed as atypic cells, and 7 (0.7%) cases

were inadequate. In malignant lesions, 321 out of 428 cases (75.0%) were diagnosed as metastatic malignancies, and 60 out of 428 cases (14.0%) were diagnosed as malignant round cell tumor (Table 3).

TABLE 2: Diagnosis of lymphadenopathy patients.

Diagnosis	Female	Male	Total
Metastatic malignancy			
Adenocarcinoma	121	21	142
Squamous cell carcinoma	29	30	59
Poorly differentiated carcinoma	14	13	27
Undifferentiated carcinoma	9	31	40
Papillary thyroid carcinoma	13	9	22
Follicular thyroid carcinoma	1	1	2
Malignant melanoma	5	4	9
Malignant phyllodes tumor	1	0	1
Sebaceous carcinoma	0	1	1
Adenosquamous carcinoma	1	0	1
Anaplastic carcinoma	1	0	1
Medullary thyroid carcinoma	0	1	1
Small cell carcinoma	0	1	1
Metaplastic carcinoma	1	0	1
Seminoma	0	1	1
Basal cell carcinoma	0	1	1
Difficult to determined	4	7	11

Diagnosis	Female	Male	Total
Lymphoma malignancies			
Non-hodgkin lymphoma	19	31	50
Hodgkin lymphoma	4	6	10
Total	223	158	381

DISCUSSION

Evaluating lymph node involvement in neoplastic disease is crucial for accurate tumor staging and therapeutic planning. Nevertheless, lymphadenopathy often presents a diagnostic challenge for clinicians [8]. Fine-needle aspiration biopsy (FNAB) remains a simple, safe, and reliable technique for cytological diagnosis. However, FNAB diagnostic accuracy has limitations, with reported failure rates up to 45%. Fine-needle aspiration biopsy (FNAB) with adequate material still might be inconclusive due to several factors, such as inadequate smear spreading, air-drying artifacts, or thick tissue fragments [9].

Age and Sex Distribution

The demographic data revealed that the predominant patient is female (56.6%) with a female-to-male ratio of 1.3:1. The patients mean age was 39.76 years, and the highest frequency was observed in the fourth to sixth decades of life (ages 41-60). Age distribution in lymphadenopathy is highly significant, as it represents the peak incidence for both reactive lymphoid disorders and the onset of malignancies [10]. Several studies indicate that lymph nodes in humans undergo alterations with age. The peak incidence in the present study was found to be between 41-60 years, which was similar to other studies [5]. There was an increased incidence in males, which was comparable to other studies [5]. Lymphadenopathy in young adults (ages 21-40) often related to infectious etiologies like tuberculosis, which is endemic in Indonesia [11].

Location

The most frequent site of lymphadenopathy is the cervical region (59%), followed by the axillary region (11%). This finding is consistent with studies worldwide and aligns with the anatomy of lymphatic drainage [12, 13, 14]. Lymph node in the cervical region is the most frequent site for reactive hyperplasia, infections (e.g., tuberculosis, viral infections), and metastases from head and neck malignancies, thyroid malignancies, and distant primaries.

Diagnosis

This study found that the distribution between non-malignant (52.8%) and malignant (45.3%) diagnoses is nearly equal. This high rate of malignancy diagnosis indicates the effectiveness of FNAB as a first-line screening tool in a tertiary care setting [15], where large numbers of patients are referred with a high suspicion of malignancy. Fine-needle aspiration biopsy (FNAB) allows for rapid triage and further management planning in malignant processes since it is effective in identifying malignancy in nearly half of all patients. A high technical success rate and diagnostic adequacy indicates from the diagnosis of atypical

(1.2%) and inadequate (0.7%) samples, which is commendable regarding the large sample size.

The majority diagnosis in malignant process is metastatic carcinoma (75.0%), which is far exceeding primary lymphoid malignancies (lymphoma) at 14.0%. These findings indicate the technique's high sensitivity in identifying metastatic deposits [16]. The spectrum of metastatic carcinomas is particularly insightful. The adenocarcinoma cases (n=142) are highly indicate primary origins including lungs, breast, or gastrointestinal tract [17]. While the squamous cell carcinoma cases (n=59) are highly indicate metastases from head and neck malignancy, which is common in the Southeast Asia region [18].

Notably, the papillary thyroid carcinoma cases (n=22) indicate that one of the common causes of cervical lymphadenopathy is thyroid malignancy. The gender distribution within these subtypes is also revealing; the adenocarcinoma cases were far more common in females, which is suggestive of metastases from breast cancer [19], while certain other carcinomas showed a male predominance.

Fine-needle aspiration biopsy (FNAB) as a single diagnosis workup of lymphoma can be challenging and often requires ancillary studies like flow cytometry or core biopsy for subtyping [20,21]. In this study, Hodgkin and Non-Hodgkin lymphoma (n=60) likely represent cases where cytomorphology was highly suggestive. This finding highlights the limitation of FNAB and a critical area for clinicopathological correlation [22].

Strength and Limitations

Despite its retrospective nature, this study provides several important strengths. Large-scale demographic and diagnostic overview of lymphadenopathy is the first strength of this study. The findings reveal a critical near-equal split between malignant and non-malignant diagnoses, powerfully underscoring the indispensable role of FNAB as a first-line diagnostic tool become the second strength of this study. Several limitations inherent to its retrospective design. Firstly, the definitive histopathological correlation (from subsequent excisional biopsies), which is the gold standard for confirming FNAB diagnoses, especially for lymphomas and atypical cases, was not available for all cases. Secondly, the lack of ancillary data, such as serological tests for infectious diseases (e.g., HIV, TB) or data on patients' HIV status, limits a deeper etiological analysis of the reactive cases. Finally, the patient population is inherently biased towards more complex or suspicious cases, which explains the high malignancy rate and may not be generalizable to primary care settings.

CONCLUSION

Our study demonstrates that in a tertiary hospital in Surabaya, Indonesia, superficial lymphadenopathy evaluated by FNAB predominantly affects middle-aged adults and females, with the neck being the most common site. FNAB proved to be an excellent first-line diagnostic tool, effectively differentiating between non-malignant and malignant processes in over 98% of cases. The high yield of metastatic carcinoma underscores the importance of a systematic evaluation for a primary tumor following a malignant FNAB diagnosis. Future prospective studies incorporating histopathological correlation and ancillary tests would further refine diagnostic accuracy and provide a more detailed understanding of the etiological landscape of lymphadenopathy in Indonesia.

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Conflict of Interest

The authors declare no conflict of interest.

Ethical Clearance

Ethical clearance for this study was obtained from the Institutional Ethics Committee of Dr. Soetomo General Academic Hospital, with approval number 3912/120/4/IX/2025. This study was a retrospective analysis of anonymized cytopathology records; therefore, informed consent was not required. All data were analyzed with high confidentiality, and no personal identifiers were used.

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