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Fine Needle Aspiration Cytology of Lymph Node Swellings at Different Sites with Categorisation on Sydney System - A One Year Retrospective Study

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ABSTRACT

Background

Fine Needle Aspiration Cytology (FNAC) is a valuable diagnostic tool for evaluating lymph node swellings, providing insights into potential malignancies.

Materials and methods

This one-year retrospective study, conducted from July 2022 to June 2023, focuses on the reclassification of lymph node swellings at various anatomical sites using FNAC. We employ the Sydney System, a comprehensive five-tier classification system that emphasizes the Risk of Malignancy (ROM) within each category.

Results

The study encompasses 226 FNAC cases, primarily affecting individuals aged 26 to 45, with a gender distribution of 79 males and 147 females. The most frequently affected region was the neck, accounting for 85% of cases, followed by the axilla (8%), inguinal (3%), posterior auricular (2%), and occipital (2%) regions. It is important to note that histopathology reports were available for only 12 cases, and we acknowledge the limitation that ancillary tests for lymphoid malignancy diagnosis, such as flow cytometry and molecular studies, were not accessible.

Conclusion

This study underscores the significance of FNAC in lymphadenopathy evaluation, the utility of the Sydney System in providing structured ROM assessments, and the need for further diagnostic refinements.

Keywords

FNAC, lymph node, Sydney system, Risk of Malignancy.

INTRODUCTION

The Sydney System

Five tier classification providing risk of malignancy (ROM) for each ascending risk category rather than a benign or malignant assessment for each individual case. Lymphadenopathy,

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characterized by the enlargement of lymph nodes, is a common clinical finding that often raises concerns regarding potential malignancies. When confronted with lymph node swellings, clinicians face a diagnostic challenge-determining whether the enlargement is benign or indicative of a malignant process. In the past, this challenge was addressed with a binary approach: classifying lymphadenopathy as either benign or malignant based on cytological examination. However, this binary approach often failed to capture the complexity of lymph node pathologies, leading to imprecise diagnoses and potentially delayed or inappropriate treatment decisions.FNAC is a quick diagnostic tool which is an integral part of the initial diagnosis and management of patients with lymphadenopathy.[1]

Recognizing the limitations of the traditional binary classification, the Sydney System emerged as a pioneering approach in lymph node cytopathology reporting. This system introduced a five-tier classification scheme that emphasizes the Risk of Malignancy (ROM) within each category. Rather than offering a simplistic benign or malignant label for each individual case, the Sydney System provides a nuanced assessment that informs clinicians about the likelihood of malignancy and guides them in determining the most appropriate management strategies.[2]

Sydney system of reporting lymph node cytopathology as follows[3-6]

Category I- Non diagnostic
Category II – Non neoplastic or benign
Category III- Atypia of undetermined significance
Category IV- suspicious for malignancy
Category V- Malignant

MATERIALS AND METHODS

- A **retrospective** study of one year **(July 2022 to June 2023)** is conducted to reclassify the lymph node swellings at different sites from previous diagnosis at **Pathology Department GMC Patiala**.
- Clinical data, FNAC and histopathology report was retrieved and cases were reclassified according to the **SYDNEY** system of classification.
- Histopathological reports wherever available, were compared.
- Statistical analysis was done.
- Risk of malignancy was calculated for each category.

Inclusion Criteria

All patients with lymphadenopathy undergoing FNAC during the study period for which subsequent histopathological reports or follow up data available were included in the study.

Exclusion Criteria

Cases without Histopathological correlation and loss to follow up cases for subsequent clinical data were excluded from the study.

RESULTS

The study encompassed 226 FNAC cases, with the majority of patients falling within the 26-45 age group. The gender distribution revealed 79 males and 147 females, reflecting a broad demographic spectrum. The distribution of lymph node swellings across anatomical sites was as follows:

- **Neck:** The most frequently affected region, with 189 cases (85%).
- **Axilla:** Accounted for 18 cases (8%).

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- **Inguinal:** Observed in 8 cases (3%).
- **Posterior Auricular:** Detected in 6 cases (2%).
- **Occipital:** Found in 5 cases (2%).

