



UTILITY OF FINE NEEDLE ASPIRATION CYTOLOGY AS A DIAGNOSTIC TOOL IN EVALUATING CERVICAL LYMPH NODE ENLARGEMENT IN A TERTIARY CANCER CENTRE

Shreedevi Bhat	Post graduate trainee, Department of Oral Pathology, KVG dental college and hospitals, Kurunjibag, Sullia, DK, Karnataka, India-574327
Kandathil Joseph Philip*	Assistant Professor, Department of Oncopathology, Malabar Cancer Centre, Thalassery, Kannur, Kerala, India- 670103 *Corresponding Author
Sangeetha K. Nayanar	Professor and Head, Department of Oncopathology, Malabar Cancer Centre, Thalassery, Kannur, Kerala, India- 670103
T.P. Sajith Babu	Associate Professor, Department of Surgical Oncology, Malabar Cancer Centre, Thalassery, Kannur, Kerala, India- 670103

ABSTRACT **Background:** Cervical lymph node enlargement is one of the common complaints among patients in the outpatient clinics of cancer hospitals. This study was undertaken to determine the utility of FNAC as a diagnostic tool in evaluating cervical lymph node aspirates and to test the discrepancy between the cytological diagnosis from FNAC and histological diagnosis from biopsy specimens.

Results: There were 234 patients who underwent FNAC of cervical lymph nodes. Most common diagnosis comprised of neoplastic lesions (63.7%) of which 61.1% were metastatic carcinomas. Majority of the metastatic carcinomas were squamous cell carcinomas (50.4%). The overall sensitivity, specificity, positive predictive value, negative predictive value and overall accuracy were 95.5%, 100%, 100%, 91.3% and 95.7% respectively.

Conclusion: FNAC is a simple, accurate and reliable cytological tool in the evaluation of enlarged cervical lymph nodes to get accurate diagnosis for the early management.

KEYWORDS : Cervical lymphadenopathy, FNAC, Metastatic, Head and neck

Introduction: Cervical lymphadenopathy is a common clinical presentation in an outpatient department of head and neck clinic in a tertiary cancer centre. Fine needle aspiration cytology (FNAC) has become a simple, fast and cost effective cytological technique in evaluating enlarged palpable cervical lymph nodes.^[1]

Our study aimed to determine the utility of FNAC as a diagnostic tool in evaluating cervical lymph node aspirates and to test the discrepancy between the cytological diagnosis from FNAC and histological diagnosis from biopsy specimens.

Methodology: This is a two year retrospective study carried out from May 2014 – April 2016 at the department of pathology in a tertiary cancer centre of northern Malabar, Kerala for all patients who underwent FNAC for the evaluation of cervical lymph node enlargement. The study was conducted after obtaining institutional review board (IRB) approval. The demographic data and clinical details like age, sex, site of lymph node enlargement including number and distribution were obtained from the patient's record file retrieved from the medical record department of the cancer institute. The exclusion criterion included patients who did not undergo biopsy and FNAC with inconclusive reports due to poor yield.

The cytological evaluation of May Grunwald Geimsa and Papanicolaou stained Slides inclusive of the representative ICC slides, when available, were reviewed. Review of the representative histopathological slides of the corresponding cases was compared.

Statistical analysis was carried out to determine the diagnostic sensitivity, specificity, positive predictive value, negative predictive value, false negative rate and overall accuracy of cytological diagnosis from FNAC as a diagnostic tool in evaluation of lymphadenopathy.

Results: There were 234 patients who underwent FNAC of cervical lymph nodes during the period May 2014 – April 2016. There was a male preponderance (69.2%) with age ranging from 20 years to 90 years and majority in the age groups of 61-70 years (32.1%). According to the distributions of cervical lymph node sampling based on different levels, majority were of level II. Level VI lymph nodes were not sampled in any of the cases. The clinical and demographic details are highlighted in Table 1.

