

Study of Pathological Spectrum of Neck Lesions with Cytohistopathological Correlation

NAMRATA SHARMA, SANGEETA SHARMA, MAHUYA SARKAR, RANI BANSAL, ANJALI KHARE, DAVENDRA SWARUP, PRIYA GUPTA, MITALI SINGHAL

ABSTRACT

Introduction: Fine Needle Aspiration Cytology (FNAC) is quick, simple, inexpensive and minimally invasive technique used to diagnose different types of lesions located in neck. Palpable lesions in neck region can arise from various structures like, lymph node, thyroid, salivary gland, soft tissues, and blood vessels.

Aim: To study the spectrum of pathological lesions in neck masses diagnosed on FNAC and to evaluate its accuracy by correlating cytological findings with histopathological diagnosis.

Materials and Methods: A retrospective as well as prospective study was conducted from September 2012 to August 2015. Cytological diagnosis was made and correlated with histopathological diagnosis. Data analysis was done by Statistical Package for the Social Sciences (SPSS) Version 19. The data were expressed as frequency and percentage.

Results: Out of total 678 Fine needle procedures, (89%) were

inflammatory, (5.4%) were malignant and (2.9%) were benign. (2.5%) were inconclusive. Out of total 400 Lymph node lesions, reactive lymphoid hyperplasia/nonspecific lymphadenitis, was the commonest, (50.7%). In all 198 cases of thyroid lesions were diagnosed, in which incidence rate of colloid goitre was 74.2%.

40 cases of salivary gland lesions were found among which chronic sialadenitis was the commonest, 17 cases (70.8%). The sensitivity, specificity of FNAC of lymph nodes was 94.12%, 100% respectively. The diagnostic accuracy was 96%. The sensitivity, specificity and diagnostic accuracy of FNAC of thyroid glands and salivary glands were all 100%.

Conclusion: Neck swellings are a very common condition encountered. FNAC is a simple and effective method of assessing neck lumps. FNAC has high accuracy rate to differentiate infective conditions from neoplastic ones and avoids unnecessary surgeries. Thus FNAC can be a helpful investigation in the diagnosis of neck swellings.

Keywords: Fine needle aspiration cytology (FNAC), Goiter, Nonspecific lymphadenitis, Pleomorphic adenoma.

INTRODUCTION

Fine needle aspiration cytology is simple, safe and cost effective method for diagnosis of neck swellings [1]. FNAC can differentiate inflammatory and neoplastic lesions so effectively that it obviates the need for surgical intervention [2,3]. The common pathological lymph node lesions encountered in the neck are lymphadenitis, metastatic carcinoma, lymphoma [4]. Fine needle aspiration cytology is a well established tool for diagnosis of non neoplastic and neoplastic lymph node lesions. Thyroid nodules are frequent and impalpable nodules are often more common than palpable nodules in adults [5]. FNAC is helpful in diagnosis of goiter and saves the patient from unnecessary thyroidectomy [6]. Salivary gland neoplasms account for 6% of all head and neck tumors [7]. FNAC is useful in assessment of suspicious salivary glands lesions due to its high specificity and sensitivity [8].

This study has been undertaken to analyze the spectrum, nature, and frequency of pathological lesions presenting with neck swellings and to evaluate the diagnostic accuracy of

fine needle aspiration technique by correlating cytological and histopathological diagnosis.

MATERIALS AND METHODS

A retrospective as well as prospective analysis during the time period of September 2012 to August 2015 was done. Total 678 cases of neck lesions underwent FNAC, out of which 622 were prospective cases and 56 cases were retrieved retrospectively. Histo-cytological correlation was available only in 69 cases.

Exclusion Criteria: All aspirates that were acellular were excluded from the study.

Inclusion Criteria: Patients of all ages with neck lumps.

Material was obtained by using 23-24 gauge needle attached to a 10ml disposable syringe. From the aspirate dry and wet smears were prepared. The smears were immediately fixed with 95% alcohol & stained by haematoxylin and eosin (H & E) and/or pap stain. Dry smears were stained with

Leishman-Giemsa stain. Ziehl-Neelsen staining was done for demonstration of acid fast bacilli wherever required.

