Original Research Article

Efficacy of fine needle aspiration cytology as a primary diagnostic tool for cervical lymphadenopathy

Sarder M. Abu Horaira*

Department of Pathology, Rajshahi Medical College and Hospital, Rajpara, Ghoramara, Rajshahi, Bangladesh

*Correspondence:
Dr. Sarder M. Abu Horaira,
E-mail: horaira14@gmail.com

ABSTRACT

Background: Cervical lymphadenopathy is a frequently encountered neck lesion in routine daily practice all over the globe. The etiology varies from a benign inflammatory process to a malignant condition. Fine needle aspiration cytology (FNAC) is now a days the initial investigation in most of the cases of cervical lymph node enlargement. The aim of this work was to evaluate the efficacy and diagnostic accuracy of fine needle aspiration cytology of cervical lymph nodes with an emphasis on discordant cases between the cytology and the histopathology.

Methods: The present study was a retrospective one, conducted at the department of pathology, Rajshahi medical college and hospital located in west-northern region of Bangladesh over a period of one year (January 2019 to December 2019). FNAC assessed and histopathologically correlated 122 documented cases were included in the study.

Results: The cytological diagnoses were detected to be benign in 107 cases (87.70%) and malignant in 15 cases (12.30%). Reactive lymphadenitis (67.20%) was the most common benign lesion followed by granulomatous lymphadenitis (16.40%). The overall diagnostic sensitivity, specificity, positive predictive value and negative predictive value of cytological diagnosis of cervical lymph node were 97.16%, 75%, 96.26% and 80%, respectively. The overall diagnostic accuracy was 94.26% while the overall discordance rate was 5.73%.

Conclusions: FNAC is the preliminary investigation of choice in the diagnostic approach to most of the cases of cervical lymphadenopathy and it has good diagnostic sensitivity, specificity and accuracy.

Keywords: Fine needle aspiration cytology, Cervical lymphadenopathy, Reactive lymphadenitis

INTRODUCTION

Diagnostic procedure of FNAC is exercised to investigate lumps or masses. In this technique, a thin (22-27 gauge, 0.50 to 0.65 mm outer diameter, so called fine needle), hollow needle is inserted into the mass for sampling of cells that, after being stained are examined under a microscope. The sampling and biopsy considered together are called fine-needle aspiration biopsy (FNAB) or FNAC (the latter to emphasize that any aspiration biopsy involves cytopathology, not histopathology).[1]

Lymph node needle aspiration is one of the oldest applications of technique in the diagnosis of human disease. In 1904, two British military surgeons, Greig and Gray, working in Uganda, published a paper describing the diagnosis of sleeping sickness by recognizing mobile trypanosomes in lymph node aspirates. In 1921, Guthrie of Johns Hopkins described the application of needle aspiration to the diagnosis of tumors. In 1930, Martin and Ellis of memorial hospital for cancer (now the memorial Sloan-Kettering cancer center) included tumors that had

metastasized to the lymph nodes among the targets of aspiration biopsy.[1]

Lymphadenopathy denotes the swelling of lymph node and lymphadenitis is the inflammation of lymph node. Cervical lymph node measuring more than 1 cm is known as cervical lymphadenopathy. It could be as a result of infection, autoimmune disease or malignancy.[2] Cervical lymphadenopathy is a quite familiar clinical presentation of patients attending the outpatient department. It is often a diagnostic challenge to medical professionals. The degree and pattern of morphological alterations depend on the inciting stimulus and the intensity of the response. Thus, lymphadenopathy may be an incidental finding and/or primary or secondary manifestation of underlying diseases which may be neoplastic or non neoplastic.[3] FNAC procedure is treated as the first line of investigation. It has assumed importance in diagnosing a variety of disease processes as it is simple, reliable, rapid, minimally invasive and cost effective procedure which can be used in outpatient setting.[4] It has become a crucial part of the initial diagnosis and management of patients with lymphadenopathy due to early availability of results, with less complication.[5] FNAC has also been advocated as a helpful method in comparison to more expensive surgical excision biopsies in developing countries with limited financial and health care resources.[6] It almost offers a correct diagnosis for reactive lymphoid hyperplasia, infectious disease, granulomatous lymphadenitis and metastatic malignancy. Thus, it can avoid the require for excision biopsy in the majority cases and allow rapid onset of therapy.[7]

