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Research Article

CLINICO PATHOLOGICAL STUDY OF NECK MASSES IN PATIENTS ATTENDING ENT DEPARTMENT OF MATA GUJRI MEMORIAL MEDICAL COLLEGE AND LIONS SEVA KENDRA HOSPITAL, KISHANGANJ, BIHAR

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ABSTRACT

Objective: The aim of the study was to compare the accuracy of fine-needle aspiration cytology (FNAC) over open biopsy in the assessment of the cause of neck swellings.

Methods: The sample includes 100 patients with neck swellings who visited the nose and throat outpatient department at M.G.M. Medical College and Lions Seva Kendra Hospital in Kishanganj, Bihar. The period of study was 2 years, from October 2019 to October 2021 prospective study. All cases of neck enlargement were referred for radiological examinations. A ultrasound neck Doppler study was performed to determine the nature and vascularity of the swelling. Then, all the cases of neck swelling were sent to the department of pathology for FNAC.

Results: Lymph node aspiration was carried on in 25 cases, tubercular lymphadenitis, which was the commonest swelling in our study. Twenty-five of these lymph node cytology reports were similar to the histopathological examination (HPE) report. Of the 49 thyroid swelling aspirates, 24 cytological reports were similar to HPE reports, and 20 reports did not match with HPE reports. Two cases of colloid goiter were found to be papillary carcinoma of the thyroid. Out of eight salivary gland swelling were matched with the HPE reports. One more case of lateral neck swelling was noted in FNAC as adnexal mass. The patient underwent surgery histopathology concluded as schwannoma.

Conclusion: FNAC of neck masses with clinical correlation can provide the surgeon with the most helpful information to determine the different management modes. It is also essential to take into consideration clinical symptoms and biochemical tests. Hence, we conclude that FNAC is a safe, simple, and rapid method that can be done to diagnose a wide range of neck swellings.

Keywords: Fine-needle aspiration cytology, Histopathological examination, Thyroid masses, Histopathology, Goiter, Malignant thyroid neoplasm.

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INTRODUCTION

Clinically, nose, and throat (ENT) specialists are commonly faced with the issue of assessing a tumor in the neck. Typical neck masses are found in lymph nodes, the thyroid, the parotid gland, and other salivary glands. Less frequent causes of neck enlargements are:

- Thyroglossal cysts
- Branchial cleft cysts
- Carotid body tumors
- Cystic hygromas
- Pharyngeal pouch abnormalities
- Lumps of skin appendages1 a part from 20 necks.

Fine needle aspiration cytology (FNAC) is a straightforward, rapid, and cost-effective method for obtaining samples of superficial neck masses. The operation was performed in an outpatient clinic. It causes minimal patient trauma and virtually no risk of complications. It is simple to diagnose head-and-neck masses, such as salivary gland and thyroid masses, using this technique [1]. Due to the variety of accessible organs and diverse pathologies encountered in the head-and-neck region, FNAC is of great value. The early distinction between benign and malignant pathology has a substantial impact on treatment planning [2]. FNAC can be performed under local anesthesia and is especially helpful when a neck mass is suspected to be malignant. There is no evidence that this technique's fine hypodermic needle facilitates the spread of the tumor. Cystic growths can be diagnosed and treated with FNAC [3].

FNAC is helpful for the diagnosis of tumors of the salivary gland, as it can distinguish between benign and malignant tumors with 90% accuracy [4]. FNAC is particularly helpful in the workup of cervical masses and nodules as biopsy of cervical adenopathy should be avoided until all diagnostic modalities have failed to establish the diagnosis [5].

FNAC is no substitute for histopathology, especially in determining nodal architecture in lymphoma, the malignant pattern of follicular thyroid tumor, extracapsular spread in squamous carcinoma, or the distinction of pleomorphic from monomorphic adenoma [2].

This study aimed to evaluate the adequacy and accuracy of FNAC in the diagnosis of neck masses.

METHODS

One hundred patients with neck swellings who visited the ENT outpatient department (OPD) at M.G.M. Medical College and Lions Seva Kendra Hospital in Kishanganj, Bihar, made up the sample. The prospective trial lasted 2 years, from October 2019 to October 2021.

Inclusion criteria

Patients of any age or gender who present to the ENT OPD complaining of neck swelling were included in the study.

