Reporting of lymph node fine needle aspiration cytology by applying the Sydney system at tertiary care hospital

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Abstract

Background: Lymph node enlargement is a common clinical finding in a wide spectrum of diseases and its evaluation is essential for proper patient care. Fine needle aspiration cytology has been used as an initial diagnostic method in such conditions especially for infective conditions and also to differentiate between benign and malignant lesions. A standardized category based cytology reporting system was proposed by IAC in 2019 which gives 5 categories of cytological diagnosis and also provides management category for each class.

Methods: This retrospective cross-sectional study was conducted at GMERS Medical college and Hospital Gandhinagar, Gujarat, India, from January 2022 to January 2024. Total of 450 fine needle aspirations of lymph node lesions performed were reviewed and cytologically re-evaluated and classified according to the Sydney system and were compared with its clinical details. The statistical analysis was done.

Result: 450 lymph node aspirates were evaluated with cases having slight male predominance. Benign category diagnosis was most common. Overall, the most common diagnosis was granulomatous lymphadenitis. Metastatic squamous cell carcinoma was most common malignant diagnosis. Risk of malignancy calculated after histopathological correlation was highest in malignant category.

Conclusion: The Sydney system for reporting lymph node cytology would be helpful in the improvement of

quality of reports, better understanding and communication between clinician and pathologist and thereby improving patient care.

Keywords: Lymph node, FNAC, Granulomatous lymphadenitis, risk of malignancy

Introduction

Lymph nodes are collection of lymphoreticular tissue at many sites in the human body. They are a part of the lymphatic system and have a role in the immune mechanism of the body. Lymph node enlargement is termed as lymphadenopathy. This can occur in a wide spectrum of diseases ranging from reactive conditions to malignancy [1]. Thus, lymphadenopathy is a common presenting symptom in clinical practice which requires proper evaluation.

Therefore, management of cases depends on lymph node pathology, which can be studied by collecting material through Fine needle aspiration cytology (FNAC) method that can be used as an outpatient procedure [1].

FNAC is a safe, simple, reliable, relatively less invasive, well established and popular diagnostic aid for patients presenting with lymphadenopathies [2].

Previously no standardized reporting system or common terminology was available for lymph node cytology like those for cervical cytology [3] and thyroid cytology [4].

For better patient care future aim would be use of standardized and integrated reporting with more involvement of cytopathologists with treating clinicians [5].

In the 20th International Congress of Cytology held at Sydney in 2019 a panel of experienced cytopathologists from all over the world proposed a standardized category based lymph node cytology reporting system. This was endorsed both by IAC and EFCS. It provided a categorical classification of aspirates into five different categories based on specific cytological features. It also provides a management category for each class. The categories are as follows- category I/L1: inadequate/non-diagnostic, Category II/L2: benign, category III/L3: atypical cells of undetermined significance/atypical lymphoid cells of uncertain significance, category IV/L4: suspicious for malignancy and category V/L5: malignant [6,7].

The present study aims to analyze and classify lymph node samples as per new proposed Sydney system and also to assess the risk of malignancy of each category by correlating with histopathology report wherever possible.

Materials and Methods

This was a retrospective cross-sectional study conducted at cytology laboratory, GMERS Medical college and Hospital Gandhinagar, Gujarat from January 2022 to January 2024. Patients who underwent lymph node swelling FNAC of both genders and all age group were included. The relevant clinical history, radiological investigation and local examination of the cases were recorded from the received test requisition forms.

All FNA procedure were performed under aseptic precautions after explaining the procedure and taking written consent using 22 Gauge needle. All aspirate smears were stained with Haematoxylin and Eosin stain, Giemsa stain and ZN staining was performed in cases where required.

The cytopathological data of previously reported cases were analysed and classified according to the Sydney system of reporting.

To assess the diagnostic accuracy the FNA diagnosis, each diagnostic category was compared with histopathologic diagnosis; when no biopsy was performed, clinical follow-up was checked.

Risk of malignancy (ROM) for a category was calculated by dividing the number of cases confirmed malignant on histopathology by number of total cases with available histopathology in the category.

