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Original Research Article

Lymph Node Cytopathology Reporting Based on the 2020 Sydney System Guidelines: Correlation Between Histopathology and Cytology

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ABSTRACT

Introduction: Fine Needle Aspiration Cytology (FNAC) is a useful method for diagnosing lymph node pathology. The updated Sydney System (2020) provides clear guidelines for categorizing and reporting FNAC results, promoting uniformity in terminology and criteria. This standardization is a significant step forward in lymph node pathology diagnosis. FNAC is a straightforward technique for diagnosing and assessing lymphadenopathies, but the presence of numerous conditions and cytomorphological similarities can complicate the diagnosis. This study aims to analyze lymph node cytopathology reports following the 2020 Sydney System guidelines and compare them with histopathological findings.

Aim: The study assessed lymph node lesions using the Sydney system over 18 months and calculated the Risk of Malignancy (ROM) for each category by comparing it with histopathology diagnoses in available cases.

Materials and Methods: An observational study was conducted from January 2022 to June 2023 at a tertiary care center's Pathology department. The study analyzed 260 lymph node aspirates collected over a one-and-a-half-year period using fine-needle aspiration cytology (FNAC). The aspirates were classified based on the Sydney System into five categories: L1 - non-diagnostic/inadequate, L2 - benign, L3 - atypical cells/atypical lymphoid cells of undetermined significance, L4 - suspicious for malignancy, and L5 - malignant. The accuracy of cytology and ROM was evaluated by comparing them to histopathology, the gold standard diagnosis.

Results: Distribution of 260 cytological diagnoses of lymphadenopathy classified in the Sydney system by category were as follows: L1-16 (6.00%); L2-161 (62.00%); L3-06 (2.30%); L4-07 (2.70%); and L5-70 (27.00%) cases. Histopathology was considered the gold standard in 53 cases, revealing malignancy rates (ROM) of 0%, 3%, 66.66%, 100%, and 100% in each category. Cytological diagnosis showed a sensitivity of 95.65%, specificity of 96.29%, Positive Predictive Value (PPV) of 95.65%, Negative Predictive Value (NPV) of 96.29%, and diagnostic accuracy of 96%. Reactive lymphadenitis was the most common benign lesion in 88 (33.85%) cases, while metastatic carcinoma was the most common malignant lesion in 63 (24.30%) cases.

Conclusion: The Sydney system for lymph node cytology reporting ensures standardized terminology and reproducibility in reports. It helps guide clinicians on follow-up and ancillary studies in atypical and equivocal cases. In cases classified as non-diagnostic (L1), a repeat procedure or biopsy is recommended to prevent false negative diagnoses.

Key Words: Fine Needle Aspiration Cytology (FNAC), The Sydney system for lymph node cytology, Lymph node

INTRODUCTION

Lymphadenopathy is a common clinical presentation in patients seen at outpatient clinics, with causes ranging from inflammatory processes to malignant conditions. In adults, enlarged lymph nodes can be the first indication of non-hematological malignancy.[1] Fine needle aspiration cytology (FNAC) of lymph nodes is a key tool for diagnosing and managing lymphadenopathy due to its quick results and low risk of complications. In children, lymphadenopathy may indicate a self-limiting infection, while in adults, it could be a sign of metastatic cancer. The infectious causes of lymphadenopathy vary by region, with tuberculosis being a common cause in developing countries. [2] While most lymph node lesions are non-neoplastic, it is important to identify neoplastic lesions for proper management. [3]

FNAC is an important tool for quickly diagnosing and managing patients with lymphadenopathy. [4] The material obtained can be used for additional studies such as flow cytometry, immunocytochemistry, or immunohistochemistry.
The diagnosis of metastatic malignancy in lymph node cytological smears is highly reliable. [5] Reporting of aspiration cytopathology for various organs is now done using category-wise formats, making it easier for clinicians to interpret and accept the results. [6]

In May 2019, a new categorical system for lymph node cytopathology was proposed at the 20th International Congress of Cytology in Sydney. This system categorizes aspirates into five categories based on specific cytologic features, providing a clear description of cytomorphology and recommendations for management options. The five basic categories are as follows: [7]

L1-Inadequate/Insufficient: Non diagnostic due to scant cellularity, possibly due to necrosis or technical issues; consider repeating the FNAC or biopsy based on the clinical situation.

L2-Benign: Includes suppurative, granulomatous or specific infections in cases with a heterogeneous lymphoid population with small lymphocytes predominating.

L3-Atypical Lymphoid (Cells) of Undetermined Significance/ Atypical (Cells) of Uncertain Significance (ALUS/AUS): Cases with a heterogeneous lymphoid population suggest a reactive process, but not enough evidence to rule out follicular lymphoma or other abnormalities. AUS should be used for cases with excess large cells, immature small lymphoid cells, or atypical non-lymphoid cells.