The knowledge about the pattern of lymphadenopathy in a given geographical region is vital for making a reliable diagnosis.[8] The most common causes of lymphadenopathy in developing countries like India and Bangladesh is tuberculosis and should be considered in every case of granulomatous lymphadenopathy unless proved otherwise. The diagnosis of metastatic tumor to the lymph node on cytological smear is crucial and highly reliable. This would be the solitary indication for searching the primary tumor, especially in cases of occult carcinoma.[9] However, there are some instances where features of different tumors overlap and the clear-cut diagnosis of the primary tumor remains obscure. Ancillary techniques, such as histopathologically, immunocytochemistry are used to overcome these difficulties.[10]

The aim of the present work was to report and bring up to date the results of FNAC of cervical lymphadenopathy, that depend on the cytomorphological features alone, in comparison to the results of histopathology in an effort to highlight the diagnostic accuracy and efficacy of FNAC of lymph nodes with an emphasis on discordant cases between the cytology and the histopathology.

METHODS

Design of study

This was a retrospective study on 122 FNAC assessed and histopathologically correlated patients with cervical lymphadenopathy.

Study setting

The study was conducted in the department of pathology, Rajshahi medical college and hospital located in West-Northern region of Bangladesh.

Study period and duration

The study was conducted over a period of one year from January 2019 to December 2019.

Sample size and study population

All FNAC assessed and histopathologically correlated 122 cervical lymphadenopathy specimens received in the department of pathology during the study period, January 2019 to December were included.

Inclusion criteria

All cervical lymphadenopathy cases which were cytologically conclusive and histopathologically correlated were included in the study.

Exclusion criteria

Unsatisfactory samples or non-conclusive data were excluded from the study.

Statistical analysis

Data was analyzed by manually and by SPSS-version 26 (SPSS=statistical programmed for scientific study).

Out of FNAC assessed 542 cervical lymphadenopathy cases 122 cases were histopathologically correlated. Therefore, those histopathologically correlated 122 cases were included in the study. According to the records, patients with significant cervical lymphadenopathy irrespective of age and gender were included in this study. The detailed clinical findings were recorded before performing FNAC. Other relevant radiological findings were also noted for correlation.

Procedure

FNAC was done on the representative lymph nodes observing strict aseptic precautions. An informed consent from the patient was taken before performing the procedure. The palpable lymph node was fixed with one hand and the overlying skin was scrupulously cleaned

prior to performing FNAC. A size 22 gauge needle, attached to a 05 ml syringe was inserted into the swelling and full suction pressure was applied. The tip of the needle was briskly moved up and down and sideways a few times till a spot of material showed in the stem of the needle. The negative pressure in the syringe was then released and the needle was withdrawn. The aspirated material was then blown on a clean glass slides using the same syringe. Smears were prepared on glass slides, others fixed in alcohol and stained with and hematoxylin and eosin stain; some stained with Leishman's when needed. Necrotic aspirates were also submitted for Ziehl-Neelsen (ZN) staining for acid fast bacilli (AFB) and their culture. Immunohitochemistry staining was done in necessary cases. Microscopic examination was carried out after staining.

RESULTS

A total of 1832 cases were received in the cytopathology section over a period of 1 year from January 2019 to December 2019, out of which, 542 (29.58%) cases were cervical lymph node FNACs. Histopathology correlation was done in 122 cases. Hence, a total of 122 patients were included in this study.

Out of the 122 studied cases with cervical lymph-adenopathy that had underwent FNAC, 73 cases (59.8%) were females and 49 cases (40.2%) were males with male:female ratio of about 1:1.45. Females showed predominance of reactive lymphadenitis (55 cases, 67.07%) (Figure 1), while metastatic carcinoma (Figure 2) and granulomatous lymphadenitisis (Figure 3), showed male predominance. 41 cases (33.60%) were in the pediatric age group (between 0 and 10 years). 26 cases (21.31%) belonged to the age group between 11 and 20 years. 25 cases (20.49%) were in the range of 21-30 years. 8 cases (6.56%) were in the group between 31 and 40 years. Only 5 cases (4.09%) were above the age of 70 years (Table 1).
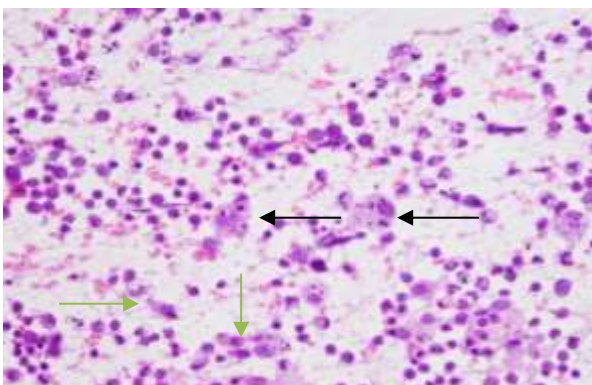