Histopathology was considered standard of diagnosis in the study. All cases which were malignant both on cytology and histopathology were considered true positive (TP). True negative (TN) were cases diagnosed benign on both cytology and histopathology. False positive (FP) were cases given malignant on cytology but were found benign on histopathology. The cases marked as benign lesion on cytology but found malignant on histopathology were considered false negative cases (FN). The sensitivity, specificity and diagnostic accuracy were also calculated.

Results

In the duration of the study from January 2022 to January 2024 FNA from the 450 lymph node cases were studied. Age ranges from 2 months to 78 years. The most common age group undergoing lymph node FNA in the study was age 21 to 30 years group shown in table 2. The gender ratio in the study cases was 1.13:1 for male to female shown in table 3. Most common site for FNA was cervical lymph nodes, comprising 83.8% (n=377) cases. Second most common site was axillary lymph nodes with 6.2% (n=28) cases, followed by submandibular lymph nodes 5.8% (n=26) cases, inguinal lymph nodes 1.1% (n=5) cases and 3.1% (n=14) cases from other sites including submental, supraclavicular and infraclavicular lymph nodes.

A total of 3.8% (n=17) cases were reported as non diagnostic/inconclusive (L1). The majority of them (n=11) showed only blood and no cellularity. Remaining cases (n=6) showed only necrosis. Benign (L2) cytologic diagnosis was seen in 85.3% (n=384) cases, which included 267 (59.3%) cases of granulomatous lymphadenitis, 57 (12.7%) cases of reactive lymphadenitis, 45 (10%) cases of Chronic non-specific lymphadenitis, and 15 (3.3%) cases of acute suppurative lymphadenitis. Among granulomatous lymphadenitis, being tuberculosis was diagnosed as the most common cause based on their clinical as well as cytologic features consistent with epithelioid histiocytic cells, multinucleated Langerhans giant cells and areas of necrosis. Atypia of undetermined significance (AUS) (L3) included 0.2% (n=1) case with atypical lymphocytic population and atypical non lymphocytic population. Suspicious of malignancy(L4) included 0.4% (n=2) case. Malignant lesions (L5) were seen in 46 cases. Amongst these 0.7% (n=3) cases were reported as non-Hodgkin's lymphoma, 9.6% (n=43) cases were of metastatic squamous cell carcinoma.

Histopathological slides were available for 61 cases out of the 450 cases whose cytology was considered in this study. Of these 20 were benign diagnoses while 41 were malignant diagnoses. The most common histopathological diagnosis was metastatic squamous cell carcinoma. The most common benign diagnosis was Granulomatous lymphadenitis.

In the L1 non-diagnostic category, histopathology correlation was not available. In the L2 category of benign cytology, histopathology was available for 20 cases out of which 2 showed features of malignancy. The ROM for this category was 10%. The L3 category of ALUS histopathological correlation was not available. There were 2 cases of histopathology available for correlation in category L4 of suspicious for malignancy out of which 1 were positive for malignancy on histopathology. The ROM in this category was 50%. In the L5 category of malignant diagnosis by cytology

histopathological correlation was available in 39 out of the 46 cases. Malignancy was diagnosed in 38 cases. The most common primary lymphoid malignancy in the study on histopathology in the study was NHL. The L5 category ROM was 97.4%.

As per cytology and histopathology correlation, sensitivity and specificity in this study was 95.12% and 90% respectively. The diagnostic accuracy of the proposed lymph node cytology reporting system in our study was found to be 93.44%.