L4-Suspicious category: Cases with small or medium-sized atypical lymphoid cells that raise suspicion for lymphoma, but the cytomorphology alone is not sufficient/or cases in which Reed-Sternberg-like cells seen or/atypical cells suspicious for metastasis are detected, but too scant to be diagnostic.

L5-Malignant: Includes small to medium-sized cells of NHL supported by flow cytometry or molecular studies, Hodgkin's Lymphoma if diagnostic Reed-Sternberg cells seen as well as metastatic neoplasms.

This study aimed to evaluate lymph node pathology using the Sydney system and compare the results with histopathology findings when available.

MATERIAL AND METHODS

The study conducted an observational analysis of lymph node aspirates collected over a one and a half-year period from January 2022 to June 2023 at the pathology department of a tertiary care center. Eligibility criteria included FNAC of 260 patients of all ages with lymphadenopathy, excluding non-lymph node aspirates. Lymph node biopsy diagnoses were compared to FNAC results in available cases.

A total of 260 patients underwent clinical evaluation and provided consent for the FNAC procedure. Specimen adequacy was assessed using Rapid Onsite Evaluation (ROSE) with toluidine blue stain Ultrasound/CT-guided fine needle aspiration cytology (FNAC) was performed for smaller and deep-seated lymph nodes. Wet slides were fixed in methanol for staining with haematoxylin-eosin, Papanicolaou stain, and air-dried smears for May Grunwald Giemsa stain. Special stains like Ziehl-Neelsen staining were used for suspected tuberculosis cases. Lesion diagnosis was based on specific morphological patterns and standard cytological guidelines.[8,9]

Cytology diagnoses were categorized into 5 groups following the Sydney system guidelines and reviewed by two pathologists for objectivity. Lymph node biopsies were processed by paraffin embedding and stained with

haematoxylin and eosin for comparison with cytology results. Malignancy diagnoses were made according to WHO guidelines for Haemato-lymphoid tumors. [10]

The Rate of Malignancy (ROM) was calculated by dividing the number of confirmed malignant cases on histopathology by the total cases with available histopathology diagnosis in that category. [11] Concordant and discordant results between cytology and histopathology were noted. Sensitivity, specificity, PPV, NPV, and diagnostic accuracy were calculated, with diagnostic accuracy determined using the formula (TP + TN) / (TP + TN + FP + FN).

Cases with concordant malignant diagnoses on cytology and histopathology were considered True Positive (TP), while cases with concordant benign diagnoses were True Negative (TN). False Positive (FP) cases were those diagnosed malignant on cytology but benign on histopathology, and False Negative (FN) cases were benign on cytology but malignant on histopathology.

The present study was a observational analysis of lymph node aspirates obtained during one and half-year period from January 2022 to June 2023, done in the department of pathology of a tertiary care centre.

RESULTS

A total of 260 aspirates of lymphadenopathy were analysed. The corresponding lymph node histopathology diagnosis was available in 53 (21.20%) cases. The age ranged from 1 year to 78 years. Youngest patient was 1-year old female and the oldest patient was 78-year-old male. The age distribution for cases were 0-10 years (48 cases), 11-20 years (44 cases), 21-30 years (61 cases), 31-40 years (38 cases), 41-50 years (22 cases), 51-60 years (23 cases), 61-70 years (22 cases) and 70-80 years (2 cases). The maximum number of cases 61 were seen in the age ranges of 21-30 years. Male to female ratio is 1.36:1. [Table-1].

Out of the total lesions, 159 (63.60%) were non-neoplastic and 68 (27.20%) were neoplastic. Non diagnostic aspirates were 14 (5.60%), atypical cells and suspicious cases were 9 (3.60%). Malignancies showed a male preponderance with 52 (76.47%) males and 16 (23.53%) females, with a M:F ratio of 3.25:1.

Table 1: Percentage of lymph node FNAC according to age groups and gender. (n=260)

	Age group	Male	Female	Total frequency (%)
1	0-10	31	17	48 (18.40%)
2	11-20	21	23	44 (16.9%)
3	21-30	26	35	61 (23.4%)
4	31-40	14	24	38 (14.60%)
5	41-50	18	04	22 (8.46%)
6	51-60	20	03	23 (8.84%)
7	61-70	18	04	22 (8.46%)
8	70-80	02	00	02 (0.76%)
	Total	150	110	260 (100%)
	Overall male female ratio-1.36:1			

The group of commonest lymph nodes aspirated were cervical nodes in 144 (57.60%) cases. Out of 38 supraclavicular lymph nodes, 17 (44.73%) were of neoplastic aetiology. Diagnostic categories in each lymph node groups are shown in [Table-2].