Exclusion criteria

A patient who underwent FNAC but did not undergo subsequent histopathological diagnosis was excluded from the study. Suspected neck masses of vascular origin on clinical examination were also excluded from the study.

According to the proforma, clinical examination was done in all cases the size of the swelling, the location of the swelling, nature of the swelling, and pulsations were checked thoroughly in all cases. The radiological examinations of all cases of neck swelling were sent off. The purpose of the ultrasound (USG) neck with Doppler examination was to determine the cause and vascularity of the

swelling. Following this, all cases of neck swelling were forwarded to pathology for FNAC.

Fine-needle aspiration biopsy was done with a 21–23 gauge needle attached to the 10 ml plastic disposable syringe. With full aseptic precaution, the needle was inserted to the desired depth in all cases, and by pulling the piston out firmly, negative pressure was created in the syringe. With the pistons pulled out, the needle swung back and forth thrice or so to maintain a constant negative pressure. After removing the needle, the piston was let go so that pressure could return to normal. For 1–2 min, the pressure was put on the wound. After being drawn into the needle, the aspirate was deposited onto a glass slide.

Air dried smears were stained with Haematoxylin, Eosin, and MAY-GRUNWALD- GIEMSA stain, whereas 95% ethyl alcohol fixed smears were stained by Papanicolaou stain.

Then, all the cases were subjected to surgery, either incisional or excisional biopsy. The biopsy material was sent to the department of pathology for HPE.

The cytological features of all cases were reviewed with corresponding histopathology features.

Patient consent and ethical consideration
Patient consent was taken who underwent FNAC and subsequent histopathological diagnosis. Suspected neck masses of vascular origin on clinical examination.

We had taken Ethical committee approval from our institutional ethical committee of M.G.M. Medical College and Hospital before started our study.

RESULTS

Thyroid swellings
- Similar to HPE – 24
- Not similar to HPE – 17.

Lymph node swelling
- Similar to HPE – 34
- Not similar to HPE – 8
- Inconclusive report – 6.

Salivary gland swelling
- Similar to HPE – 4
- Not similar to HPE – 1.

Other neck swellings
- Similar to HPE – 4
- Inconclusive report – 1.

Sensitivity: 98.88
Specificity: 90.91
PPV: 99.52
NPV: 80.98
Accuracy: 98.48

p<0.001**

Methods

This study used descriptive statistical analysis. Results for continuous variables are shown as mean standard deviation (min max) and results for categorical variables as number (percentage). The 5% significance level is used to determine significance. There are several presumptions about the data that are made: The following conditions must be met: (1) The dependent variables are regularly distributed; (2) samples are taken at random from the population; and (3) samples are independent of one another.

Chi-square/Fisher exact test has been used to find the significance of study parameters on a categorical scale between two or more groups. Diagnostic statistics, namely, sensitivity, specificity, PPV, NPV, and accuracy have been computed to find the correlation between FNAC and diagnosis with HPE findings.

Significant figures
Significant indications (p-value: 0.05<p<0.10).

Table 1: Age distribution of patients studied

Age in years	Number of patients	%
1–10	12	12.0
11–20	16	16.0
21–30	25	25.0
31–40	23	23.0
41–50	11	11.0
51–60	9	9.0
61–70	4	4.0
Total	100	100.0

Mean±SD: 34.25±14.24

Table 2: Gender distribution of patients studied

Gender	Number of patients	%
Male	30	30.0
Female	70	70.0
Total	100	100.0

Table 3: Anatomic sites of the swellings

Anatomic site	Number of patients (n=100)	%
Submental triangle	3	3.0
Submandibular triangle	8	8.0
Upper cervical	29	29.0
Middle cervical	2	2.0
Lower cervical	1	1.0
Posterior triangle	5	5.0
Anterior part of neck/midline swelling	44.0	44.0
Lateral part of the neck	1	1.0

Table 4: Clinical diagnosis of the study patients

Clinical diagnosis	Number of patients (n=100)	%
Thyroid swelling		
Multinodular goiter	2	2.0
Colloid goiter	19	19.0
Thyroiditis	12	12.0
Solitary thyroid nodule	10	10.0
Malignant thyroid neoplasm	6	6.0
Salivary gland		
Chronic sialoadenitis	1	1.0
Salivary neoplasm	7	7.0
Lymph nodes		
Acute suppurative lymphadenitis	6	6.0
Chronic lymphadenitis	1	1.0
TB lymphadenitis	14	14.0
Malignant neck node	4	4.0
Lymphoproliferative disorder	4	4.0
Lymph node abscess	1	1.0
TB abscess	1	1.0
Others		
Cystic hygroma	6	6.0
Thyroglossal cyst	4	2.0
Branchial cyst	2	2.0
Carotid body tumor	1	1.0
Vascular swelling	1	1.0