Table 1: Distribution of demographic details and clinical findings of all patients who underwent FNAC for evaluation of cervical lymph node enlargement during the period from May 2014 – April 2016

Demographic details	
Total number of patients	234
Males	162 (69.2%)
Females	72 (30.8%)
Male:Female ratio (M:F)	2.3:1
Age wise distribution	
21-30 years	5 (2.1%)
31-40 years	12 (5.1%)
41-50 years	28 (12.0%)
51-60 years	70 (29.9%)
61-70 years	75 (32.1%)
71-80 years	37 (15.8%)
81-90 years	6 (2.6%)
91-100 years	1 (0.4%)
Clinical findings	
Level wise distribution of cervical lymph nodes	
Level IA	3
Level IB	42
Level II	112
Level III	32
Level IV	18
Level V	59
Level VI	Nil

Most common diagnosis comprised of neoplastic lesions (63.7%) of which 61.1% were metastatic carcinomas. Among the metastatic carcinomas, majority were metastatic squamous cell carcinoma (50.4%) followed by metastatic adenocarcinoma (10.7%) [Table 2].

Table 2: Distribution of cytological diagnosis of all patients who underwent FNAC for evaluation of cervical lymph node enlargement during the period from May 2014 – April 2016

Cytological diagnosis	
Neoplastic	149 (63.7%)
Metastatic carcinomas	143 (61.1%)
Metastatic Squamous cell carcinomas	118 (50.4%)
Metastatic Adenocarcinomas	25 (10.7%)

Lymphoproliferative disorders	6 (2.6%)
Non Hodgkin Lymphoma	4 (1.7%)
Hodgkin Lymphoma	1 (0.4%)
Granulocytic sarcoma	1 (0.4%)
Non neoplastic	85 (36.3%)
Reactive lymphadenitis	73 (31.2%)
Infections	12 (5.1%)
Granulomatous inflammation	5 (2.1%)
Acute suppurative	7 (3.0%)

Metastatic squamous cell carcinomas from head and neck region constituted majority of the primary site wise distribution (35.0%) while thyroid (4.7%) followed by breast (1.7%) were the most common primary sites among all metastatic adenocarcinomatous lesions [Table 3].

Table 3: Primary site wise distribution of metastatic squamous cell carcinoma and adenocarcinoma lesions

Primary site (metastatic scc)	No (%)	Primary site (metastatic adeno ca)	No (%)
Head and neck region	82 (35.0%)	Thyroid	11 (4.7%)
Gastrointestinal region (esophagus-4,GE junction-2)	6 (2.6%)	Lung	2 (0.9%)
Female genital region (cervix)	2 (0.9%)	Git (colon-2,GE junction-1)	3 (1.3%)
Skin (scalp)	1 (0.4%)	Prostate	1 (0.4%)
Unknown primary	27 (11.5%)	Breast	4 (1.7%)
		Ovary	1 (0.4%)
		Unknown primary	3 (1.3%)
Total	118/234 (50.4%)	Total	25/234 (10.7%)

In the current study, primary site wise distribution of metastatic squamous cell carcinoma in the head and neck region was further classified into various sites namely tongue (13 cases), larynx (11 cases) [supraglottic-7 cases, glottic-3 cases, subglottic-1case], pyriform sinus (10 cases), oropharynx (10 cases), buccal mucosa (8 cases), tonsil (7 cases), alveolus (6 cases), retromolar trigone (4 cases), hypopharynx, gingivobuccal sulcus and palate (3 cases each), Nasopharynx (2 cases), floor of mouth and maxilla (1 case each).

Metastatic carcinomas of unknown primary (30 cases) accounted for 21% of all metastatic diseases, majority of which were of squamous cell carcinoma subtype. Level II cervical lymph nodes were the most commonly affected neck nodes among the metastatic carcinomas of unknown primaries (15/30 cases).

