Original Article

Reporting of Lymph Node Fine Needle Aspiration Cytology by Application of Sydney System and Assessment of Prevalence of Malignancy

Shriya Roy*, Junu Devi, Daljeet Kaur

Department of Pathology, Gauhati Medical College and Hospital, Guwahati, Assam, India

DOI: 10.21276/APALM.3370

***Corresponding Author**:
Dr Shriya Roy
dr.shriya.roy@gmail.com

Submitted: 05-May-2024
Final Revision: 01-Jul-2024
Acceptance: 15-Aug-2024
Publication: 08-Sep-2024

Abstract

Background: Fine needle aspiration cytology (FNAC) is a stepwise diagnostic approach that combines age, sex, site, clinical findings, multiplicity, ultrasound findings, low power pattern, high power pattern, and disease-specific diagnostic clues, including granulomas. The Sydney System for lymph node cytology classification and reporting has been developed to standardize the reporting language among cytopathologists and clinicians. We aim to apply the proposed Sydney System, categorize lymph node lesions accordingly, and determine the prevalence of different types of malignancies.

Materials and Methods: This was a cross-sectional study of lymph node cytology conducted from July 2022 to June 2023 in the Department of Pathology at Gauhati Medical College and Hospital. The results were reported according to the Sydney System into five groups, from L1 to L5.

Results: Out of the 555 cases, the cervical group of lymph nodes was the most commonly affected (72.9%). The male-to-female (M:F) ratio was 1.61. The most commonly affected age group was 41-50 years. A total of 54.41% of cases were categorized under L2, followed by 28.29% of cases under L5. Metastatic squamous cell carcinoma (SCC) was the most commonly encountered neoplastic lesion. The prevalence of lymphoma was 2.16% in the present study. The prevalence of malignancy was higher in males compared to females.

Conclusion: The Sydney System of reporting and classifying lymph node cytology can help achieve uniformity and reproducibility, leading to fairly accurate risk assessments of malignancy for further clinical management.

Keywords:

Lymph node, cytology, Sydney System, malignant neoplasms

Introduction

Lymph nodes are vital parts of the body's defense mechanism. They become enlarged due to stimulation by infectious agents, malignant diseases, or metastasis [1]. Fine needle aspiration cytology (FNAC) of lymph nodes is an age-old technique used to confirm a clinical suspicion of metastasis or local recurrence of cancer without subjecting the patient to further surgical intervention [2].

Lymphadenopathy is mostly self-limiting in children, whereas in adults it may be a sign of metastatic malignancy. Most lymph node lesions are non-neoplastic. Currently, FNAC is used as the first tool to diagnose lymphadenopathy because it causes minimal trauma and provides a rapid diagnosis [3]. Complications such as scar tissue formation, bleeding, neurovascular injury, and a long healing process are associated with excision biopsy [1,4].

The Sydney System of lymph node cytology reporting was proposed in 2020 by an expert panel, which established the following five diagnostic categories [5]: L1: Inadequate/insufficient, L2: Benign, L3: Atypical cells of undetermined significance/Atypical lymphoid cells of uncertain significance (ALUS/AUS), L4: Suspicious and L5: Malignant.

This system is based on well-documented international cytopathology studies and provides a management algorithm that has been approved by the International Academy of Cytology and the European Federation of Cytology Societies [6,7].

Despite this, the Sydney system for reporting lymph node lesions remains underutilized to date [8,9]. Therefore, the present study aims to recognize the diagnostic utility of the Sydney reporting system.

This study aims to evaluate the spectrum of lymph node lesions using the proposed Sydney System, categorize the lesions accordingly, and determine the prevalence of different types of malignancies.

Materials and Methods

This is a hospital-based cross-sectional study, conducted over one year, from July 2022 to June 2023, in the Department of Pathology at a tertiary care center in Northeast India. Ethical approval was obtained from the institutional ethics committee.

Inclusion criteria: Conventional FNACs and USG-guided FNACs of all lymph node swellings, including all age groups and irrespective of gender, were included in the study.

Exclusion criteria: Patients who did not provide written informed consent and FNACs from sites other than lymph nodes were excluded from the study.

A total of 555 cases were included in this hospital-based study. FNAC was performed using a 20 mL syringe, and smears were made immediately. Dry smears were fixed with methanol and stained with May-Grünwald-Giemsa stain (MGG), while wet smears were fixed with alcohol and stained with Papanicolaou stain (PAP). All the smears were evaluated under a light microscope and categorized according to the Sydney System. Statistical analysis was performed using MS Excel Sheets. Qualitative variables are expressed as frequency and percentage. The Chi-square test was used to determine the association between two variables. The level of statistical significance is expressed as a p-value of <0.05.