In a subset of 12 cases, corresponding histopathological data were available, providing an opportunity for additional validation. However, it is crucial to acknowledge a notable limitation of this study—the unavailability of ancillary tests commonly used for the final diagnosis of lymphoid malignancy, such as flow cytometry, immunohistochemistry, or molecular studies. These ancillary tests play a pivotal role in establishing precise diagnoses in some cases, and their absence underscores the need for caution in the interpretation of results.

	Diagnostic Category	Total Frequency (%) 226	Cytology Diagnosis	Frequency (%)
1	Category I/L1-inadequate/non diagnostic	41 (18%)	Blood only	25 (61%)
			Scanty Material	16 (39%)
2	Category II/L2-Benign	138 (61%)	Reactive Lymphoid Hyperplasia	72 (52%)
			Granulomatous Lymphadenitis	66 (48%)
3	Category III/L3-Atypia of Undetermined malignancy	7 (3%)	Reactive Lymphoid Hyperplasia	4 (57%)
			Lymphoma	3 (43%)
4	Category IV/L4-Suspicious	5 (2%)	Suspicious of Lymphoma	4 (80%)
			Suspicious of Metastasis	1 (20%)
5	categoryV/L5- malignant	35 (16%)	Lymphoma	3 (8%)
			Metastasis	32 (92%)

Table 1.

DISCUSSION

Category I

Inadequate/Non-diagnostic Specimen-Primarily peripheral blood contamination, scant cellularity, air drying effect, poorly preserved cells. In this category, FNAC did not provide sufficient material for diagnosis. While FNAC is generally a reliable technique, there can be challenges in obtaining adequate material, particularly in cases with small or deeply located lymph nodes. As a result, this category highlights the importance of proper technique and the potential need for repeat procedures to obtain adequate samples. In our study 41 cases were diagnosed under category 1

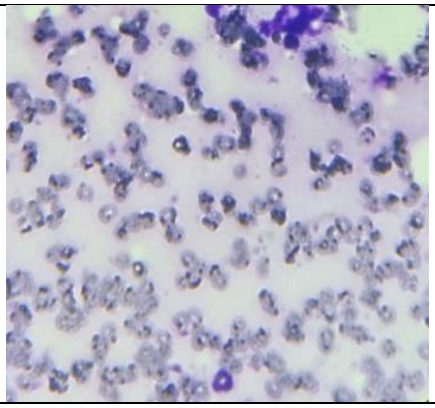

Figure 1: Shows blood mainly with scant cellularity

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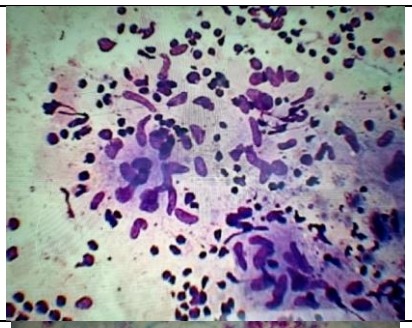
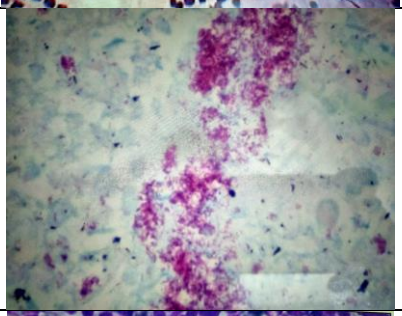
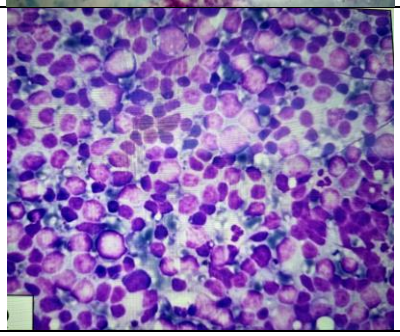
Category II

FNAC findings in this category indicate a benign cytological pattern. These cases provide reassurance to both patients and clinicians, as they suggest a non-malignant etiology for the lymph node enlargement. However, it's essential to note that even benign lymphadenopathy may require monitoring or further evaluation, depending on clinical context.

