



## Study of Correlation Between The Preoperative FNAC And Final Histopathological Diagnosis of Thyroid Swellings in A Tertiary Care Centre

## KEYWORDS

Thyroid, Goitre, FNAC

**Dr. M Sri Hari Rao**

Associate Professor, Department of General Surgery, Osmania Medical College.

**Dr. Guru Raghavendra Naik M.**

Senior Post Graduate, Department of General Surgery, Osmania Medical College.

**Dr. Mohammed Imaduddin**

Junior Post Graduate, Department of General Surgery, Osmania Medical College.

**ABSTRACT**

*Thyroid swellings are a common cause for presentation in a surgical clinic. The etiology of thyroid swellings varies considerably ranging from several benign causes to sometimes malignant. Preoperative evaluation of the nature of the swelling thus forms an important part of management. This study aims to correlate preoperative FNAC and postoperative histopathology to evaluate usefulness of FNAC to guide the clinician in the management of thyroid problems encountered in surgical practice.*

**INTRODUCTION**

Thyroid swellings are frequently encountered endocrine disorders. Majority of these are benign, of which goitre is the commonest. The magnitude of the problem in South East Asia is evident by the recent estimates that 172 million people are affected by goitre in this region, and another 600 million are at risk for developing iodine deficiency disorders. Presence of swelling causes much anxiety and cosmetic embarrassment, especially for females who are affected more than males, in addition to the morbidity associated with hypo or hyperthyroidism.

Clinical assessment assists in making a diagnosis but it has its limits. Nevertheless, it is difficult to differentiate the benign goitres from the early malignant lesions. A radionuclide scan with radioactive Iodine or Technetium delineates the functional status of nodules, but doesn't establish its precise histological nature.

Fine needle aspiration cytology (FNAC) is a simple and safe procedure which can be carried out in the outpatient department or in the laboratory with minimum equipment. It has good patient compliance and results can be known within one hour. This study aims to correlate the preoperative FNAC and Postoperative Histopathological examination (HPE) and also to evaluate the sensitivity, specificity and positive predictive value of the smears.

**REVIEW OF LITERATURE**

Goiters (from the Latin *guttur*, throat), have been documented since 2700 B.C. even though the thyroid gland was not recognized as such up until the Renaissance period. The term *thyroid gland* (Greek *thyreoeides*, shield-shaped) is, however, credited to Thomas Wharton in his *Adenographia* (1656).

The first records of thyroid surgery for the management of goiters were made by Roger Frugardi in 1170. The most prominent thyroid surgeons known are Emil Theodor Kocher (1841 – 1917) and C.A. Theodor Billroth (1829-1894), who performed many operations with increasingly successful outcomes. In 1909, Kocher was presented the Nobel Prize in recognition of his works on the physiology, pathology, and surgery of the thyroid gland.

**Pathology**

The normal thyroid gland is not palpable clinically. The term goitre is used to describe generalized enlargement of the thyroid gland. A distinct swelling (nodule) in one lobe with no palpable abnormality elsewhere is term an isolated (or solitary) swelling. Discrete swellings with evidence of associated abnormality elsewhere in the gland are termed dominant. In general, thyroid enlargement can be classified as follows:

**Classification of Thyroid Swellings****1. Simple Goitre (Euthyroid):**

- Diffuse hyperplastic
  - Physiological
  - Pubertal
  - Pregnancy
- Multinodular

**2. Toxic**

- Grave's disease
- Multinodular
- Toxic adenoma

**3. Neoplastic**

- **Benign**
  - Follicular adenoma
  - Papillary adenoma
  - Atypical adenoma
  - Hyalinising trabeculated adenoma

• **Malignant**

- Papillary carcinoma
- Follicular carcinoma
- Medullary carcinoma of thyroid
- Anaplastic carcinoma
- Poorly differentiated carcinoma

**4. Inflammatory**

- Autoimmune
- Chronic lymphocytic thyroiditis- Hashimoto's disease
- Granulomatous
  - De Quervain's thyroiditis
- Fibrosing
  - Reidel's thyroiditis
- Infective

## 5. Others

- Amyloid

### Fine Needle Aspiration Cytology

Aspiration biopsy cytology is a branch of diagnostic cytology that interprets the changes in cells extracted from within the organs, tumors or non-neoplastic abnormal tissues.

It is generally carried out with a "fine" needle (OD 0.6 to 0.9 mm), sometimes under image guidance. There is no question that the procedure is, in most instances, inexpensive, safe, quick, and when performed by experienced workers quite accurate. It has contributed a great deal to transform cytology from a screening tool to a powerful diagnostic procedure. However, like any other technique, it has definite limitations that its enthusiastic champions sometimes choose to ignore. Minimal material is available for examination. Due to cystic lesions and cystic areas in thyroid diseases inadequate specimens are aspirated. Architecture and cell relationship are absent because of which distinction between a follicular adenoma and well differentiated follicular carcinoma is quite difficult where follicular malignancy is diagnosed by capsular or vascular invasion. It can also induce artifacts of various types in the tissues, which the pathologist should be aware of in order to avoid misinterpretation.