Size of lymphadenopathy varied from 0.5 cm to 4 cm, average size of 1 to 2 cm was seen in 137 (54.80%) cases. Diagnostic categories per the Sydney system are shown in [Table-3].

Category I/L1-There were 16 (6.00%) non diagnostic aspirates, 8 (3.00%) were blood only and 8 (3.00%) were scanty material. Repeat aspiration/biopsy was recommended.

Category II/L2- Out of 161 (62.00%) cases in L2, there were reactive hyperplasia in 88 (33.85%).The microscopic examination of reactive lymphadenitis showed polymorphous population of cells, comprising of small lymphocytes, centrocytes and centroblasts (Figure 1).

Table 2: Category wise distribution of cytological lesions across lymph node groups. (n-260).

Lymph node group %	Non diagnostic category 1	Benign category II	AUS category III	Suspicious category IV	Malignant category V	Total frequency (%)
Cervical	10	93	04	03	44	154
(59.20%)	(6.49%)	(60.39%)	(2.60%)	(1.95%)	(28.57%)	(100%)
Supraclavicular	-	18	01	02	17	38
(14.65%)		(47.36%)	(2.63%)	(5.26%)	(44.73%)	(100%)
Axillary	03	23	-	-	03	29
(11.15%)	(10.34%)	(79.31%)			(10.34%)	(100%)
Inguinal (7.7%)	03	12	-	01	04	20
	(15%)	(60%)		(5%)	(20%)	(100%)
Sub- mandibular (3.1%)	-	06 (75%)	01 (12.50%)	-	01 (12.50%)	08 (100%)
Postauricular	-	06	-	-	-	06
(2.30%)		(100%)				(100%)
Sub-mental	-	03		01	01	05
(1.9%)		(60%)		(20%)	(20%)	(100%)
	14	159	04	05	68	250

Table-3: Category wise cytology diagnosis as per the proposed Sydney System in the present study (n-260).

	Diagnostic category	Total frequency (%) 250	Cytology diagnosis (n-250)	Frequencey (%)
1	CategoryI/(L1) inadequate/non diagnostic	16 (6.00%)	Blood only	8 (3.00%)
			Scanty material	8 (3.00%)
2	Category II/(L2) benign	161 (62.00%)	Reactive lymphoid hyperplasia-	88(33.85%)
			Acute/suppurative lymphadenitis	16 (6.15%)
			Granulomatous lymphadenitis	53(20.40%)
			Miscellaneous-reactive lymphadenitis with Histiocytes	4 (1.60%)
3	Category III/(L3) ALUS/AUS	6 (2.30%)	Atypical lymphoid cells	6 (2.30%)
4	Category IV/(L4): suspicious	7 (2.7%)	Suspicious of lymphoma	3 (1.20%)
			Suspicious of metastasis	4 (1.50%)
5	Category V/(L5): malignant	70 (27.00%)	Lymphoma	7 (2.70%)
			Metastasis	63(24.30%)

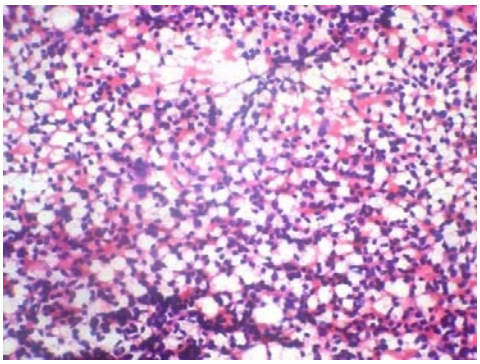

Figure 1: Shows polymorphous population of lymphoid cells comprising of small lymphocytes, centrocytes and centroblasts. (H&E 400X)

53 (20.40%) cases were diagnosed as granulomatous inflammation and suppurative lymphadenitis in 16 (6.15%) cases. Diagnosis of reactive background with histocytes, to rule out toxoplasmosis by serology was given in 4 (1.60%) cases. Epithelioid granulomas were seen in all 53 (100%) cases of granulomatous lymphadenitis. Necrosis was seen in 31 (58.49%) cases (58.50%). Microscopic examination of granulomatous inflammation showed granuloma consists of epithelioid cells, fibroblast, lymphocyte and caseous necrosis (Figure 2).