Among the non neoplastic lesions, reactive lymphadenitis were the most common (31.2%) lesions diagnosed on FNAC followed by acute suppurative lymphadenitis (3.0%) and granulomatous lymphadenitis (2.1%). Previous history of malignancy was recorded in 89% of individuals with cervical lymph node enlargement which was diagnosed reactive hyperplasia on FNAC. In the present study, the overall sensitivity, specificity, positive predictive value, negative predictive value and overall accuracy were 95.5%, 100%, 100%, 91.3% and 95.7% respectively.

Discussion:

Cervical lymphadenopathy is one of the common clinical presentations in a cancer hospital, particularly head and neck clinics. Cervical lymph node enlargement can be single or multiple, either discrete or matted, involving one or many levels of cervical group of nodes. Cervical lymph nodes can get enlarged due to reactive process and infections like tuberculosis at one end of the spectrum to lymphomas and metastatic malignancies at the other end of the spectrum. FNAC is a simple, accurate, rapid and minimally invasive diagnostic tool that can be used as an initial investigation tool for evaluation of cervical lymphadenopathy.^[1]

FNAC provides an accurate cytological diagnosis for common entities like reactive hyperplasia, granulomatous lymphadenitis, metastatic disease and lymphoma; thereby avoiding need for excision biopsy in most cases.^[2] Neoplastic lesions in lymph nodes in our country are predominantly metastatic in nature with an incidence ranging from 65.7-90% and lymphomas ranging from 2-15.3%.^[3] FNAC may at times be the only investigative tool available for diagnosis and

management of metastatic malignancy.^[3,4]

Histopathology is considered to be the gold standard in diagnosis especially lymphomas which require detailed immunohistochemistry (IHC) work up for histopathological subtyping. Cell block preparations with immunocytochemistry (ICC) studies are at times used as an ancillary tool to identify the possible primary site and make a precise diagnosis especially for metastatic work up of diseases.^[5]

In our study, there was a male preponderance with a male: female ratio of 2.3:1 which was similar to other studies ranging from 3.1:1 to 1.5:1,^[6-8] although there are few studies showing a female preponderance.^[10,9]

Patients above the age of 40 years with suspicious nodal enlargement should be evaluated for neoplastic etiology, especially when there is a history of smoking noted.^[10] In the current study, majority our patients belonged to the 6th and 7th decade with similar observational results.^[6]

In the present study, level II cervical lymph nodes from known primary sites were the most commonly sampled neck nodes which were comparable to the findings from other studies.^[1,8] Squamous cell carcinoma from upper aerodigestive tract is the most common histological subtype that affects level I-III cervical lymph nodes comparable to our results. Metastasis from unknown primary sites most frequently involve level II lymph nodes similar to our findings from this study.^[10,11]

In our study, a total of 234 cases of cervical lymphadenopathy were evaluated using FNAC of which 63.7% were malignant cases. Both Hafez et.al and Steel et.al found 69.4% and 59% malignant cases respectively which were comparable to our findings.^[1,12] Metastatic lesions accounted for 61.1% which was the most common malignant cause for cervical lymphadenopathy which were similar to results reported by many other researchers ranging from 79.4% to 38.2%.^[8,13-15] On the contrary, there are studies from India^[7], Croatia^[10] and Bangladesh^[16] which reported reactive lymphadenitis as the most common cause of cervical lymphadenopathy. Our centre is a tertiary cancer institute receiving many referral cancer cases from northern belt of Kerala and neighbouring states which could attribute to the higher incidence of neoplastic lesions.