Figure 1: Cytological case number 34 of reactive lymphadenitis shows multiple tingible body macrophages (black arrow) and plasma cell (green arrow) scattered through small lymphocytes (hematoxylin and eosin stain 400×).
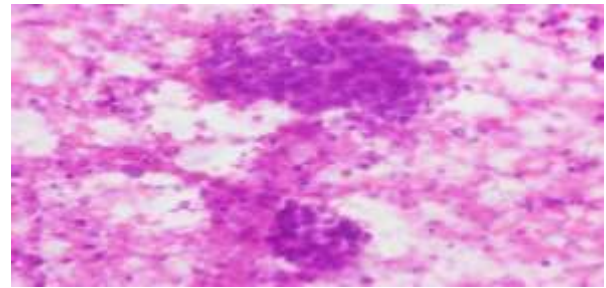

Figure 2: Cytologically diagnosed case number 113 shows metastatic adenocarcinoma and correlated well with the histopathology (hematoxylin and eosin stain 400×).

Figure 3: Oil immersion view of granulomatous lymphadenitis of cytological case number 40 demonstrates multiple AFB in a necrotic background (Ziehl Neelsen stain, 1000×).
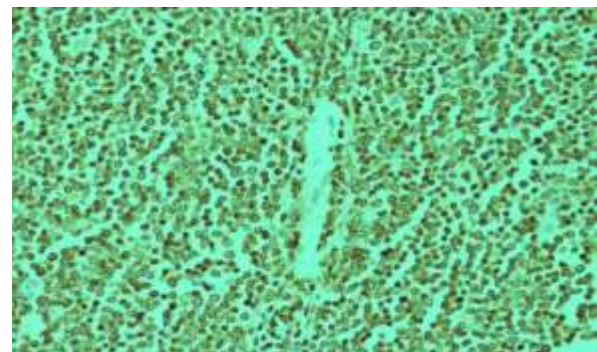

Figure 4: Immunostain of case number 109 (histopathology) shows strong CD 3 positive non-Hodgkin lymphoma which was cytologically misdiagnosed as granulomatous lymphadenitis (immunohistochemical stain 200×).

Table 2 shows the lymph node groups involved in various types of cervical lymphadenopathy. Most common lymph nodes involved were the upper deep cervical group. Out of 122 cases, 53 patients (43.44%) presented with upper deep cervical lymphadenopathy, followed by involvement of the mid cervical lymph nodes in 23 cases (18.85%). Among the remaining cases, 17 cases (13.9%), 9 cases (7.4%), 8 cases (6.6%), 8 cases (6.6%) and 4 cases (3.3%) were in supraclavicular, lower deep

cervical, submandibular, preauricular and occipital lymph nodes, respectively.

Out of total 122 cases 75 cases (61.47%) of right sided cervical lymphadenopathy were more common than the left cervical lymphadenopathy, seen in 47 cases (38.53%). Though 02 cases of non-Hodgkin lymphoma were involved in both side of cervical lymph nodes due to predominance of number of involved lymph nodes, they were counted as right sided. Among the 82 reactive lymphadenitis cases 52 cases were right sided. On the other hand, out of 20 granulomatous lymphadenitis cases 14 cases observed as right sided cervical lymphadenopathy. Interestingly out of 09 metastatic carcinoma cases 07 were left cervical lymphadenopathy (Table 3).

Table 1: Age and cytological diagnoses of the 122 studied cases with cervical lymphadenopathy.

Age (in years)	Cytological diagnosis						Total
	Reactive lymphadenitis	Suppurative lymphadenitis	Granulomatous lymphadenitis	Metastatic carcinoma	Non-Hodgkin lymphoma	Hodgkin lymphoma	
0-10	36	04	01	00	00	00	41
11-20	17	01	08	00	00	00	26
21-30	15	00	08	00	00	02	25
31-40	05	00	02	00	01	00	08
41-50	02	00	01	03	01	00	07
51-60	03	00	00	01	01	00	05
61-70	00	00	00	04	01	00	05
>70	04	00	00	01	00	00	05
Total	82	05	20	09	04	02	122

Table 2: Topographic distribution and cytological diagnoses of the studied cases (n-122).

