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Original Research Article

Fine needle aspiration cytology diagnostic accuracy corelation to histopathology of head and neck swelling in Manipal teaching hospital

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ABSTRACT

Background: Palpable neck swelling is a common clinical manifestation in otolaryngology. Rapid, inexpensive and simple method of examination for the diagnosis of such superficial masses is fine needle aspiration cytology (FNAC). Objectives were to evaluate the usage of fine needle aspiration cytology as a first-line tool for diagnosis, accuracy compared with histopathology.
Method: A hospital based prospective cross sectional was conducted by taking 65 patients with neck swelling presentation thyroid swelling were highest in number followed by lymph node and salivary, in which female were 43 (66.15%) and male were 22 (33.85%), the age group ranged from 6 to 75 years in ear, nose, throat (ENT) OPD of Manipal teaching hospital between 15th November 2015 to 15th May 2017. FNAC along with histopathological examination (HPE) were done and compared. For data analysis SPSS 20 version was used. The sensitivity, specificity and accuracy rates were calculated. The Cohen's Kappa statistical test was employed.
Results: The overall sensitivity and specificity of FNAC was 90.76% and 98.075% respectively in determining the various pathologies. The diagnostic accuracy of FNAC in comparison to histopathology was 92.25%. This study showed almost perfect correlation (measure of agreement) between FNAC and final histopathology diagnosis of neck swellings from Cohen's Kappa test.
Conclusions: FNAC is a safe, simple and rapid method with a high sensitivity and specificity that can be done in diagnosing wide range of neck swellings.

Keywords: Fine needle, Cytology, Diagnosis, Histopathology

INTRODUCTION

Neck concerned swelling such as thyroid, lymph node, salivary glands and rare thyroglossal cyst, brachial cleft cyst, carotid body tumour, dermoid, hygroma etc. are the complaint encountered in ENT department, invariably clinical dilemma to the otolaryngologist exist for the evaluation of the finding.[1,2]

Neck and head swelling corresponds to superficial masses of which diagnostic procedure is quicker, easy, inexpensive by FNAC compared to HPE.[3]

FNAC technique is performed in outpatient clinic under with or without anaesthesia. There is minor trauma with no risk of complication. Masses located within the region of head and neck including salivary glands and thyroid masses can be readily diagnosed using this technique. It is particularly useful if a neck lump is thought to be

malignant. Till date skin track created by fine hypodermic needle is enormously safe.[4,5]

The current study was undertaken in view of comparing and correlating the FNAC findings with that of histopathology findings among the patients with palpable neck swellings assuming histopathology as the gold standard. So, the objective of this study is to determine the diagnostic accuracy of FNAC in comparison to histopathology in patients undergoing surgery for neck swellings in Manipal teaching hospital.

METHODS

This hospital based observational cross-sectional study was done over a period of 18 months from 15 November 2015 to 15 May 2017 performed in the department of ENT, Manipal teaching hospital, Pokhara, Nepal after ethical approval from the institutional review committee.

Inclusion criteria included all patients attending to the ENT OPD with palpable neck swelling of both sex and all age groups.

Exclusion criteria excluded patients who underwent FNAC but did not undergo subsequent histopathology examination

Suspected neck masses of vascular origin on clinical examination.

Sample size was calculated using Epi Info version 7.2.

The formula used was:

$$N = \frac{zPQ^2}{d^2}$$

(Confidence interval=95%), where z=1.96 and d= 5
So, sample size was p=4 (total number of neck biopsies performed in the year 2014 is 18 out 430 surgeries)

$$Q = 100 - p$$

Therefore,

$$N = \frac{4 \times 4 \times 96}{25}$$

N=61.44, took a sample of 65.

According to proforma detailed history was taken, thorough examination was carried out and basic relevant investigations was done in all patients to arrive at provisional diagnosis. Informed consent was taken first.

All the cases of neck swellings were sent to department of pathology where fine needle aspiration was done. The palpable swelling was fixed with one hand and with all aseptic precautions, 22- 23G needle with 10 ml syringe was inserted into the swelling and a negative pressure was applied. The aspiration material was smeared on the glass slides and smears made were relevantly stained, including Giemsa, Papanicolaou and hematoxylin and eosin (H and E) stains. Lymph node swellings, with purulent or cheesy material as aspirate or with clinical suspicion of tuberculosis were stained by Ziehl-Neelsen stain. Cytological findings were recorded and patients were advised medical treatment and follow up or biopsy and surgical intervention depending upon the pathology.