### FNAC and Histopathology of Thyroid Lesions:

1. Low cellular smears are benign. High cellular smears are suspicious
2. Degenerative changes and old haemorrhages are characterized by histiocytes, seen as large cells with peripherally pushed pyknotic nuclei and cloudy cytoplasm with many vacuoles and granules of degraded or digested material.
3. Hurthle cells look longer than follicular cells with well-defined cellular borders with granular cytoplasm and moderate to large nuclei.
4. Inflammations

### PATIENTS AND METHODS:

1. The study group involved 40 patients who underwent thyroid surgery at Osmania General Hospital, Hyderabad, Telangana, India during the period from November 2012 to April 2014.
2. In all the 40 cases of thyroid swellings a clinical diagnosis for arrived at and Fine Needle Aspiration Cytology was done.
3. In the 40 cases that required surgery, postoperative Histopathological diagnosis was established.
4. A Correlation was arrived by comparing the cytological and Histopathological examination.

### INCLUSION CRITERIA

Patients presenting with thyroid swellings to Osmania General Hospital during the study period and underwent surgery for the same were included in the study.

### EXCLUSION CRITERIA

Patients who either refused to get admitted or those who refused to undergo surgery were excluded. All the patients with severe cardiac risk for surgery were excluded.

### OBSERVATION AND ANALYSIS:

#### Age and Sex Distribution

The study group of 40 cases ranged from 18 - 70 years with 60% in the 3rd & 4th decades of life. Females

constituted 82.5% and males 17.5%.

### Presentation

The duration of the complaints ranged from 3 months to 2 years. The commonest mode of presentation was swelling in the thyroid region. 40 patients presented with thyroid swellings. 11 patients had features of pain, 1 patient presented with dysphagia, 7 patients came up with hoarseness of voice and 2 patients with dyspnea and stridor.

### Clinical Diagnosis

The most common presentation was Solitary nodule, present in 30 patients (75%). Patients presenting with Multinodular goitre were 5 (12.5%). Diffuse goitre was seen in 2 patients (5%), malignancy in 2 patients (5%) and toxic nodule in 1 patient (2.5%).

### Cytological Diagnosis

S. No	Cytological Diagnosis	No. of Cases	Percentage
1	Adenoma	15	37.5
2	Nodular hyperplasia	6	15
3	Follicular neoplasm	7	17.5
4	Papillary carcinoma	6	15
5	Colloid goiter	5	12.5
6	Hashimoto's thyroiditis	1	2.5
TOTAL		40	100

### Histopathological Diagnosis

	Histopathological Diagnosis	No.	Total	%
Benign	Colloid Goitre	5	29	72.5
	Multinodular Goitre	3		
	Adenoma	11		
	Follicular Adenoma	8		
	Reidel's Thyroiditis	1		
	Hashimoto's thyroiditis	1		
Malignant	Follicular Carcinoma	3	11	27.5
	Papillary Carcinoma	6		
	Hurthle cell Carcinoma	1		
	Thyroid Lymphoma	1		

### Correlation of Histology and Cytology

Cytology	Histology		Total Cytology
	Benign	Malignant	
Benign	29	5	34
Malignant	0	6	6
Total histology	29	11	40

The parameters of FNAC were calculated as  
 SENSITIVITY = 54.5%  
 SPECIFICITY = 100%  
 POSITIVE PREDICTIVE VALUE = 100%  
 ACCURACY = 87.5%

## DISCUSSION:

### Age Distribution

The age of the patients varied from 18 to 70 years in the present series with the mean age of 44 years. The mean age of the group studied by Gershengorn et al (1977) was 39 years, P.J. Kleimi et al (1990), 50 years and Prakash H et al (2012) 35.67 years.

### Sex Distribution

The sex ratio (Female: male) in the present study group was 33:7. In the series of Gershengorn et al (1977) female to male ratio was 28:5, P.J. Kleimi et al series (1990) 8:1 and Prakash H et al (2012) 7.1:1.

### Incidence of Malignancy

6 out of 40 cases (15%) we have studied were malignancy on FNAC. Other figures were reported by Chu et al (1979) 26%, Lowhagen et al (1979) 20%, Colacchio et al (1980) 16%, Silver et al (1981) 22%, Ramaciotti et al (1984) 20%, Braun & Silver (1984) 18%, Harsoulis et al (1986) 19%, P.J. Kleimi et al (1990) 11.8% and L. Godinho et al (1992) 21%.

### Incidence of Malignant Histologic Types

Among the malignant lesions on histopathology, papillary carcinoma comprised of 54.6% and follicular carcinoma 24%. The frequency of histological types of carcinomas in the series of Starvic et al (1980) and Barun and Silver (1984) were 38%:25% and 37%:29%, respectively of papillary and follicular carcinomas. The incidence of papillary carcinoma was high in the series of Ramaciotti et al (1984) 76%, also Harsoulis et al (1988) with 70% and P.J. Kleimi et al (1990) with 59% and the present series with 54.5%. The incidence of papillary carcinoma was, however, low in the series of Muratli. A et al (2014) which is 26.2%.