Table 5: FNAC report of patients studied

FNAC report	Number of patients (n=100)	%
Thyroid swelling		
Multinodular goiter	2	2.0
Colloid goiter	19	19.0
Nodular goiter	9	9.0
Nodular colloid goiter	0	0.0
Lymphocytic thyroiditis	7	7.0
Hashimoto "s thyroiditis	6	6.0
Papillary carcinoma	2	2.0
Follicular neoplasm	5	5.0
Anaplastic carcinoma	0	0.0
Salivary gland		
Chronic sialoadenitis	1	3.0
Mucoepidermoid carcinoma	4	4.0
Pleomorphic adenoma	3	3.0
Adenoid cystic carcinoma	0	0.0
Warthin tumor	0	0.0
Pleomorphic adenoma ex carcinoma	0	0
Lymph nodes		
Acute suppurative lymphadenitis	5	5.0
Reactive lymphadenitis	1	1.0
TB lymphadenitis	14	14.0
Granulomatous lymphadenitis	1	1.0
Metastatic neck nodes	4	4.0
Lymphoproliferative disorder	4	4.0
Others		
Lipoma	1	1.0
Thyroglossal cyst	4	4.0
Branchial cyst	2	2.0
Cystic hygroma	6	6.0

Table 6: HPE report in patients studied

HPE report	Number of patients (n=100)	%
Thyroid swelling		
Multinodular goiter	10	10
Colloid goiter	9	9
Nodular goiter	9	9
Nodular colloid goiter	0	0
Lymphocytic thyroiditis	7	7
Hashimoto "s thyroiditis	6	6
Follicular adenoma	4	4
Follicular carcinoma	1	1
Papillary carcinoma	4	4
Anaplastic carcinoma	0	0
Salivary gland		
Chronic sialoadenitis	1	1
Mucoepidermoid carcinoma	4	4
Pleomorphic adenoma	3	0
Adenoid cystic carcinoma	0	0
Pleomorphic adenoma, ex. Carcinoma	0	0
Lymph nodes		
Acute suppurative lymphadenitis	5	5
Reactive lymphadenitis	1	1
TB lymphadenitis	14	14
Metastatic neck nodes	4	4
Granulomatous lymphadenitis	1	1
Non-Hodgkin" s lymphoma	1	1
Hodgkins Lymphoma	3	2
Others		
Lipoma	1	1
Thyroglossal cyst	2	4
Dermoid cyst	0	0
Cystic hygroma	6	6
Branchial cyst	2	2
Schwannoma	1	1
Carotid body tumor	1	1

When compared to the null hypothesis, the results were *extremely significant ($p<0.01$).

Statistical software

The Statistical software, namely, SAS 9.2, SPSS 15.0, Stata 10.1, MedCalc 9.0.1, Systat 12.0, and R environment version 2.11.1, were used for the analysis of the data, and Microsoft Word and Excel have been used to generate graphs, tables, etc.

DISCUSSION

This research was performed by the ear, ENT division, M.G.M. Medical College and Lions Seva Kendra Hospital, Kishanganj, Bihar, from October "2019 to October " 2021. Of the 100 cases clinically evaluated, 48 were lymph node swellings, 41 were thyroid swellings, five were salivary gland swellings, and six were other swelling. Seventy-four were female patients and 26 were male patients. A maximum number of patients were between the age group of 20–48 years.

One case was excluded as it was diagnosed to be vascular swelling following clinical examination and USG neck.

Lymph node aspiration was carried on in 2–5 cases, tubercular lymphadenitis, which was the commonest swelling in our study. Twenty-five of these lymph node cytology reports were similar to the HPE report.

Of the 49 thyroid swelling aspirates, 24 cytological reports were similar to HPE reports, and 20 reports did not match with HPE reports. Two cases of colloid goiter were fond of being papillary carcinoma of the thyroid.

Of the eight salivary glands swelling, eight cases matched with the HPE reports.

