Section: Pathology

Original Research Article

INCIDENCE OF MALIGNANCIES IN FNAC OF LYMPH NODE LESIONS IN A RURAL TERTIARY CARE HOSPITAL

S.Venkateswaran[1], Krishnamani S[2], K. R. Mohan[3]

[1]Assistant Professor, Department of Pathology, Government Vellore Medical College, Vellore, Tamilnadu, India
[2]Assistant Professor, Department of Otorhinolaryngology and Head and neck surgery, Government Vellore Medical College, Vellore, Tamilnadu, India
[3]Professor, Department of Pathology, Government Vellore Medical College, Vellore, Tamilnadu, India

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Corresponding Author:
Dr. K. R. Mohan,
Email: renukamohan2010@gmail.com

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ABSTRACT

Background: Fine-needle aspiration cytology (FNAC) is a minimally invasive, rapid, and cost-effective method for evaluating lymph node lesions. It aids in differentiating non neoplastic and neoplastic conditions, thereby guiding early management, particularly in rural healthcare settings. The aim is to evaluate the incidence of malignancies in lymph node lesions on FNAC and to study the cytomorphological patterns in correlation with histopathology. **Materials and Methods:** This prospective observational study included 150 patients with palpable lymph node enlargement who attended the Department of Pathology at Government Vellore Medical College and Hospital over one year. FNAC was performed, and smears were categorised as benign lesions, metastatic deposit, or lymphomas. Clinical features, nodal sites, and consistency were recorded, with histopathological correlation where available. **Result:** Of the 150 patients, 83 (55.3%) were male and 67 (44.7%) were female. FNAC showed 128 (85.3%) benign lesions, 20 (13.3%) metastatic lesions, and 2 (1.3%) lymphomas. The most common presentation was swelling alone in 85 (56.3%) patients, followed by fever with swelling in 24 (15.9%), fever with swelling and weight loss in 19 (12.6%), swelling with weight loss in 15 (9.9%), fever alone in 7 (4.6%), and weight loss alone in 1 (0.7%). The cervical nodes were the most frequently involved (105, 69%), followed by the axillary (32, 22%), inguinal (10, 7%), and other nodes (3, 2%). The consistency was firm in 91 (60.7%), soft in 50 (33.3%), and hard in 9 (6%) patients. Among metastatic carcinomas, squamous cell carcinoma was the most common (7, 35%), followed by adenocarcinoma (3, 15%), malignant melanoma (3, 15%), and others (7, 35%). **Conclusion:** FNAC effectively differentiates benign lymph node lesions from malignant ones. Cervical nodes were the most commonly affected, firm consistency predominated, and squamous cell carcinoma was the most frequent metastatic subtype, highlighting value of FNAC in early diagnosis in rural tertiary care settings.

INTRODUCTION

Fine-needle aspiration cytology (FNAC) of lymph node lesions is a minimally invasive, rapid, and cost-effective diagnostic procedure in clinical practice. Lymph nodes are commonly palpable and easily accessible, making FNAC a practical first-line investigation to differentiate between non neoplastic and neoplastic etiologies of lymphadenopathy.[1,2] This diagnostic modality has a high sensitivity (up to 100%) and specificity in distinguishing metastatic disease from reactive or inflammatory processes, reinforcing its value in outpatient and resource-limited settings.[3]

In many low- and middle-income countries, particularly in semi-urban and rural areas, FNAC plays a pivotal role in guiding timely therapeutic decisions and reducing morbidity. For instance, a study from Bareilly, Uttar Pradesh, reported FNAC as a crucial tool in diagnosing both suspected and unsuspected metastatic lymph node lesions, enabling early clinical intervention.[4] Likewise, retrospective data from Himachal Pradesh demonstrated that FNAC effectively triaged benign from malignant lymph node lesions, identifying 18% of aspirates as malignant and avoiding unnecessary excision biopsies in many cases.[5]

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Cytomorphological patterns observed via FNAC are instrumental in identifying the nature and origin of lymph node malignancy. A five-year study at a tertiary hospital in Mumbai showed that metastatic carcinoma accounted for 87.5% of malignancies detected by FNAC, with squamous cell carcinoma being the most common. The study also highlighted the value of FNAC in guiding further investigation to determine the primary site.[6] Such findings affirm FNAC's role not only in detecting malignancy but also in providing essential clues for clinical management pathways.[7] Furthermore, FNAC complements histopathological methods and helps avoid invasive surgical procedures, particularly when lymphoma is suspected.[8] In a hospital-based study, FNAC successfully diagnosed metastases and lymphomas, including cases in which malignancy was clinically unsuspected. The procedure's sensitivity and simplicity rendered it a valuable adjunctive tool in diagnostic workflows.[9]

Despite the wealth of evidence supporting the diagnostic utility of FNAC, data from rural tertiary care hospitals are limited. Existing studies frequently originate from urban centres or specialised cancer institutes, making it difficult to generalise the findings to rural healthcare environments. To address this gap, the present study specifically explored lymph node FNAC in a rural tertiary hospital.