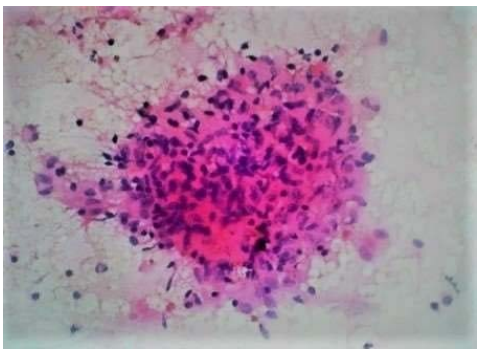

Figure 2: showing granuloma consists of epitheloid cells, fibroblast, lymphocyte and necrosis. (H&E 400).

Acid-Fast Bacilli (AFB) positivity was seen in 9 (29.03%) cases. AFB positivity was assessed based on the original grading system for AFB in the sputum smears [12]. Microscopic examination of ZN-stained slide showed presence of acid fast bacilli in necrotic background (Figure 3).

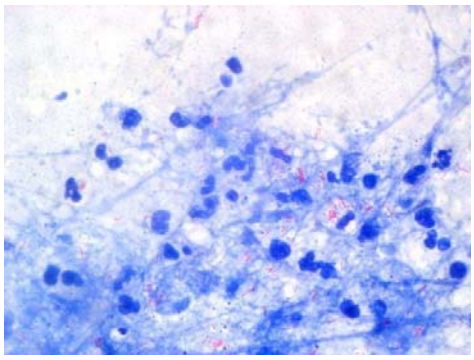

Figure 3: Shows tubercle bacilli (Acid fast bacilli) in the background of necrosis. (ZN 1000 X).

Category III/L3-There were 6 (2.30%) cytology diagnosis. Atypical cells in a reactive background, including large cells and immunoblasts. Biopsy and IHC were recommended.

Category IV/L3-There were 7 (2.70%) cases. Four were suspicious of metastasis, where granuloma, necrosis and atypical cells found. Cases suspicious of lympho proliferative lesions in 3 cases were advised biopsy with recommendation for ancillary studies.

Distribution of metastatic malignancies given in Table-4. Category V-Included 70 (27.00%) malignant lesions, 63 (90.00%) were metastatic malignancy and 7 (10.00%) cases were lymphomas.

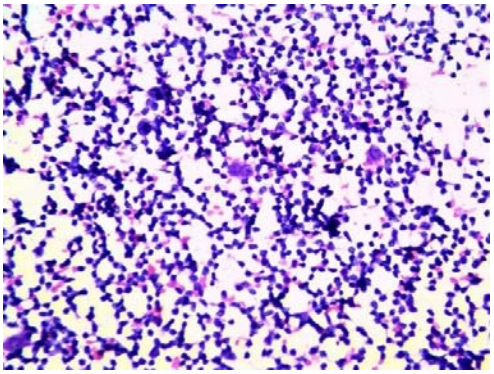

Figure 4: Shows monomorphic population of lymphoid cells along with presence of classical

Out of 7 (2.70%) cytology diagnosis of lymphomas, one case was Hodgkin's lymphoma, microscopic examination of Hodgkin's lymphoma showed presence of classical reed-sternberg cell along with monomorphic population of lymphoid cells (Figure 4&5) and 6 cases were Non-

Hodgkin's lymphomas showed monomorphic population of lymphoid cell (Figure 6).

Table-4: Distribution metastatic carcinoma (category V) in males and females (n=63).

Metastatic carcinoma	Males	Females	Total frequency (%)
Squamous cell carcinoma	23	06	29 (46.00%)
Poorly differentiated carcinoma	14	03	17 (27.00 %)
Adenocarcinoma	10	04	14 (22.20%)
Breast carcinoma	00	02	02 (3.20%)
Papillary thyroid Carcinoma	01	00	1 (1.60%)
Total	42	12	63 (100%)

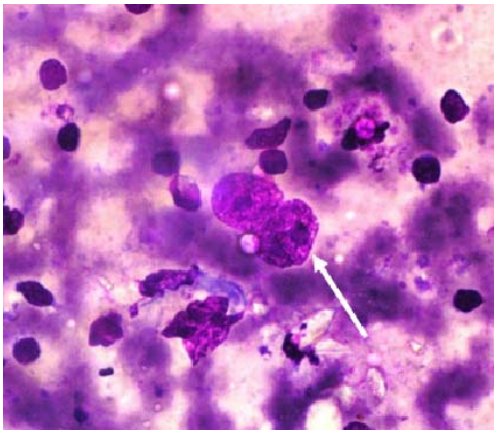

Figure 5: Shows classical Reed-sternberg cell. (MGG 1000X)

Hodgkin's lymphoma was confirmed on histopathological examination. Among the 6 cases of NHL, two cases were further confirmed as NHL on histopathology in our centre. Four cases were confirmed through immunohistochemistry after follow-up. Metastatic malignancy in 63 (24.30%) was the second most common cause of lymphadenopathy, second to reactive lymphadenitis in the present study. The breakup of metastatic lymphadenopathy in 63 cases showed highest incidence for squamous cell carcinoma, 29 (46.00%) cases showed sheets of squamoid type cell with abundant eosinophilic cytoplasm in background of lymphoid cells (Figure 7&8), out of which 23/29 were males.

