



Original Research Article

Study of thyroid lesions based on cytological and histopathological comparison

Gunjan Gupta¹, S Naganna^{1,*}¹Dept. of Pathology, VRK Medical College, Hyderabad, Telangana, India

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ABSTRACT

Background: Thyroid swelling is one of the most common indications for surgical excision. Since most of the swellings are benign and with euthyroid status, these patients do not require surgical excision. Fine needle aspiration cytology is a rapid, efficient, inexpensive and safe diagnostic method in these cases. FNAC has some limitations, particularly limited to representatives of samples and exact typing of benign and malignant neoplastic lesions. Thus, FNAC alone may not give a confirmative diagnosis regarding few thyroid lesions. Hence, histopathological study has been the standard technique for the diagnosis of thyroid lesions.

Aim of the study: To study the accuracy of fine needle aspiration cytology (FNAC) of thyroid swellings and to correlate with histopathology so as to avoid unnecessary surgeries for benign lesions.

Materials and Methods: This was a prospective study done on 55 cases wherein Fine Needle Aspiration cytology was done followed by histopathology. The reports on both modalities were correlated and sensitivity, specificity and accuracy were calculated.

Results: In the present study, females (72.7%) outnumbered males (27.2%). Non neoplastic lesions constituted 83.3% in our study. Among Non-neoplastic lesions, Nodular goiter was most commonly reported and constituted 49% cases. The sensitivity and specificity for thyroid FNAC are reasonably good.

Conclusion: FNAC is a minimally invasive, low cost testing modality. It accurately diagnoses malignant thyroid lesions. It has good specificity and accuracy but is less sensitive in diagnosing definitive etiology. However, it is an important diagnostic test to guide the management of thyroid lesions.

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1. Introduction

Thyroid gland in the adults is the largest of all endocrine glands and embryologically it is the first to develop in fetal life. It is known to undergo various disorders ranging from developmental to acute, subacute and chronic inflammatory processes, hyperplastic changes and neoplastic disorders as well.¹ Incidental asymptomatic lesions are also common in the thyroid gland. Due to better availability of ultrasound (USG) in the present days, almost 33% to 68% of such thyroid nodules are detected by USG. Detecting thyroid

nodules on physical examination is possible only when they are a little large and just 4% of cases are picked up by palpation. Meticulous autopsy can detect thyroid lesions up to a tune of 50%.²⁻⁵ Overall, in the general population, almost 4% to 10% adults may have thyroid lesions whereas, in the paediatric population the prevalence of thyroid lesions is 0.2% to 1.2%. Almost 95% of thyroid swellings are benign, but some pointers in patient history, laboratory, and sonographic findings can point towards malignancy.⁶ It is difficult to distinguish between the benign and malignant nodules solely based on patient history. However, whenever there is a history of irradiation to head and neck region, especially in childhood, followed

* Corresponding author.

E-mail address: drsnaganna1@gmail.com (S. Naganna).

by thyroid lesion, one has to be very cautious as irradiation is a predisposing factor for thyroid malignancy. The risk of carcinoma in such nodules is very high, almost 35% to 40%, whereas, in the general population such risk is just 5%.⁷ Many diagnostic modalities like ultrasound, thyroid nuclear scan, fine needle aspiration cytology (FNAC) are useful to assess goitre. Most often a definitive diagnosis mandates a morphological examination of lesions for which FNAC and histopathological examination (HPE) become more important.⁸ Thyroid fine-needle aspiration cytology (FNAC) began in 1950 and has been widely used since then.⁹ In the present day, it is a well-accepted technique for pre-operative diagnosis of thyroid pathology. Diagnosis based on thyroid FNAC is extremely useful as it segregates the benign lesions from malignant ones and thereby helps in obviating unnecessary surgery.¹⁰ Thyroid cytology can provide a near-definite diagnosis. It can triage the remaining patients into those who potentially require surgical approach as opposed to medical/endocrinological treatment.¹¹ Thyroid cytology is useful for diagnosis as well as for guiding treatment approach.¹²

2. Aim of the Study

To evaluate cytology and histopathology correlation of thyroid swellings in a teaching hospital.