Results

A total of 555 cases were analyzed. There were 343 males and 212 females, with a male-to-female ratio of 1.61. The most commonly affected age group was between 41–50 years (Table 1). The cervical group of lymph nodes was the most commonly involved (405/555), followed by the inguinal (42/555) and supraclavicular (36/555) groups of lymph nodes.

Twenty-nine cases (5.23%) were insufficient for diagnosis under the L1 category. In the L2 category (Benign), a total of 302 lesions (54.41%) were encountered, of which 105 cases were granulomatous lesions (35%), 100 were reactive lesions (33%), and 97 were suppurative lesions (32%). Fifty-eight cases (10.45%) were categorized as L3 lesions, and 9 cases (1.62%) were categorized as L4 lesions (Table 2).

In the L5 category (Malignant), 157 cases (28.29%) were encountered. The maximum number of malignant cases occurred in the 41–50 years age group (Table 2). The most common malignancy found was squamous cell carcinoma (Table 3), accounting for 111/157 cases (70.68%). Overall, the prevalence of malignancy was higher in males than in females. However, in this study, for metastasis due to papillary thyroid carcinoma, small cell carcinoma, and myeloid sarcoma, females were more affected than males (Table 3).

Table 1: Categorization according to age and sex.

AGE GROUP	MALE	FEMALE	TOTAL	P-VALUE
0-10 YEARS	27	8	35	<0.0001
11-20 YEARS	36	31	67	
21-30 YEARS	64	18	82	
31-40 YEARS	85	10	95	
41-50 YEARS	139	18	157	
51-60 YEARS	56	7	63	
61-70 YEARS	43	1	44	
71-80 YEARS	10	0	10	
81-90 YEARS	2	0	2	

Table 2: Distribution according to age group and Sydney system

	L1	L2	L3	L4	L5	P-VALUE
0-10 YEARS	8	27	-	-	-	<0.0001
11-20 YEARS	10	50	2	4	1	
21-30 YEARS	4	59	6	4	9	
31-40 YEARS	3	51	12	-	29	
41-50 YEARS	2	73	31	1	50	
51-60 YEARS	2	28	7	-	26	
61-70 YEARS	-	12	-	-	32	
71-80 YEARS	-	2	-	-	8	
81-90 YEARS	-	-	-	-	2	
TOTAL	29	302	58	9	157	

Table 3: Categorization according to the type of malignancy

TYPE OF MALIGNANCY	CASES	NO OF CASES	% (TOTAL L5= 157)	% (TOTAL = 555)
LYMPHOMA	NHL	9	5.73	1.62
	HL	3	1.91	0.54
METASTATIC MALIGNANCIES	Adenocarcinoma	14	8.91	2.52
	SCC	111	70.68	19.98
	Small cell carcinoma	1	0.63	0.18
	Metastatic malignant melanoma	1	0.63	0.18
	Myeloid sarcoma	2	1.27	0.36
UNDIFFERENTIATED CARCINOMAS		16	10.19	2.88

Table 4: Distribution of metastatic carcinoma and lymphomas according to sex.

METASTATIC CARCINOMA	MALE	FEMALE	TOTAL	P- VALUE
Adenocarcinoma **Papillary thyroid carcinoma** • **Mucoepidermoid carcinoma**	2 6	3 3	14	
Well differentiated SCC	42	8	50	
Moderately differentiated SCC	5	2	7	
Poorly differentiated SCC	44	10	54	
Myeloid Sarcoma	0	2	2	
Metastatic Malignant Melanoma	1	0	1	0.0277
Small cell carcinoma	0	1	1	
Undifferentiated carcinoma	12	4	16	
LYMPHOMAS				
NHL	7	2	9	0.7003
HL	2	1	3	

In most of the malignancies males were more affected than females, except for metastasis due to papillary thyroid carcinoma, small cell carcinoma and myeloid sarcoma. In case of Lymphomas also males were more involved than females