The received post-operative surgical specimen was fixed in 10% neutral formalin and subjected to gross examination, processing, paraffin embedding, section cutting, staining by H and E. The cytomorphological features of various diseases were studied. FNAC and HPE of the same lesion were correlated where available.

RESULTS

Age of patient ranged from 6-75 years with the mean age of presentation being 39.6 years with a standard deviation of ±17.164. Maximum number of patients belonged to the two age ranges 21-30 years (n=14) and 51-60 years (n=14).

Table 1: Distribution of cases according to age group.

Age group (years)	Frequency	Percentage (%)
≤10	1	2
11-20	7	10.8
21-30	14	21.5
31-40	13	20
41-50	10	15.4
51-60	14	21.5
≥61	6	9.2
Total	65	100

Females outnumbered males. Males accounted for 33.85% (n=22) of total patients, while females were 66.15% (n=43).

Table 2: Distribution of cases according to sex.

Sex	Frequency	Percentage (%)
Male	22	33.85
Female	43	66.15
Total	65	100

Table 3. Distribution of cases according to type of lesion.

Types of clinically detected swellings	Number of patients	Percentage (%)
Thyroid	40	61.53
Lymph node	14	21.53
Salivary gland	7	10.76
Others	4	6.15
Total	65	100

Total of 65 cases were recruited for clinical evaluatedion, 40 were thyroid swellings, 14 lymph node swellings, 7 salivary gland swellings and 4 were other swellings.

Out of 40 thyroid swelling aspirates 39 cytological reports matched with HPE reports and 1 report did not match with HPE report.

The 14-lymph node swelling aspirates 12 cytological reports matched with HPE reports and 2 reports did not match with HPE report.

The 7 salivary glands swelling 6 cases matched with the HPE reports.

Table 4: FNAC and histopathology correlation of thyroid swellings.

FNAC report (n)	Histopathology report (n)	Accuracy rate (%)
Colloid goiter (n=14)	Colloid goiter (n=14)	100
Nodular goiter (n=4)	Nodular goiter (n=4)	100
Multinodular goiter (n=4)	Multinodular goiter (n=4)	100
Papillary carcinoma (n=8)	Papillary carcinoma (n=8)	100
Follicular neoplasm (n=5)	Follicular adenoma (n=4) Follicular carcinoma (n=1)	100
Benign cystic aspirate thyroid (n=1)	Colloid goiter with cystic changes (n=1)	100
Chronic lymphocytic thyroiditis (n=1)	Papillary carcinoma thyroid (n=1)	0
Anaplastic carcinoma thyroid (n=1)	Anaplastic carcinoma thyroid (n=1)	100
Medullary carcinoma thyroid (n=1)	Medullary carcinoma thyroid (n=1)	100
Hashimoto's thyroiditis (n=1)	Hashimoto's thyroiditis (n=1)	100

Table 5: FNAC and histopathology correlation of lymph nodes.

FNAC report (n)	Histopathology report (n)	Accuracy rate (%)
Reactive lymphadenitis (n=5)	Reactive lymphadenitis (n=3) Tubercular lymphadenitis (n=1) Non-Hodgkin's lymphoma (n=1)	60
Tubercular lymphadenitis (n=6)	Tubercular lymphadenitis (n= 6)	100
Non-Hodgkin's lymphoma (n=1)	Non-Hodgkin's lymphoma (n=1)	100
Hodgkin's lymphoma (n=1)	Hodgkin's lymphoma (n=1)	100
Metastatic adenocarcinoma (n=1)	Metastatic adenocarcinoma (n=1)	100

Table 6: FNAC and histopathology correlation of salivary glands.

FNAC report (n)	Histopathology report (n)	Accuracy rate (%)
Pleomorphic adenoma (n=5)	Pleomorphic adenoma (n=4) Mucoepidermoid carcinoma (n=1)	80
Warthin's tumor (n=1)	Warthin's tumor (n=1)	100
Chronic sialadenitis (n=1)	Chronic sialadenitis (n=1)	100

Table 7: FNAC and histopathology correlation of other swellings.

FNAC report (n)	Histopathology report (n)	Accuracy rate (%)
Benign cystic aspirate (n=2)	Dermoid cyst (n=2)	100
Sebaceous cyst (n=1)	Sebaceous cyst (n=1)	100
Lipoma (n=1)	Lipoma (n=1)	100

Table 8: Sensitivity, specificity and accuracy of FNAC in diagnosis of neck swellings.

