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Case Report

Diagnostic challenges in distinguishing primary thyroid lymphoma from hashimoto's thyroiditis: A case series of respiratory distress

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Abstract

Primary thyroid lymphomas (PTL) are extremely uncommon and constitute less than 2% of all thyroid malignancies. PTL is defined as a lymphoma that affects just the thyroid or the thyroid along with regional lymph nodes, with no metastasis to other sites at the time of diagnosis. Here we represent four cases of the patients presented with midline neck swelling. All the patient had complaints related to pressure symptoms like dysphagia, change in voice and dyspnea. The swelling moved with deglutition and did not move with protrusion of the tongue. Sonographies performed in two cases were suggestive of thyroiditis and in other two cases were suggestive of goiter. Cytology performed only in two cases was suggestive of hashimoto's thyroiditis. Patients underwent total or hemi - thyroidectomy surgery as needed and the specimens were received in histopathology department. The representative sections were taken and stained with hematoxylin and eosin stain. It was difficult to distinguish on microscopy between Hashimoto's thyroiditis and lymphoma. Immunohistochemistry panel consisting of CD – 45, TTF – 1, CD -19, CD – 20, CD – 10, Cyclin – D1 and Ki – 67 were kept. The atypical lymphoid cells stained with CD – 45, CD – 19 and CD – 20 and atrophied thyroid follicles stained for TTF-1. The final diagnosis of diffuse large B cell lymphoma with non-germinal center B-cell subtype was given. For treatment, R – CHOP regimen (Rituximab, Cyclophosphamide, Adriamycin, Vincristine, Prednisolone) with chemotherapy and radiotherapy was given. Advance age and tumor extension outside the capsule showed a negative impact on the prognosis.

Keywords: Primary thyroid lymphoma, Midline neck swelling, Respiratory distress, Immunohistochemistry.

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1. Introduction

Malignant thyroid tumors are primarily follicular epithelial-derived tumors, which are classified into three types: papillary carcinoma, follicular carcinoma, and anaplastic carcinoma.[1,2]

Although lymphoma is one of the most prevalent hematological malignancies, primary thyroid lymphoma (PTL) is extremely rare, accounting for less than 2% of all thyroid malignancies and 2.5 to 7% of all extra nodal lymphomas.[3] PTL is defined as a lymphoma that affects just the thyroid or the thyroid along with regional lymph nodes, with no metastasis to other sites at the time of diagnosis.[4]

Thyroid lymphomas are almost always non-Hodgkin's B cell type. The most frequent subtype of PTL is diffuse large B cell lymphoma (DLBCL), accounting for more than half of cases, followed by mucosa associated lymphoid tissue (MALT) lymphoma, which accounts for 10-23 percent of cases.[5]

The only known risk factor for developing PTL is Hashimoto's thyroiditis (HT). Patients with HT are 40-80 times more likely to acquire lymphoma. However, only 0.6% of those with thyroiditis develop lymphoma.[6]

PTL is most frequent among women. The most typical presentation is a rapidly developing painless mass in the neck, resulting in compression sensations.[7]

Modern diagnostic methods, such as immunohistochemistry, have considerably improved PTL detection. Furthermore, ancillary studies, such as clonal

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immunoglobulin (Ig) gene rearrangements, might provide valuable information for determining lymphoma categorization and biological activity.[8]

Primary thyroid lymphoma warrants prompt diagnosis because of its ability to cause progressive compression symptoms. This study aimed to highlight the clinical features, diagnosis, therapy and prognostic variable of primary thyroid lymphomas and to emphasize the importance of timely diagnosis and thereby helping such patients to start with early treatment.

2. Case Presentation

Here we present case details of the four patients who visited our tertiary care centre for the complaints of rapidly progressing neck mass and resultant pressure symptoms.

Our first case was a 57 years old female presented with the complaints of progressively increasing midline neck swelling since last six months. There were presence of pressure symptoms like dysphagia, change in voice and dyspnea. The swelling moved up with deglutition but not with the tongue protrusion. The patient was a known case of hypothyroidism since last four years. She was on 50 microgram thyroxin tablet. She underwent ultrasonography that was suggestive of thyroiditis. Bilateral thyroid lobes were enlarged, bulky and heterogeneous. The right lobe measured 5.5cmX3.8cmX3.2cm, isthmus measured 2.1cm and left lobe measured 5.4cmx3.8cmx3.1cm. The fine needle aspiration (FNA) of the swelling showed clusters of thyroid epithelial cells and hurthle cell changes. There was diffuse infiltration of lymphocytic cells and the diagnosis of hashimoto's thyroiditis was given. To alleviate the pressure symptoms, total thyroidectomy was performed and the specimen was received in histopathology department.

