



## Original Research Article

## Study of cyto-histopathological correlation in thyroid lesions at rural tertiary care hospital

Mangala Rajesh Nagare<sup>1</sup>, Sneha R Joshi<sup>1,\*</sup><sup>1</sup>Dept. of Pathology, MIMER Medical College, Pune, Maharashtra, India

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## ABSTRACT

**Background:** Fine Needle Aspiration Cytology of the thyroid gland is firmly established as an important test for the evaluation of thyroid diseases and an effective test for the preoperative diagnosis of solitary thyroid nodule.

**Aims & Objective:** 1. To correlate cytological and histopathological finding in thyroid lesions.; 2. To find out the spectrum of thyroid lesions in our rural hospital.

**Materials and Methods:** Prospective study of 2 years duration was undertaken in our institution. Total 110 cases were included in this study. All had FNAC examination as an outpatient procedure. Out of 110 cases, 64 were operated and specimens were sent for histopathology.

**Result:** Out of the 111 patients studied, on cytology 104 were non-neoplastic lesions, 3 were neoplastic, and 3 were inadequate. Out of 111 patients, Histopathology of 65 thyroid specimens showed 28 Colloid/Nodular goiter, 14 Multinodular goiter, 5 Lymphocytic thyroiditis, 7 Hashimoto's thyroiditis, 1 Granulomatous thyroiditis, 3 follicular carcinoma, 1 undifferentiated Anaplastic carcinoma, 1 Medullary carcinoma, 1 papillary carcinoma.

**Interpretation and Conclusion:** By comparing the result of FNAC and histopathology, FNAC had higher accuracy, sensitivity of 80% and specificity 100% in the diagnosis of neoplastic thyroid lesions. FNAC is safe, inexpensive and less invasive diagnostic method with excellent patient compliance. FNAC can be used in the management of thyroid swelling to avoid unnecessary surgery on conditions like thyroiditis. FNAC with the help of imaging techniques is helpful in diagnosis of neoplastic lesion.

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## 1. Introduction

Thyroid lesions are common among all endocrine disorders. In clinical practice, a majority are benign but in a significant percentage they are underlying malignant.<sup>1,2</sup> It is difficult to overall diagnose based only on clinical evaluation. Therefore, it is essential that a correct diagnosis is made as early as possible.<sup>3</sup>

As we know, thyroid lesions are very common in surgical practice and their worldwide prevalence is 4-7%. The incidence of malignancy in thyroid goiter is 10%. It

affects women more commonly than men. It is not practical to excise all the thyroid lesions because of certain risks associated with it. To avoid unwanted surgery, an effective screening test is required.<sup>4</sup>

In the management of thyroid lesions, fine needle aspiration cytology (FNAC) has been accepted as the first-line investigation, especially for solitary nodules. It is a screening tool to decide whether a patient needs surgical intervention or can be managed conservatively.<sup>5</sup> Fine needle aspiration cytology (FNAC) is simple, cheap, easily available, reliable, time saving, easy to perform, effective and almost accurate diagnostic technique for investigation of thyroid swelling.<sup>6-8</sup>

\* Corresponding author.

E-mail address: [stencildiagnosics@gmail.com](mailto:stencildiagnosics@gmail.com) (S. R. Joshi).

FNAC has its limitations like sample adequacy, techniques of sampling, experience of the cytopathologists. Also, there are difficulties in differentiating between benign and malignant follicular neoplasms because of many overlapping cytological features. Hence for final diagnosis, "histopathological examination" is necessary.<sup>9,10</sup>

## 2. Materials and Methods

This observational Prospective study was conducted in the Department of pathology of our hospital, MIMER Medical College Talegaon (D), Pune, India, between Oct 2015 to August 2016 in collaboration with Department of Surgery and Radiology.

### 2.1. Inclusion criteria

All the patients coming our hospital with thyroid lesions irrespective of age and sex was included in present study.

### 2.2. Sample collection and method

All the patients were clinically examined in detail according to the proforma and a careful palpation of the thyroid was done to guide precisely the location for doing aspiration. Details of the procedure were explained to the patients. Aspiration was done with the patient lying comfortably in a supine position and the neck was extended with a pillow under the shoulder so as to make the thyroid swelling appear prominent.

FNAC was performed under all aseptic precaution, with help of 23 gauge needle and disposable 5ml/10ml syringes. Whenever needed USG guided FNAC was done. Smears was prepared, fixed in 95% ethyl alcohol and Stained with hematoxylin & eosin stains FNAC smears were carefully studied and categorized into non neoplastic and neoplastic lesions.

