

COMPARATIVE STUDY OF CYTOLOGY AND HISTOPATHOLOGY OF NODULAR LESIONS OF THYROID WITH REFERENCE TO SPECIAL STAIN

R. Narayana Vadivoo¹, S.Muthuselvi², Kavitha Selvaraj³, M.Johnraj Suresh⁴

Received : 01/01/2024
Received in revised form : 20/02/2024
Accepted : 04/03/2024

Keywords:
Histopathology, Thyroid, Nodular lesion, Fine Needle Aspiration Cytology.

Corresponding Author:
Dr. M.Johnraj Suresh,
Email: johnrajsuresh69@gmail.com.

DOI: 10.47009/jamp.2024.6.2.37

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2024; 6 (2); 177-181



¹Assistant Professor, Department of Pathology, Sri Manakula Vinayagar Medical College and Hospital, Puducherry, India.

²Assistant Professor, Department of Pathology, Government Thoothukudi Medical College, Tamilnadu, India.

³Assistant Professor, Department of Pathology, Government Thoothukudi Medical College, Tamilnadu, India.

⁴Associate Professor, Department of Pathology, Government Thoothukudi Medical College, Tamilnadu, India.

Abstract

Background: Thyroid swelling is a common symptom in our Department of ENT, Head, and Neck Surgery. However, the most challenging difficulty in clinical practice is differentiating a few deadly tumours from several benign nodules. This study aims to compare cytology and histopathology of nodular thyroid lesions. **Material and Methods:** A prospective study was done at Government Mohan Kumaramangalam Medical College, Salem, from November 2016 –April 2018. All 100 patients with Nodular thyroid lesions, irrespective of age and sex, were referred to the Cytology lab in the Department of Pathology. In each case, a detailed clinical history and thorough examination were made before procuring a sample for cytological examination. **Result:** Females are more likely than males to have thyroid lesions, with a percentage of 92 in females and 8 % in males. Fifteen percent of cases were highly cellular, and 85 percent were moderately cellular. Among highly cellular smears, 9 percent were reported as malignancy. Seventy-seven percent of cases had abundant colloid, 8 % had moderate colloid, and 15% had scant colloid. Among which 29 percent of cases had cyst macrophages and negative in 71 percent of cases. Among cases reported as Nodular colloid goitre with cystic changes, there were discrepancies with 8 cases; all were reported as benign lesions. **Conclusion:** We conclude that thyroid swelling was common among the age group 41 -50 years, with a female preponderance. Therefore, the judicious use of (FNAC) as a screening tool helps in planning the management and avoids unnecessary expenditure on surgery.

INTRODUCTION

Thyroid lesions are the most frequent ailment encountered in clinical practice and are found worldwide. Thyroid illness is significant because it is treatable surgically and medically and is one of the most challenging problems modern physicians confront.^[1] In addition, the differential analysis of Malignant thyroid lesions is very important as malignancy requires Surgical management, whereas Benign lesions need strict follow-up.^[2] The thyroid gland is the biggest endocrine gland that was the first to form during foetal development. Thyroid swelling is a persistent endocrine disorder in the patient. The frequency of palpable thyroid nodules in India is 4-7%.^[3,4]

The vast majority are benign, with less than 5% being cancerous. The most common diagnosis nodule is a colloid goitre. Martin and Ellis published the first report on thyroid lesion identification using Fine Needle Aspiration Cytology (FNAC) in 1930.^[4] FNAC is regarded as the gold standard in selecting patients for surgery. The final diagnosis is based on morphological inspection of lesions with FNAC, although the histopathological investigation is now required.^[5] Essential factors for satisfactory results include representative swelling from the thyroid lesions and an experienced cytopathologist to report the findings. Thyroid malignancy closely resembles its benign lesion. As a result, surgical removal of the nodule and histopathological examination are the only ways to distinguish between benign and malignant nodules.^[6,7]