Of the other neck swellings, cytological reports FNAC were not done in one case, which was a case was carotid body tumor patient underwent surgery. Histopathology analysis of the sample indicated the presence of a tumor in the carotid body.

One more case of lateral neck swelling was reported in FNAC as adnexal mass. The patient underwent surgery histopathology concluded as schwannoma.

The causes for false negative results are:

- Acellular/poorly cellular sample as encountered in large cystic papillary CA, in marked desmoplasia, and in cases of thick fibrous or calcified capsule
- Sampling error – in case of small scar carcinoma.

Thyroid CA may have a macrofollicular area and yield moderate amounts of colloid on FNA. Three cases in our study were cytologically diagnosed as colloid goiter turned out to be follicular adenoma on HPE. The cytological appearance in colloid goiter forms a continuum that merges with those of follicular adenoma, and in this grey area, cytological criteria alone cannot reliably distinguish between the two.

Two cytologically diagnosed cases of follicular neoplasm turned out to be follicular adenoma on HPE. The differentiation of thyroid adenoma from early follicular carcinoma based on cytologic criteria is difficult and challenging as the cytologic appearance of both is very similar. Histologic examination of such cases is advised for final diagnosis.

The cytological picture of tubercular lymphadenitis is divided into three types.

- Smears with epithelial granuloma with/without giant cells in the milieu of parent lymphoid cells
- Smears with degenerating epitheloid granuloma in the background of cheesy material
- Smears with degenerating and viable neutrophils in a necrotic background occasional degenerating epitheloid cell granuloma.

A definite cytologic diagnosis of TB lymphadenitis can be offered in the smears with the first two patterns, while the third pattern, in the absence of Ziehl-Neelsen staining, would be dismissed as acute suppurative lymphadenitis.

FNAC is a practical alternative to empirical anti-tubercular treatment or routine lymph node biopsy. It is less sensitive than open biopsy for diagnosis of TB, but if the diagnosis is made, its predictive value is high.

When evaluating a test for its ability to identify patients with malignancy, sensitivity is more important than specificity since a false negative report may encourage delay in further investigation or treatment. Needle aspiration has lower sensitivity than accuracy both in our study and in other reports. Therefore, caution is mandatory, clinical suspicion must always take precedence, and so negative cytology must disregard if there is strong clinical suspicion. A negative fine-needle aspiration test should not be taken as evidence against cancer. A negative aspiration indicates only that a repeat aspiration may be necessary and/or that some other procedure such as biopsy, endoscopy, or CT scan may be helpful. It cannot be over-emphasized that fine-needle aspiration is always a part of work up and not the final diagnosis.

Table 7: Correlation of clinical diagnosis, FNAC report, and HPE final diagnosis

FNAC report	Clinical diagnosis (n=100)		FNAC (n=100)		HPE (n=100)	
	No	%	No	%	No	%
Thyroid swelling						
Multinodular goiter	34	34	2	2	10	10
Colloid goiter	2	2	19	19	9	9
Nodular goiter	-	-	9	9	9	9
Nodular colloid goiter	-	-	0	0	0	0
Lymphocytic Thyroiditis	-	-	7	7	7	7
Hashimoto" s Thyroiditis	-	-	6	6	6	6
Follicular adenoma	-	-	-	-	4	4
Follicular carcinoma	-	-	-	-	1	1
Follicular neoplasm	-	-	4	4		
Papillary carcinoma	-	-	2	2	4	4
Anaplastic carcinoma	0	0	0	0	0	0
Salivary gland						
Chronic Sialoadenitis	5	5	1	1	1	1
Mucoepidermoid carcinoma			4	4	4	4
Pleomorphic adenoma			3	3	3	3
Adenoid cystic carcinoma	-	-	0	0	0	0
Warthins tumor			0	0	0	0
Pleomorphic adenoma exCarcinoma			0	0	0	0
Lymph nodes						
Acute Suppurative lymphadenitis	13	13	5	5	5	5
Reactive lymphadenitis	3	3	1	1	1	1
TB lymphadenitis	21	21	14	14	14	14
Granulomatous lymphadenitis	-	-	1	1	1	1
Metastatic neck nodes	6	6	4	4	4	4
Lymphoproliferative disorder	-	-	4	4	-	-
Hodgkin" s lymphoma	1	1			3	3
Non-Hodgkin" s lymphoma	-	-			1	1
Others						
Lipoma	2	2	1	1	1	1
Thyroglossal cyst	3	3	4	4	2	2
Dermoid cyst	-	-	-	-	0	0
Carotid body tumor	1	1	-	-	1	1
Paraganglioma (Adnexal Tumor)	-	-	1	1	-	-
Cystic hygroma	6	6	6	6	6	6
Branchial cyst	2	2	2	2	2	2
Schwannoma	1	1			1	1