This study aimed to evaluate the incidence of malignancies in lymph node lesions on FNAC and to study the various cytomorphological patterns in correlation with the histopathology of various malignant lymph node lesions.

MATERIALS AND METHODS

Study design and setting: This prospective observational study included 150 cases from the Department of Pathology, Government Vellore Medical College and Hospital, Vellore, over a period of one year (2024) and was approved by the Institutional Ethics Committee. Written informed consent was obtained from all participants before enrolment in the study.

Inclusion criteria

The study included both males and females in all age groups with clinically palpable lymph node enlargement who were referred to the Department of Pathology for FNAC during the study period. Only cases in which aspirated smears yielded sufficient material for cytological interpretation were considered suitable for analysis.

Exclusion Criteria

Patients with deep-seated lymph nodes inaccessible for FNAC, those with grossly inadequate or poorly prepared aspirates, and those unwilling or medically unfit to undergo the procedure were excluded from the final evaluation.

Methods: All enrolled patients underwent FNAC under aseptic precautions in the pathology outpatient department. A 22–27 gauge disposable needle attached to a 10 ml disposable syringe was used for aspiration. Multiple passes were made whenever necessary to obtain sufficient material. The aspirated material was gently expelled onto clean glass slides and spread evenly to prepare the smears. Some smears were immediately fixed in 70–90% ethanol for haematoxylin and eosin (H&E) staining, while others were air-dried for additional staining when indicated.

Cytological examination was performed independently by qualified pathologists using a light microscope, and diagnoses were categorised into non-neoplastic and neoplastic groups. Among the neoplastic lesions, metastatic tumours and lymphomas were identified and further subtyped, wherever possible. Clinical findings, such as patient demographics, presenting complaints, nodal site involvement, and consistency of nodes, were also recorded and compared.

In a subset of patients with excisional lymph node biopsy specimens, histopathological correlation was performed to assess concordance with cytological findings. Data obtained from all cases were compiled and analysed descriptively to determine the incidence and distribution of malignant lymph node lesions in the study population.

Statistical analysis: Data were entered into Microsoft Excel and analysed using descriptive statistics. Categorical variables, such as demographic details, clinical features, nodal site, consistency, and cytological diagnosis, were expressed as frequencies and percentages.

RESULTS

Of the 150 patients, 83 (55.3%) were male and 67 (44.7%) were female. Cytological evaluation revealed that the majority of cases were benign 128 (85.3%), followed by metastatic lesions 20 (13.3%) and lymphoma 2 (1.3%). Clinically, most patients presented with swelling alone 85 (56.3%), while combinations of fever, swelling, and weight loss were observed in 19 (12.6%) patients; fever with swelling in 24 (15.9%), swelling with weight loss in 15 (9.9%), fever alone in 7 (4.6%), and weight loss alone in 1 (0.7%) patient [Table 1].

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Table 1: Demographic, cytological, and clinical characteristics of study participants

Category	Subtype	N (%)
Sex	Male	83 (55.33%)
	Female	67 (44.66%)
Cytological diagnosis	Benign	128 (85.33%)
	Metastasis	20 (13.33%)
	Lymphomas	2 (1.33%)
Symptom/Combination	Fever	7 (4.6%)
	Fever + Swelling + Weight Loss	19 (12.6%)
	Fever + Swelling	24 (15.9%)
	Swelling	85 (56.3%)
	Swelling + Weight Loss	15 (9.9%)
	Weight Loss	1 (0.7%)

The majority of lymph nodes were cervical (105, 69%), followed by axillary (32, 22%), inguinal (10, 7%), and other groups (3, 2%). Regarding consistency, most nodes were firm (91, 60.7%), 50 (33.3%) were soft, and 9 (6%) were hard nodes. Among metastatic carcinomas, squamous cell carcinoma was the most frequent subtype (7, 35%), followed by adenocarcinoma (3, 15%), malignant melanoma (3, 15%), and other, less common types (7, 35%). On FNAC diagnosis, the majority of lesions were non-neoplastic, accounting for 128 (85.3%) cases, while neoplastic lesions were observed in 22 (14.7%) cases, of which 20 (13.3%) were metastatic deposits [Figures 1-3 and Table 2].

