

CYTOMORPHOLOGICAL STUDY OF SPECTRUM OF HASHIMOTO THYROIDITIS: A COMPREHENSIVE ANALYSIS

Pathology

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ABSTRACT

Hashimoto's thyroiditis (HT) is the predominant etiology of hypothyroidism in regions with adequate iodine levels. It predominantly occurs between the ages of 45 and 65 and is significantly more prevalent in women. The disease process is characterized by the gradual reduction of thyroid epithelial cells accompanied by lymphocytic infiltration and fibrosis. In Hashimoto's thyroiditis, the immune system erratically attacks the thyroid gland. This autoimmune condition involves the activation of B and T lymphocytes targeting thyroid peroxidase (TPO) and thyroid-specific proteins, thyroglobulin (TG), leading to inflammation and destruction of thyroid tissue. HT is a typical kind of chronic autoimmune thyroiditis, with detection reliant on clinical, cytomorphologic as well as serologic criteria. HT is a typical kind of chronic autoimmune thyroiditis, with detection reliant on clinical, cytomorphologic as well as serologic criteria. Fine Needle Aspiration Cytology (FNAC) is a recognized technique for obtaining thyroid tissue samples to diagnose various lesions impacting the gland. Out of the 90 patients examined, 84 comprises of females forming and rest 6 were males. Out of the 90 patients studied, majority of them belongs to age group 21-30 years comprising of 36.66%. Most of the patient examined in the case studied belongs to hypothyroid state. Grade 3 feature has been seen in majority of patient studied. FNAC thus proves to be a gold standard cost effective tool which gives an early diagnosis along with cytological grading of Hashimoto Thyroiditis.

KEYWORDS

Hashimoto, Thyroiditis, Lymphocytic, cytology, FNAC.

INTRODUCTION

The initial account of chronic thyroiditis known as “*struma lymphomatosa*”, was documented by Hakaru Hashimoto in 1912, and it is eponymously named after him.¹ The thyroid had pronounced lymphocytic infiltration, later referred to as Hashimoto's thyroiditis (HT).² Hashimoto's thyroiditis, often termed goitrous thyroiditis, is generally regarded as synonymous with autoimmune thyroiditis or chronic lymphocytic thyroiditis, a term encompassing both non-goitrous and atrophic forms.¹

Hashimoto's thyroiditis is the predominant etiology of hypothyroidism in regions with adequate iodine levels. It predominantly occurs between the ages of 45 and 65 and is significantly more prevalent in women.³ The disease process is characterized by the gradual reduction of thyroid epithelial cells accompanied by lymphocytic infiltration and fibrosis.

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Chronic lymphocytic thyroiditis is characterized by elevated thyroid-stimulating hormone (TSH) levels, diminished free T4 (FT4) levels, and reduced free T3 (FT3) levels.²

Clinically, patients present with painless diffuse enlargement of thyroid with progressive hypothyroidism. Patients having Hashimoto thyroiditis frequently exhibit comorbid autoimmune disorders and are predisposed to the emergence of B-cell non-Hodgkin lymphomas originating in the thyroid gland.³

FNAC (Fine needle aspiration cytology) is a basic, low-risk technique utilized for the diagnosis of thyroid anomalies. The cellular diagnostic spectrum of Hashimoto's thyroiditis includes Hurtle cell neoplasms and chronic lymphocytic thyroiditis.⁴ Despite the well-established cytomorphologic criteria for HT, numerous patients remain misdiagnosed due to lack of material yield from FNAC. The significance of an integrated serological and cytomorphologic methodology in the assessment of HT is recognized.⁵

In a resource-constrained nation such as India, FNAC is the most fundamental and efficient method for accurately diagnosing prevalent thyroid disorders, particularly chronic lymphocytic thyroiditis. The cytology grade of HT on FNAC smears is a methodical process for classifying the disorder according to the cytomorphological

characteristics identified.²

In current study, emphasis is being given to cytomorphological categorization of Hashimoto thyroiditis.

AIMS & OBJECTIVE:

To study the cytomorphological spectrum of Hashimoto Thyroiditis.

METHODOLOGY

This study is a hospital based prospective study of Thyroid lesions carried out at Gadag Institute of Medical Sciences, Gadag, for a total of 4 years. Fine needle aspiration was done, and the results were interpreted as per the Bethesda System of Reporting Thyroid cytology (TBSRTC). Purposive sampling was done. Data were entered in a Microsoft Excel sheet and analyzed in latest “SPSS software”. Patient presented with complaint of thyroid swelling initially to Surgery department and then came to department of pathology for FNAC. In most of the patient, FNAC was done in a sitting position, except in a few where procedure was done in supine position.