3. Materials and Methods

There were no ethical issues involved in our study.

Written informed consent was taken from all the patients included in the study.

This was a prospective study conducted in the department of Pathology at VRK Medical College for a duration of two years from April 2019 – March 2021.

Total of 55 cases of thyroid swelling were included in this study.

3.1. Inclusion criteria

1. Age 10 years to 70 years.
2. Both genders.
3. Diffuse thyroid swellings.
4. Solitary thyroid nodules.

All patients with thyroid swellings, who underwent FNAC (Fine needle aspiration cytology) followed by its subsequent Histopathological examination.

3.2. Exclusion criteria

Age less than 10 years.

3.3. Methodology

A questionnaire was prepared and all the demographic characteristics were noted including age, gender, history of present illness, personal history, and history of any drug intake. A thorough clinical examination of neck was done and followed by routine investigations including complete blood counts (CBP) and complete urine examination (CUE). Values of thyroid function tests, serum T3, T4, and TSH levels were noted. Ultrasonography of neck was done in the department of Radiology on Toshiba machine.

FNAC was done in all the patients with thyroid swelling included in the study under all aseptic measures and slides were prepared and stained with hematoxylin and eosin stains (H&E) and Papanicolaou stain. FNAC Slides were reported. For histopathological examination, thyroid specimens (subtotal thyroidectomy, total thyroidectomy and lobectomy) were sent from the department of general surgery to the pathology department. Thyroid specimens were fixed in 10% formalin, processed and embedded in paraffin. Sections were cut on microtome (Leica) and slides were made and stained with H&E. IHC markers done wherever needed.

The cytology reports were compared with the histopathological diagnosis.

3.4. Statistical evaluation

Data was entered in Microsoft Excel sheet and was analyzed using SPSS version 20.0 statistical software. The sensitivity, specificity, accuracy, negative predictive value and positive predictive value were calculated.

4. Results and Observations

Table 1: Age-wise distribution

Age distribution (years)	No. of cases	Percent (%)
10-20	02	3.6%
21-30	07	12.7%
31-40	09	16.3%
41-50	32	58.1%
51-60	03	5.4%
61-70	02	3.6%
Total	55	100%

The age distribution ranged from 10 -70 years. Most of the cases were noted among 41-50 years (58.1%), followed by 31-40 years (16.3%). Table 1

There were 40 (72.7%) female patients and 15 (27.2%) male patients and the male to female ratio was 1:2.6.

Table 2: Clinical symptoms

Distribution of clinical symptoms	No. of cases	Percent (%)
Diffuse Thyroid Swelling	07	12.7%
Solitary nodule thyroid	18	32.7%
Multinodular goitre	16	29%
Solitary nodule thyroid+ Difficulty in swallowing+ pain in throat	06	10.9%
Multiple nodules + Difficulty in swallowing+pain in throat	08	14.5%
Total	55	100%

Duration of symptoms: In the present study, duration of symptoms was less than one month in 4 (7.2% cases); it was 1 month to 1 year in 37 (67.2%) cases; 1 year to 2 years in 5 (9%) cases and more than 2 years duration was seen in 9 (16.3%) cases.

Table 3: Distribution of cases on FNAC

Distribution on FNAC	No. of cases	Percent (%)
Colloid goitre	09	16.3%
Nodular goiter	27	49.0%
Autoimmune thyroiditis	10	18.1%
Follicular neoplasm	04	7.2%
Suspicious of malignancy	03	5.4%
Malignancy	02	3.6%
Total	55	100%

On FNAC, non neoplastic lesions constituted 83.3% (46/55) cases and nodular goiter was the most commonly reported entity.

Table 4: Distribution of cases on histopathological examination (HPE)

HPE	No. of cases	Percent (%)
Colloid goiter	09	16.3%
Nodular goiter	25	45.4%
Hashimotos thyroiditis	07	12.7%
Lymphocytic thyroiditis	03	5.4%
Follicular adenoma	05	9.09%
Follicular carcinoma	02	3.6%
PTC	04	7.2%
Total	55	100%

On histopathology, nodular goiter was the most commonly reported diagnosis and constituted 45.4% (25/55) cases.

