

Original article

Evaluation of thyroid pathologies by fine needle aspiration cytology

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Abstract

Aim: To study pathological patterns of thyroid swellings in Konaseema region using fine needle aspiration cytology(FNAC).

Materials & methods: This prospective study was conducted on 90 patients within an age range of 15-75years,in the Department of Otorhinolaryngology ,from July 2015 to December 2015. All patients who attended ENT opd with thyroid swellings were evaluated for thyroid status. FNAC was performed after patients were in euthyroid status.

Results: Total of 90 patients were evaluated. Youngest being 17yrs old female (FNAC suggestive of colloid goitre),eldest being 73 yrs old male(FNAC suggestive of papillary carcinoma thyroid). In the overall study,females were seen to be more affected with thyroid conditions as compared to males.

In our study ,benign pathologies were seen to occur more commonly than malignant pathologies.

a)In benign conditions, colloid goitre was more predominant(51.11%)

b)In malignant conditions,follicular carcinomawas more predominant(5.55%)

Conclusion: Costal regions, falling under the goitrogenic belt, are more prone for thyroid pathologies. FNAC is recommended for timely identification of various pathologies for their succesful treatment outcome.

Keywords: Thyroid pathologies ,FNAC

1. INTRODUCTION

Thyroid nodules are becoming an epidemic problem in the world in the general population, however the thyroid malignancy is rare among these swellings [1-3].East godavari region, being a sea coast ,is endemic for thyroid disorders. Hence we chose to conduct this study in this region. Thyroid disorders can range from a small, harmless goitre that needs no treatment to life-threatening cancer. It is important to diagnose thyroid cancer at an early stage, because it may reduce the risk of disease advancement ,recurrence and possible mortality. Fine-needle aspiration cytology (FNAC) has become a prominent and initial diagnostic modality in evaluating thyroid nodules/swellings. The primary purpose of FNAC is to provide a rational guideline for the management of patients

with thyroid nodules and to allow surgical planning for those requiring surgery.

2. MATERIAL AND METHODS

This prospective study was conducted on 90 (10 males,80 females) patients within an age range of 15-75years,in the Department of Otorhinolaryngology, from July 2015 to December 2015. The study was approved by ethical committee of the institution. All patients who attended ENT opd with thyroid swelling were evaluated for thyroid status. Patients who were not euthyroid were brought to euthyroid status after adequate medical treatment. A written “informed consent” was taken from patients before performing fine needle aspiration Cytology(FNAC).

- The FNAC samples were collected from patients who presented with a thyroid swelling.

2.1. Inclusion Criteria

- 1) Age 15 to 75 years.
- 2) Both genders.
- 3) Patients with no other associated co-morbidities.
- 4) Patients who are biochemically euthyroid at the time of FNAC.

2.2. Exclusion Criteria

- 1) Patients who underwent previous thyroid surgeries.
- 2) Patients who are not biochemically euthyroid at the time of FNAC.
- 3) Patients below age of 15 years and above age of 75 years.

2.3. Method of Fine needle aspiration cytology

An experienced pathologist performed an fine needle aspiration (FNAC) using a 10 ml disposable syringe with a 23-gauge needle. By making a perpendicular puncture, the needle tip is extended till the

The distribution of FNAC results in ascending order are as follows

Table 1. Age distribution of thyroid pathologies

	15-30yrs	31-45yrs	46-60yrs	61-75yrs	Total
Lymphocytic thyroiditis		1			1
Hyperplastic nodule	1				1
Non-specific thyroiditis	1				1
Papillary carcinoma			2	1	3
Follicular neoplasm		2	3		5
Multinodular goiter	2	4	1		7
Hashimotos thyroiditis	12	12	2		26
Colloid goitre	12	23	8	3	46

the target swelling, after which sampling was commenced.

3. OBSERVATION & RESULTS

A total of 90 patients who fulfilled the criteria were included in the study. The mean age of patients was 45 years, with 89% being female and the rest male.

The youngest patient was a 17yrs old female (FNAC suggestive of colloid goitre), and the eldest patient was 73 yrs old male (FNAC suggestive of papillary carcinoma thyroid).

In the overall study, females were seen to be more affected with thyroid conditions as compared to males.

In our study, benign pathologies were seen to occur more commonly than malignant pathologies

- a) In benign conditions, colloid goitre was more predominant (51.11%)
- b) In malignant conditions, follicular carcinoma was more predominant (5.55%)

Table 2. Sex distribution of thyroid pathologies

	Male	Female
Lymphocytic thyroiditis	0	1
Hyperplastic nodule	0	1
Non-specific thyroiditis	0	1
Papillary carcinoma	1	2
Follicular neoplasm	2	3
Multinodular goitre	1	6
Hashimotos thyroiditis	1	25
Colloid goiter	4	42
Total	9	81

4. DISCUSSION

The thyroid gland, is one of the largest endocrine glands in the body, consisting of two lobes connected by the isthmus. It is found in the anterior neck, below the laryngeal prominence. The gland produces thyroid hormones, the principal ones being thyroxine (T4) and triiodothyronine (T3), the more active form. These hormones regulate the growth and rate of function of many other systems in the body. T3 and T4 are synthesized from iodine and tyrosine. The thyroid also produces another hormone called, the calcitonin, which plays a role in calcium homeostasis

Hormonal output from the thyroid is regulated by the thyroid stimulating hormone (TSH) produced by the anterior pituitary, which itself is regulated by thyrotropin releasing hormone (TRH) produced by the hypothalamus.