### 2.3. Ethical clearance

Clearance from the Institutional Ethical committee was obtained.

(Ethical Approval letter no. : 222. Date-16-10-2014.)

### 2.4. Statistical analysis

Statistical analysis was done with appropriate tests in consultation with a statistician.

## 3. Results

The present study deals with the fine needle aspiration cytology of thyroid lesions and determination of diagnostic accuracy of aspiration cytology. A total of 111 patients with thyroid lesions were subjected to fine needle aspiration cytology during a period of 2 years. Of these 65 patients underwent surgery subsequently and the excised

specimens were sent to the Department of Pathology for histopathological examination. Correlation between FNAC and histopathological study was done.

### 3.1. Sex distribution

Majority of the patients referred for FNAC thyroid were females constituting 87 (78.32%) of the total 111 patients, and 24 male cases (21.81%). Male to female ratio was 1:3.58.

### 3.2. Age distribution

Age of the patients ranged from 10 years to 75 years with a median age of 39 years. The maximum incidence of thyroid lesions was noted in the 31 to 40 years age group in which there were 33 cases (29.72%). This was followed by the 21 to 30 years of age group and 41 to 50 years of age group with an incidence of 27.02% (30 cases) and 24.32% (27 cases).

### 3.3. Fine needle aspiration cytology

In the present study, non-neoplastic lesions were more commonly encountered than the neoplastic lesions, cytological evaluation of the lesions was performed based on standard criteria reported in the literature.

### 3.4. Cytologic diagnosis was classified as

#### 3.4.1. Non-neoplastic category

Smears with large quantity of colloid and several groups (generally six or more) of normal appearing follicular cells with or without the presence of histiocytes. The benign lesions include colloid nodule, nodule goiter, thyroiditis and thyroid cysts.

#### 3.4.2. Neoplastic category

It includes both benign and malignant neoplasms. The aspirations which contained groups of cells with malignant features were considered diagnostic of primary thyroid cancer (papillary, medullary or anaplastic subtypes) or disease metastatic to thyroid. Histopathologic evaluation was advised because the criteria of malignancy in these lesions are based on evidence of capsular or vascular invasion.

#### 3.4.3. Insufficient/inadequate category

Smears showing a minimum of six clusters of well-preserved follicular cells with each group containing at least 10 cells were considered adequate. Aspirates considered in sufficient had only blood or cyst fluid or scattered thyroid cells fewer than above mentioned number without colloid.

Total number of cytological diagnosis was 111. Amongst them 91.89% were non-neoplastic and 7.20% were neoplastic. (Table 1)

In the present study among 111 patients, nodular / colloid goiter were most common lesions accounting for 69 cases (67.64%) followed by Multinodolar goiter which were 15 cases (14.70%). (Figure 1)

In the present study, of total 8 neoplastic cases, majority of the cases were of suspicious for follicular neoplasm (4 cases) (Figure 3). This was followed by suspicious for papillary carcinoma (2 cases) (Figure 4), medullary carcinoma (1 case) and undifferentiated (Anaplastic) carcinoma(1 case) (Figure 5). In present study cytological diagnosis of suspicious of follicular neoplasm was made in 4 cases out of 111.

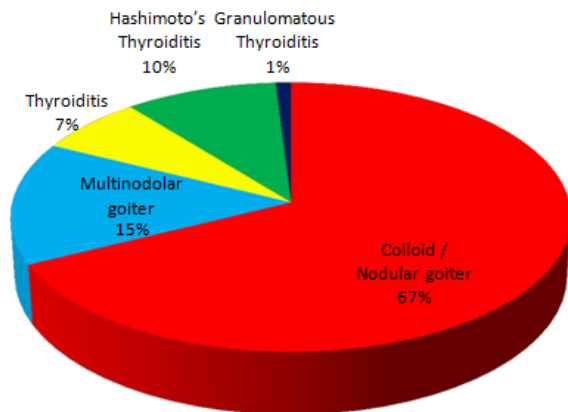


Fig. 1: Non – Neoplastic lesions on cytology

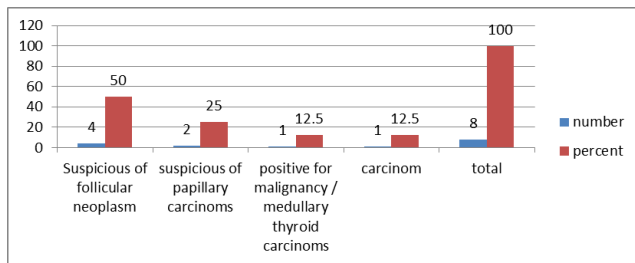


Fig. 2: Neoplastic lesions on cytology in the present study

Table 1: Cytological diagnosis

Cytological diagnosis-	Number(n)	Percentages (%)
Non-Neoplastic	102	91.89
Neoplastic	08	7.20
Inadequate	01	0.90
Total	111	100