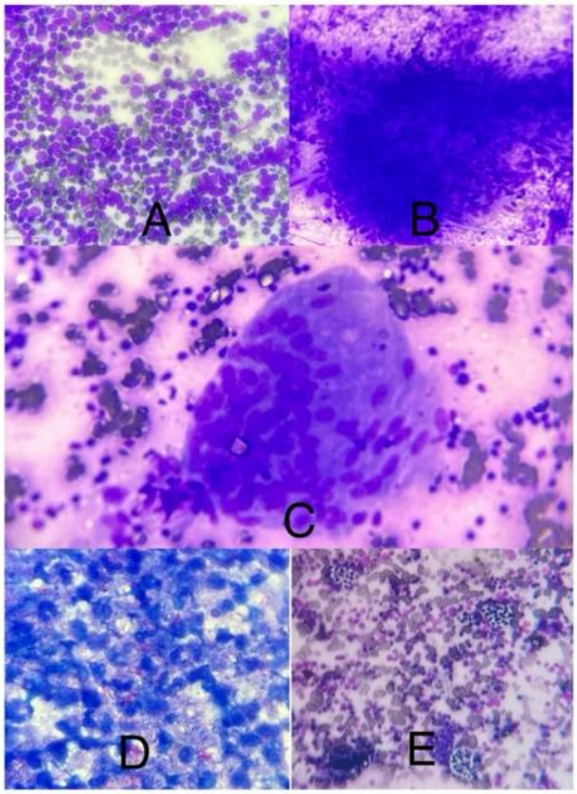

Figure 1: L2 Lesions: - A: Reactive lymph node (10x40 on MGG stain): showing polymorphous population of lymphoid cells in different stages of maturation, B: Epithelioid granulomatous (10x40 on MGG stain), C: Multinucleated giant cell (10x40 on MGG stain), D: Acid fast bacilli (10x100 oil immersion on ZN stain), E: Rosai Dorfman Disease (10x10 on MGG stain)

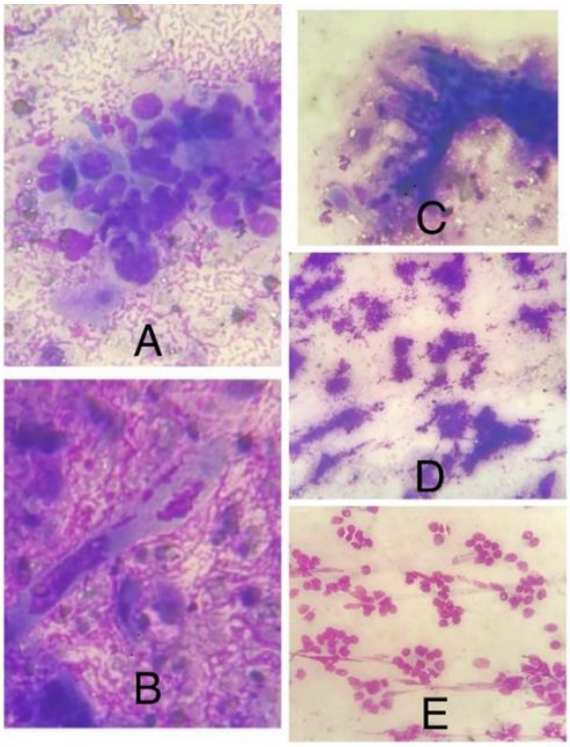

Figure 2: A: Metastatic SCC (10x40 on MGG stain): showing pleomorphic atypical cells with moderate amount of blue cytoplasm, B: Metastatic SCC (on 10x40 on MGG stain): showing atypical spindle shaped squamous cell, C: Metastatic SCC on 10x40 on MGG stain showing keratinization, D: Metastatic adenocarcinoma (on 10x10 on MGG stain), E: Metastatic adenocarcinoma (on 10x40 on MGG stain).

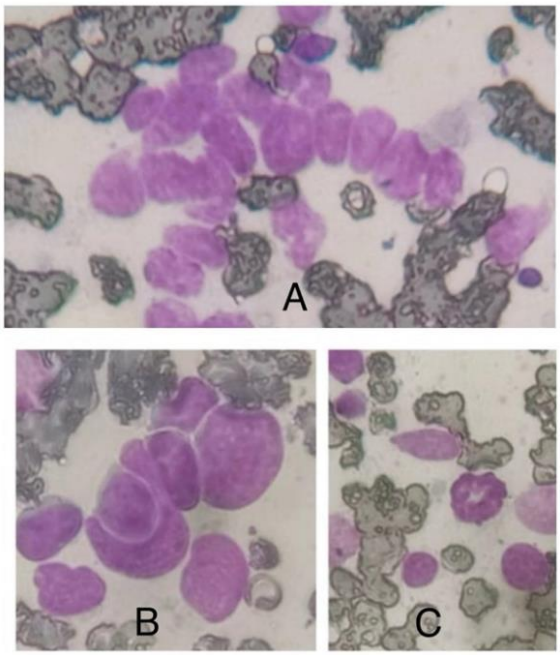

Figure 3: Metastatic Small cell carcinoma (10x40 on MGG stain) showing A: Nuclear moulding, B : Nuclear engulfment C: Mitosis