Hyperthyroidism occurs when the gland produces excessive amounts of thyroid hormones, the most common cause is Graves's disease. In contrast, hypothyroidism is a state of insufficient thyroid hormone production, the common cause is iodine deficiency worldwide. Thyroid hormones are important for development, and hypothyroidism secondary to iodine deficiency remains the leading cause of preventable intellectual disability.[4]. In

iodine-sufficient regions, the most common cause of hypothyroidism is Hashimoto's thyroiditis. Interestingly both these above mentioned conditions are autoimmune disorders. Thyroiditis as an entity is classified as below.

Etiological classification of thyroiditis

1) Acute

- a) Infective:
- b) Bacterial : staphylococcus, streptococcus and enterobacter
- c) Fungal: aspergillus, candida, histoplasma, pneumocystis
- d) Radiation thyroiditis (131I therapy)
- e) Drug: Amiodarone induced thyroiditis

Subacute

- a) Infective:
- b) Viral (or granulomatous) thyroiditis
- c) Mycobacterial infection
- d) Silent Thyroiditis (including postpartum thyroiditis)

Chronic

- a) Autoimmune: focal thyroiditis, Hashimoto's thyroiditis, atrophic thyroiditis
- b) Reidel's thyroiditis
- c) Infective:
- d) Parasitic : Echinococcosis, cysticercosis
- Traumatic : after palpation

Graves' disease, also known as toxic diffuse goiter, affects the thyroid gland by producing antibodies which bind to the TSH receptor and chronically stimulate it, resulting in abnormal high production of T3 and T4. This causes the clinical symptoms of hyperthyroidism, and the enlargement of the thyroid gland visible as goiter. Signs and symptoms of hyperthyroidism include irritability, muscle weakness, sleep disorders, palpitations, intolerance to heat, diarrhoea, weight loss, excessive sweating, pretibial myxedema, "orange peel skin", menstrual abnormalities such as menorrhagia. Also eye signs such as lid retraction, exophthalmos, a condition known as Graves' ophthalmopathy (in 25%-80%) [5].

Hashimoto's thyroiditis is also an autoimmune disorder, usually presenting as a small to large firm, painless goiter. All three variants of thyroid hormone abnormalities can be seen at different stages of its pathological process. Thyrotoxicosis could be initial presentation in few cases. Proptosis and other eye manifestations of thyroid disease can occur in these patients, but are usually less severe than in Graves' disease. Hashimoto's thyroiditis is associated with other autoimmune diseases including pernicious anemia. It is also associated with a central nervous system disorder called Hashimoto's encephalopathy which is associated with anti-thyroid antibodies and respond to glucocorticoids. [6]

The thyroid gland tumours on the other hand, have been classified by the world health organisation (WHO) as follows.

WHO Histological Classification of Thyroid Tumors

1). Epithelial tumors

A. Benign

- I. Follicular adenoma
2. Others

B. Malignant

1. Follicular carcinoma
2. Papillary carcinoma
3. Medullary carcinoma
4. Undifferentiated (anaplastic) carcinoma
5. Others

2). Nonepithelial tumors

- A. Benign
- B. Malignant

3). Malignant lymphomas

4). Miscellaneous tumors

5). Secondary tumors

6). Unclassified tumors

7). Tumor-like lesions

Identification of thyroid pathologies/swellings is done mainly by two methods

- 1) Fine needle aspiration cytology
- 2) Histopathological examination after biopsy/surgery.

The American Thyroid Association (ATA) guidelines suggest that, only nodules larger than 10 mm in diameter should be evaluated as the nodules having the potential to represent a clinically significant cancer [7]. Sometimes occult carcinoma may arise from the nodules less than 10 mm therefore a careful evaluation is necessary from the patients with smaller lesions [8,9].

Thyroid cancer is the most common malignancy of the endocrine system and the 7th most common malignancy in women [10]. The gender disparity in thyroid cancer is also specific to the histologic subtype of thyroid cancer.