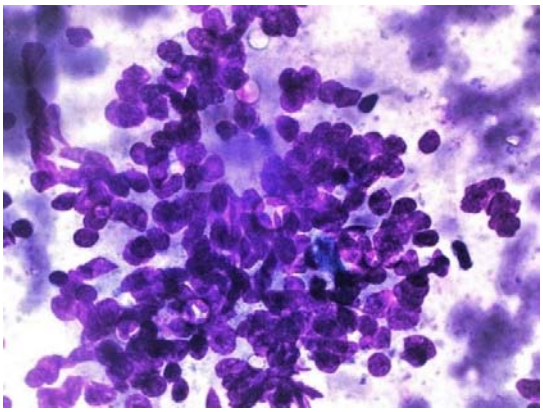

Figure 6: Shows monomorphic population of lymphoid cells. (MGG 1000X)

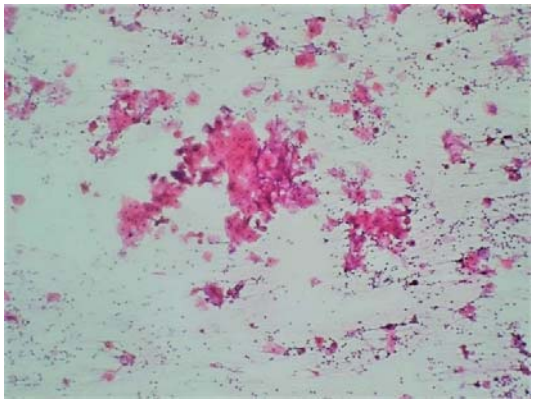

Figure 7: Shows sheets of squamoid type tumor cells in a background of lymphoid cells. (H&E 100X)

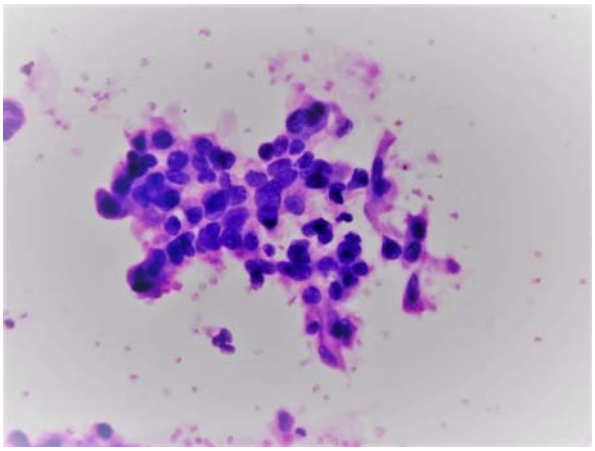

Figure 8: Shows sheets of squamoid type cell with abundant eosinophilic cytoplasm in background of lymphoid cells. (H&E 400X)

The other metastatic tumours were poorly differentiated carcinoma, adenocarcinoma, breast carcinoma and papillary thyroid carcinoma. 17 (27.00 %) cases of poorly differentiated carcinoma showed highly cellular, crowded cell clusters, with individual cell with high N/C ratio and hyperchromasia (Figure 9). 14 (22.20%) cases showed features of metastatic adenocarcinoma showed cohesive group of tumor cells with markedly vacuolated cytoplasm (Figure 10). 02 (3.20%) cases showed features of metastatic breast carcinoma showed monolayer ductal cells with mild nuclear pleomorphism and intact cytoplasm (Figure 11). 1 (1.60%) case was diagnosed as metastasis of papillary thyroid carcinoma.

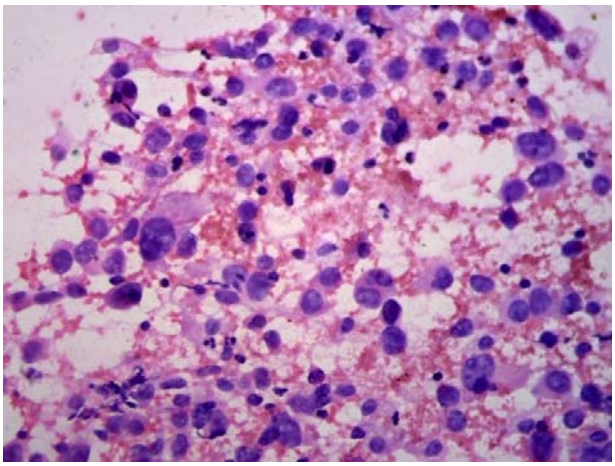

Figure 9: Shows crowded cell cluster, with individual cell with high N/C ratio and hyperchromasia. (H&E 400X)

Table-5: List of cytologic diagnosis and the corresponding HP diagnosis with the category wise concordant and discordant cases.