### Accuracy Rate

The Overall accuracy of FNAC was more than 75% in most of the series on the subject reported by various authors. Accuracy of FNAC in thyroid swellings in the study of J L Morgan (2003) and Manoj Gupta (2010) were 67.2% and 84% respectively. Accuracy of FNAC in the series of Bhatta et al (2012) and Muratli.A et al (2014) were 90% and 77.3% respectively. In the study of Kessler et al (2005), accuracy was 87% which is same as that of present study. Moshe Friedman (1979) reported the highest figure of 99%. In the present series an overall accuracy rate of 87.5% was obtained. All the 6 cases diagnosed as malignant cytologically were also diagnosed as malignant on histopathology in the present series.

### False Negative

The false negative ranged from nil to 20% in various series. But majority of false negatives were below 5% and in the present study it was 12.5%. The false negatives were due to misdiagnosis of follicular carcinoma as adenoma and nodular hyperplasia and misdiagnosis of papillary carcinoma as goitrous lesion and adenoma. The difficulty in distinguishing follicular carcinoma from its benign counterpart was experience considering capsular and vascular invasion are essential for the diagnosis of

malignancy, which cannot be demonstrated on cytology. It is difficult to differentiate Lymphoma from Hashimoto's thyroiditis (Wang et al 1976). The possibility of papillary carcinoma with cystic degeneration must be kept in mind in cystic lesions though most of them are benign (Chu et al 1979), and wall must be aspirated after evacuating the cyst completely. False negative rate was highest (20%) in the series of Gupta et al (2010). In the studies of Bhatta S et al (2012) and Muratli A et al (2014) was 14.28% and 7.23% respectively.

### False Positive

There was no false positive smear in the present series. False positives ranged from 0-18.75% in various series. False positive were less frequent than false negatives. They are due to atypical appearances of follicular cells with moderate variations in size. Such a change can be observed in benign lesions also as hyperplastic reaction of thyroid cells (Friedman et al 1979). False positive rates in the series of Bhatta S et al (2012) and Muratli A et al (2014) were 7.69% and 15.5% respectively and in the current series it was 0%.

### Sensitivity and Specificity

Sensitivity and specificity ranged from 55% to 100%. More false negatives decrease the specificity and sensitivity. More false positives decrease the predictive value of a positive result and also the value of the study.

Name of the Author	Year	Sensitivity	Specificity
K.C. Suen et al	1983	97%	100%
Aggarwal SK et al	1989	68.1%	100%
P.J Kleimi et at	1990	55%	100%
Gupta C et al	2001	89.47%	99.2%
J.L.Morgan et al	2003	55%	73.7%
Gupta et al	2010	80%	86.6%
Present	2014	54.5%	100%

### CONCLUSION AND SUMMARY:

40 patients were subjected to clinical examination and FNAC over a period of 24 months from November 2012 to April 2014. Histopathological diagnosis was established in all and correlated with cytological diagnosis.

Out of 34 cases reported as benign by FNAC, 29 cases proved to be so. The remaining 5 cases were established as follicular carcinoma (3), Hurthle cell carcinoma (1) and thyroid lymphoma (1). The predictive value of FNAC in the present series was calculated as:

SENSITIVITY: 54.5%  
 SPECIFICITY: 100%  
 OVERALL ACCURACY: 87.5%  
 POSITIVE PREDICTIVE VALUE: 100%

In conclusion preoperative Fine Needle Aspiration Cytology can be considered effective due to its high positive predictive value when used in diagnosis and planning of surgery for thyroid lesions.

**REFERENCE**

1. Lal, G., & Clark, O.H. (2015) Thyroid, Parathyroid and Adrenal. Schwartz's Principles of Surgery (10th ed.). New York, MA: McGraw Hill.
2. Mahmoud, E., & Hisham, M. (2012). Histopathological and Cytological efficacy in the diagnosis of solitary thyroid nodules. Egyptian Journal of Pathology. 32(1), 121-128. doi: 10.1097/01.XEJ.0000415768.18425.22
3. Manoj, G., Gupta, S., & Gupta, V.B. (2011). Correlation of fine needle aspiration cytology with histopathology in the diagnosis of solitary thyroid nodule. Journal of thyroid research. doi:10.4061/2010/37905
4. Nada, A., Ahmed, A.M., Vitallonga, R., Armengol, M., & Moustafa, I. (2011). A giant euthyroid endemic Multinodular goitre with no obstructive or compressive symptoms. Case Reports of Medicine. doi: 10.1155/2011/620480
5. Pawde, Y., & Kathale, S. (2014). Fine Needle Aspiration Cytology as a Diagnostic Tool in Head and Neck Lesions. Journal of Evolution of Medical and Dental Sciences, 3(45), 11072-11079