The more aggressive types of thyroid cancer, anaplastic thyroid cancer and medullary thyroid cancer have similar rates of incidence in men and women. Meanwhile, differentiated thyroid cancer of follicular cell origin, such as follicular thyroid cancer and papillary thyroid cancer, are more common in women. This correlates with our study (follicular carcinoma M:F= 2:3, papillary carcinoma M:F=1:2)

Papillary thyroid cancer is the most common type of thyroid cancer, accounting for approximately 80% of the cases. Its incidence has nearly doubled over the last 30 years and is thought to be due in part to earlier diagnosis of subclinical disease [10,11]. Not much is known about the factors responsible for the dramatic increase in papillary thyroid cancer, and established risk factors such as radiation exposure and a family history of thyroid cancer do not appear to account for the increasing incidence [12]. The rate of papillary thyroid cancer among women is nearly three-times higher than men. In females, the age-specific incidence rate rises sharply at the beginning of the reproductive years, with increasing age peaking at 40–49 years, while in men the peak is at 60–69 years. The incidence rates equalize by 85 years of age [10,13]. Women have an earlier age of onset but men tend to have more aggressive disease at diagnosis. Moreover, in most studies, male gender is associated with a lower disease-free survival and higher mortality [13,14]. As the incidence of thyroid cancer increases, particular papillary thyroid cancer, the gender differences observed are likely to be even more dramatic. The same has been proven in our study, rates of papillary carcinoma were seen to be more in women than compared to men (1 case in male of 7th decade, 2 cases in female of 4th decade).

Fine needle aspiration technique is simple and an accurate modality to evaluate a thyroid nodule/swelling. This is selected as a tool to evaluate clinicopathological pattern of thyroid in our region, in this study. For uniformity the Bethesda system was adopted

The Bethesda System for Reporting Thyroid Cytopathology

Recommended Diagnostic Categories

I. Nondiagnostic or Unsatisfactory

- -Cyst fluid only
- -Virtually acellular specimen
- -Other (obscuring blood, clotting artifact, etc)

II. Benign

- -Consistent with a benign follicular nodule (includes adenomatoid nodule, colloid nodule, etc)
- -Consistent with lymphocytic (Hashimoto) thyroiditis in the proper clinical context
- -Consistent with granulomatous (subacute) thyroiditis
- -Other

III. Atypia of Undetermined Significance or Follicular Lesion of Undetermined Significance

IV. Follicular Neoplasm or Suspicious for a Follicular Neoplasm

- -Specify if Hürthle cell (oncocyctic) type

V. Suspicious for Malignancy

- - Suspicious for papillary carcinoma
- -Suspicious for medullary carcinoma
- -Suspicious for metastatic carcinoma
- -Suspicious for lymphoma
- -Other

VI. Malignant

- - Papillary thyroid carcinoma
- -Poorly differentiated carcinoma
- -Medullary thyroid carcinoma
- -Undifferentiated (anaplastic) carcinoma
- - Squamous cell carcinoma
- - Carcinoma with mixed features (specify)
- - Metastatic carcinoma
- -Non-Hodgkin lymphoma
- -Other

**Table 3.The Bethesda System for Reporting Thyroid Cytopathology.
Implied Risk of Malignancy and Recommended Clinical Management**

Diagnostic Category	Risk of malignancy(%)	Usual management
Nondiagnostic or Unsatisfactory	1-4	Repeat FNA with ultrasound guidance
Benign	0-3	Clinical follow-up
Atypia of Undetermined Significance or Follicular Lesion of undetermined significance	5-15	Repeat FNAC
Follicular Neoplasm or Suspicious for a Follicular Neoplasm	15-30	Surgical lobectomy
Suspicious for Malignancy	60-75	Near-total thyroidectomy or surgical lobectomy
Malignant	99-97	Near-total thyroidectomy

FNA-fine-needle aspiration.

- By using this FNAC technique,90 patients with thyroid swellings were included in the study after being brought to euthyroid state.Colloid goitre,(46 cases,4male & 42 female) and Hashimotos thyroiditis(26 cases,1 male & 25 female) were the most predominant pathologies.
- The sensitivity of this study is around 95%,hence it is an accurate study.

5. SUMMARY

- Prospective study conducted on 90 patients.(10 male and 80 female) who attended the ENT opd,of konaseema insitute of medical sciences & research foundation,from july 2015 to december 2015
- All patients fall within the age group Of 15-75 yrs.
- Only patients with thyroid swellings,who came down to euthyroid state after adequate medical treatment were included in the study.
- FNAC was performed and results were tabulated.
- Of the evaluated 90 patients,the youngest patient was a 17yrs old female (FNAC suggestive of colloid goitre), and the eldest patient

was 73 yrs old male(FNAC suggestive of papillary carcinoma thyroid).

- In the overall study,females were seen to be more affected with thyroid conditions as compared to males.
- In our study,benign pathologies were seen to occurs more commonly than malignant pathologies
- FNAC suggested,Colloid goitre in 46 cases,hashimotos disease in 26 cases,nodular goite in 7 cases,follicular neoplasm in 5 cases predominantly.

6. CONCLUSION

The authors conclude that,with increasing thyroid pathologies,any coastal region falling under the goitrogenic belts,FNAC is recommended to identify the pathological pattern as early as possible to enable a successful outcome.

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