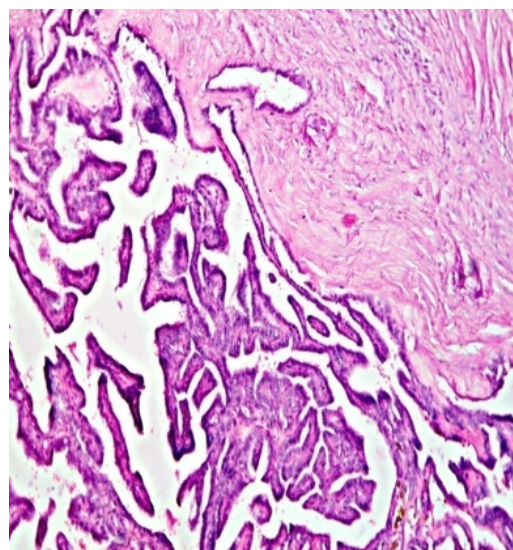
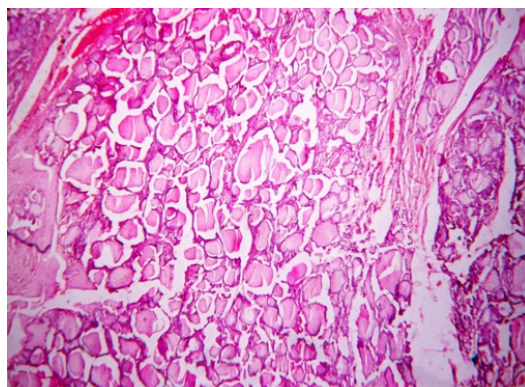
Suspicious for malignancy were considered as malignant on cytology.

In our study, FNAC had a Sensitivity of 62.5%, and Specificity of 100% to detect thyroid malignancy. The Positive predictive value and Negative predictive value were 100% and 97.9% respectively.

Table 5: Cytology and histopathology correlation

Distribution on FNAC	Distribution on Histopathology	Remarks
Colloid goiter (09)	Colloid goiter (09)	True negative
Nodular goiter (27)	Nodular goiter (25)	True negative
	Follicular adenoma (02)	False negative
Autoimmune thyroiditis (10)	Hashimotos thyroiditis (07)	True negative
	Lymphocytic thyroiditis (03)	True negative
Follicular neoplasm (04)	Follicular adenoma (03)	True negative
	Follicular Carcinoma (01)	False negative
Suspicious of malignancy (03)	Follicular carcinoma (01)	True positive
	PTC (02)	True positive
Malignancy (02)	PTC (02)	True positive

PTC: Papillary carcinoma thyroid.

**Fig. 1:** H and E stained sections shows papillary thyroid carcinoma**Fig. 2:** H and E stained sections shows nodular goitre

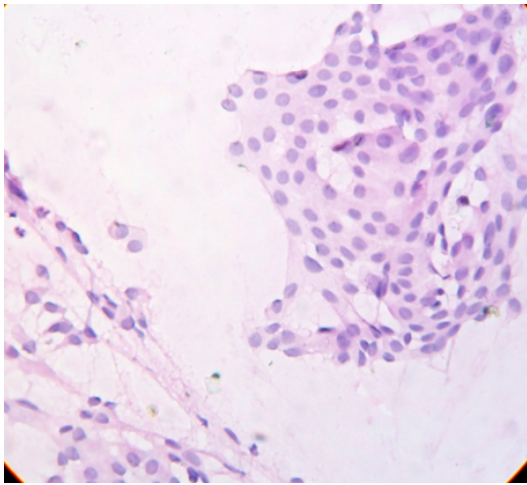


Fig. 3: Cytology smear shows nodular goitre

5. Discussion

In the present study, 55 cases of thyroid lesions were compared for cytology and histopathology.