Sites	Cytological diagnosis						Total
	Reactive lymphadenitis	Suppurative lymphadenitis	Granulomatous lymphadenitis	Metastatic carcinoma	Non-Hodgkin lymphoma	Hodgkin lymphoma	
Upper deep cervical	33	05	08	05	02	00	53
Mid cervical	12	00	05	04	01	01	23
Supraclavicular	14	00	01	00	01	01	17
Lower deep cervical	06	00	03	00	00	00	09
Submandibular	05	00	03	00	00	00	08
Pre-auricular	08	00	00	00	00	00	08
Occipital	04	00	00	00	00	00	04
Total	82	05	20	09	04	02	122

Table 3: Cytological diagnoses of cervical lymphadenopathy with laterality of the studied patients (N=122).

Cytological diagnosis		Side of neck		Total	Percentage (%)
		Right	Left		
Benign	Reactive lymphadenitis	52	30	82	67.2
	Suppurative lymphadenitis	04	01	05	04.1
	Granulomatous lymphadenitis	14	06	20	16.4
Malignant	Metastatic carcinoma	02	07	09	07.4
	Non-Hodgkin lymphoma	02	02	04	03.3
	Hodgkin lymphoma	01	01	02	01.6
Total		75	47	122	100

Table 4: Comparative analysis of cytological diagnoses by histopathological diagnoses in 122 studied cases.

Cytopathological diagnosis	Histopathological diagnosis		Total
	Benign	**Malignant**	
Benign	103 (true positive)	04 (false positive)	107
Malignant	03 (false negative)	12 (true negative)	15
Total	106	16	122

Table 5: Diagnostic efficacy of cytopathological diagnoses as compared with histopathological diagnoses (N=122).

Statistical parameters	Percentage (%)
Sensitivity	97.16
Specificity	75.00
Positive predictive value (PPV)	96.26
Negative predictive value (NPV)	80.00
Accuracy	94.26
Discordance	05.73

Table 6: Comparison of detailed cytopathological diagnoses with the corresponding detailed histopathological diagnoses in 122 patients with cervical lymphadenopathy.

Cytological diagnosis	Total cases	Histological diagnosis						Accuracy (%)
		Reactive lymphadenitis	Suppurative lymphadenitis	Granulomatous lymphadenitis	Metastatic carcinoma	NHL	HL	
Reactive lymphadenitis	82	81	00	00	00	00	01	98.78
Suppurative lymphadenitis	05	00	05	00	00	00	00	100
Granulo-matous lymphadenitis	20	00	00	17	01	01	01	85
Metastatic carcinoma	09	00	00	00	09	00	00	100
Non-Hodgkin lymphoma	04	02	00	00	00	02	00	50
Hodgkin lymphoma	02	00	00	01	00	00	01	50
Total	122	83	05	18	10	03	03	

NHL=non-Hodgkin lymphoma; HL=Hodgkin lymphoma.

Benign lesions contributed to 107 cases (87.70%) and malignant lesions to 15 cases (12.30%). Among benign lesions, reactive lymphadenitis was the most common which constituted 82 cases (67.20%) followed by granulomatous lymphadenitis comprising 20 cases (16.40%). Suppurative lymphadenitis was diagnosed in 5 cases (4.1%). Reactive lymphadenitis was seen most often under the age of 30 years. Out of the 20 cases of granulomatous lymphadenitis 17 cases (85%) were also seen under the age 30 of years.

Among the 15 malignant cases, 09(60%) cytological smears were diagnosed as malignant metastatic tumors. Among the remaining cases, 4 cases (26.66%) and 2 cases (13.33%) were diagnosed as non-Hodgkin lymphoma and Hodgkin lymphoma, respectively. Metastatic cases were seen most often over the age of 40 years. Out of the 9 metastatic cases to the lymph nodes, 5 cases were metastatic squamous cell carcinoma, 3 cases were metastatic adenocarcinoma (Figure 2) and single case was metastatic undifferentiated carcinoma.

The cytopathological results were then compared with the histopathological diagnoses of the corresponding excised lymph nodes. As the number of benign cases was more as compared to malignant, the benign cases were considered as either true positive or false positive while malignant cases were considered as either true negative or false negative.