A lone thyroid nodule is a palpable, solitary, clinically detectable lesion in the thyroid. It is mainly a concern because of the high likelihood of cancer, which ranges from 5-35 percent of all solitary thyroid nodules. Benign and malignant lesions present with clinically detectable nodules known as Nodular lesions.^[8]

Miller et al. showed that using Fine Needle Aspiration (FNA) correctly lowered the number of benign thyroid lesions that required surgery by 70%.^[9-11] The incidence of thyroid malignancy in males is 0.2 % and in females is 0.7%. There is an increased incidence of thyroid malignancy in India. Recent developments in medicine and research have improved our knowledge and management of thyroid problems. Every year, there seem to be 2,16,000 new instances of thyroid cancer in India, and assessing thyroid tumours is critical.^[12]

In India, many techniques are employed to diagnose a single nodule; however, histology has remained the gold standard for comparison. According to a recent study, FNAC is a primary examination of thyroid lesions employed in patients with one or more thyroid nodules. FNAC is also recommended for every patient for cancer exclusion and early patient care. It is widely utilised because it is a low-cost, sensitive, specific, and precise method; as a result, it has been adopted as the primary examination of thyroid problems in all tertiary institutions in underdeveloped countries.^[13]

Aim

To study the incidence of nodular thyroid lesions with relevance to age and sex in GMKMCH, to evaluate the presentation of various Nodular thyroid lesions, to evaluate the role of FNAC in various Nodular thyroid lesions, to study the role of special stain in thyroid lesions, to categorise the patients for surgical management based on Fine Needle Aspiration Cytology diagnosis, and to study FNAC and Histopathological correlation of various thyroid lesions.

MATERIALS AND METHODS

It is a prospective study done at Government Mohan Kumaramangalam Medical College, Salem, November 2016 –April 2018. All 100 patients with Nodular thyroid lesions, irrespective of age and sex, referred to the Cytology lab in the Department of Pathology, at GMKMC, Salem, from ENT OP, Surgery OP, and patients admitted to the ward were selected for inclusion criteria. In each case, a detailed clinical history and thorough examination were made before procuring a sample for cytological examination.

Post Radiotherapy patients, Patients having diffuse enlargement of the thyroid, and Patients with past surgery history for Thyroid lesions are excluded from the study. In all 100 cases, informed consent was taken before surgery.

RESULTS

The most common age group was between 41- 50 years of age, the second most common was within 31-40 years, and the oldest age group was between 71- 80 years and is the least common age of presentation in the present study. Six of the patients were between the ages of 10 and 20 years. The thyroid lesions are more prevalent in females than males, with a percentage of 92 in females and 8 % in males. [Table 1]

Predominantly it was a moderately cellular smear, and 15 percent of cases were highly cellular, and 85 percent were moderately cellular. Among highly cellular smears, 9 percent were reported as malignancy. Nuclear grooves present in only 6 percent of cases which is papillary carcinoma of the thyroid. Nuclear grooves were seen in all thyroid papillary carcinomas. Macro follicles were present in only 2 % of cases, and in 98% of cases, it was negative. Among the 2 cases, one was reported as Adenomatous hyperplasia, and the other was reported as colloid goitre. The distribution of micro follicles is present in only 3 percent of cases. Out of which, 2 cases were reported as Adenomatous hyperplasia, and one case was reported as colloid goitre. The hurthle cells in 100 cases, out of which only 8 cases were positive and in 92 cases, it was negative. Among eight positive cases, there were seven cases of Hashimoto's thyroiditis and one of Multinodular goitre. [Table 2]

It was noted in 6 cases of papillary carcinoma of the thyroid and was negative in all other thyroid lesions. Out of 100 cases, 77 percent of cases had abundant colloid, 8 % had moderate colloid, and 15 percent had scant colloid. [Table 3]