For histological analysis, formalin fixed paraffin embedded H & E stained sections were studied and same were retrieved from the records for retrospective analysis. The cytomorphologic features were correlated with the concomitant histopathological sections, wherever available.

STATISTICAL ANALYSIS

Data analysis was done by Statistical Package for the Social Sciences (SPSS) Version 19. The data were expressed as frequency and percentage. Diagnostic sensitivity, specificity and accuracy of FNAC were calculated for neck lesions by 2 x 2 contingency table by comparing the test diagnosis with the gold standard diagnosis.

RESULTS

The study included 678 cases of neck lesions. The age ranged from 3 years to 70 years, out of which 65.6% were females and 34.4% were males with a female to male ratio of 1.9:1 for all lesions. Although this ratio varied for different sites of lesions from 1.2 to 8:1. Overall the mean age was 29.97 years [Table/Fig-1].

Out of total 678 cases diagnosed on FNAC, (89%) were nonneoplastic, (2.9%) were benign, (5.4%) were malignant, while (2.5%) were inconclusive [Table/Fig-2]. Among 400 Lymph node lesions, (88.7%) were non neoplastic, (8%) were

Age Group (years)	Lymph Node Lesion		Thyroid Lesion		Salivary Gland Lesion		Miscellaneous Lesion		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
≤ 10	90	22.5	7	3.5	4	10.0	11	27.5	112	16.5
11-20	73	18.3	37	18.7	0	0.0	10	25.0	120	17.7
21-30	85	21.3	48	24.2	4	10.0	11	27.5	148	21.8
31-40	66	16.5	42	21.2	14	35.0	4	10.0	126	18.6
41-50	53	13.3	30	15.2	7	17.5	1	2.5	91	13.4
51-60	19	4.8	34	17.2	9	22.5	0	0.0	62	9.1
≥ 61	14	3.5	0	0.0	2	5.0	3	7.5	19	2.8
Total	400	100	198	100	40	100	40	100	678	100

[Table/Fig-1]: Age wise distribution.

Etiological Categorization	Lymph Node	Thyroid	Salivary Gland	Miscellaneous Group	Total
NON-NEOPLASTIC	355	194	24	31	604
MALIGNANT	32	4	1	-	37
BENIGN	-	-	13	07	20
TOTAL CASES	387**	198	38**	38**	661

[Table/Fig-2]: Etiological categorization of lesions (n=661)**

** Total 17 cases were inconclusive. Out of which 13 cases were in the lymph node lesions, 2 cases each in the salivary gland lesions and miscellaneous group lesions were not included in categorization.

malignant and (3.3%) were inconclusive. Among 198 thyroid lesions (23.7%) were inflammatory, (74.3%) colloid goitre and colliod cysts and (2%) were malignant. Similarly out of 40 cases, (60%) Salivary gland lesions were nonneoplastic (inflammatory and others), (2.5%) was malignant, (32.5%) were benign, and (5%) were inconclusive. Among 40 cases of the miscellaneous group lesions, (77.5%) were cystic and vascular lesions, (17.5%) were benign and (5%) were inconclusive.

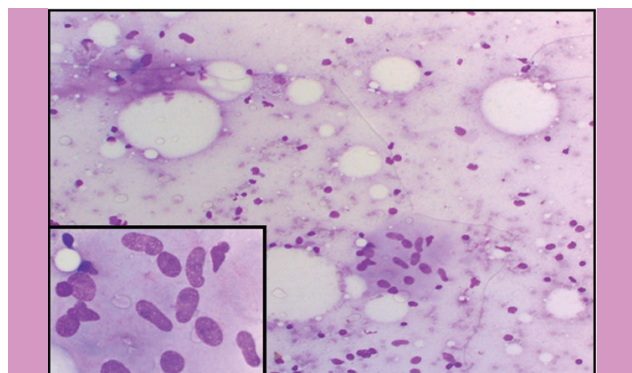
The Cytological spectrum of neck lesions was as shown [Table/Fig-3a,3b]. Out of 355 non neoplastic lymph node cases, reactive lymphoid hyperplasia / nonspecific lymphadenitis 180 cases (50.7%), was the commonest cytological finding in cervical lymphadenopathy, followed by tubercular lymphadenitis [Table/Fig-4], 120 cases (33.8%). Among 32 neoplastic lesions of lymph nodes, (34.3%) were of lymphoma, (53.1%) were of metastatic squamous cell carcinoma, (3.1%) was of metastatic adenocarcinoma and (9.3%) were of leukaemic infiltration. Out of 400 lymph node aspirates, (3.3%) were inconclusive.