Analyzing the data, among the 107 cytologically benign cases, 103 cases (96.26%) were proved histopathologically to be benign, true positive and 4 cases (3.74%) were diagnosed histopathologically as malignant, false positive. 12 cases (80%) out of the 15 cytologically diagnosed malignant cases were proved histopathologically to be malignant, true negative and 03

cases (20%) were benign, false negative (Table 4). Accordingly, the overall diagnostic sensitivity, specificity, positive predictive value and negative predictive value of cytological diagnosis of cervical lymph node were 97.16%, 75%, 96.26% and 80%, respectively. The overall diagnostic accuracy was 94.26% while the overall discordance rate was 5.73% (Table 5).

Calculating the detailed correlation between cytological and histological diagnoses, it was observed that of the 82 cases that were cytologically diagnosed as reactive lymphoid hyperplasia 01 cases was turned out to be Hodgkin lymphoma on histological examination. This result showed 98.78% diagnostic accuracy of reactive lymphoid hyperplasia (Table 6). In the 5 cases that were diagnosed cytologically as suppurative lymphadenitis, all 5 cases were found to be suppurative lymphadenitis on histopathological base. In the same, 9 cases that were diagnosed cytologically as metastatic carcinoma, all 9 cases were found to be malignant on histopathological findings. These result showed 100% diagnostic accuracy of both suppurative lymphadenitis and metastatic carcinoma cases. Out of 20 cases that were diagnosed cytologically as granulomatous lymphadenitis 03 were diagnosed histopathologically as malignant. The diagnostic accuracy was 85%. Among those three cases, 01 case was histopathologically diagnosed as metastatic carcinoma, 01 as non-Hodgkin lymphoma (Figure 4) and remaining 01 as Hodgkin lymphoma. On the other hand, among the 04 cytologically diagnosed non-Hodgkin lymphoma, 02 reclassified histopathologically as benign, reactive lymphoid hyperplasia and those 02 cytologically diagnosed Hodgkin lymphoma, 01 histopathologically proved as benign granulomatous lymphadenitis. The diagnostic accuracy of both non-Hodgkin lymphoma and Hodgkin lymphoma cases was 50%.

DISCUSSION

In the present study, an attempt has been made to study the cytomorphological spectrum and epidemiological pattern of lymph node lesions with a comparison to the results of histopathology in an effort to highlight the diagnostic accuracy and efficacy of FNAC of enlarged cervical lymph nodes. Several times, an aspirate may be the only tissue available for offering a diagnosis, as sometimes a surgical biopsy may not be possible for various reasons. FNAC may often be the barely tool for diagnosis for management of the patients in some cases of disseminated metastatic malignancy.

Out of the 122 studied cases, 73 cases (59.8%) were females and 49 cases (40.2%) were males with male:female ratio of about 1:1.45. These findings agreed with other studies.[11,12] Some authors have reported male predominance. The cause of female predominance in this study may be attributed to some factors like small sample size; increased awareness in both sex about the diseases especially where clinical symptom is present; availability of test facilities.

Cervical lymphadenopathy was observed in patients with wide age range. The author found that the youngest patient in the study was 1.5 years old and the oldest one was 81 years old. These figures came in close comparison to other workers.[13] In this study, maximum cases (41/122) were observed in the age group of 0-10 years. This differs with the study by Chandanwale et al where maximum numbers of cases were spotted in the age group of 21-40 years.[14] But most of the cases (92/122) were documented below 30 years of age. In this milieu, the findings correlated with that of Ahmad et al and Sarda et al.[15,16]

Aspirates were benign in 107 cases (87.70%) and malignant in 15 cases (12.30%). Similar findings were obtained by other authors in eastern countries where most of the cases are due to infections and tuberculosis.[17,18] However this differs with the study carried out in eastern country of Egypt at national cancer institute, Cairo university by Hafez and Tahoun getting 69.4% malignant lesions.[19] The cause of the large percentage malignant lesions in Hafez and Tahoun 19 study may be attributed to two factors; they studied the suspicious cases only and that study was carried out in cancer institute where most referral cases have serious complaints.[19]

The peak incidence of benign lesions was below 30 years of age while the peak incidence of malignant lesions was in the 5th decade. The results correlated with that of Ahmad et al, Sarda et al and Ajinyka attributed the cause of the presence of more malignancy in older age to the fact that adult or elderly patients often react to the infection with only slight to moderate lymph node enlargement; therefore, distinct lymphadenopathy in an elderly patient would arouse suspicion of malignancy and justify immediate FNAC.[15,16,20]