Discussion

Lymph node enlargement is a common presenting symptom in the general outpatient department. It is one of the first and very common presenting features in variety of diseases, either infective or benign or malignant. The application of FNA to evaluate the lymph node swellings is advantageous as it is a rapid and relatively faster method. FNAC is the first line of investigation in the diagnosis of lymph node lesions. It is safe, inexpensive and highly acceptable to the patient and can be used as a safe alternative to excision biopsy. The cytology results can help in early distinction of benign and malignant lesions. Also, it is helpful in diagnosis of early diagnosis of granulomatous lesions which are common in India [8]. The IAC has proposed a standardized categorical lymph node cytology reporting system which has defined criteria for diagnosis and it also provides management guidelines for each category. Its aim is improved clinical integration and overall better disease management. [6, 7]

As the proposed reporting system is a recent development in cytopathology field, only few publications are available for comparison. The present retrospective study included cases of FNA of superficial lymphadenopathy over a period of 2 years duration and included 450 cases. All of these were non guided as well as USG guided FNA procedures. In comparison to the retrospective study by Gupta P *et al*. [9] which included 6983 cases, ours is a smaller study as per number of cases. The retrospective study by Rivas HE *et al*. [10] and Vigliar E *et al*. [11] also published in 2021 evaluated 363 and 300 cases respectively but included only ultrasound guided FNA of lymphadenopathy. In the current study the age range of patient undergoing FNA was from 2 months to 78 years. The current study had more number of male patients undergoing lymph node FNA. The cervical lymph nodes were the most common site to be evaluated and this was similar in study by Vigliar E *et al*. [11] and Gupta P *et al*. [9] Rivas HE *et al*. [10] included all palpable and non-palpable lymphadenopathy cases visualized using ultra-sonography (USG).

In the current study category L1 of insufficient aspirates was seen in 17 cases (3.8%) while Gupta P *et al*. [9] had 289 cases (4.1%) as they used rapid on-site evaluation (ROSE) [12] technique. The study by Rivas HE *et al*. [10] had 13 aspirates (3.58%) in this category which could be because of FNA being done using USG guidance. The L2 benign cytology category included most number of cases (85.3%) in our study that was comparable to the studies by Gupta P *et al*. [9] and Rivas HE *et al*. [10] The L3 category of ALUS 0.2 % cases were given in our study. Study results of Gupta P *et al*. [9] and Rivas HE *et al*. [10] who had 0.5% and 1.93% cases in this category respectively. The suspicious for malignancy category L4 had 0.4 % cases in the current study which was lower than the study result of Gupta P *et al*. [9] (1.4%) and Rivas HE *et al*. [10] (5.79%). The last category of malignant cytology L5 was diagnosed in 46 cases (10.3%) in the current study. This is a much smaller number than studies by Gupta P *et al*. [9] and Vigliar E *et*

al. [11] who had 41.76% and 46% malignant cytological lesions respectively. This could be due to larger number of cases included in study by Gupta P *et al*. [9] Also Vigliar E *et al*. [11] used USG guided FNA in all lymphadenopathy cases that was additional help.

The most common cytological diagnosis in our study was granulomatous/ necrotizing lymphadenitis. The most common malignant lesion diagnosed on cytology was metastatic squamous cell carcinoma. In the study by Gupta P *et al*. [9] the most common cytological diagnosis was metastatic squamous cell carcinoma. In the present study histopathological correlation was available in 61 cases (13.5%) cytologically evaluated cases. 8.8% cases available with histopathological correlation in the study done by Gupta P *et al*. [9] while this number was 80.6% in Study by Vigliar E *et al*. [11] ROM was calculated in each category using available data. In our study, 17 cases of non-diagnostic category, histopathological correlation was not available. In category L2 of benign cytology, histopathological correlation showed malignancy in 2 out of the 20 evaluated cases. The ROM was 10% in our study which was comparable to the study results of Gupta P *et al*. [9] (11.5%), and higher than Rivas HE *et al*. [10] (3%). The L3 category termed as ALUS/AUS we found 1 case histopathological correlation was not available. The L4 category termed as suspicious for malignancy had histopathology available in 2 cases out of this 1 case was found malignant. The ROM of 50.0% was obtained in the current study which was 88% and 100% seen in the studies by Gupta P *et al*. [9] and Rivas HE *et al*. [10] respectively. The last category of cytologically malignant lesions showed ROM of 97.4%. 38 out of 39 histopathologically evaluated cases confirmed malignancy. This high ROM is closets to the results of Rivas HE *et al*. [10] (100%) and Gupta P *et al*.