Cytologic category Sydney system	Total no of Cases with HP diagnosis %	Cytology diagnosis	Histopathology diagnosis concordant	Histopathology diagnosis discordant
L1- Non diagnostic	3/16 (18.75%)	Blood only and inadequate material (n=3)	*Reactive lymphoid hyperplasia (n=3)	NA*
L2 Benign	27/161 (16.77%)	Reactive lymphoid hyperplasia (n=11)	Reactive lymphoid hyperplasia (n=11)	nil
		Acute suppurative lymphadenitis (n=4)	Acute suppurative lymphadenitis (n=3)	Granulomatous lymphadenitis (1)
		Granulomatous lymphadenitis (n=12)	Granulomatous lymphadenitis (n=9)	Reactive lymphoid hyperplasia (2) Hodgkin's Lymphoma (1)
L3-Atypical ALUS/AUS	3/6 (50%)	Atypical cells (n=3)	Non Hodgkin's Lymphoma(n=2)	Reactive lymphoid hyperplasia (1)
L4 Suspicious	2/7 (28.57%)	Suspicious of metastatic carcinoma (n=2)	Metastatic carcinoma (n=2)	nil
L5 Malignant	18/70 (25.7%)	Lymphoma (n=3)	Non Hodgkin's Lymphoma (n=2) Hodgkin's Lymphoma (n=1)	nil
		Metastasis (n=15)	Metastasis (n=15)	nil
Total	53/260 (20.38%)			

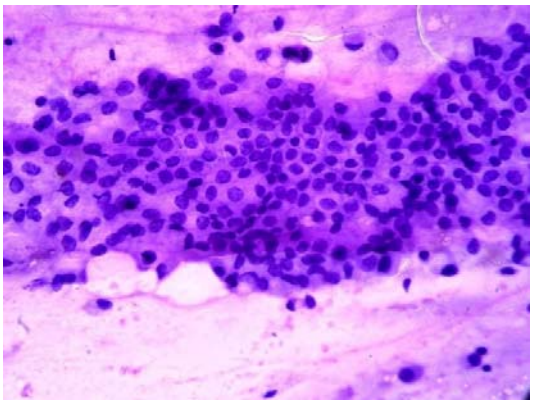

Figure 10: Shows cohesive group of tumor cells with markedly vacuolated cytoplasm.(H&E 400X)

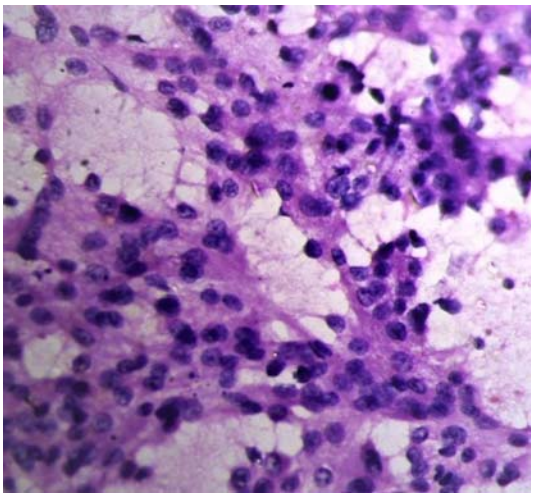

Figure 11: Shows monolayer of ductal cells with mild nuclear pleomorphism and intact cytoplasm. (H&E 400X)

Biopsy diagnosis of FNACs in categories I, II, III, IV and V were available in 03, 27, 03, 02, and 18 cases respectively. Category wise concordant and discordant diagnosis on cytology and histopathology are tabulated in [Table-5].

Category I /L1(03cases) Category IV/L4 (02 cases) -3/16 cases of inadequate cytology were biopsied, histopathology diagnosis in all 3 cases was reactive follicular hyperplasia.

Category II/L2 (27 cases)-Out of the 11 cytological smears of reactive lymphadenitis, 11 were diagnosed as reactive follicular hyperplasia on histopathology. Out of the 4 smears of suppurative lymphadenitis, 3 were confirmed histologically, one case turned out to be granulomatous lymphadenitis on biopsy. Out of the 12-cytology diagnosis of granulomatous lymphadenitis, 9/12 was confirmed to be granulomatous lymphadenitis consistent with tuberculosis on histopathology, 2/12 cases were diagnosed as reactive hyperplasia. One out of twelve cases in category II were diagnosed as Hodgkin's lymphoma on histopathology, indicating a discordant diagnosis of malignancy.