Among the benign lesions, reactive lymphadenitis was the most common which constituted 82 cases (67.20%) followed by granulomatous lymphadenitis comprising 20 cases (16.40%) which correlates with the study by Hirachand et al Reactive lymphadenitis is a common finding as infections from head and neck drain into these nodes.[13,20] Few authors have reported granulomatous lymphadenitis as the most common cause of cervical lymphadenopathy.[22,23] In the current study overall AFB positivity (Figure 3) was 30.2%. Highest AFB positivity was seen in smears with only necrosis or neutrophilic infiltrate (90%), whereas least AFB positivity was seen in smears with only epithelioid granulomas (5%). The findings correlated with the study of Nidhi et al who demonstrated 85.5% AFB positivity in cases having caseous necrosis only and 3.2% AFB positivity in smears having epithelioid granuloma without necrosis.[24]

Out of 15 malignant cases, 09 FNAC smears (60%) were diagnosed as malignant metastatic tumors. Among the remaining cases, 4 cases (26.66%) and 2 cases (13.33%) were non-Hodgkin lymphoma and Hodgkin lymphoma, respectively. In the present study, all cases of metastatic

carcinoma to the lymph nodes showed exact corroboration with the histopathology. The diagnostic accuracy of these cases was 100%. This finding showed exact correlation of other workers.[13] In this study, most of the metastatic nodes were metastatic squamous cell carcinoma (5/9) followed by metastatic adenocarcinoma(3/9). Similar findings had been documented by other researchers.[13,15]

In this study upper cervical lymph nodes (43.44%) were the most common group of lymph nodes involved, followed by involvement of the mid cervical lymph nodes (18.85%) which was similar to that observed by Khajuria et al, Hirachand et al and Chandanwale et al.[8,13,14]

The author also documented the laterality of cervical lymphadenopathy. 75 cases (61.47%) right sided cervical lymphadenopathy were more common than the left cervical lymphadenopathy, seen in 47 cases (38.53%). Though 02 cases of non-Hodgkin lymphoma were involved in both side of cervical lymph nodes due to predominance of number of involved lymph nodes, they were counted as right sided. Interestingly out of 09 metastatic carcinoma cases 07 were left cervical lymphadenopathy. One reason of predominance to left laterality of metastatic carcinoma may be due to large aerodigestive tract areas including respiratory tract, stomach, pancreas and also prostate and testis are drained through terminal collecting lymphatic trunks to left cervical lymph node groups.[25]

In accordance with the histopathological diagnosis, the overall diagnostic sensitivity, specificity, positive predictive value and negative predictive value of cytological diagnosis of cervical lymph node were 97.16%, 75%, 96.26% and 80%, respectively. Rakhshan in their similar study reported sensitivity, specificity, positive predictive value and negative predictive value of 75.8%, 96.6%, 94% and 85%, respectively.[26] In the present study and based on the cytomorphology alone, the overall diagnostic accuracy of FNAC in cases of cervical lymphadenopathy was 94.26%. This observation was similar that reported by many other authors in similar studies who reported an accuracy rate of 85% to 94.4%.[26,27] Ahmad et al observed a much higher accuracy rate (97.6%) in their series.[15] The overall discordance rate was 5.73%. Among the 07 discordant cases, 4 cases were false positive and 3 cases were false negative. This result is much lower studied by Hafez where they observed 17.8% discordance.[19]

Out of 04 false positive cases, 03 cases that were diagnosed cytologically as granulomatous lymphadenitis histopathologically proved malignant, 01case was histopathologically diagnosed as metastatic carcinoma, 01 as Hodgkin lymphoma and remaining 01 as non-Hodgkin lymphoma. The non-Hodgkin lymphoma case was not conclusive in histopatholy rather than established as peripheral T cell lymphoma in immunocytochemistry (Figure 4). Remaining single false positive case, which

was cytologically diagnosed a reactive lymphoid hyperplasia, histopathologically diagnosed as Hodgkin lymphoma. On the other hand, 3 false negative cytologically benign cases became malignant histopathologically. 02 cytologically diagnosed non-Hodgkin lymphoma false negative cases histopathologically confirmed as reactive lymphoid hyperplasia and single cytologically diagnosed Hodgkin lymphoma false negative case, proved granulomatous lymphadenitis histopathologically.