A valuable aspect of fine needle aspiration is its ability to determine the diagnostic categorization of a mass in the neck independent of the determination of either malignant or benign growth. This is particularly useful for a patient presenting 1st time with neck mass as the only finding.

For example, a determination that the lesion consists of lymphoid tissue effectively rules out squamous cell carcinoma as a possibility. In such an instance, an early open biopsy of the lesion under local anesthesia would be pursued rather than an extensive search for a primary occult tumor.

The problems with fine-needle aspiration are:

- The technique is difficult when small lesions, which tend to slip away from the needle, are encountered and when there is an excessive amount of fibrosis/necrosis.

Certain limitations of the procedure in the neck region that we have encountered are:

- Difficulty in the diagnosis and sub-classification of lymphomas
- Distinguishing colloid goiter from follicular adenoma
- Differentiation of colloid goiter from macrofollicular papillary carcinoma
- Distinguishing thyroid adenoma from early follicular carcinoma.

Our study evaluated 100 patients and found the overall sensitivity of FNAC in the diagnosis of neck masses to be 66.32% and specificity to be 70.4%.

A study by Soni *et al*. had a sensitivity of 83.01% and specificity of 78.94%. Out of the 59 patients, 28 were neck nodes, 14 were thyroid, 13 were salivary gland masses, and four were other types of neck masses [6].

Howlett *et al*. studied a total of 276 patients and found FNAC of neck nodes to have a sensitivity of 89% and a specificity of 57%; for thyroid masses, the sensitivity was 62%, and specificity was 86%; and for salivary glands, the sensitivity was 64%, and specificity was 100% [5].

Tilak *et al*. studied 550 patients and found the overall sensitivity of FNAC for neck masses to be 90.91% and specificity to be 93.18% which is greater than that observed in our study [7].

The difference in the specificity between our study and others may be due to differences in the method of aspiration of the neck lump. In our study, blind FNAC was performed by different technicians without USG guidance. In Howlett *et al*. study, USG-guided FNAC was used in 50% of the thyroid group and a few parotid patients. The differences might also be explained by differences in the patient population. In India, most patients are illiterate and unaware of their health problems until they are at an advanced stage. The majority of patients present with a huge neck mass which is obvious and easy for the cytopathologist to locate with FNAC without the use of USG guidance. In addition, in such large lesions, there may well be a sampling error within the mass itself, with different regions of the mass having different grades of pathology.

Table 8: Comparison with different study

	Present study	Soni *et al*. [6]	Howlett *et al*. [5]	Schwarz *et al*. [9]	Young *et al*. [8]	Tilak *et al*. [7]
Total no of patients	100	68	712	182	500	550
Duration of study	Two years	12 months	12 months	72 months	-	18 months
Sensitivity	66.32	83.01	89	-	94.5	90.91

Another study was reported by Schwarz *et al*., in which the authors evaluated 165 patients. In their study, the sensitivity of FNAC for metastatic carcinoma was 92% and for lymphoma was 100%. In their study, the accuracy was highest for the malignant salivary group and lowest for the benign salivary gland group [8].

Finally, Young *et al*. observed an overall accuracy for FNAC of 94.5%. Thyroid metastasis or benign node lesion had an accuracy of approximately 95%. The diagnosis of the lymphomatous lesion had a lower accuracy of 75% [8].

CONCLUSION

When it comes to reliably determine a diagnosis, fine-needle aspiration cytology is the gold standard, which can be achieved with more extraordinary experience and expertise. FNAC of neck masses with clinical correlation can provide the surgeon with the most helpful information to determine the different management modes. It is also essential to take into consideration clinical symptoms and biochemical tests. Hence, we conclude that FNAC is a safe, simple, and rapid method that can be done to diagnose a wide range of neck swellings.

CONFLICTS OF INTERESTS

Nil.

AUTHORS CONTRIBUTION

Equal contribution.

AUTHORS FUNDING

Nil.

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