The distribution of cyst macrophages in 100 cases, among which 29 percent of cases had cyst macrophages and negative in 71 percent of cases. Among these, 19 cases were reported with lymphocytes. Among 19 positive cases, seven were reported as Lymphocytic thyroiditis, seven cases of Hashimoto's thyroiditis and five cases of Nodular colloid goitre. [Table 4]

Out of 50 Cases reported as Nodular colloid goitre in FNAC, Colloid goitre has been recorded in 34 cases, and the remaining cases were reported as Multinodular goitre, Lymphocytic thyroiditis, Hashimoto's thyroiditis, Follicular adenoma, Adenomatous hyperplasia, Infarcted Follicular Adenoma and Papillary Carcinoma of thyroid respectively. Among those diagnosed with Nodular Colloid Goitre with Cystic Changes, there were discrepancies with 8 cases; all were reported as benign lesions. [Table 5]

2 Cases reported as Colloid cyst in FNAC is reported as Colloid cysts in HPE. Among 7 cases of Lymphocytic thyroiditis in FNAC, only 1 case is reported as Hashimoto's thyroiditis in HPE. Among 7 cases reported as Hashimoto's thyroiditis in FNAC, one case was reported as Adenomatous

hyperplasia. Four of 6 cases of Adenomatous hyperplasia in FNAC were reported as Follicular Adenoma in HPE. One case reported as Follicular Adenoma in FNAC is reported as Follicular Adenoma in HPE. 2 Cases reported as Follicular

Neoplasm in FNAC are reported as Follicular Adenoma in HPE. 1 case reported as Suspicious of Malignancy reported as Follicular Carcinoma in HPE. 6 Cases reported as Papillary carcinoma in HPE.

Table 1: Distribution of patient characteristics

Variable	No. of cases	Percentage	
Age in Years	10-20 Years	6	6.0
	21-30 Years	20	20.0
	31-40 Years	26	26.0
	41-50 Years	27	27.0
	51-60 Years	12	12.0
	61-70 Years	8	8.0
Gender	71-80 Years	1	1.0
	Female	92	92.0
	Male	8	8.0

Table 2: Distribution of Cellularity, Nuclear grooves, Macro follicles, Micro follicles, Hurthle cells in Thyroid lesions

Parameters	Frequency	percentage	
Cellularity	Highly cellular	15	15
	Moderately cellular	85	85
Nuclear grooves	Negative	94	94
	Positive	6	6
Macro follicles	negative	98	98
	positive	2	2
Micro follicles	Negative	97	97
	Positive	3	3
Hurthle cells	Negative	92	92
	Positive	8	8

Table 3: Cytoplasmic inclusions and Colloid in Thyroid lesions

Parameters	Cytoplasmic inclusions		Colloid		
	Negative	Positive	Abundant	Moderate	Scant
FNAC diagnosis					
NCG	50	0	47	1	2
NCG with cystic changes	19	0	17	2	0
Colloid cyst	2	0	2	0	0
HT	7	0	5	0	2
LT	7	0	3	1	3
AH	5	0	3	1	1
FA	1	0	0	1	0
FN	2	0	0	2	0
Pap ca	0	6	0	0	6
S/O Malignancy	1	0	0	0	1
Total	94	6	77	8	15

Table 4: Distribution of Cyst macrophages and Lymphocytes in Thyroid lesions

Parameters	Cyst macrophages		Lymphocytes	
	Negative	Positive	Present	Absent
FNAC diagnosis				
NCG	25	25	3	47
NCG with cystic changes	18	1	3	16
Colloid cyst	0	2	0	2
HT	0	7	6	1
LT	0	7	7	0
AH	0	5	0	5
FA	0	1	0	1
FN	0	2	0	2
Pap ca	3	3	0	6
S/O Malignancy	0	1	0	1
Total	29	71	19	81

Table 5: Correlation of FNAC with HPE

FNAC diagnosis	FNAC Total	Correlation with HPE diagnosis										HPE Total	
		NCG	NCG - LT	MNG	MNG-AH	LT	HT	AH	FA	Infarcted FA	PAP Ca		FC