RESULTS:

Out of the 90 patients examined, 84 comprises of females forming and rest 6 were males. Out of the 90 patients studied, majority of them belongs to age group 21-30 years comprising of 36.66% followed by age group of 31-40 years of age forming 27.78 %. The youngest patient age is 10 years and age of eldest patient was 61 years. Most of the patient examined in the case studied belongs to hypothyroid state. Grade 3 feature has been seen in majority of patient studied. Out of 90 patient who underwent cytological evaluation of thyroid lesions, only 4 patients underwent surgery.

Table No 1. Age-sex Distribution

Age Groups (years)	Male	Female	Total	% age
0-10	0	1	1	01.11
11—20	2	15	17	18.88
21-30	4	29	33	36.66
31-40	0	25	25	27.78
41-50	0	9	9	10.00
51-60	0	4	4	04.44
60-70	0	1	1	01.11
TOTAL	6	84	90	100
%age	6.66%	93.34%		

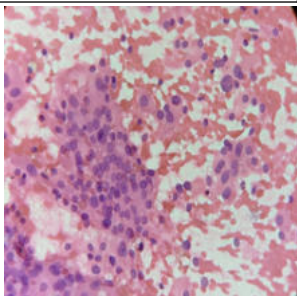
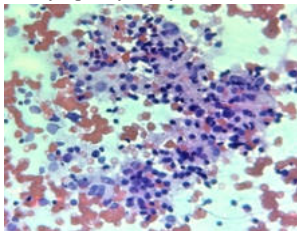
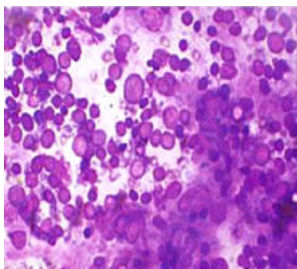
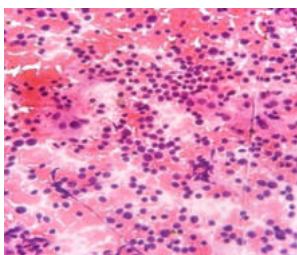
Table No 2. Hormonal Status With Cytological Grading

Grading	Euthyroid	Hypothyroid	Hyperthyroid	Total	%age
I	12	11	4	27	30

II	10	38	8	56	62
III	4	3	0	7	8
Total	26	52	12	90	100

Table No 3. Morphological Features In Hashimoto Thyroiditis

Sl no	Features	Cases	%age
1	Thyroid epithelial cells	90	100
2	Follicular Lymphocytic infiltrates	90	100
3	Background lymphocytes	90	100
4	Anisonucleosis	72	80
5	Hurthle cells	63	70
6	Giant cells	22	24
7	Epitheloid like cells	7	8
8	Granuloma	0	0
9	Germinal centre formation	2	2
10	Colloid	27	30
11	Histiocytes engulfing colloid	13	14
12	Plasma cells	7	6
TOTAL		90	

**Fig1** showing Grade1 lymphocytic thyroiditis. H&E- 100X**Fig 2.** Grade 1 Lymphocytic Thyroiditis, Leishman- 40X**Fig 3.** Grade 2 Hashimoto thyroiditis with isonucleosis, Leishman - 100X**Fig 4.** Grade 3 Hashimoto Thyroiditis with Hurthle cells, H&E-40X**DISCUSSION:****Table No 4 Comparison Of Age-sex Ratio With Previous Studies**

Parameters	Bhatia et al [1]	Anila et al [17]	Chandanwale et al [8]	Gupta et al [6]	Chandanwale et al [9]	our study
Cases	76	60	110	162	52	90
Age	6-60	5-70	1-70	7-80	17-64	11-61
M:F ratio	1:11.6	1:11	1:15	1:9.25	1:16.4	1:14

Table No 5. Comparison Of Morphological Features Of Hashimoto Thyroiditis With Previous Studies

Features	Ashraf et al [2]	Chandanwale [9]	Chowdappa & Shetty [10]	Chandanwale [8]	Our study
Thyroid epithelial cell	100%	-	25.3	79	80
Follicular lymphocytic infiltrates	100	70	-	100	90
B/g Lymphocytes	100	52	-	19	50
Anisokaryosis	79.5	-	-	64	70
Hurthle cell	77.27	36	95.4%	-	80
Giant cells	34.09	5	26	18	30
Epitheloid cell	15.9	1	46	-	30
Granuloma	6.81	-	-	8	7
Colloid	29.5	-	-	-	25
Histiocytes	15.9	2	-	12	14
Plasma cells	-	-	54	5	10

Table No 6 Comparison Of Cytological Grading With Other Studies

Grading	Gupta et al [6]	Bhatia et al [1]	Ashraf et al [2]	Chandanwale et al [9]	Chowdappa & Shetty [10]	Ranabhat et al [11]	Our study
I	29.6%	38.67	18.18	45	34.5	7.7	30
II	64.2%	44.0	70.46	36.67	10.3	69.2	65
III	6.2%	17.33	11.36	18.33	1.7	23.1	5