Reactive-Reactive (draining primary tumors, following bx, autoimmune, idiopathic, NOS)-Infection-Granulomatous inflammation –Suppurative granulomatous inflammation. In our study. 138 cases were diagnosed under category 2 out of these, 59 cases of granulomatous pathology and 79 of RLH.

	***Figure 2.*** ***Shows epithelioid cell granulomas (MGG 400x)***
	***Figure 3*** ***Shows mycobacterium tuberculosis against blue background(ZN stain 400x)***
	***Figure 4.*** ***Shows polymorphous population of cells comprising of centroblasts, centrocytes, immunoblasts, mature lymphocytes ,tangible body macrophages - Reactive Lymphoid Hyperplasia (MGG400x)***

Category III

Atypical Lymphoid Cells of Undetermined Significance Lymph node FNA alone cannot distinguish between reactive hyperplasia and small-cell non-Hodgkin lymphoma FCM distinguishes many of the ALUS, but not in all cases.[7] This category presents a diagnostic challenge, as it suggests the presence of cellular atypia without definitively confirming malignancy. Clinicians must exercise caution in interpreting these results, recognizing that further investigations, including histopathological analysis or ancillary tests, may be necessary to arrive at a conclusive diagnosis.

In our study, 7 cases studied under AUS. Further follow up 4cases came out to be RLH and 3 cases diagnosed were Lyphomas.

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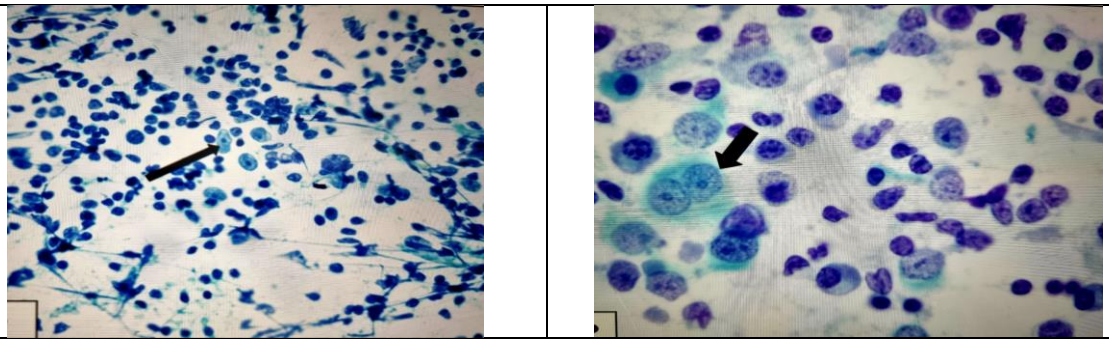

Figure 5 and 6: Shows large atypical cells with irregular nuclei and prominent nucleoli (PAP100x, MGG 400x)

Category IV

Smears show rare large atypical mononucleated cells with very prominent nucleoli in a background of lymphocytes suspicious for Hodgkin lymphoma.[7] Insufficient material for ancillary studies. FNAC findings in this category provide strong indicators of malignancy but fall short of definitive confirmation. These cases raise a red flag, alerting clinicians to the potential presence of malignancy. However, further diagnostic steps, such as histopathological analysis or ancillary tests, are often required to establish a conclusive diagnosis and inform treatment decisions.

In our study 5 cases diagnosed under category 4. Out of these on further follow up 4 cases came out to be lymphomas and one case of metastatic deposits.

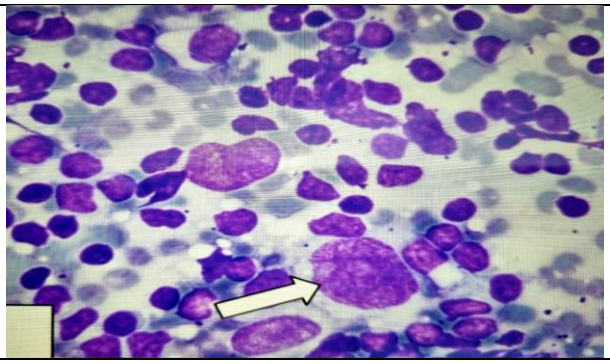

Figure 7: Shows large atypical mononuclear cells with irregular nuclear contour and prominent nucleoli in the background of lymphocytes (MGG400x)

Category V

Malignancy (Primary or Secondary). In our study 35 cases kept under category 5. Out of these 3 cases were of primary origin and 32 cases of secondary origin.