NCG	54	34	0	8	0	1	2	3	3	1	2	0	54
NCG- cystic changes	15	7	1	0	0	3	1	1	2	0	0	0	15
Colloid cyst	2	2	0	0	0	0	0	0	0	0	0	0	2
LT	7	0	0	0	0	6	1	0	0	0	0	0	7
HT	7	0	0	0	0	0	6	1	0	0	0	0	7
AH	6	0	0	0	1	0	1	0	4	0	0	0	6
FA	1	0	0	0	0	0	0	0	1	0	0	0	1
FN	2	0	0	0	0	0	0	0	2	0	0	0	2
S/O Malignancy	1	0	0	0	0	0	0	0	0	0	0	1	1
Pap ca	6	0	0	0	0	0	0	0	0	0	6	0	6
Total	100	43	1	8	1	10	11	5	12	0	8	1	100

DISCUSSION

Thyroid nodules are a common endocrine abnormality. The incidence of thyroid nodules increases with age and in prevalence among women compared to men. Sometimes the clinically palpated solitary thyroid nodule could be part of multinodular goitre in such cases. Ultrasound plays an important role. Malignancy is more common in solitary nodules than those in multinodular lesions.

80 % of thyroid nodules are benign lesions or Hyperplastic lesions. Among Endocrine malignancies, Thyroid carcinoma constitutes 5-10%. Identifying benign lesions is essential because incorrect diagnoses may lead to unwanted procedures and treatment. Unfortunately, no diagnostic tools are available to differentiate benign from malignant lesions. Every diagnostic modality has its advantage and disadvantage. So combined diagnostic modalities are needed.

Fine Needle Aspiration Cytology has become the standard approach for determining thyroid lesions before surgery. A recent study shows that cytologic variations between normal thyroid and other nodular thyroid lesions can be noted with high accuracy. The most accurate approach for Non-Follicular Primary Thyroid Carcinoma is Fine Needle Aspiration Cytology, but it is less accurate to diagnose Follicular carcinoma. Identifying thyroid follicular lesions is the most challenging aspect of thyroid fine needle aspiration cytology. The primary cause of False negative diagnosis is an inadequate sample from the representative area. Thyroid FNAC is commonly used since it is safe and can be done quickly and inexpensively. The accuracy rate of FNAC is greater than 90%. In good hands, sensitivity, as well as accuracy, can reach up to 95%. FNAC has established itself as a diagnostic modality with a positive predictive value of 90-98 percent and a negative predictive value of 94-99 percent.

Mandal S et al. reported 12 incidents of FNAC false positives, 9 of which were follicular neoplasms and 3 of which were Hurthle cell neoplasms that were

ultimately shown to be benign on histology. According to the FNAC study, only three instances of adenomatous nodule were papillary carcinoma on histology (i.e., false negative).^[14]

Handa U et al. investigated the most common lesion was a colloid goitre, which was seen in 250 (57.60 percent) of the cases, followed by thyroiditis in 119 (27.41 percent), ten (2.30 percent), adenomatous goitres, and two (0.004 percent) thyroglossal cysts. But in the neoplastic category, 14 (1.38%) instances were follicular/Hurthle cell neoplasms, while 17 (3.91%) had malignant tumours. In comparing the clinical diagnosis, FNAC improved thyroiditis and cancer diagnosis compared to goitre.^[15]

Rangaswamy M et al. performed FNAC and identified 90 cases as neoplastic lesions. Ten instances were first diagnosed as non-neoplastic lesions, but histological analysis revealed that they were neoplasms. 47 of the 100 cases were biopsied and histopathologically examined.^[16]

Mondal SK et al. investigated that the 1020 FNAs showed non-diagnostic in 1.2 percent, benign in 87.5 percent, AFLUS (atypical follicular lesion of unknown significance) occurs in 1% of patients, suspected for malignancy (SM) in 1.4 percent, suspicious with follicular neoplasm (SFN) in 4.2 percent and malignant in 4.7 percent. After re-aspiration, 12 of the 69 instances that were first classified as non-diagnostic remained so. Further histopathologic examination (HPE) information is available in 323 instances.^[17]