Organ of origin	FNAC/HPE	Sensitivity (%)	Specificity (%)	Accuracy rate (%)
Thyroid	39/40	97.5	100	95.12
Lymph node	12/14	85.71	92.3	87.34
Salivary gland	6/7	85.71	100	87.5
Others	4/4	100	100	100
Total	57/65	90.76	98.075	92

In the other swelling 4 other neck swellings, all cases matched FNAC and HPE report.

The sensitivity of NAC in comparison with histopathology was 90.76%, specificity was 98.075% and diagnostic accuracy was 92.25%. This study showed almost perfect correlation (measure of agreement) between FNAC and final histopathology diagnosis of neck swellings from Cohen's Kappa test. (Kappa value of 1.00).

DISCUSSION

In this study, cytology diagnosis was in concordance with histopathology diagnosis in 61 cases (93.84%) except in 4 results. Similar results were obtained in a study done by Khetrapal and Vijay et al in which they had concordance in 91.8 and 89.5% respectively.[6,7]

Majority of patients were females with male to female ratio of 0.51:1 and the study included patients of all age groups. Similar results of female preponderance were also reported by Muggegodwa et al and Ahmad et al.[8,9]

In this study predominant site of FNAC was thyroid (61.53%) lymph nodes (21.53%) salivary gland (10.7%) and then others (6.15%) which was similar to the results studied by Vijay et al in which they have thyroid (46.03%), lymph nodes (43.65%), salivary gland swellings (5.5%) and other neck swellings (4.7%) except for that there were lesser number of lymph node swellings in our study.[7] This was due to the fact that only a smaller number of lymph nodes underwent biopsy to be correlated to the FNAC since most lymph nodes were reactive on FNAC and subsided on anti-inflammatory and antibiotic medications so they did not undergo biopsy precluding them from the study data (became exclusion criteria).

Thyroid: Of 40 cases, 28 (70%) were benign lesions and 12 (30%) were malignant lesions. Out of these 28 benign lesions 14 cases were diagnosed as colloid goiter which was the commonest pathology observed in this group. Amongst the malignant lesions, papillary carcinoma of thyroid was the most common.

In this study thyroid swellings were the predominant site of FNAC with colloid goiter as the predominant finding and female were more. These results were similar to the studies performed by Muddegowda and Rathod et al.[8,10]

One cytologically diagnosed case of chronic lymphocytic thyroiditis turned out to be papillary carcinoma on histopathology. Similar results are seen in study of Tilak et al.[11]

Lymph nodes: In lymph node swellings, tubercular lymphadenitis was the most common pathology similar to study done by Tilak et al followed by reactive lymphadenitis which is in concordance with Ahmad and Bhagat et al.[9,11,12]

One case of reactive lymphadenitis diagnosed by FNAC was later diagnosed as non-Hodgkin's lymphoma by histology. The diagnostic dilemma arising in distinguishing cytologically between reactive lymphadenitis and TB from lymphomas may be due to cluster of epithelioid cells, macrophages and polymorphous population of lymphocytes found in lymphomas.[13]

Above discrepancy of results highlights the points given by Tilak et al as a limitation of FNAC in diagnosing certain diseases such as lymphomas.[11]

Salivary glands: Pleomorphic Adenoma was the commonest lesion reported. However, one case of mucoepidermoid carcinoma was diagnosed as pleomorphic adenomas in FNAC, false negative case. Same type case was noted by Al-Khafaji et al.[14]

In summary: In this study it is observed that, though FNAC is a rapid, cost-effective, feasible first line diagnostic tool in management of neck swellings, histopathological confirmation is required especially for neoplastic swellings to avoid false negative results. Similar recommendation is given for the role of FNAC in diagnosing head and neck swellings by Carroll et al.[15]

CONCLUSION

FNAC is recommended as a safe and reliable technique in diagnosis of neck swellings. It is a quick and convenient procedure and should be considered as a first line investigation in evaluation of the neck lesion. Despite of high sensitivity there are certain pitfalls due to the misleading diagnostic yields. The diagnosis of reactive lesions in lymph nodes and various cystic swellings of neck have to be done only on the basis of adequate cellularity and in conjunction with the clinical history of the patient. Though FNAC is a rapid and cheap diagnostic tool with overall accuracy rate more than 90%, biopsy remains the gold standard for diagnosis of neck lesion.

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