5.1. Comparative studies related to age distribution

In the present study age distribution ranged from 10 -70 years. Majority were noted among 41-50 years (58.1%), followed by 31-40 years (16.3%). This was compared with various other studies. In the study by Sirry MA et al¹³ the age ranged from 15 to 79 years, with a mean of 45.36 years. Most were found in the fourth and fifth decades of life (55%). In Santosh et al¹⁴ study, the age of the patients ranged from 19 years to 60 years with mean age of 39.5 years. In Borgohain et al study¹⁵ most of the patients were in age group of 21-40 years.

5.2. Comparative studies related to gender distribution

In the present study, females (72.7%) outnumbered males (27.2%). In a study done by Abhay Kumar et al¹⁶ the thyroid lesions were common in women than men with 6.02:1 ratio. In Santosh et al¹⁴ study, 34 (92%) were females and 3 (8%) were males. In Raniwala et al¹⁷ study, the ratio of female : male was 5.7:1. The proportion of males was 9 (15%) as compared to females 51 (85%). In Borgohain et al¹⁵ study, females (109 patients, 89.34%) were higher in frequency than males (n=13; 10.66%). In Sirry et al¹³ study, 80 (80%) patients were females and 20 (20%) patients were males, with female to male ratio of 4:1. Our findings of gender distribution compare well with all the above studies.

5.3. Comparative studies related to clinical presentation

In the present study, 32.7% presented with solitary nodule thyroid, 29% Multinodular goiter, 12.7% diffuse

thyroid swelling, 14.5% multiple nodules + difficulty in swallowing+pain in throat and 10.9%+ solitary nodule thyroid+ Difficulty in swallowing+ pain in throat. In a study conducted by Raniwala et al¹⁷ out of 60 cases, 34 (56.67%) were unilateral, followed by 15 (25%) cases with bilateral complaints and 11 (18.33%) cases were of solitary thyroid nodule (STN). Kumar et al¹⁶ in their study observed that swelling in front of the neck was most common presentation and was seen in 98.98% (n=293) cases followed by dysphagia seen in 17.97% (n=53) cases.

5.4. Comparative studies related to duration of symptoms

In the present study, 67.2% presented with symptoms of 1 month to 1 year and 16.3% had > 2 years duration and 9% cases had duration of 1-2 years. In a study done by Raniwala et al¹⁷ majority of the cases, i.e., 30 (50%) cases had swelling for 1 to 4 years, while there were 17 (28.33%) cases who had thyroid swelling for less than one year, followed by 10 (16.67%) cases with duration of 4 to 7 years. In Kumar et al¹⁶ study, most of the patients (32.88%) had symptoms lasting for over more than one year.

5.5. Comparative studies related to FNAC

In our study, non neoplastic lesions constituted 83.3% (46/55) cases on FNAC. Among non neoplastic lesions, nodular goiter was most commonly reported and constituted 49% cases, autoimmune thyroiditis 18.1% cases, and colloid goiter 16.3% cases. Neoplastic lesions constituted 16.2% and among neoplastic lesions, Follicular neoplasm occupied 7.2%, Suspicious of malignancy were 5.4% cases, and Malignancy was reported in 3.6% cases. In a study conducted by Kumar et al¹⁶ FNACs showed colloid goitre in 65.4% cases. Six cases were reported as follicular neoplasm on FNAC. Two cases were in the 'Suspicious for malignancy' category. In Disha J et al¹⁸ study, amongst non-neoplastic lesions, colloid goiter (71.5%) was most common, followed by lymphocytic thyroiditis (14.6%) and least common was acute thyroiditis (1.5%) cases. Among neoplastic lesions based on FNAC, follicular neoplasm consisted 89.2% cases, papillary carcinoma thyroid (PTC)) was 6.1% cases, anaplastic carcinoma was 4.6% cases and least was Hurthle cell neoplasm, 1.5% cases. In Raniwala et al¹⁷ study maximum cases were diagnosed as multinodular and colloid goiter. Eight out of 60 cases were diagnosed as being malignant (follicular, papillary, and medullary carcinoma). Rout et al¹⁹ observed colloid goiter to be most common among thyroid lesions (42.2%) followed by colloid goiter with cystic degeneration (13.2%). In Santosh et al¹⁴ study, FNAC results showed benign lesions in 34 (92%) patients [Multinodular goiter in 12 (32.4%) cases, Hashimoto thyroiditis in 9 (24.3%) cases, Follicular adenoma in 6 (16.2%) cases, Colloid goitre with cystic