Table 2: Distribution of lymph nodes by location, consistency and metastatic carcinomas

Category	Subtype	N (%)
Group of lymph nodes	Cervical	105 (69%)
	Axillary	32 (22%)
	Inguinal	10 (7%)
	Other groups	3 (2%)
Consistency	Firm	91 (60.7%)
	Hard	9 (6%)
	Soft	50 (33.3%)
Metastatic carcinomas	Squamous cell carcinoma	7 (35%)
	Adenocarcinoma	3 (15%)
	Malignant melanoma	3 (15%)
	Others	7 (35%)
FNAC Diagnosis	Non-neoplastic lesions	128 (85.3%)
	Neoplastic lesions	22 (14.7%)
	Metastatic cases	20 (13.3%)

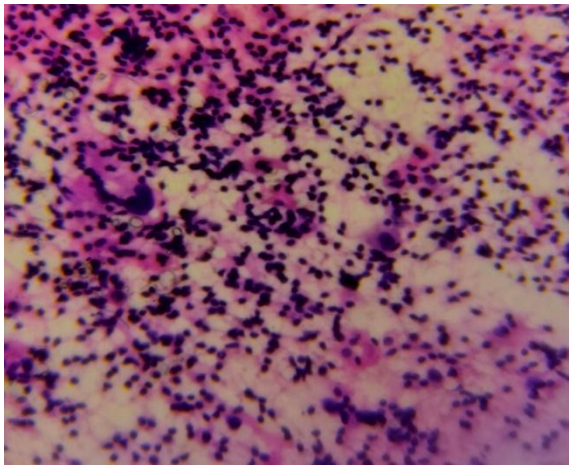

Figure 1: Squamous cell carcinoma metastatic deposit lymph node cytology

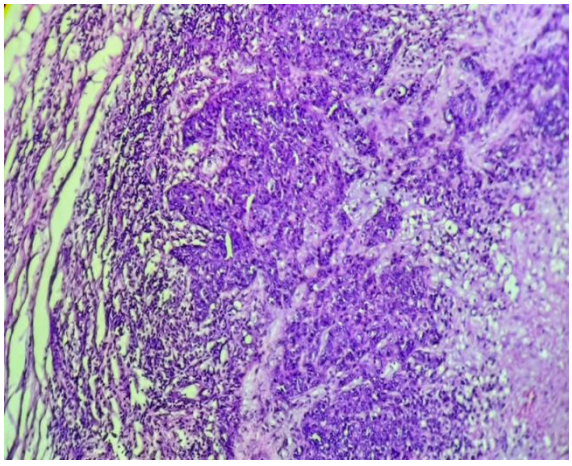

Figure 2: Metastatic deposit in lymph node in H&E

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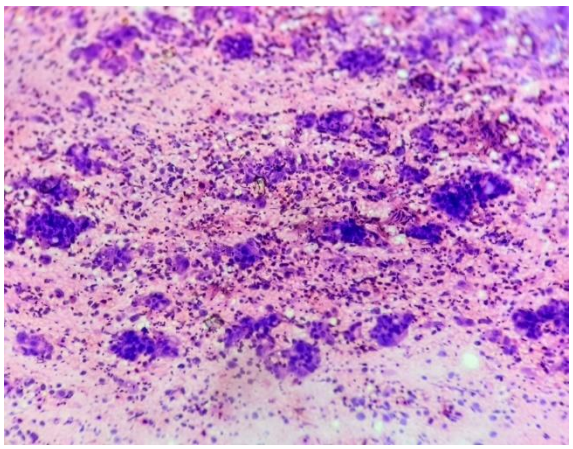

Figure 3: Squamous cell carcinoma metastatic deposit lymph node cytology

DISCUSSION

Our study showed a predominance of male patients. Cytological evaluation revealed that most cases were benign, whereas metastatic lesions and lymphomas were less frequent. Clinically, swelling was the most common presenting symptom, followed by combinations such as swelling with fever and weight loss. Few patients presented with fever or weight loss alone. Chandran et al. reported 880 lymph node FNACs, with 235 (26.7%) neoplastic lesions 205 (87.2%) metastatic and 30 (12.8%) lymphoproliferative. Metastatic lesions showed male predominance (60.5%, M:F 1.5:1), mostly above 40 years, peaking in the 6th–7th decades.10 Gupta et al. studied 97 malignant aspirates, noting male predominance (66% males, M:F 1.94:1). The mean age was 53.7 years (range, 6–95 years), with most cases in the 41–60 years group (42.3%), followed by 61–80 years (35%).11 Overall, most studies reported a male predominance, with non neoplastic lesions being more common than neoplastic ones, while malignant cases were observed mainly in middle-to older-age groups, which is consistent with our findings.