Site	Diagnostic Category	Cytological Diagnosis	No. of Cases	%
Lymph Node 400 Cases	Nonneoplastic (355)	Reactive Lymphadenitis	180	26.55
		Tubercular Lymphadenitis	120	17.70
		Granulomatous Lymphadenitis	35	5.16
		Acute Lymphadenitis	20	2.95
	Inconclusive (13)	-	13	1.92
Thyroid 198 Cases	Nonneoplastic (194)	Colloid Goitre	139	20.50
		Chronic Thyroiditis	47	6.93
		Colloid Cysts	8	1.18
	Inconclusive (0)	-	-	-
Salivary Gland 40 Cases	Nonneoplastic (24)	Chronic Sialadenitis	17	2.51
		Chronic Sialadenosis	5	0.74
		Acute Sialadenitis	2	0.29
	Inconclusive (2)	-	2	0.29
Miscellaneous 40 Cases	Nonneoplastic (31)	Epidermal Inclusion Cyst	23	3.39
		Haemangioma (Vascular Lesion)	6	0.88
		Thyroglossal Cyst	2	0.29
	Inconclusive (2)	-	2	0.29

[Table/Fig-3a]: Cytological spectrum of neck lesions (non-neoplastic). (n=678)

Site	Diagnostic Category	Cytological Diagnosis	No. of Cases	%
Lymph Node 400 Cases	Neoplastic (32)	Metastatic Squamous Cell CA	17	2.65
		Lymphoma	11	1.62
		Leukaemic Infiltration	3	1.62
		Metastatic Adenocarcinoma	1	0.44
Thyroid 198 Cases	Neoplastic (4)	Papillary CA	3	0.44
		Follicular CA	1	0.15
Salivary Gland 40 Cases	Neoplastic (14)	Pleomorphic Adenoma	12	1.77
		Warthins Tumour	1	0.15
		Mucoepidermoid CA	1	0.15
Miscellaneous 40 Cases	Neoplastic (7)	Lipoma	7	1.03

[Table/Fig-3b]: Cytological spectrum of neck lesions (neoplastic), (n=678)



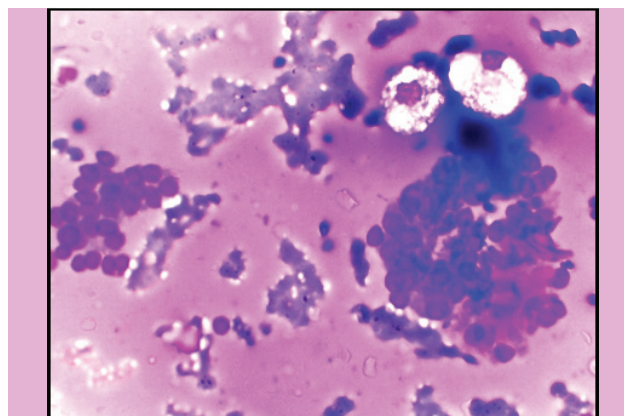
[Table/Fig-4]: Epithelioid cell granuloma in tubercular lymphadenitis. (Leishman & Giemsa stain, 100 x) Granuloma, 400x (inset).

Among 194 nonneoplastic thyroid lesions, colloid goitre [Table/Fig-5], (71.6%) was the commonest cytological diagnosis, followed by chronic thyroiditis (24.2%) ,and colloid cysts (4.1%). Among the 4 neoplastic lesions, papillary carcinoma were, (75%) and follicular carcinoma was (25%).