Second patient was 46 years old female presented with the complaint of midline neck swelling since two years. It was associated with the symptoms of breathing difficulty, swallowing difficulty and dysphagia. The swelling moved up with deglutition but not with the tongue protrusion. Ultrasonography was suggestive of goiter along with increased vascularity of thyroid gland. She underwent left hemithyroidectomy for the relief of pressure symptoms and the specimen was processed in the department of histopathology.

Our third patient was a 40 years old female with 1 year history of hypothyroidism and regular thyroxin treatment. She developed midline neck swelling that was gradually increasing in size and was associated with throat pain and painful swallowing since 10 months. There was also history of change in voice and dyspnea. Patient had significant weight loss of 7 kilograms in last 2 month. The ultrasonography of neck region was suggestive of thyroiditis with bilateral enlargement of the thyroid lobes. Right lobe was measuring 6.2cmX4.2cmX3.9cm, isthmus measured 2.3cm and left lobe measured 7.1cmx4.7cmx4.1cm. Patient underwent total thyroidectomy to relieve the symptoms related to the respiratory distress.

The fourth case was a 41 year old female with midline neck swelling since 1 year. She had progressive dyspnea with rapid enlargement of the thyroid gland. The patient had the complaint of dysphagia. On ultrasonographic evaluation of neck, left thyroid lobe was found to be enlarged and bulky with increased vascularity. The FNAC was suggestive of colloid goiter with nonspecific thyroiditis. Left hemithyroidectomy was performed to relieve the respiratory distress symptoms resulting from the pressure over trachea.

In all the cases, the correlation between clinical, imaging and cytological features were not precise enough for the definitive diagnosis. To reach to the final diagnosis we performed histopatholgical examination of each four specimens followed by immunohistochemistry studies using the markers specific to the various differential diagnosis.

Gross examination of the received specimens was performed. The affected lobe of the thyroid showed smooth and bosselated outer surface with vascular congestion. The cut surface showed whitish homogenous areas with fleshy consistency. At places, hemorrhagic areas were evident. (**Figure 1**)

The representative sections were given and processed. The slides were stained with hematoxylin and eosin (H & E) stain. Microscopically, the sections showed marked atypical lymphoid proliferation within the thyroid parenchyma arranged in discohesive pattern. The atypical lymphoid cells appeared large, pleomorphic with high nuclear to cytoplasmic ratio, having moderate eosinophilic cytoplasm and irregular nuclear border. There were frequent mitotic figures. Prominent atrophic changes were evident in some of the follicles and some showed hurthle cell changes as well. The lesion was not breaching the capsule. (**Figure 2**) Based on this the impression of high grade Non-Hodgkin's lymphoma was given.

For further evaluation immunohistochemistry (IHC) panel was kept. It is the technique in which antibodies are used to detect antigens in tissues. We kept CD – 45, CD -19, CD – 20, CD – 10, TTF – 1, BCL -6, Cyclin – D1 and Ki – 67 markers. Out of these, the atypical lymphoid cells stained positive for CD – 45, CD – 19 and CD – 20. CD – 10, BCL - 6 and Cyclin – D1 were negative. TTF – 1 stained the cells of thyroid follicles. Ki – 67 indices were around 40 – 60%. (**Figure 3**)

Based on combined histopathology and IHC studies of the thyroid gland, the final diagnosis of diffuse large B cell lymphoma with non-germinal center B-cell subtype was given.

Our second and fourth case was managed by providing R – CHOP regimen (Rituximab, Cyclophosphamide,

Adriamycin, Vincristine, and Prednisolone) with chemotherapy and radiotherapy. The rest two cases received R – CHOP regimen with chemotherapy. The rituximab is a monoclonal antibody that acts against the CD-20 membrane antigen and improves overall outcome. The first and fourth case lost to follow – up after the completion of the treatment respectively. Other two patients are on regular follow – up without any significant complaints. Any disease related or treatment related complications have not been reported till date.