In our study, cervical lymph nodes were the most frequently involved, followed by axillary, inguinal, and other nodal groups. With respect to consistency, most lymph nodes were firm, whereas soft and hard nodes were observed less frequently. Shitole et al. similarly observed that the cervical region was the most commonly affected (91.4%). The majority of lymph nodes were firm in consistency 152 (87.3%), followed by soft (10.3%) and hard (2.3%).[12] Chandran et al. observed that cervical lymph nodes were the most commonly involved site in both metastatic cases (55.1%) and lymphoproliferative disorders (60%). Supraclavicular nodes were the next most frequent (32.2%), followed by axillary nodes (5.4%).[10] Hazra et al. also reported cervical lymph nodes as the most common group (68.3%), followed by submandibular (9.7%), and axillary nodes (6.9%). Less commonly affected groups included supraclavicular (4.9%), inguinal (3.8%), and others.[13]

Ton Eryilmaz et al. found cervical nodes to be the most common (145, 37%), followed by axillary (83, 21.2%), submandibular (17.1%), jugular (8.9%), supraclavicular (6.1%), and others.[14] Gupta et al. also reported cervical lymph nodes as the most frequent site (61, 62.8%), followed by supraclavicular (13.4%) and axillary (12.4%) nodes. Other less frequent sites included submandibular (7.2%), submental (2.1%), and inguinal (1%) sites.[11] Wilkinson et al. also reported cervical lymph nodes as the most frequent site of malignancy (31, 62%), followed by axillary (22%), inguinal (10%), and supraclavicular (6%) sites.[9] Overall, most studies reported cervical lymph nodes as the most frequently involved group, followed by axillary, supraclavicular, and other nodal sites, with firm consistency being the most common, similar to our findings.

Our study found that non-neoplastic lesions were the most common. Neoplastic lesions were less frequent, and the majority were metastatic deposits. Among metastatic carcinomas, squamous cell carcinoma is the most frequent subtype, followed by adenocarcinoma, malignant melanoma, and other types. Chandran et al. reported that among 205 metastatic cases, squamous cell carcinoma was the most frequent (36%), followed by adenocarcinoma (28.2%) and poorly differentiated carcinoma (21%). Less common primary sites included the lung, gastrointestinal tract, thyroid, breast, and female genital tract, while 12.1% had an unknown primary site. They also noted 30 cases (3.4%) of lymphoproliferative disorders, predominantly non-Hodgkin lymphoma (27 cases).[10]

Gupta et al. reported metastatic malignancy as the major category (78, 80.4%) and primary lymphoma in 19 (19.6%) cases; within metastases, squamous cell carcinoma was the most frequent (42, 43.3%), followed by adenocarcinoma (14.4%) and poorly differentiated carcinoma (11.3%).[11] Wilkinson et al. observed that 90% of cases were metastatic tumors, with squamous cell carcinoma as the most common subtype, followed by breast ductal carcinoma, thyroid carcinoma, melanoma, and mucoepidermoid carcinoma.[9]

Ton Eryilmaz et al. found reactive lymphoid hyperplasia to be the most common diagnosis (239, 61%), followed by metastatic lesions (61, 15.6%), granulomatous lymphadenitis (6.1%), suspicious cases (6.1%), pyogenic abscess (2.6%), and lymphomas (1%), with benign cases comprising 76.1% and malignant 23.9%, carcinoma metastasis being predominant among metastases.[14] Overall, most studies reported non-neoplastic lesions as the predominant category, with metastatic tumours being the majority among neoplastic cases. Squamous cell carcinoma was the most frequent metastatic subtype, followed by adenocarcinoma and other variants, which align with our study results.[15,16]

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Limitations: This study was conducted at a single rural tertiary centre, which may limit generalisability, and the data were based on short-term observations without longitudinal follow-up.

CONCLUSION

FNAC is a reliable and minimally invasive diagnostic tool for evaluating lymph node lesions. Cervical nodes were most commonly involved, and firm consistency predominated. Among malignant cases, squamous cell carcinoma was the most common metastatic subtype. FNAC effectively differentiates benign from malignant lesions, guiding early clinical management and reducing the need for invasive procedures, making it particularly valuable in rural tertiary-care settings.

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