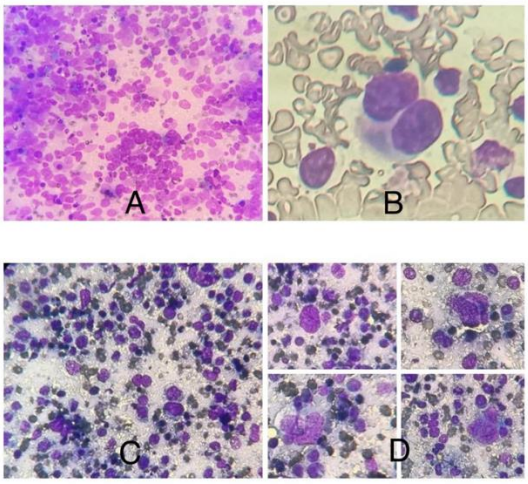

Figure 4: NHL (10X40 on MGG stain), B: Hodgkin's lymphoma (10x40 on MGG stain) showing Reed Sternberg cells, C: Anaplastic large cell lymphoma (10x10 on MGG stain), D: Anaplastic large cell lymphoma (10x40 on MGG stain) showing cellular anaplasia.

Discussion

The Sydney system is important for the reliability of lymph node FNAC and for clinicians' awareness of its diagnostic potential. With the introduction of this reporting system, there has been a decrease in the rate of clinical misinterpretation and inter-observer variation. In peripheral areas, the availability of histopathological examination, flow cytometry, or immunohistochemistry is questionable. Various studies have proven that lymph node aspiration and its uniform classification can be a significant step towards quality treatment and prompt referral to higher centers when needed [10].

In the present study, the most commonly affected age group was 41–50 years (28.28%; $p < 0.0001$), whereas in the study by Raman et al., the >60 years age group was most commonly affected (26%). The 21–30 years age group was the most commonly affected in the studies by Sharma et al. (34%) and Shakya G et al. (33.66%) [11, 12]. The discrepancy noted in the present study may be due to demographic differences and higher consumption of betel nut, alcohol, and tobacco in North-East India. The cancer burden in North-East India is higher compared to the rest of India. In North-East India, oral cancer and other head and neck cancers are very common due to the widespread habit of chewing tobacco and betel nut. There is also an alarming rise in the number of lymphoma cases in this "cancer capital" of India.

The cervical group of lymph nodes was the most commonly affected (72.9%) in our study, which was concordant with the studies by Pandya et al., Gupta, and Vigilar E. et al. [7, 9]. In the present study, the L2 category showed the highest prevalence (54.41%), followed by L5 (28.28%). This finding was consistent with the studies by Pandya et al. and Gupta et al. However, in the study by Vigilar E. et al., the L5 category showed the maximum prevalence (46%) [7, 9].

Among the malignant lesions, 70.68% of cases were of squamous cell carcinoma and 8.91% were of adenocarcinoma ($p < 0.027$). This was similar to the findings in studies by Kadam et al., Kiran Alam et al., and Patel D et al. [13, 14]. The prevalence of lymphoma was 2.16%, comprising 7/12 cases of non-Hodgkin's lymphoma and 2/12 cases of Hodgkin's lymphoma ($p < 0.7003$). This prevalence was higher compared to the studies by Nikethan et al. (1.8%) and Krishnaswamy et al. (0.14%) [15, 16].

FNAC alone can provide a sufficiently detailed diagnosis, avoiding the need for surgical biopsy. This reduces diagnostic costs, allows patients to avoid invasive procedures, and enables earlier diagnosis. The Sydney system of categorizing lymph node lesions helps by using specific cytological features.

For L1 category lesions, we recommend repeat FNAC. For L2 lesions, clinical correlation and appropriate management are advised. For L3 lesions, we recommend repeat FNAC after a course of antibiotics and follow-up. For L4 lesions, histopathological examination is advised. Most L5 cases were of metastatic carcinoma, where the primary site was known, so histopathological examination was not performed. For lymphoma cases, flow cytometry with histopathological examination and ancillary techniques were recommended.

Among the neoplastic lesions, we found that the prevalence of metastasis due to squamous cell carcinoma was the highest. This is likely because the prevalence of head and neck squamous cell carcinoma is higher in North-East India. Oral deleterious habits, socioeconomic status, and the genetic makeup of this population are contributing factors [17].

The present study has a limitation in that ancillary tests for the final diagnosis of lymphoid malignancies, such as histopathology, flow cytometry, immunohistochemistry, or molecular studies, were not available.