Table 1: Annarbor classification of primary thyroid lymphoma

Stage	**Localization of the disease**
IE	Involvement of the thyroid gland only
IIE	Involvement of the thyroid gland as well as regional lymph nodes of the same side of the diaphragm.
IIIE	Involvement of the thyroid gland as well as regional lymph nodes of the both side of the diaphragm.
IVE	Disseminated disease
Modifiers	**Constitutional symptoms**
A	Absent
B	Present (fever > 38 F, weight loss > 10% in 6 months, night sweats)

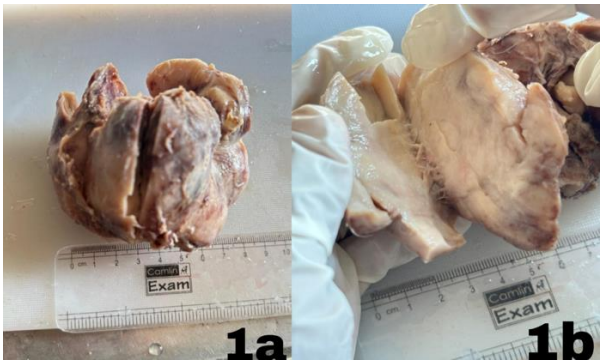

Figure 1: a: Outer smooth and bosselated surface; **b:** Whitish homogenous cut surface.

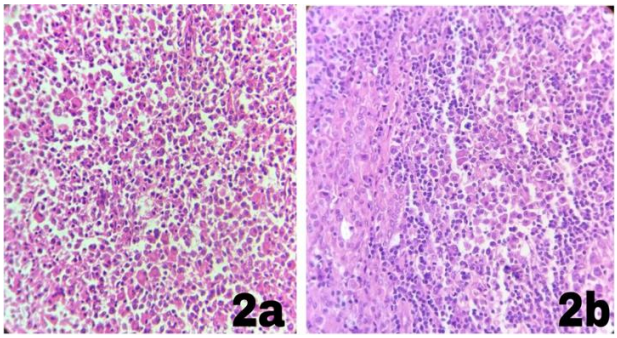

Figure 2: a: Diffuse infiltrate of atypical lymphoid cells (H & E, 10x); **b:** Atrophic thyroid follicle and mitotic figures. (H & E, 40x).

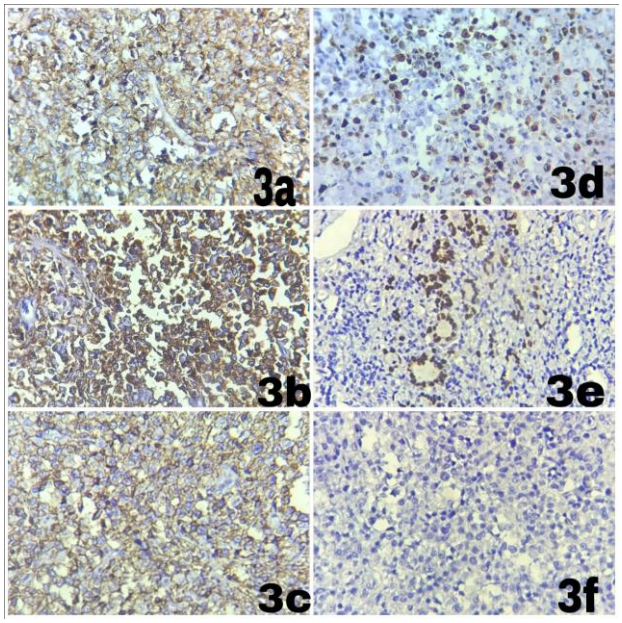

Figure 3: Immunohistochemistry (40x): **a:** CD – 45 - positive, **b:** CD – 19 - positive, **c:** CD – 20 - positive, **d:** Ki – 67 – 50%-60% index; **e:** TTF – 1 – positive in thyroid follicle and negative in tumor cells; **f:** CD – 10 - negative.

3. Discussion

Primary thyroid lymphoma is extremely rare and comprises only less than 2% of all thyroid malignancies. They constitute 2.5-7% of all extra nodal lymphomas. It is mainly a disease of elderly females (F: M ratio = 4:1).[9]

In a case series carried out by Nihan et el and Yi Lai et al, majority of the patients were elderly female patients.[6,10] In our study, the patients were also elderly females.