The cytological diagnosis of suspicious for papillary carcinoma was given in two cases. There was one case of medullary carcinoma and one case of anaplastic carcinoma on cytology. (Figure 2)

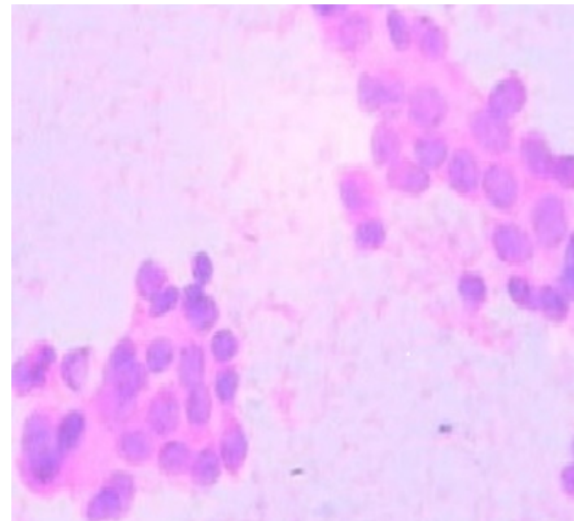


Fig. 3: Follicular neoplasm

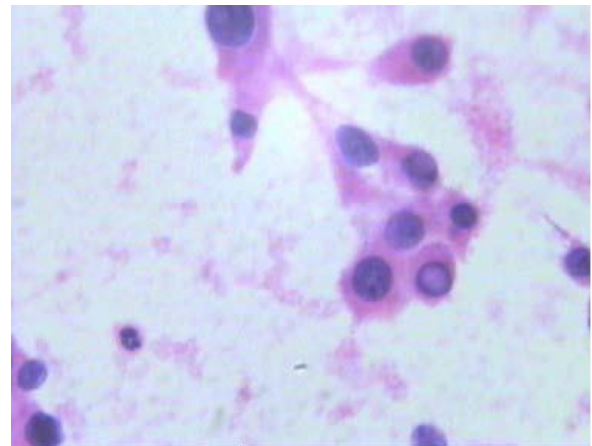


Fig. 4: Papillary carcinoma of thyroid

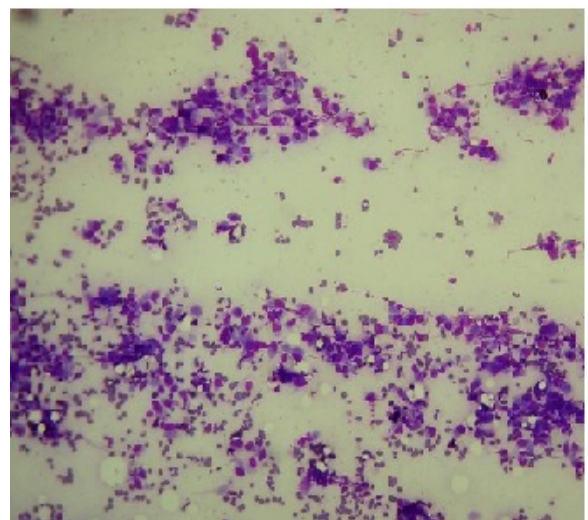


Fig. 5: Anaplastic carcinoma of thyroid

**Table 2:** Neoplastic Lesion on histopathology

Histopathological Diagnosis	Number	Percent (%)
Follicular adenoma	3	30
Follicular carcinoma	2	20
Papillary carcinoma	2	20
Medullary carcinoma	1	10
Undifferentiated (anaplastic) thyroid carcinoma	2	20
Total	10	100

**Table 3:** Cyto-Histopathological correlation of neoplastic and non-neoplastic thyroid lesions

Histological diagnosis	No. of patients	Cytological Diagnosis			
		Correlated		Non-Correlated	
		No. of patients	Percentage (%)	No. of patients	Percentage (%)
Non-Neoplastic lesions	55	54	98.18	01	1.81
Follicular neoplasms	05	04	100	-	-
Medullary carcinoma	01	01	100	-	-
Papillary carcinoma	02	02	100	-	-
Anaplastic carcinoma	02	01	50	01	50
Total	65	63	96.92	02	3.07