Conclusion

In conclusion, the systemic use of lymph node FNAC reporting using the Sydney system in the initial assessment of lymphadenopathy is both clinically and financially advantageous. This is because surgical biopsy can often be avoided, and immediate management in most cases is possible. The introduction of this system for performing and reporting LN-FNAC may improve the quality of the procedure, the report, and communication between cytopathologists and clinicians. The Sydney system of reporting lymph node lesions remains underutilized, and there is very limited data in the literature from Northeast India to date. By implementing the Sydney system, a more standardized method of reporting and categorization can be achieved. This system may lead to greater acceptance and utilization of LN-FNAC, as well as better interdisciplinary understanding of the results.

Acknowledgements: We would like to thank the technical staff of the Department of Pathology, Gauhati Medical College and Hospital.

Funding: Self

Competing Interests: None

References

1. Choi AH, Bolaris M, Nguyen DK, Panosyan EH, Lasky JL, Duane GB. Clinicopathological correlation in an atypical presentation of lymphadenopathy with review of literature. Am J Clin Pathol. 2015;143:749-54.
2. Orell SR, Sterrett GF. Orell & Sterrett's fine needle aspiration cytology. 5th ed.
3. Keith VE, Harsharan SK, Jerald GZ. Fine needle aspiration biopsy of lymph nodes in the modern era: reactive lymphadenopathies. CytoJournal. 2007;12:27-35.
4. Fine needle aspiration biopsy: role in diagnosis of pediatric head and neck masses. Int J Pediatr Otorhinolaryngol. 2008;72:1547-53.
5. Sreelekshmi, Raman J, Joseph TP. Structured reporting of lymph node cytopathology using the 2020 Sydney System Guidelines: a retrospective study. Natl J Lab Med. 2023;12(2)
6. AI-Abbadi MA, Barroca H, Bode-Lesniewska B, Calaminici M, Caraway NP, Chhieng DF, et al. A proposal for the performance, classification, and reporting of lymph node fine-needle aspiration cytopathology: the Sydney System. Acta Cytol. 2020;64:306-22.

7. Pandya D, Bhetariya B, Gupta P. Diagnostic utility of proposed Sydney System of lymph node by fine needle aspiration cytology: a cross-sectional study. J Clin Diagn Res. 2022;16(12)
8. Gupta P, Gupta N, Kumar P, Bhardwaj S, Srinivasan R, Dey P, et al. Assessment of risk of malignancy by application of the proposed Sydney System for classification and reporting lymph node cytopathology. Cancer Cytopathol. 2021 Sep;129(9):701-18.
9. Vigliar E, Acanfora G, Laccario A, Mascolo M, Russo D, Scalia G, et al. A novel approach to classification and reporting of lymph node fine-needle cytology: application of the proposed Sydney System. Diagnostics. 2021;11(8):1314.
10. Newaskar V, Verma D, Balani S, Malik R, Khan A. Application of the novel Sydney System in classification and reporting of lymph node fine needle aspiration cytology. Int J Sci Res. 2022;11:9.
11. Shakya G, Malla S, Shakya KN, Shrestha R. A study of FNAC of cervical lymph nodes. J Nepal Health Res Counc. 2009;7(1):1-5.
12. Sharma RI, Dharaiya CM. Study of fine needle aspiration cytology of lymphadenopathy in a tertiary care centre of Ahmedabad, Gujarat. Trop J Pathol Microbiol. 2018;4(3):258-64.
13. Alam K, Hiremath SS, Patil SB. Fine needle aspiration cytology, a handy tool for metastatic lymphadenopathy. Int J Pathol. 2010;10(2).
14. Kadam SA, Miskin AT, Dombale VD. Role of FNAC in study of cytomorphological patterns in cervical lymph node. Med Innov. 2020;9(2).
15. Krishnaswamy J, Rahaman K, Reshma S. A clinical study of reliability of fine needle aspiration cytology as a diagnostic tool in cervical lymphadenopathy. Int Surg J. 2017 Oct;4(10):3409-13.
16. Nikethan B, GV N, Hiremath SS, Patil SB. Role of fine needle aspiration cytology in the evaluation of the etiology of lymphadenopathy. Indian J Pathol Oncol. 2016;3(4):548-51.
17. Sharma P, Deb T, Ray JG, Singh AK, Gupta G, Das A, et al. Oral squamous cell carcinoma profile in North-Eastern regions of India from habits to histopathology: a hospital-based study. Natl J Maxillofac Surg. 2018 Jun;9(1):56-60.