[9] (99.6%). On basis of all calculated data the sensitivity, specificity and diagnostic accuracy in the current study were 95.12%, 90% and 93.44% respectively. These values are compared with other study results in table 4.

Conclusion

FNAC has important application and diagnostic significance in lymph node swellings. The new proposed Sydney reporting system provides defined diagnostic categories and helps in evaluating risk of malignancy. Its use will be beneficial both in improving cytology practice with uniform reporting and also allow better understanding of cytology report by the treating physician ultimately leading to improved patient management.

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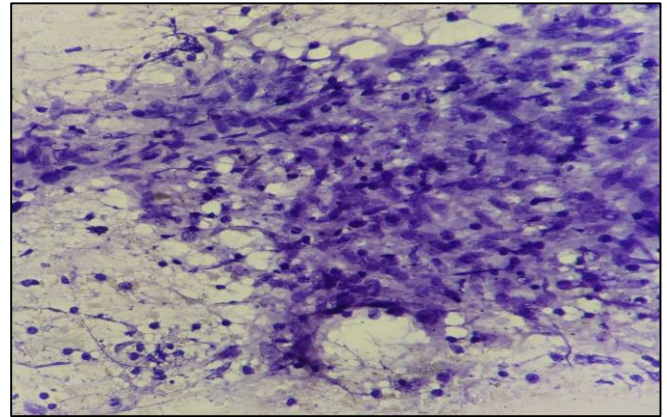**Legend Figures and Tables**

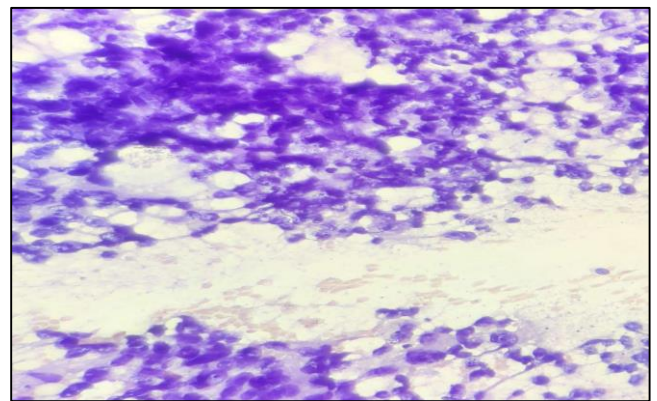Figure 1: Granulomatous Lymphadenitis (H & E 40x)

Figure 2: Metastatic Squamous Cell Carcinoma (H & E 40x)

Table 1: Category wise cytological diagnosis in number

Sn.	Category	Cytological Diagnosis	Number
1.	L1-Inadequate/non-diagnostic	Blood only	11
		Necrosis only	06
2.	L2-Benign	Granulomatous lymphadenitis	267
		Reactive lymphadenitis	57
		Chronic non-specific lymphadenitis	45
		Acute lymphadenitis	15

3.	L3- Atypical cells of undetermined significance/atypical lymphoid cells of uncertain significance	Atypical lymphoid cell	01
4.	L4- suspicious for malignancy	Suspicious for metastasis	02
5.	L5-Malignant	Metastatic squamous cell carcinoma	43
		Non-Hodgkin's lymphoma	03

Table 2: Age wise distribution of lymph node lesions (n=450)

Age (years)	Number of cases	Percentage
< 1 year	03	0.7%
1-10	62	13.8%
11-20	84	18.7%
21-30	114	25.3%
31-40	70	15.5%
41-50	45	10%
51-60	44	9.8%
61-70	23	5.1%
71-80	05	1.1%

Table 3: Sex wise distribution of lymph node lesions (n=450)

Sex	Frequency	Percentage
Female	211	53.1%
Male	239	46.9%
Total	450	100%

Table 4: Comparison of statistical value with other study results (All value in percentage)

	Current study	Gupta P et al.	Vigliar E et al.
Sensitivity	95.12	79.9	98.7
Specificity	90	98.7	95.33
Diagnostic accuracy	93.44	89.3	97.06