change in (13.5%) cases, Haemorrhage in 2 (5%) cases] and Malignant lesions in 3 (8%) patients [PTC in 2 (5.4%) cases and Colloid goiter with follicular neoplasm in 1 (2.7%) case.

5.6. Comparative studies related to histopathological examination

In the present study, nodular goiter was most commonly reported on histopathology and constituted 45.4% cases, autoimmune thyroiditis 12.7%, Lymphocytic thyroiditis in 5.4%, colloid cyst in 7.2% and colloid goiter in 16.3% cases. Follicular adenoma occupied 9.09%, 7.2% as PTC and 3.6 % reported as Follicular carcinoma. In Disha J et al¹⁸ study, colloid goiter 79.1% was the most common diagnosis, followed by thyroid cyst in 11.9% cases and least common was lymphocytic thyroiditis seen in 1.5% cases. On histopathology, follicular adenoma 38.4% was most common, followed by papillary carcinoma 30.7% cases, and follicular carcinoma 15.3% cases. Least common lesions were 7.69% each of Hurthle cell adenoma and undifferentiated carcinoma. In Santosh et al¹⁴ study, histopathology revealed benign lesions in 34 (91.8%) patients. Multinodular goiter was seen in 32.4%, Hashimoto thyroiditis in 24.3%, Follicular adenoma in 16.2%, colloid goiter with secondary changes in 10.8% cases. PTC was seen in 8.1%) patients. Borgohain et al¹⁵ reported on histopathology 92 (75.40%) cases as non-neoplastic and 30 (24.5%) as neoplastic. Within the non-neoplastic diagnoses, colloid goiter was the most common 41%, nodular goiter was 18%, MNG was 7%, Hashimoto's thyroiditis was 5%, benign haemorrhagic cyst was 2.4%, and one case each of benign colloid cyst and chronic thyroiditis was seen. In the neoplastic group, PTC was the most common with 10% cases, follicular adenoma with 9 cases, follicular carcinoma 5 cases and medullary carcinoma with 4 cases. In Sirry et al¹³ study, the postoperative histopathological examination revealed 75 (75%) benign cases: 13 (13%) colloid nodules, six (6%) adenomas, 22 (22%) simple MNG, 29 (29%) toxic MNG, and five (5%) cysts. A total of 25 (25%) cases were malignant: 15 (15%) were papillary carcinoma, five (5%) follicular carcinoma, two (2%) medullary carcinoma and three (3%) anaplastic carcinoma.

Non neoplastic lesions were more commonly reported in above comparative studies as well as in our study.

5.7. Comparative studies related to statistics

In our study, results showed Sensitivity of 62.5%, and Specificity of 100% for malignancies on FNAC. Positive predictive value and Negative predictive value were 100% and 97.9% respectively. In the study conducted by Santosh et al¹⁴ results showed Sensitivity of 66.66%, and Specificity of 97.65%. Positive predictive value and Negative predictive value were 66.66% and 97.65% respectively.

6. Conclusion

FNAC is a minimally invasive, low cost testing modality. It accurately diagnoses malignant thyroid lesions. It has good specificity and accuracy but is less sensitive in diagnosing definitive etiology. However, it is an important diagnostic test to guide the management of thyroid lesions.

7. Source of Funding

None.

8. Conflict of Interest

The authors declare that there are no potential conflicts of interest for the authorship and publication of the article.

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Author biography

Gunjan Gupta, Associate Professor

S Naganna, Associate Professor

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