The degenerative changes of the gland over time are reflected in the clinical presentation of HT. Following a period of early diffuse swelling, the gland experiences fibrosis, the development of germinal centers, with the gradual replacement of thyroid follicular cells by lymphocytes. Following their colonization of the gland, B lymphocytes contribute to the autoimmune process by triggering the production of lymphoid follicles and autoantibodies. In addition, the gland typically becomes atrophic and shrinks. Hypothyroidism is one of the long-term HT complications; PTC or PTL are less common.¹²

Because hormonal, clinical, and radiological data coincide with other thyroid disorders, such as Hashimoto's thyroiditis, they are not beneficial. 7–33% of instances of Hashimoto's thyroiditis are antibody negative, particularly in the initial phase of the disease, as intrathyroidal cells make antibodies on site while releasing them into the bloodstream, although antibody testing is helpful in cases of ambiguity. Smear showing cytological signs of hyperplasia, including excessive colloid or Grave's disease, are likely to miss the diagnosis of Hashimoto's thyroiditis. It may not be able to differentiate between pure Hashimoto's thyroiditis and Grave's disease in the toxic stage, referred to as Hashitoxicosis, cytologically; instead, hormonal profiles and clinical data must be matched.⁶

Fine needle aspiration cytology had a high diagnostic accuracy, and in nearly all cases, several aspirations were beneficial. As aspirates are extracted from a limited portion of the thyroid gland, they might fail to fully capture the pathophysiology. Since lymphocytic infiltration of thyroid follicles is a pathognomonic sign of lymphocytic thyroiditis, FNAC is still the gold standard for diagnosis. Mild, moderate, and severe thyroiditis have poor correlations with clinical, biochemical, and ultrasonographic measurements.¹

Although the national iodine deficiency disease control program has been implemented, iodine deficiency in non-coastal regions continues to be the cause of the disease's predominance in young patients. On the other hand, even in places with adequate iodine levels, the condition may appear in the elderly. Many writers have linked excessive iodine intake or individuals who consume enough iodine to the higher incidence of Hashimoto's thyroiditis, especially in coastal regions. In more than 70% of the cases, the thyroid gland's diffuse enlargement was the most frequent initial symptom. However, patients frequently seek medical care when the condition is advanced, when the patient exhibits significant thyroid hypertrophy and hormonal and clinical changes have already occurred.

Although the cytological grading offers a glimpse into the thyroid gland's autoimmune activity, it may not accurately represent the gland's current state of function.

As opposed to this, only a few researchers have graded cytology smears. The thyroid profile and cytomorphological grades did not significantly correlate. Clinical, biochemical, ultrasonographic, and radionuclide indicators have been utilized to relate the extent of lymphocytic infiltration using this grading system.

"Nonetheless, research has consistently demonstrated no statistically significant association between TSH and cytological grades, including the current study. Factors influencing FNAC smear grading, including blood dilution, FNAC technique, and the number of aspirations carried out, could be the cause of this lack of relevance. Moreover, aspirates obtained from a limited portion of the thyroid gland may not consistently represent the condition precisely. Although cytological grading helps detect HT, absence of correlation suggests it may not serve as a reliable indicator of the disease's biochemical complexity.

This is further supported by the observation that numerous Hashimoto's thyroiditis patients exhibit normal TSH levels alongside elevated ATPO and ATG levels, irrespective of the cellular degree. This suggests that antithyroid antibodies may be a sign of the autoimmune process before thyroid dysfunction's biochemical and clinical symptoms appear.²

Hashimoto's thyroiditis primarily affects women in their reproductive years due to elevated estrogen levels throughout this time. 73% of the patients in the research we conducted were within the reproductive age of 20 to 50. Cohort of 20 to 35 years exhibited the highest patient prevalence at 53.8% when the age group was reduced. Hashimoto thyroiditis was less prevalent in people under 20 and over 50. Other studies from South Asia complement our findings. In contrast, Hashimoto thyroiditis is more common in industrialized nations between the ages of 45 and 65, which is 10 to 20 years later than in developing nations.⁶

When autoimmunity induces inflammation, thyroid follicles are destroyed. Patients who are in the latter stages may exhibit hypothyroidism. Overt hypothyroidism takes years to develop and progresses gradually. However, patients may be euthyroid, exhibit subclinical hypothyroidism, or even be hyperthyroid in the early stages. Thus, symptoms of hyperthyroidism, euthyroidism, or subclinical thyroiditis do not rule out Hashimoto's thyroiditis.

The primary diagnostic method for determining the cause of an enlarged thyroid is fine needle aspiration cytology. Since FNAC is so sensitive and specific for Hashimoto thyroiditis, it is regarded as the gold standard diagnostic test for the condition.

CONCLUSION:

FNAC proves to be a better and costeffective technique which helps in not only in grading but also tells about the morphological changes than compared to other investigations like antibody screening for identifying Hashimoto's thyroiditis.

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Conflict Of Interest- NIL

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