The most common clinical presentation of PTL in a study by Nihan et al was rapid enlargement of a neck mass that resulted in compression symptoms such as dysphagia, dyspnea, coughing and change in voice.[11] Few patients presented with B-cell lymphoma symptoms like fever, night sweats or weight loss.[10] Similarly in our study, the patients presented with similar complaints of rapidly enlarging neck mass associated with features of dysphagia, dyspnea, coughing and respiratory distress. Two of them showed B-cell lymphoma symptoms, such as fever, night sweats, and weight loss.

In most cases, ultrasound of PTL reveals a hypoechoic mass with less echogenicity than that of the adjacent neck muscles, increased vascularity and an undifferentiated border.[12]

Hashimoto's thyroiditis is a well-known risk factor, with a 40-fold higher risk of developing primary thyroid lymphoma than the general population. Hashimoto's thyroiditis is linked to more than 90% of primary thyroid lymphomas.[13] Diffuse large B-cell lymphoma and MALT lymphoma are the most prevalent forms.[10]

There are numerous other studies that show a relationship between chronic inflammation and lymphoproliferative diseases. Certain chronic conditions raise the risk of lymphoproliferative malignancy. Sjogren's syndrome (SS) is recognized as a risk factor for the development of lymphoid malignancies. Nine percentage of the patients with primary SS developed malignant lymphoma as per the retrospective cohort studies, which is approximately 40 times greater than in the general population.[14,15]

Rheumatoid arthritis and systemic lupus erythematosus patients, particularly those with severe illness, are more likely to develop lymphoid malignancy.[16] Pyothorax-associated lymphoma can develop in patients with chronic pyothorax caused by lung tuberculosis or tuberculous pleuritis, and helicobacter pylori infection is linked to the pathogenesis of mucosa-associated lymphoid tissue gastric lymphoma. Lymphomas associated with chronic inflammatory conditions are typically B-cell in origin.[17,18]

There is no native lymphoid tissue in a thyroid gland. Thus, PTL is thought to arise from intrathyroidal lymphoid tissue acquired during the course of chronic inflammation or an autoimmune process. A history HT can be traced in about one-half of PTL cases. It has been proposed that in HT, lymphomatous changes that are vulnerable to neoplastic transformation may be caused by prolonged antigenic stimulation and lymphoid tissue proliferation. This theory is supported by the recent report by demonstrating the sequence similarity in immunoglobulin heavy chain gene rearrangement between the clonal bands of HT and that of subsequently developed PTL. Furthermore, aberrant somatic hypermutation, which has previously been linked to the development of numerous proto-oncogenesis in other kinds of DLBCL, might constitute a pathogenetic mechanism for developing PTL by reflecting an early step in the process of B-cell clonal transformation in patients with HT.[19]

Epidemiological evidence and indirect molecular findings from immunoglobulin heavy chain variable region gene investigations indicate that chronic persistent antigen stimulation causes malignant transformation and may be a significant pathogenic mechanism of thyroid lymphoma.[20]

The vast majority of primary thyroid lymphomas are B cell lymphomas, which can be linked to Hashimoto's thyroiditis.[21] Our study included two patients who had been diagnosed with Hashimoto's thyroiditis.

Lapadat et al. have shown that most primary thyroid lymphomas develop on the chronic thyroiditis or Hashimoto thyroiditis pattern. In patients with Hashimoto thyroiditis when the thyroid gland remains enlarge, in spite of the thyroxin replacement therapy, thyroid lymphoma should be considered.[22]

Yi Lai et al reported in his study that 77.3% patients had associated hashimoto's thyroiditis. This findings were consistent with our findings that showed 50% of the patient presented with associated hashimoto's thyroiditis.[6]

Hashimoto's thyroiditis, secondary thyroid lymphoma and anaplastic thyroid carcinoma are some of the differential diagnosis of PTL that needs to be ruled out. HT is the most common autoimmune thyroid disease. The defining feature of HT is lymphocytic infiltration of the thyroid gland, which is followed by fibrous replacement of the thyroid parenchyma tissue.[13]