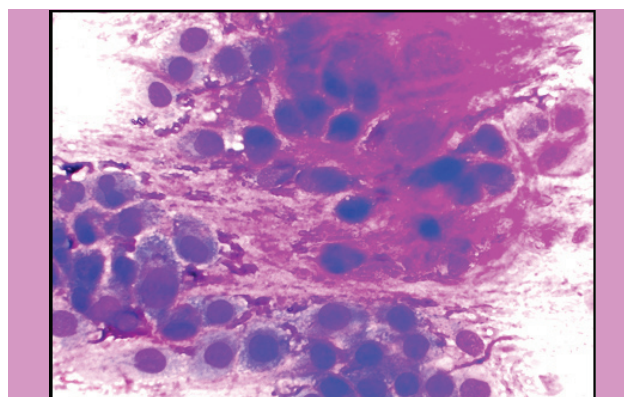
Out of 14 neoplastic cases in salivary gland lesions, 13 were benign, pleomorphic adenoma were 12 cases (85.7%) [Table/Fig-6], and Warthins tumor was 1 case, (7.14%) [Table/Fig-7]. The only malignant lesion was 1 mucoepidermoid carcinoma, (7.14%). 2 cases were inconclusive.

Among the 31 nonneoplastic miscellaneous lesions, maximum cases were of epidermal inclusion cysts , 23 cases (74.1%) followed by thyroglossal cysts, 2 cases (6.4%) and 6 cases (19.3%) were haemangiomas. Lipoma was the only neoplastic lesion, seen in 7 cases. Out of 40, 2 (5%) cases were inconclusive.

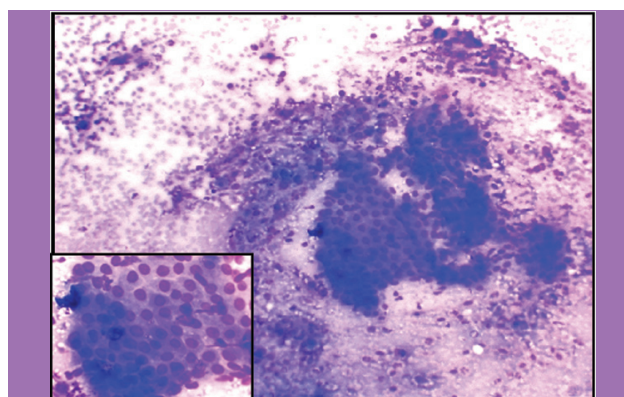
Cyto-histopathological correlation was available only in 69



[Table/Fig-5]: FNAC thyroid-colloid goitre showing clusters of uniform follicular cells with abundant colloid and macrophages. (Leishman-Giemsa 400x)



[Table/Fig-6]: Pleomorphic adenoma – abundant chondromyxoid stroma with sheets of plasmacytoid cells. (Leishman-Giemsa, 400x)



[Table/Fig-7]: Warthins tumor showing sheets of oncocytic cells in dirty background. (Leishman-Giemsa, 100x) Oncocytic cells, 400x (inset).

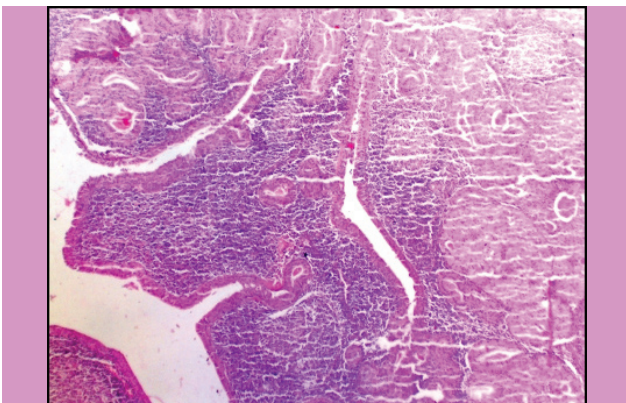
cases out of total 678 cases. FNAC findings were correlated with histopathological diagnosis in 66 cases, however 3 aspirates showed discrepancy. Out of 400 FNAC cases of lymph nodes, only 23 cases had histopathological correlation. Histopathological findings were found to be concurrent in 22 cases. Tubercular lymphadenitis correlation was 100% in the

4 cases. 8 cases of lymphomas were diagnosed on cytology out of which 7 were correlated on histopathology, 4 cases were Non-hodgkins lymphoma and 3 cases were Hodgkins lymphoma. Only 1 case reported as lymphoma on cytology was diagnosed as reactive hyperplastic lymphadenitis on histopathology. 9 cases of metastatic carcinoma had histopathological correlation with cytological diagnosis.