The diagnostic accuracy of reactive lymphoid hyperplasia in the current study was 98.78%. This finding agreed with experience of Al-Mulhim et al who reported 100% diagnostic accuracy for such cases.[28] However this finding differs with experience of Keith et al who reported 88% diagnostic accuracy.[5] In the present study, the diagnostic accuracy of chronic granulomatous lymphadenitis was 85%. This outcome was much lower than that conducted by Keith et al and Ahmad et al who reported 100% and 97.4% accuracy rate, respectively.[5,15] In the current study, the diagnostic accuracy for non-Hodgkin lymphoma and Hodgkin lymphoma was 50% each. However, this result was much lower than that recorded by Al-Mulhim et al who reported 92% and 86% diagnostic accuracy for non-Hodgkin lymphoma and Hodgkin lymphoma on cytology, respectively.[28] This much lower diagnostic accuracy for non-Hodgkin lymphoma and Hodgkin lymphoma may be due to small samples size.

Diagnostic accuracy of metastatic carcinoma cases was 100%. This judgment came in close similarity to most investigators who reported more than 90% accuracy rate.[15,28,29] While Khajuria et al reported 87% diagnostic accuracy.[8] Most of the studied metastatic nodes were metastatic squamous cell carcinoma (55.56%) followed by metastatic adenocarcinoma (33.34%). Similar results had been documented by other researchers.[13,15]

But the limitations and pitfalls of the FNAC procedure should be kept in mind. Open biopsy for histological confirmation is gold standard. FNAC can strongly suggest a preliminary diagnosis, which can be followed up by biopsy for histopathology and if necessary, immunohistochemistry for confirmation and final classification. The evaluation of FNA in patients with no previously diagnosed malignancy should be interpreted by an experienced cytopathologist in the context of clinical, radiological and laboratory finding and if any of these findings is suspicious, further investigation is justified to overcome the limitations and pitfalls of the cytomorphological features when applied alone.

CONCLUSION

Finally it is concluded that, FNAC appears as a good first line method for investigating the cases of cervical lymphadenopathy. It is quick, safe, minimally invasive, and reliable and is readily accepted by the patient. It is a

useful tool in diagnosing both non neoplastic and neoplastic lesions. Most of cervical lymphadenopathies are due to non-neoplastic conditions. FNAC can assess correctly metastatic lesions. FNAC is useful adjunct to diagnostic procedures and can point to primary depending upon the cell type.