Category III/L3 (3 cases), there were 3 diagnoses of atypical lymphoid cells, out of which, 2 were diagnosed as NHL, one case diagnosed as benign reactive hyperplasia, was another discordant diagnosis on histological correlation.

Category IV/L4 (2 cases) - Biopsy confirmed metastatic carcinoma in both cases initially suspected to be metastatic carcinoma.

Category V/L5 (18 cases)-Cytological diagnosis of metastasis was confirmed on biopsy in all 15 cases. In 3 cases of Lymphoma, 2cases were confirmed as NHL and one case as Hodgkin’s Lymphoma, which also was concordant.

Out of the 27 cytologically benign cases, 26 were confirmed as benign histopathologically, TNs and one was malignant,FN. Among the 23 cytologically malignant/suspicious cases, 22 were confirmed as malignant histopathologically were TP, and one was benign, FP on cytology. The true and FPs and negatives in comparison to gold standard shown in Table-6.

Table-6: The true and False Positives (FP) and negatives in comparison to gold standard.

	Histopathology Diagnosis		
	Malignant	**Benign**	**Total**
Cytology Diagnosis	22 (TP)	1 (FN)	23
	1 (FP)	26 (TN)	27
Total*	23	27	50

The sensitivity, specificity, PPV, NPV, and overall diagnostic accuracy of lymph node FNAC were assessed by comparing with the histopathological diagnosis in 50

cases (non diagnostic category excluded). The diagnostic accuracy was calculated as 96% using the formula: (TP + TN) / (TP + TN + FP + FN) = (22 + 26) / 50.

Table-7- The statistical values of FNAC diagnosis compared to gold standard

	Statistical analysis	Percentage
1	Sensitivity	95.65%
2	Specificity	96.29%
3	PPV	95.65%
4	NPV	96.29%
5	Diagnostic accuracy	96%

ROM in each category was calculated by dividing the number of cases with a confirmed malignant diagnosis by the total number of cases in each diagnostic category Table-8.

Table-8: Risk Of Malignancy (ROM) for each Sydney system category in the present study (n=53)

Diagnostic category Sydney system	Number of cases biopsied in each category (%)	Confirmed malignancy by histopathology	Risk of malignancy
L1	3 (2.14%)	Nil	0%
L2	27 (16.98%)	1	3%
L3	3 (75%)	2	66.6%
L4	2 (40%)	2	100%
L5	18 (26.47%)	18	100%

DISCUSSION

A standardized reporting system ensures consistency in the use of terminology and facilitates clear communication to clinicians in a consistent and reproducible manner. The proposed Sydney system for performance, diagnosis and classification of lymph node cytopathology has addressed the issue favourably. Recommendations to perform ROSE, comments on use of additional investigations at a second diagnostic level, management recommendations for each category and the calculation of ROM related to each category of cytological diagnosis are the highlights of the proposed classification system [7].

Evaluation of 260 Lymph node FNACs in all ages and 53 Lymph node biopsies in corresponding cases were done. Mean age was 32.5 years. Male to female ratio of 1.36:1. In 3rd and 4th decades, females outnumbered males with a male-to female ratio of 1:1.3. Qadri SK et al. also made similar observations with a ratio of 1.5:1 [13]. Mohanty R described Male female ratio of 1.05:1 in their study of 355 cases [14].

Cervical lymphadenopathy in 154 (59.20%) cases was the commonest group of nodes seen in the present study. Non neoplastic disorders seen in 161 (62.00%) outnumbered neoplastic disorders in 70 cases (27.00%). A total of 53 (20.40%) of granulomatous lymphadenitis were seen in the present study, AFB positivity was seen in 9 (29.03%) cases. Qadri SK et al., in their study of 1579 lymphadenopathy reported reactive lymphadenitis as the commonest finding in 36.90%, Granulomatous lymphadenitis in 9.10% and metastatic malignancy in 38.20% cases of lymphadenopathy [13]. In their study of 656 cases, Khajuria R et al. found that granulomatous lymphadenitis was the most common lesion, present in 52.3% of cases, followed by reactive lymphadenitis in 37.20% and metastatic malignancy in only 3.80% of cases [15].