CONCLUSION

Thyroid swelling was common among the age group 41 -50 years, with a female preponderance. Most cases were Benign, with a percent of 91 confirmed in HPE and 9 cases reported as Malignant in Histopathology. The sensitivity and specificity of FNAC's correlation with HPE were 77.8% and 97.8 %, respectively. Therefore, the judicious use of FNAC as a screening tool aids in planning the management and avoids unnecessary expenditure on surgery.

REFERENCES

1. Tsegaye B, Ergete W. Histopathologic pattern of thyroid disease. *East Afr Med J*. 2003; 80:525-28.
2. Polyzos SA, Kita M, Avramidis A. Thyroid nodules – Stepwise diagnosis and management. *Hormones gr (Athens)*. 2007; 6:101-19.
3. Chandanwale S, Singh N, Kumar H. Clinicopathological correlation of thyroid nodules. *Int J Pharm Biomed Sci*. 2012;3:97-102.
4. Rojeski MT, Gharib H. Nodular thyroid disease: Evaluation and management. *N Eng J Med*. 1985;313(7):428-36.
5. Martin HE, Ellis EB. Biopsy by needle puncture and aspiration. *Ann Surg*. 1930; 92:169-81.
6. Gupta M, Gupta S, Gupta VB. Correlation of fine needle aspiration cytology with histopathology in diagnosing a solitary thyroid nodule. *J Thyroid Res*. 2010; 2010:379051.
7. Pandit AA and Kinare SG. Fine needle aspiration cytology of thyroid. *Indian J Cancer*. 1986;23(1):54-8.
8. Ananthakrishnan N, Rao KM, Narasimhans R, Veliath, et al. The Single Thyroid Nodule: A south Indian Profile of 503 Patients with Special Reference to Incidence of Malignancy. *Indian J Surg*. 1993;55(10):487 -92.
9. Miller JM. Diagnosis of thyroid nodules: Use of fine-needle aspiration and needle biopsy. *JAMA*. 1979;241(5):481.
10. Hamburger JI, Miller JM, Kini SR. The impact of needle biopsy on the diagnosis of the thyroid nodule. In: *Diagnosis and Management of Endocrine-related Tumors*. Boston, MA: Springer US; 1984. p. 123–49.
11. Miller JM, Kini SR, Hamburger JI. The diagnosis of malignant follicular neoplasms of the thyroid by needle biopsy. *Cancer*. 1985;55(12):2812–7.
12. Ghoshal B, Pal NC, Majumdar P. FNAB in diagnosing cold thyroid nodules: a correlative study with histopathology and its application in thyroid surgery. *J Indian Med Assoc*. 1984; 18:127-9
13. Esmaili HA, Taghipour H. Fine-needle aspiration in diagnosing thyroid diseases: An appraisal in our institution. *ISRN Pathol*. 2012; 2012:1–4.
14. Mandal S, Barman D, Mukherjee D, Saha J, et al. Fine Needle Aspiration Cytology of thyroid nodules – evaluation of its role in diagnosis and management. *J Indian Med Assoc*. 2011;109(4):258-61.
15. Handa U, Sukant G, Mohan H, Nagarkar N. Role of fine needle aspiration cytology in diagnosing and managing thyroid lesions: A study on 434 patients. *J cytol* 2008;25(1):13-7.
16. Rangaswamy M, Narendra KL, Patel S, Guruprasad C, et al. Insight to neoplastic thyroid lesions by fine needle aspiration cytology. *J cytol* 2013; 30 (1):23-6.
17. Mondal SK, Sinha S, Basak B, Roy DN, et al. The Bethesda system for reporting thyroid fine needle aspirates: A cytologic study with histologic follows up. *J Cytol* 2013;30(2):94-9.