Out of 139 cytologically diagnosed cases of colloid goiter, histopathology was available only in 10 cases, which was 100% correlated. Chronic thyroiditis also showed 100% correlation. 3 cases were diagnosed as papillary carcinoma on FNAC whose histopathological diagnosis was same as cytological diagnosis. 1 case of thyroid was diagnosed as follicular neoplasm on cytology which was diagnosed to be Hurthle cell neoplasm on histopathology. In salivary gland lesions, maximum cases were of chronic nonspecific sialadenitis on cytology. Histopathology was available in 4 cases only, which were consistent with cytology. In this study, 5 out of 6 cases were reported as pleomorphic adenoma on cytology and were confirmed by histopathology and one was diagnosed to be Warthin's tumor [Table/Fig-7,8]. 1 case was diagnosed as mucoepidermoid carcinoma on cytology and it was confirmed on histopathology.

Among the 40 cases of miscellaneous lesions, 10 cases were correlated histopathologically. 4 cases of epidermal inclusion cyst, 2 cases of thyroglossal cysts, and 2 cases of lipoma were confirmed on histology. 2 cases of vascular lesions were diagnosed as haemangioma on histological examination.

Histopathology was taken as gold standard. According to statistical analysis, the sensitivity, specificity, positive predictive value and negative predictive value of FNAC of lymph nodes were 94.12%, 100%, 100% and 85.71% respectively. The diagnostic accuracy was 96%. The sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy of FNAC of thyroid glands and salivary glands were all 100%. Overall, the diagnostic sensitivity, specificity, positive predictive value, and negative predictive value of FNAC of all neck lesions were, 95.45%, 100%, 100%, and 97.29% respectively. The diagnostic accuracy was 98%.



[Table/Fig-8]: Warthin's tumor – cystic spaces and lymphoid follicles. (H & E, 100X)

DISCUSSION

Neck lesions are a common clinical problem in India posing a diagnostic dilemma in clinical practice. During this study, cytological findings of 678 patients of all age groups presenting with neck lesions were studied and cyto-histological correlation was done wherever it was available, and the results were analyzed.

In the present study, maximum number of cases were of lymph nodes, i.e. 400 cases (59%), followed by thyroid gland 198 cases (29.2%), salivary gland 40 cases (5.9%) and miscellaneous group lesions 40 cases (5.9%). Similar to our study, Peters et al [9] analyzed 253 cases of FNAC in palpable head and neck lesions, and found cervical lymph node was the commonest lesion 61%, followed by thyroid nodule 21%, salivary gland 16% and miscellaneous 3.2%. Studies by Kishore H et al., [10], Sharma R and Mathur DR [11], Vijaya C et al., [12] also showed similar results, lymph nodes being the commonest site. In contrast to this, Muddegowda HP et al., [13] found thyroid swellings to be the commonest lesion.

In our study, maximum number of cases of lymphadenopathy were in ≤ 10 years age group however Chawla N et al., [14] and Kumar H et al., [15] found maximum incidence in third decade of life. In our study, thyroid cases were maximum in third decade. Similar result was found by Wahid IF et al., [16] and Parikh UR et al., [17]. Salivary gland lesions were maximum in 31-40 yrs age group. Khandekar MM et al., [18] and Chetna Jain [19] found maximum number of salivary gland lesions in 21-40 years and 20-29 years respectively. In our study, lesions in miscellaneous group were most common in both the ≤ 10 yrs age group and the 21-30 yrs age group.

There was female preponderance in our study with a female to male ratio of 1.9:1 for all neck lesions. Kishore et al., [10], Muddegowda P et al., [13], and Sharma R and Mathur DR [11] also found slight female preponderance with female to male ratios of 1:0.71, 1:0.29, 1.5:1 and in their study on neck masses.

In our study, out of 198 thyroid cases, 176 were female patients and 22 were male patients with the female to male ratio of 8:1. Similar results were found by various authors [20,21].