REFERENCES

1. Nancy P, Ruth C, Katz L. Lymph nodes. In: Koss LG, Melamed MR, eds. Koss Diagnostic Cytology and its histopathologic bases. 5th ed. Philadelphia: Lippincott Williams and Wilkins; 2006: 1186-7.
2. Mukul P, Borsaikia K, Das BK, Hazarika A. A clinicopathological evaluation of cervical lymphadenopathy in children (0-14 years) by fine needle aspiration cytology and histopathological examination: a hospital based study. Nat J Otorhinolaryngol Head Neck Surg. 2014;2(11):12-4.
3. Pandit AA, Candes FP, Khubchandani SR. Fine needle aspiration cytology of lymph nodes. J Postgrad Med. 1987;33(3):134-6.
4. Pavithra P, Geetha JP. Role of fine needle aspiration cytology in the evaluation of the spectrum of lymph node lesions. Int J Pharm Bio Sci. 2014;5:377-84.
5. Keith VE, Harsharan SK, Jerald GZ. Fine needle aspiration biopsy of lymph nodes in the modern era: reactive lymphadenopathies. Pathol Case Rev. 2007;12(1):27-35.
6. Das DK. Value and limitation of fine-needle aspiration cytology in diagnosis and classification of lymphomas: a review. Diagn Cytopathol. 1999;21(4):240-9.
7. Howlett DC, Harper B, Quante M, Berresford A, Morley M, Grant J. Diagnostic adequacy and accuracy of fine needle aspiration cytology in neck lump assessment: results from a regional cancer network over a one year period. J Laryngol Otol. 2007;121(6):571-9.
8. Khajuria R, Goswami KC, Singh K, Dubey VK. Pattern of lymphadenopathy on fine needle aspiration cytology in Jammu. JK Sci. 2006;8(3):157-9.
9. Kollur SM, El-Hag IB. Fine needle aspiration cytology of metastatic nasopharyngeal carcinoma in cervical lymph nodes: comparison with metastatic squamous cell carcinoma and Hodgkin and non-Hodgkin lymphoma. Diagn Cytopathol. 2003;28(1):18-22.
10. Haque MA, Talukder SI. Evaluation of fine needle aspiration cytology of lymph node in Mymensingh. Mymensingh Med J. 2003;12(1):33-5.
11. Upadhyay GP, Thakker RM. Evaluation of fine needle aspiration cytology as the initial diagnostic test in cases of cervical lymphadenopathy. Int J Res Med Sci. 2016;4(12):5103-7.
12. Badge SA, Ovhal AG, Azad K, Meshram AT. Study of fine-needle aspiration cytology of lymph node in rural area of Bastar District, Chhattisgarh. Med J DY Patil Univ. 2017;10:143-8.
13. Hirachand S, Lakhey M, Akhter J, Thapa B. Evaluation of fine needle aspiration cytology of lymph nodes in Kathmandu medical college, teaching hospital. Kathmandu Univ Med J. 2009;7(26):139-42.
14. Chandanwale S, Buch A, Verma A, Shruthi V, Kulkarni S, Satav V. Evaluation of granulomatous lymphadenitis on fine needle aspiration cytology-diagnostic dilemma. Int J Pharma Bio Sci. 2014;5:377-84.
15. Ahmad SS, Akhtar S, Akhtar K, Naseen S, Mansoor T. Study of fine needle aspiration cytology in lymphadenopathy with special reference to acid fast staining in cases of tuberculosis. J K Sci. 2005;7(1):1-4.
16. Sarda AK, Bal S, Singh MK, Kapur MM. Fine needle aspiration cytology as a preliminary diagnostic procedure for asymptomatic cervical lymphadenopathy. JAPI. 1990;38(3):46-9.
17. Gupta AK, Nayar M, Chandra M. Reliability and limitations of fine needle aspiration cytology of lymphadenopathies: an analysis of 1,261 cases. Acta Cytol. 1991;35:777-83.
18. Raghuveer CV, Pai MR, Manohar C. Role of FNAC in disorders of lymph nodes. J Cytol. 1996;13(1):45-9.
19. Hafez NH, Tahoun NS. Reliability of fine needle aspiration cytology (FNAC) as a diagnostic tool in cases of cervical lymphadenopathy. J Egypt Nat Cancer Institut. 2011;23(2):105-14.
20. Saluja JG, Ajinyka MS. Comparative study of fine needle aspiration cytology, histology and bacteriology of enlarged lymph node. Bombay Hosp J. 2000;42(2):1-7.
21. Ahmad T, Naeem M, Ahmad S, Samad A, Nasir A. Fine needle aspiration cytology and neck swellings in the surgical outpatient. J Ayub Med Coll Abbottabad. 2008;20(3):30-2.
22. Paliwal N, Thakur S, Mullick S, Gupta K. FNAC in tuberculous lymphadenitis: experience from a tertiary level referral centre. Indian J Tuberc. 2011;58(3):102-07.
23. Fatima S, Arshad S, Ahmed Z, Hasan SH. Spectrum of cytological findings in patients with neck lymphadenopathy- Experience in a tertiary care hospital in Pakistan. Asian Pac J Cancer Prev. 2011;12(7):1873-5.
24. Nidhi P, Sapna T, Shalini M, Kumud G. FNAC in tuberculous lymphadenitis: experience from a tertiary level referral centre. Indian J Tuberc. 2011;58(3):102-07.
25. Lockhart J, Lopez R, Nath H. Lymph node. In: Rosai J, ed. Rosai and Ackerman's surgical Pathology. 9th ed. Missouri: Mosby; 2004: 1978-79.

26. Rakhshan M, Rakhshan A. The diagnostic accuracy of fine needle aspiration cytology in neck lymphoid masses. Iranian J Pathol. 2009;4(4):147-50.
27. Shakya G, Malla S, Shakya KN, Shrestha R. A study of fine needle aspiration cytology of cervical lymph nodes. J Nepal Health Res Counc. 2009;7(14):1-5.
28. Al-Mulhim AS, Al-Ghamdi AM, Al-Marzooq HM, Mohammad HA, Gharib IA. The role of fine needle aspiration cytology and imprint cytology in cervical lymphadenopathy. Saudi Med J. 2004;25:862-5.
29. Al-Alwan NA, Al-Hashimi AS, Salman MM, Al-Attar EA. Fine needle aspiration cytology versus histopathology in diagnosing lymph node lesions. East Mediterr Health J. 1996;2(2):320-5.