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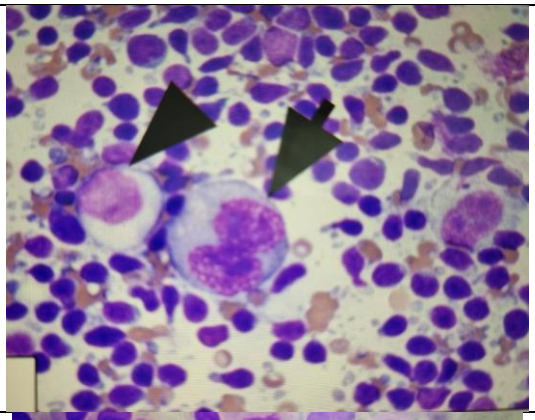

Figure 8.
Shows Hodgkin Lymphoma (MGG 400X) Category V

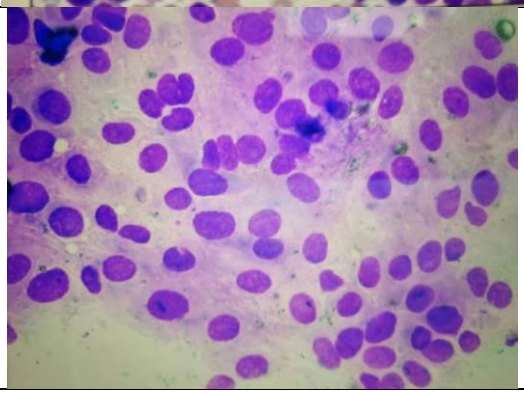

Figure 9.
Shows Metastatic carcinomatous deposits(MGG 400x) category5

Primary

Few large atypical mononucleated & binucleated (R-S cells) with very prominent nucleoli in a background of lymphocytes and rare eosinophils. IHC studies performed on the CB show the large atypical cells are positive for CD30, CD15, and PAX5 (dim). Overall, the findings are consistent with Hodgkin lymphoma.

Secondary

Smear shows malignant tumour cells arranged in clusters as well as scattered singly.individual tumor cells are round to oval in shape showing nuclear pleomorphism, irregular nuclear contour, hyper chromatic nuclei inconspicuous nucleoli and moderate amount of cell cytoplasm. Cytological features are suggestive of metastatic carcinomatous deposits.

This category presents definitive evidence of malignancy, offering a clear diagnosis that necessitates prompt clinical action. FNAC findings in this category provide a basis for initiating appropriate treatment strategies tailored to the specific malignancy type.

It's crucial to acknowledge that the interpretation of FNAC results can be context-dependent, requiring a holistic assessment that considers clinical history, imaging, and ancillary tests when available. The Sydney System's contribution lies in its ability to provide a standardized framework for interpreting FNAC results, ensuring consistency in reporting, and facilitating clear communication between pathologists and clinicians.

However, while the Sydney System enhances the diagnostic process, it is not without its challenges. One significant challenge lies in the variability of the Risk of Malignancy (ROM) within Category I. This category includes cases where FNAC did not yield sufficient material for diagnosis. While this may be due to technical factors, it can also be attributed to the nature of lymphadenopathy. Lymph nodes are highly dynamic structures, and the presence of malignancy can be focal or patchy. Consequently, a single FNAC sample may not always capture malignant cells, leading to a false-negative result.

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To address this variability, the Sydney System acknowledges the need for context-specific recommendations in Category I cases. Clinicians must exercise clinical judgment and consider the patient's history, clinical presentation, and imaging findings when deciding whether to pursue further diagnostic procedures, including repeat FNAC, core needle biopsy, or excisional biopsy. Failing to do so may result in missed diagnoses and delayed treatment, underscoring the importance of personalized and patient-centered care.