In our study, reactive nonspecific lymphadenitis/chronic nonspecific lymphadenitis 180/400 cases (45%), is found to be the commonest cause of lymphadenopathy followed by tubercular lymphadenitis, 120/400 cases (30%). Acute lymphadenitis was seen in 20/400, (5%), and granulomatous lymphadenitis in 35/400, (8.75%). Similar observations were reported by Chawla N et al., [14]. They found that 41.7% of cases were of reactive nonspecific lymphadenitis and 31.7% cases were of tubercular lymphadenitis among lymph node lesions, 5.3% cases were of abscess however Sharma R and Mathur DR [11], and Kumar H et al., [15] found tubercular lymphadenitis were the commonest lesion followed by chronic nonspecific lymphadenitis.

Among neoplastic lesions of lymph nodes in our study, 17/400 cases, (4.25%) were of metastatic squamous cell carcinoma,

1/400 case (0.25%) was of metastatic adenocarcinoma, 3/400 cases (0.75%) were of leukaemic infiltration, and 11/400 cases (2.75%) were of lymphoma. 13/400 cases, (3.25%) were inconclusive. Slightly, higher percentage was observed by Sharma R and Mathur DR [11] and Chawla et al., [14].

Among 198 thyroid lesions, colloid goitre, 139 cases (70.2%), was the commonest cytological diagnosis followed by chronic thyroiditis, 47 cases (23.7%). Among the neoplastic lesions, papillary carcinoma cases were 3 (1.51%) and follicular carcinoma was seen in only 1 case (0.5%). Bhatta S et al., [21] also found that colloid goitre was the commonest lesion 64.45% followed by benign cysts 14.45%, thyroiditis, 6.3% cases while they observed higher percentage of cases of papillary carcinoma, (10%) and 3.33% cases of follicular carcinoma as compared to our study .

In present study, maximum number of salivary gland cases were of chronic sialadenitis, 17/40 cases, (42.5%). Pleomorphic adenoma were 12/40 cases, (30%) and Warthins tumor was 1 case ,among benign neoplastic lesions. The only malignant lesion was 1 case (2.5%) of mucoepidermoid carcinoma. 2/40 cases were inconclusive. Kishore H et al., [10] found that among 54 salivary gland lesions, 51 were benign and 3 were malignant. In contrast to our findings, Khandekar MM et al., [18], found 56 cases (80%) as neoplastic lesions and 14 (20%) as nonneoplastic out of 70 cases of salivary gland lesions. Although pleomorphic adenoma was the commonest benign neoplasm in their study also. Among the 40 cases of miscellaneous lesions, maximum cases 23 (57.5%), were of epidermal inclusion cysts followed by thyroglossal cysts , 2 cases (5%) and haemangiomas 6 cases (15%) among the nonneoplastic lesions. Lipoma were 7 cases (17.5%) . 2 cases were inconclusive in our study. Kishore H et al., [10] also found similar results. Sharma R and Mathur DR [11] found in their study that 2 cases were of thyroglossal cysts, 1 case was epidermal inclusion cyst , 1 case was lipoma and 1 was squamous cell carcinoma out of total 5 cases of miscellaneous lesions.

Out of 400 FNAC cases of lymph nodes, only 23 cases had histopathological correlation. Histopathological findings were found to be consistent in 22 cases. Tubercular lymphadenitis correlation was 100%. Sharma R and Mathur DR [11] also reported 100% correlation of cytological diagnosis of tubercular lymphadenitis with histological diagnosis. In present study, both cases of reactive lymphadenopathy had histopathological diagnoses consistent with cytological diagnosis. 1 case reported as lymphoma on FNAC was diagnosed as reactive hyperplastic lymphadenitis on histopathology. 7 lymphomas cases, which were reported on cytology correlated well on histopathology. Out of 7 cases, 4 cases were Non Hodgkin's lymphoma and 3 were Hodgkin's lymphoma. The present study correlated well with studies by Vijaya C et al., [12] and Sharma R and Mathur DR [11]. 9 cases of metastatic deposits had similar diagnosis on histopathology as well as on cytology.