The thyroid gland can be involved by secondary thyroid lymphoma in advanced and disseminated lymphoma. Due to the widespread disease burden, secondary lymphoma of the thyroid has poor outcome as compared to PTL.[23] Anaplastic thyroid carcinoma is known for its most aggressiveness and bad prognosis with mean survival rate of six months while PTL has good treatment outcomes and survival. So it is of paramount importance to differentiate between anaplastic thyroid carcinoma and PTL. Chemotherapy and radiotherapy is the mainstay of treatment in PTL, while surgical resection is indicated for resectable anaplastic carcinoma thyroid. The presence of discohesive atypical large cells, irregular nuclear border, vesicular chromatin, prominent nucleoli along with lymphoglandular bodies and cytokeratin and epithelial membrane antigen negativity on IHC are supporting features in diagnosing PTL and ruling out anaplastic thyroid carcinoma.[24]

IHC is the technique in which antibodies are utilized to detect antigens in biological tissues. The accuracy of diagnosing lymphoma has greatly been improved by this process. Not only diagnosis, but this method also helps to identify the cell lineage as well as the developmental stage of the lymphoma.[5]

B cell lineage is decided by detecting the antibodies against the B cell antigens such as CD19 and CD 20. CD10 is typically negative in both DLBCL and MALT lymphoma. The diagnosis of non – germinal centre type diffuse large B – cell lymphoma is confirmed by the negative staining for both CD10 and BCL – 6.[25]

Ann Arbor staging system that was basically used for Hodgkin's lymphoma is applied to non-Hodgkin's lymphoma staging also. The suffix A and B are denoted for absence or presence of the constitutional symptoms. The suffix E and S are used for extra-nodal and splenic involvement.[26] (**Table 1**)

Various IHC stains are used for categorization of DLBCL to identify the cell of origin. The prognostic importance of MYC and BCL2 gene translocations and co expression of proteins have been detected by proteomics and genetic studies. FISH studies have shown that 7%–10% of DLBCL are supposed to have MYC, BLC2 and/or BCL6

translocations. These have been known as Double hit lymphoma and triple hit lymphoma in the past. High-grade B-cell lymphoma with rearrangements of MYC and BCL2 and/or BCL6 have been recognized separately by the WHO in recent lymphoma classification revision.[27]

The therapeutic approach for the PTL is determined by the histopathological subtype and the grade and stage of the disease. The treatment strategy for the patients with PTL has evolved through the previous few decades. Because of the introduction of efficient chemotherapeutic regimens, conservative treatment, mostly with combination chemotherapy, has replaced the thyroidectomy as a primary treatment option. Nowadays, surgery is mainly used to obtain enough tissue for diagnosis or to ease pressure symptoms. DLBCL of the thyroid should be treated similarly to DLBCL of any other site. Chemotherapy consisting of CHOP regimen (Cyclophosphamide, doxorubicin, vincristine, prednisone) in association of radiotherapy is the mainstay of the treatment for PTL. The addition of rituximab, a monoclonal antibody against the CD-20 membrane antigen found on pre-B and mature B lymphocytes, has improved overall survival and life expectancy.[19]

As per the research report conducted at Mayo Clinic, the combination of thyroidectomy and adjuvant radiotherapy and chemotherapy are implicated to have increased disease-free survival and high cure rates. In high grade lymphomas displaying extra capsular extension, addition of radiotherapy and chemotherapy proved to be beneficial. The clinicians should be considerate about the neutropenic fever that is caused by CHOP- Rituximab therapy. For low-grade lymphoma, ten-year survival rate is 75%, while 5-year survival rate is less than 50% in high grade lymphoma. The histopathological type, grade and the stage of the disease are the key factors for assessment of prognosis in PTL. Advance age and tumor extension outside the capsule have a negative impact on the prognosis. Early diagnosis and correct therapeutic approach lead to favorable prognosis.[10,25]

4. Limitations of study

We had difficulties in the diagnosis of MALT lymphoma as there were no specific IHC markers. When there is any confusion in sub typing, genetic studies plays a very important role, but it was not available in our centre. Being a single centre study with limited number of cases, the findings cannot be generalized to the vast population.

5. Conclusion

In elderly female patients with rapidly growing thyroid mass causing respiratory compression symptoms, PTL should be highly suspected. It is challenging to diagnose primary thyroid lymphomas because of their rare occurrence. It should be kept in mind that patients with hashimoto's thyroiditis should be evaluated carefully when they have a rapidly growing thyroid gland or cervical lymphadenopathy. It should be emphasized that PTL is entirely different from follicular epithelial-derived thyroid malignancy in disease management. Multimodal treatment with rituximab, combination chemotherapy, and local radiotherapy provides the highest ever survival rates.

6. Source of Funding

None.

7. Conflict of Interest

None.

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