Among the neoplastic lesions, we found that 118 cases were metastatic squamous cell carcinomas (50.4%) followed by 25 cases of metastatic adenocarcinomas (10.7%). A five years study on metastatic neck nodes by Khurajam et.al showed squamous cell carcinoma as the most common histological subtype (33%) followed by adenocarcinoma (21.5%).^[17] Another hospital based study on cytological evaluation of enlarged cervical lymph nodes in metastatic diseases showed squamous cell carcinoma (87 cases) as the most commonly diagnosed histological subtype followed by adenocarcinoma (32 cases).^[6]

In the current study we had six cases of lymphoproliferative disorders (2.6%) of which four cases were Non Hodgkin lymphomas (1.7%), one case each of Hodgkin lymphoma (0.4%) and granulocytic sarcoma (0.4%). Both Ahmad et.al and Gupta et.al reported 4.5% and 5.0% cases of lymphoma which were comparable to our findings in the current study.^[18,19]

Among the various primary site wise distribution of metastatic squamous cell carcinoma lesions, head and neck region was the most common site (35.0%) followed by upper gastrointestinal tract (2.6%) namely oesophagus and GE junction. A hospital based study on metastatic diseases carried out by Mehdi et.al showed head and neck region as the most common primary site (45.1%) similar to our study though we had a slightly lower incidence of cases.^[6]

In the current study, the most common primary sites affected with squamous cell carcinoma in the head and neck region were tongue (13 cases) followed by larynx (11 cases). Mehdi et.al reported larynx (29 cases) followed by tongue (27 cases) as the most common primary sites of metastatic squamous cell carcinoma in head and neck region.^[6]

In our study, there were metastatic carcinomas including both squamous cell carcinomas and adenocarcinomas whose primary site of origin were unknown, accounting for 12.8% which was slightly lower to an audit study carried out by Gupta et.al accounting for 13.3%.^[20] Squamous cell carcinoma is the most common cytological subtype

among the metastatic carcinomas of unknown primary in our study similar to studies by Mehdi et.al.^[6]

In the present study, the overall sensitivity, specificity, positive predictive value, negative predictive value and overall accuracy were 95.5%, 100%, 100%, 91.3% and 95.7% respectively. In other studies, the sensitivity, specificity, positive predictive value and negative predictive value ranged from 90.9-100%, 93.7-98.5%, 82-97.6% and 81-96% respectively. In our study, there were no false positive cases; as a result we got 100% specificity and positive predictive value. The overall diagnostic accuracy using FNAC as a diagnostic tool in evaluating enlarged cervical lymph nodes was 95.7% which was within the range of 82-97% from other studies.^[1,6,8,19]

In our study, we concluded that metastatic carcinoma is the most common cause for cervical lymph node enlargement in the head and neck region by cytological evaluation using FNAC as a diagnostic tool. Squamous cell carcinoma is the most common subtype among all metastatic carcinoma including from unknown primary sites. FNAC is a simple, accurate, cost effective and reliable cytological tool, useful as a first line investigation and outpatient procedure, in the evaluation of enlarged cervical lymph nodes to get accurate diagnosis for the early management especially in malignant conditions.

References:

- Hafez, N., & Tahoun, N. (2011). Reliability of fine needle aspiration cytology as a diagnostic tool in cases of cervical lymphadenopathy. *J Egypt Natl Canc Inst*, 23,105-114.
- Patel, K.R., Patel, J.M., Shah, K.J., & Patel, N.U. (2014). Role of FNAC in Diagnosis of cervical lymphadenopathy. *Int J Med Sci Public Health*, 3, 572-573.
- Alam, K., Khan, A., Siddiqui, F., Jain, A., Haider, N., & Maheshwari, V. (2010). Fine needle aspiration cytology (FNAC): A handy tool for metastatic lymphadenopathy. *Int J Pathol*, 10, 2.
- Wilkinson, A.R., Mahore, S.D., & Maimoon, S.A. (2012). FNAC in the diagnosis of lymph node malignancies: A simple and sensitive tool. *Indian J Med Paediatr Oncol*, 33, 21-24.
- Rakhshan, M., & Rakhshan, A. (2009). The Diagnostic Accuracy of Fine Needle Aspiration Cytology. *Iran J Pathol*, 4, 147-150.
- Mehdi, G., Singh, A.K., Hasan, M., Ansari, H.A., Rehman, S., Mirza, S., & Sherwani, R.K. (2015). Cytological evaluation of enlarged lymph nodes in metastatic disease: A hospital-based assessment. *Clin Cancer Investig J*, 4, 152-157.
- Khurajam, S.D., Sarkar, R., Haldar, B., Rasaily, N., Khurajam, S., & Debnath, K. (2015). Aspiration cytology of metastatic neck node: A 5-year study. *J Med Soc*, 29, 160-163.
- Qadri, S.K., Hamdani, N.H., Besina, S., Makhdoomi, R., Rasool, R., Shah, P., & Baba, K.M. (2016). Cytological Study of Cervical Lymphadenopathy in a Tertiary Care Institution from Kashmir Valley, India. *J Cytol Histol*, 7, 418. doi:10.4172/2157-7099.1000418.
- Vasilj, A., & Katović, S.K. (2015). Fine-needle aspiration cytology of head and neck lymph nodes in a ten-year period - single centre experience. *Acta Clin Croat*, 54(3), 315-318.
- Balm, A. J. M., van Velthuysen, M. L. F., Hoebbers, F. J. P., Vogel, W. V., & van den Brekel, M. W. M. (2010). Diagnosis and Treatment of a Neck Node Swelling Suspicious for a Malignancy: An Algorithmic Approach. *International Journal of Surgical Oncology*, 2010, 581540. <http://doi.org/10.1155/2010/581540> doi:10.1155/2010/581540
- Wojke, P., Bhagat, R., Gaur, R., & Sharma, D.C. (2016). Fine Needle Aspiration Cytology in Cervical Lymphadenopathy; A Key to Divergent Locks. *IOSR-JDMS*, 15(8), 118-123. DOI: 10.9790/0853-150810118123.
- Steel, B.L., Schwartz, M.R., & Ibrahim, R. (1995) Fine needle aspiration biopsy in diagnosis of lymphadenopathy in 1,103 patients. *Acta Cytol*, 39, 76-81.
- Martins, M.R., & Santos, G.C. (2006). Fine-needle aspiration cytology in the diagnosis of superficial lymphadenopathy: A 5-year Brazilian experience. *Diagn Cytopathol*, 34, 130-134.
- Baqwan, I., Kane, S., & Chinoy, R. (2006). Cytologic Evaluation of the Enlarged Neck Node: FNAC Utility in Metastatic Neck Disease. *The Internet Journal of Pathology*, 6(2).
- Arora, B., Beena, K.R., & Arora, D.R. (1999). Utility of fine needle aspiration cytology in lymphadenopathies. *J Cytol*, 16, 61-66.
- Kafi, A.H., Arif, H.B., & Ruhul, A.S. (2012). Role of Fine needle aspiration cytology in the diagnosis of cervical lymphadenopathy. *Bangladesh J Med Sci*, 11, 25-27.
- Khurajam, S.D., Sarkar, R., Haldar, B., Rasaily, N., Khurajam, S., & Debnath, K. (2015). Aspiration cytology of metastatic neck node: A 5-year study. *J Med Soc*, 29, 160-163.
- Ahmad, S.S., Akhtar, S., Akhtar, K., Naseem, S., & Mansoor, T. (2005). Study of Fine Needle Aspiration Cytology in Lymphadenopathy with Special Reference to Acid-fast Staining in Cases of Tuberculosis. *J K Sci*, 7(1), 1-4.
- Gupta, R.K., Naran, S., Lallu, S., & Fauck, R. (2003). The diagnostic value of fine needle aspiration cytology (FNAC) in the assessment of palpable supraclavicular lymph nodes: a study of 218 cases. *Cytopathology*, 14, 201-207.
- Gupta, N., Rajwanshi, A., Srinivasan, R., & Nijhawan, R. (2006). Pathology of supraclavicular lymphadenopathy in Chandigarh, north India: an audit of 200 cases diagnosed by needle aspiration. *Cytopathology*, 17, 94-96.