**Table 4:** Comparison of the result of the present study with other similar studies

Author	Hyang-MiKo et al <sup>11</sup>	Gupta et al <sup>8</sup>	Bashrat et al <sup>12</sup>	Pandey et al <sup>9</sup>	Chetna Sharma <sup>13</sup>	Present Study
Year	2003	2010	2011	2012	2015	2016
No. of cases	207	75	50	447	945	111
Sensitivity (%)	78.4	80	80	57.14	89.5	88
Specificity (%)	98.2	86.6	97.70	90	98	100
PPV (%)	99	80	80	70.58	84.6	100
NPV (%)	66.3	86.6	97.70	83.33	98.6	98.21
Accuracy (%)	84.4	84	96	80.28	97	95.45

In the present study following neoplastic lesions of thyroid were found - follicular adenoma, follicular carcinoma, papillary carcinoma, medullary carcinoma, undifferentiated (anaplastic) thyroid carcinoma (Table 2)

In present study the cytology - histopathology concordance rate for Non-neoplastic lesions and neoplastic lesions was as follows –

1. Non-neoplastic lesions-98.18%
2. Neoplastic lesions – 90%

#### 4. Discussion

For preoperative investigation of thyroid nodules, fine needle aspiration cytology is a well-established technique. To differentiate between benign and malignant thyroid nodules, this non-invasive technique is an efficient method.<sup>12,14,15</sup>

According to several investigators, the fine needle aspiration cytology is a useful tool for selecting patients with nodular thyroid disease for thyroidectomy.<sup>12,15,16</sup>

In the present study, age of the patients ranged from 10-75 years with a median age of 39 years.

This was comparable to Rabia Basharat et al,<sup>12</sup> Pandey et al,<sup>9</sup> Herachand et al,<sup>15</sup> Rangaswamy et al.<sup>17</sup>

The number of males in the present study was 24(21.62%) and females were 87 (78.37%) with a male to female ratio of 1: 3.62. Sex distribution was comparable with Rangaswamy et al,<sup>17</sup> Afroze N et al.<sup>18</sup>

In the present study, the most common lesion was Nodular/colloid goiter accounting for 69 (67.64%) followed by thyroiditis, 18 cases (16.21%) and Multinodular goiter, 15 cases (14.70%). A comparable observation was made by Handa et al. where 250 cases (65.6%) were colloid goiter and thyroiditis were 119 cases (31.23%).

The next common was follicular neoplasm (4 cases), papillary carcinoma (2 cases, anaplastic carcinoma (2 cases) and medullary carcinoma (1 case). Distribution was comparable with Handa et al,<sup>19</sup> Richard et al<sup>16</sup> and Bagga & Mahajan et al.<sup>3</sup>

In the present study of total 111 cases diagnosed on cytology, surgical sample were available for 65 cases, of this 62 cases correlated with histopathological findings, 1 case which was reported as inadequate on cytology was diagnosed as microfollicular adenoma on histopathology. This was because of presence of very tiny lesion that was missed during aspiration.

In the present study the false negative rate is 1.5%. This figure is in agreement with the other studies which reported false negative rate between 1- 11%. 64 false negative rate is a concern because a missed malignant lesion will result in direct consequences for the patient.

In the present study 2 cases were diagnosed as papillary carcinoma on cytology which proved to be papillary carcinoma on histopathology. Hyang Mi Ko et al,<sup>11</sup> has reported the predictive value of a cytologic diagnosis as 100% for papillary carcinoma. In present study no false positive case (0%) was diagnosed. This is in agreement with other studies which reported false positive error rates between (0-9%)

In the present study majority of the lesions were non-neoplastic 84.61% (55 cases) and 10 were neoplastic (15.38%) cases percentage was similar to Safirullah et al<sup>20</sup> and Kamal et al.<sup>21</sup>

Statistical analysis of Malignant lesions showed accuracy, sensitivity, specificity, positive predictive value and negative predictive value of FNAC to be 95.45%, 88%, 100%, and 100%, 98.21% respectively. These results are comparable to the study done by Afroze et al<sup>18</sup> where malignancy showed 1) sensitivity of 61.90%, 2) specificity of 99.31%, 3) positive predictive value of 92.86%, 4) Negative predictive value of 94.74%, 5) Accuracy of 94.58%. (Table 4)

## 5. Conclusion

Fine needle aspiration cytology of thyroid is simple diagnostic tool with sensitivity 88% and specificity 100%. It has certain limitations but it gives guidelines to clinicians about further management of various thyroid lesions.

## 6. Source of Funding

None.


## 7. Conflict of Interest

No conflict of interest.

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## Author biography

**Mangala Rajesh Nagare**, Assistant Professor  <https://orcid.org/0000-0001-7107-5120>

**Sneha R Joshi**, Professor and HOD

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