The distribution of cases in different categories according to the Sydney system was 18%(cat l) , 61%(cat ll) , 3%(cat lll), 2%(cat iv), 16%(cat v). Overall risk of malignancy reported was 0%, 0%, 43%, 80% and 100% respectively

LIMITATIONS

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

CONCLUSION

In conclusion, this one-year retrospective study highlights the value of FNAC as a crucial diagnostic tool in assessing lymphadenopathy. By employing the Sydney System's five-tier classification, it reinforces the significance of a structured approach that considers the Risk of Malignancy (ROM) within each category.[8] This system not only enhances the precision of cytology reports but also guides clinicians in determining appropriate management strategies.

FNAC, as a minimally invasive technique, plays a pivotal role in evaluating lymph node swellings, offering reliable and accurate results.[9] Its advantages include quick results, minimal discomfort for patients, and the ability to provide valuable diagnostic information without the need for more invasive procedures.

However, it's important to emphasize the limitations of FNAC, particularly in Category I, where a lack of sufficient material for diagnosis can lead to false-negative results. To address this, clinicians must exercise clinical judgment and consider context-specific recommendations, which may include repeat FNAC or additional diagnostic tests.

Furthermore, this study underscores the importance of ancillary tests, such as flow cytometry, immunohistochemistry, and molecular studies, in establishing precise diagnoses in cases where FNAC results are inconclusive or require further characterization. The absence of these ancillary tests in our study serves as a reminder of their relevance in comprehensive diagnostic assessments.

In summary, the Sydney System and FNAC together provide a valuable approach to evaluating lymphadenopathy, offering both structured reporting and the flexibility to adapt to individual clinical contexts. While the Sydney System enhances the accuracy and consistency of cytology reports, it also highlights the need for personalized clinical decision-making in certain cases. This study serves as a reminder of the ongoing evolution in diagnostic techniques and the critical role they play in patient care, ultimately contributing to more precise diagnoses and improved treatment outcomes.

- The FNAC is a minimally invasive, reliable, and accurate investigation in the evaluation of lymphadenopathy.
- The Sydney system is useful in creating uniformity and reproducibility of cytology reports, category wise informs about risk of malignancy and provide information for further management.[10]
- It enhances the role of FNAC by confirming benignity in benign lesions and by alerting the clinician for follow-up and ancillary studies in atypical and equivocal cases.

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- ROM in L1 is variable and cannot be generalised, recommendation for repeat procedure or biopsy in such cases is required depending on the context to avoid false negative cases.

REFERENCES

[1] Sreelekshmi JR, Joseph T. Structured reporting of lymph node cytopathology using the 2020 sydney system guidelines- a retrospective study. National Journal of Laboratory Medicine 2023;12(2):39-44.
[2] Al-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(4):306-22.
[3] Ahuja S, Malviya A. Categorisation of lymph node aspirates using the proposed Sydney system with assessment of risk of malignancy and diagnostic accuracy. Cytopathology. 2022;33(4):430-8.
[4] Shibu Robert A, Saldanha C. An approach to classification and reporting lymph node cytopathology using Sydney system and evaluating the likelihood of malignancy. Biomedicine 2023;43(02):701-5.
[5] Vigliar E, Acanfora G, Iaccarino 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.
[6] Shankar M, Singh M, Pandey H, Gautam A. Applicability of the proposed Sydney system: classification and reporting of lymph node fine-needle cytology Int J Adv Res 2023;11:1411-6.
[7] Chong Y, Park G, Cha H, Kim H, Kang C, Ghaffar J, et al. A stepwise approach to fine needle aspiration cytology of lymph nodes. Journal of Pathology and Translational Medicine 2023;57(4):196-207.
[8] Shanmugasundaram S, Balasubramanian NB, Amirthakatesan AS. The application of the proposed Sydney system for reporting lymph node cytopathology: a five year experience of an academic institution in South India. Acta Cytologica 2023;67(4):365-77.
[9] Juanita J, Ikram D, Sungowati NK, Purnama IP, Amalia A, Ningrati AF, et al. Diagnostic accuracy of lymph nodes fine needle aspiration biopsy based on the Sydney system for reporting lymph node cytology. Asian Pacific Journal of Cancer Prevention: APJCP. 2023;24(6):1917.
[10] Cavallo M, Ciliberti V, Maffei E, Serio B, Sabbatino F, Zappa P, et al. An economic evaluation of fine needle cytology as the primary diagnostic tool in the diagnosis of lymphadenopathy. Open Medicine 2023;18(1):20230719.