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Comparison of lymph node fnac analysis between conventional and sydneyreporting system

[1]Dr. Shraddha Laddhad, [2]Dr. Surbhi Kathuria

[1]Assistant Professor, Department of Pathology, Sukh Sagar Medical College and Hospital, Jabalpur, Madhya Pradesh, India
[2]Assistant Professor, Department of Pathology, R D Gardi Medical College, Ujjain, Madhya Pradesh, India

Corresponding author
Dr. Surbhi Kathuria
Assistant Professor, Department of Pathology, R D Gardi Medical College, Ujjain, Madhya Pradesh, India
Email: surbhikathuria06@gmail.com

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ABSTRACT
Aim: The purpose of the present research was to compare the conventional with sydney reporting systems in cases of Lymph node Fine needle aspiration cytology (LN-FNAC).
Methodology: This retrospective study was conducted which included smears from LN-FNACs performed over a period of one year. 358 lymph node FNACs along with relevant clinical details were retrieved from cytopathology records and reclassified according to the proposed Sydney System. The smears were allocated into 2 groups, one reported with the help of conventional method, and second with the sydney reporting system.
Results: It was observed that sydney reporting system was much better than conventional reporting system, where most of the cases were of Category II (224 cases) and least were of Category IV (89 cases). The difference was also statistically significant based on CBNAAT score.
Conclusion: The proposed Sydney system of reporting and classification of lymph node cytology can help in achieving uniformity and reproducibility**.**
Keywords: Lymph node · Fine-needle aspiration cytology · Reporting system.

INTRODUCTION
Fine needle aspiration cytology (FNAC) is widely accepted as the first line approach in the evaluation of lymphadenopathy of unknown aetiology. Minimum invasiveness, rapidity, cost effectiveness, and the capability to provide material for several ancillary techniques contribute to its wide applicability in evaluation of lymphadenopathy.[1-4] In pediatric cases as well, FNAC in evaluation of lymphadenopathy is found to have high diagnostic accuracy.[5] Clinical, morphological, and ancillary data that are required for specific diagnoses of lymphoproliferative disorders are incorporated in the current World Health Organization (WHO) classification.[6] Lymph node-Fine Needle Aspiration Cytology (LN-FNAC) can thus play a key role in the evaluation of lymphadenopathies as it can provide cytomorphological information and material for ancillary testing that is diagnostic. However, the conventional system of reporting lymph node smears lacks standardized diagnostic classification, a common language of reporting among cytopathologists and clear communication to clinicians about risk of malignancy and further management.[7,8] To address this problem, the Sydney system of lymph node cytology reporting and classification was proposed in 2020 by an expert panel where the use of five diagnostic categories was introduced.[9] Underutilization

and limited literature are the causes of the knowledge gap in the applicability of the Sydney system of classification and reporting lymph node pathologies.FNAC has shown high accuracy in diagnosing reactive lymphoid hyperplasia, infectious diseases, granulomatous lymphadenitis, and metastatic malignancy.[10] The diagnostic accuracy of FNAC, however, may be lower in patients with primary lymphoproliferative disorders.[11] Early reports suggested that FNAC produced high false negative rates in patients with Hodgkin lymphoma (HL) and low-grade non-Hodgkin lymphoma. More recent studies have indicated that FNAC can accurately diagnose lymphoma in 85–90% of patients, particularly when ancillary techniques complement morphological assessment.[12] Ancillary techniques, such as immunohistochemistry (IHC), can overcome these difficulties and support the interpretation of cytological diagnoses.[13] However, the role of FNAC in the initial diagnosis and subclassification of primary lymphoid malignancy remains unclear. A cytological diagnosis of lymphoma on FNAC is often followed by tissue biopsy.[14] Diagnosing tumors that have metastasized to the lymph nodes on cytological smears is crucial, as it may be the sole indication for searching for the primary tumor, especially in patients with occult carcinoma. In most of these patients, however, the primary tumor has been identified clinically, with FNAC used widely for patient follow-up. Although most metastatic carcinomas can be identified solely by their cytomorphological characteristics, the features of different tumors may overlap, limiting the precise diagnosis of the primary tumor.[15]

AIM OF THE PRESENT STUDY

To categorize the lymph node FNAC samples according to the newly proposed Sydney System for reporting LN FNAC and to compare it with the conventional system (entity wise) of reporting.