Out of 198 cases of thyroid gland FNACs, maximum cases 139 were diagnosed as colloid goitre. Histopathological diagnosis was consistent with cytological diagnosis in all of these 10 cases. Chronic thyroiditis was reported in 47 cases on cytology. Histopathological diagnosis was consistent with cytological diagnosis in all 9 cases . 3 cases were reported as papillary carcinoma on FNAC whose histopathological diagnosis was same as cytological diagnosis. 1 case was reported as follicular neoplasm on FNAC which was diagnosed to be Hurthle cell neoplasm. Similar results were noted in study by Bhatta S et al., [21], where commonest lesion was goitre. Among the malignant lesions, the commonest lesion was papillary carcinoma.

In salivary gland lesions, maximum cases were of chronic nonspecific sialadenitis on cytology. Histopathology was available in 4 cases, which were consistent with cytology. In this present study, 5 out of 6 cases of pleomorphic adenoma reported on cytology were confirmed by histopathology and one was diagnosed to be Warthin's tumor. 1 case of Warthins tumor was diagnosed on cytology and was confirmed on histopathology. Sharma R et al., [11] has reported 100% accuracy of FNAC in diagnosing pleomorphic adenoma which showed close correlation with the present study. 1 case was diagnosed as mucoepidermoid carcinoma on FNAC and it was confirmed on histopathology. In the present study, findings in salivary gland lesions were similar to that of Vijaya C et al., [12] study. Among the 40 cases of miscellaneous lesions, all 10 cases were well correlated with histopathologically. 4 cases as epidermal inclusion cyst, 2 cases as thyroglossal cysts, 2 cases as lipoma and 2 cases of vascular lesions were confirmed on histopathology.

Overall, the diagnostic sensitivity, specificity, positive predictive value, and negative predictive value of FNAC of all neck lesions were, 95.45%, 100%, 100%, 97.29% respectively. The diagnostic accuracy was 98%. Tilak et al., [22] found the sensitivity of FNAC to be 90.91% for head and neck masses, specificity to be 93.18% and overall diagnostic accuracy to be 92.73% in their study. Vijaya C et al., [12] found sensitivity of FNAC to be 90.47%, specificity, 94.44% and overall accuracy 93.33%. Kishore H et al., [10] found overall accuracy rate of FNAC was 93.02% with sensitivity of 81.8%, specificity of 96.87%, and positive predictive value of 85% and negative predictive value of 90.14%.

LIMITATIONS

1. Histopathological tissue was available in only few cases, so the statistical analysis may not reflect actual scenario.
2. Since, this was a hospital based study, it cannot be considered wholly as reflection of entire population.

CONCLUSION

We thus conclude from this study that FNAC is an effective, useful and a minimally invasive procedure. FNAC as an initial diagnostic tool can help in reducing the number of diagnostic surgeries in patients with neck lumps.

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AUTHOR(S):

1. Dr. Namrata Sharma
2. Dr. Sangeeta Sharma
3. Dr. Mahuya Sarkar
4. Dr. Rani Bansal
5. Dr. Anjali Khare
6. Dr. Davendra Swarup
7. Dr. Priya Gupta
8. Dr. Mitali Singhal

PARTICULARS OF CONTRIBUTORS:

1. Junior Resident, Department of Pathology, Subharti Medical College, Meerut, UP, India.
2. Professor, Department of Pathology, Subharti Medical College, Meerut, UP, India.
3. Professor, Department of Pathology, Subharti Medical College, Meerut, UP, India.
4. Professor and Head, Department of Pathology, Subharti Medical College, Meerut, UP, India.

5. Professor, Department of Pathology, Subharti Medical College, Meerut, UP, India.
6. Professor, Department of Pathology, Subharti Medical College, Meerut, UP, India.
7. Assistant Professor, Department of Pathology, Subharti Medical College, Meerut, UP, India.
8. Assistant Professor, Department of Pathology, Subharti Medical College, Meerut, UP, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Sangeeta Sharma,
Professor, Department of Pathology, Subharti Medical College, Swami Vivekananda Subharti University, N.H. 58, Meerut, UP-250005, India.
E-mail: dr_sangeetasharma@yahoo.co.in

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