In Category I, three out of 16 lesions were examined histopathologically and found to be benign reactive hyperplasia, resulting in a ROM of zero for this category. Though repeat FNAC or excision biopsy was advised, the cases were not available for follow-up. Gupta P et al., described that ROM was high for category I lesion (27.50%) [11]. The discrepancy seen in the present study, was due to the smaller number of nodes biopsied, smaller nodes and paediatric FNACs.

Comparison of ROM for Sydney system categories in other studies shown in [Figure 9] [11,16,17].

Table-9: comparison of Risk Of Malignancy (ROM) stratification with other study results [11,16,17].

Diagnostic category Sydney system	Gupta P et al., (2021) [11]	Vigliar E et al., (2021) [16]	Joshee A and Joshee R (2021) [17]	Present Study (2023)
L1	27.5	50%	34.7	0%
L2	11.5	1.92%	20	3%
L3	66.7	58.3%	15	66.6%
L4	88	100%	78.5	100%
L5	99.6	100%	96.7	100%

In category II, one diagnosis of suppurative lymphadenitis and 2 cases of granulomatous lymphadenitis turned out to be reactive lymphadenitis on histopathology. Upon reviewing the slides, the sparse cellular nature of the aspirate was identified as one of the reasons for this discrepancy. A discordant diagnosis in this category was a FN case of Hodgkin's Lymphoma, reported as granulomatous lymphadenitis on cytology. G Gupta et al. discussed the challenges of diagnosing nodular sclerosis due to its paucicellular nature and sclerotic pattern on cytological aspirates. Interpretation of AFB staining on second diagnostic level has enabled confirmatory diagnosis of tuberculosis in 9 cases of granulomatous lymphadenitis. The ROM was 3% in the present study, similar observation by Vigliar E et al., have reported ROM of 1.92% for category II lesions [16].

In category III-In this group, 2/3 cases were lymphoma NHL, on biopsy. One cytology among this category was reactive hyperplasia on biopsy. Advice on excision and recommendation for ancillary testing is warranted in cases in this category as the ROM can be high, 66.6 % in our study and high in other studies [11,16]. Joshee A and Joshee R have reported ROM was 15% for category III lesions [17].

In category IV-5/5 cytology among this category turned out to be malignant on histopathology. Two metastatic nodes were biopsied at our center, and 3 lymphomas were diagnosed at other centers but were subsequently followed up. The rate of malignancy in this category is 100%. Similar results were reported by Vigliar E et al. [16].

In category V-There were 70 lesions in cytology and 18 biopsy proven cases. Primary malignancy of oropharynx, lung, were the commonest known primary in these cases. ROM was 100%. Similar results were reported by Vigliar E et al., Joshee A and Joshee R [16,17]. Bhagwan I et al., found that the majority of tumours metastasizing to cervical lymph nodes were from the head and neck region, followed by the respiratory system and tumors of unknown origin [18]. Comparison of statistical evaluation using the Sydney system in cytology with other studies is presented in Table 10 [11, 16, 17].

Gupta P et al., on evaluation of 6983 cases has found that FNAC has high diagnostic accuracy, application of the Sydney system can help in achieving uniformity and reproducibility in cytologic diagnoses and help in risk-stratification [11]. Similar conclusions were drawn by Vigliar E et al., and Joshee A and Joshee R concluding that FNAC coupled with use of ancillary studies and implementation of Sydney system will be effective in evaluation of lymph node pathology [16,17].

Table-10: Comparison of statistical evaluation of Lymph node cytology using Sydney System with the gold standard in studies [11,16,17].

	Gupta P et al., (2021) (n=6983) [11]	Vigliar E et al., (2021) (n=300) [16]	Joshee A and Joshee R (2021) (n=1409)[17]	Present (2023) (n=260)
Sensitivity%	79.9	98.47	95.12	95.65
Specificity%	98.7	95.33	90.32	96.29
PPV%	98.4	96.27	97.5	95.65
NPV%	83.1	98.08	82.35	96.29
Diagnostic accuracy%	89.3	97.06	94.16	96

Limitations

The current study is limited by the absence of ancillary tests, such as flow cytometry, immunohistochemistry, or molecular studies, for confirming the final diagnosis of lymphoid malignancy. The main limitations of this study include limited histopathological follow-up.

CONCLUSIONS

FNAC has a diagnostic accuracy of 96% and is a reliable and minimally invasive method for evaluating lymphadenopathy. The Sydney system helps standardize cytology reports and categorize risk levels for better management. It confirms benign lesions and prompts further investigation for atypical cases. ROM in L1 varies, necessitating context-specific recommendations for repeat procedures or biopsies to avoid false-negative diagnoses. FNAC aids in the primary diagnosis of lymphadenopathy, guiding subsequent management. The Sydney system enhances risk stratification and management with high sensitivity and specificity.

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