METHODOLOGY

This retrospective cross-sectional study was conducted which included smears from LN FNACs performed over a period of one year, from 1st October 2020 to 1st October 2021 at GMCH Nagpur. 358 lymph node FNACs along with relevant clinical details were retrieved from cytopathology records and reclassified according to the proposed Sydney System. Flowcytometry, histopathology, CBNAAT and special stains were included wherever required and available. Information regarding pathological records and demographic and clinical details were retrieved from the electronic databases in the Department of Pathology at our institution. A prior ethical clearance was taken from the Institutional Ethical Committee. The smears were divided into groups of two- Group I- where the FNAC reporting was carried out by conventional method and Group II- with the help of sydney reporting system. The statistical tools used were calculation of sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), accuracy, and risk of malignancy (ROM). A true positive in sydney reporting system was defined as any histologically or clinically confirmed malignant lesion with a malignant (L5), suspicious (L4) or atypical cytological diagnosis (L3); a true negative was defined as any histologically or clinically confirmed benign lesion with a benign (L2) diagnosis; a false positive was defined as any histologically benign lesion with an L5, L4, or L3 cytological diagnosis; a false negative was defined as any histologically malignant lesion with an L2 cytological diagnosis. (Table 1) Risk of Malignancy (ROM) was calculated by dividing the number of cases with a confirmed malignant lesion by the total number of cases with a histological or clinical follow-up within each diagnostic category.[16] All statistical analysis was done using SPSS version 26 (SPSS Inc., Chicago, IL, USA).

RESULTS

Out of the 358 cases in total in terms of site distribution, highest frequency of cases was of cervical origin (61.5%) followed by axillary lymph nodes (11.7%). (Table 2) As far as age distribution was considered, maximum cases were of 21-30 years age bracket (19.6%), followed by 41-50 years of age (16.8%). In case of gender variation, maximum cases were from female patients (56.4%). It was observed that sydney reporting system was much better than conventional reporting system, where most of the cases were of Category II (224 cases) and least were of Category IV (89 cases). The difference was also statistically significant based on CBNAAT score.

Table 1- Cytomorphological features of each category of Sydney System for reporting of lymph node cytology

Category	Features
L1: Inadequate/Insufficient	Scant cellularity; Extensive necrosis; Technical limitations that cannot be overcome
L2: Benign	Suppurative and granulomatous inflammation; Heterogeneous lymphoid population with small lymphocytes predominating, and often germinal centers with dendritic cells and tingible body macrophages
L3: Atypical (Cells) Undetermined Significance/Atypical Lymphoid (Cells) of Uncertain Significance (ALUS/AUS)	Heterogeneous lymphoid population, features suggest a reactive process, follicular lymphoma cannot be excluded; Excess of large cells (centroblasts or immunoblasts) immature small lymphoid cells or cases where the atypical cells are not lymphoid cells.
L4: Suspicious.	Small and/or medium-sized, monomorphic atypical lymphoid cells suspicious of lymphoma, but the cytomorphology alone is not sufficient; Polymorphous lymphoid smears, few Hodgkin- or Reed-Sternberg-like cells are detected; Large cell or Burkitt lymphomas scantly cellular; Smears in which atypical cells suspicious for metastasis are detected, but are too scant to be diagnostic
L5: Malignant	NHL; HL: Appropriate cellular background and diagnostic Hodgkin and Reed-Sternberg cells; Metastatic neoplasms.

Table 2- Site distribution for the samples of FNAC in lymph nodes

SITE	Frequency	Percent
ABDOMINAL	2	.6
AXILLARY	42	11.7
CERVICAL	220	61.5
ILIAC	2	.6
INFRAAURICULAR	1	.3
INFRAMAMMARY	1	.3
INGUINAL	31	8.7
LEVEL 1B	1	.3
POST AURICULAR	1	.3

PREAURICULAR	1	.3
SUBMANDIBULAR	32	8.9
SUBMENTAL	4	1.1
SUPRACLAVICULAR	19	5.3
SUPRASTERNAL	1	.3
Total	358	100.0

Table 3- Conventional v/s sydney system of reporting compared in percentage analysis

CONVENTIONAL * SYDNEY Crosstabulation								
			SYDNEY					Total
			CAT1	CAT2	CAT3	CAT4	CAT5	
CONVENTIONAL/ Group I	CAT1	Count	36	2	0	0	0	38
		% within SYDNEY	100.0%	.9%	0.0%	0.0%	0.0%	10.6%
	CAT2	Count	0	219	5	0	0	224
		% within SYDNEY	0.0%	98.6%	50.0%	0.0%	0.0%	62.6%
	CAT3	Count	0	0	5	0	0	5
		% within SYDNEY	0.0%	0.0%	50.0%	0.0%	0.0%	1.4%
	CAT4	Count	0	0	0	2	0	2
		% within SYDNEY	0.0%	0.0%	0.0%	14.3%	0.0%	.6%
	CAT5	Count	0	1	0	12	76	89
		% within SYDNEY	0.0%	.5%	0.0%	85.7%	100.0%	24.9%
Total		Count	36	222	10	14	76	358
		% within SYDNEY	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 4- Chi-square scores on inter- group comparisons

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	907.845[a]	16	.000
Likelihood Ratio	630.794	16	.000
N of Valid Cases	358		
a. 15 cells (60.0%) have expected count less than 5. The minimum expected count is .06.			

DISCUSSION

Diagnosing tumors that have metastasized to the lymph nodes on cytological smears is crucial, as it may be the sole indication for searching for the primary tumor, especially in patients with occult carcinoma.[17] In most of these patients, however, the primary tumor has been identified clinically, with FNAC used widely for patient follow-up. Although most metastatic carcinomas can be identified solely by their cytomorphological characteristics, the features of different tumors may overlap, limiting the precise diagnosis of the primary tumor.[18]It has been seen that the application of standardised reporting systems in

cytopathology reduces intra-observer variability in reporting and helps in the communication of clinically relevant information in a reproducible manner.[6] More-over, it enhances the interpretation of cytopathological reports by clinicians with regard to risk assessment. In the present study, the risk of malignancy was calculated for every diagnostic category in the Sydney system of classification and reporting of lymph node cytopathology.T-cell lymphomas are also known to be challenging for diagnosis on FNA and small biopsies.[9] To prevent false negatives, we stress the importance of careful searching for rare intact large atypical cells or naked enlarged atypical nuclei, which are often found more frequently along the edges of smear preparations.[12] Cell blocks may also be a useful tool in assisting the diagnosis of Hodgkin lymphoma in LN-FNAC by the application of immunohistochemistry.[1]In conclusion, FNC coupled with ancillary techniques is effective in the evaluation of lymphoadenopaties; the implementation of the Sydney system, by the introduction of a standardized categorization, may improve the lymph node FNC diagnostic accuracy. Moreover, clinical practice would benefit from management recommendations specific for diagnostic categories with increasing ROMs, as reported in our experience. The most significant limitations of our study were the single institution and retrospective nature and the low number of cases; therefore, further studies with larger sample sizes are required to confirm the Sydney system's usefulness.

CONCLUSION

The proposed Sydney system of reporting and classification of lymph node cytology can help in achieving uniformity and reproducibility of cytopathological diagnosis. It will lead to a fairly accurate risk assessment of malignancy for further clinical management.

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