



An Extraordinary Case of an Ectopic Thyroid Gland Presenting as a Frontal Scalp Mass in a Ugandan Patient: A Case Report

BY

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Abstract

Ectopic thyroid tissue is a rare anomaly resulting from aberrant migration of thyroid tissue during embryological development. This case report details the presentation and diagnosis of a 68-year-old Ugandan patient who presented with an unusual frontal scalp mass that was later identified as ectopic thyroid tissue. This case underscores the importance of considering ectopic thyroid tissue in the differential diagnosis of atypical head and neck masses and discusses the relevant clinical, radiological, and histopathological findings.

Keywords Bone erosion, Heterogenous mass, Thyroid nodule

1. Introduction

Ectopic thyroid tissue refers to the presence of thyroid tissue outside its normal anatomical position, typically found along the thyroid gland's descent path during embryogenesis [1]. The thyroid gland originates from the floor of the primitive pharynx and migrates to its final pretracheal position by the seventh week of gestation. However, disruptions in this migration process can result in thyroid tissue being located in abnormal sites [2].

Although ectopic thyroid tissue is relatively uncommon, the most frequent occurrence is the lingual thyroid, where the tissue is situated at the base of the tongue [3]. Other possible locations include the sublingual, pretracheal, mediastinal, and even lateral neck regions, though these are much rarer [4, 5, 6, 7]. Recognizing ectopic thyroid tissue is essential for accurate diagnosis and management, as its presence can lead to thyroid dysfunction or mass effects, depending on the location and functional capacity of the tissue.

Understanding the embryological development of the thyroid gland is crucial for identifying ectopic thyroid tissue. Diagnosis typically requires a combination of imaging and histological evaluation to confirm the presence of thyroid

tissue in these unusual locations and to guide appropriate treatment.

2. Case Presentation

a. Clinical History

A 68-year-old female patient presented to the pathology department with a painless, progressively enlarging mass on her frontal scalp, which she had first noticed six months earlier. The patient reported no associated symptoms, such as those related to hypothyroidism or hyperthyroidism. Additionally, she had no history of radiation exposure and no family history of thyroid disease. During the physical examination, a firm, non-tender mass measuring 6 cm x 6 cm was observed in the frontal scalp region. The overlying skin appeared unremarkable, with no signs of discoloration, ulceration, or other abnormalities (**Fig 1**). The absence of thyroid-related symptoms and the location of the mass in the scalp made this case particularly unusual, prompting further investigation to determine the nature of the lesion.

b. Laboratory Findings:

The thyroid function tests of the patient were within normal limits. The results were as follows: Thyroid-Stimulating Hormone (TSH) level was 1.80 $\mu\text{mol/L}$, falling within the



normal range of 0.27-4.2 $\mu\text{mol/L}$. The Free Thyroxine (T₄) level was slightly below the normal range at 64.69 mmol/L, where the normal range is 66-161 mmol/L. The Free Triiodothyronine (T₃) level was 2.65 mmol/L, within the normal range of 1.3-3.2 mmol/L. These findings suggest that despite the presence of the scalp mass, the patient's thyroid function remains largely normal, further complicating the clinical picture and necessitating additional investigation into the nature of the lesion.

c. *Imaging findings:*

An ultrasound of the thyroid was performed, which revealed that the right lobe of the thyroid gland was absent, likely due to previous surgery. There was no residual mass in the thyroid bed. The left lobe of the thyroid measured 13 x 10 x 40 mm. Within the left lobe, a solitary solid hypoechoic nodule measuring 5.6 x 5.0 x 5.6 mm was identified. The nodule was hard, wider than it was tall, and showed increased blood flow on color Doppler. There was no evidence of extracapsular extension or vascular invasion, and no enlarged lymph nodes were observed. The findings suggested a solitary left lobe TIRADS 4 nodule, warranting further evaluation.

An ultrasound of the scalp mass revealed a large heterogeneous mass in the frontal scalp region, with evidence of frontal bone erosion. The mass, which measured 78 x 64 x 81 mm, showed increased blood flow on Doppler imaging. The conclusion was that the findings were indicative of a large, heterogeneous, bone-destructive frontal scalp mass, likely metastatic in nature thus requiring the need for further investigation to confirm the diagnosis and determine the appropriate course of treatment.

d. *Histopathological findings:*

An incisional biopsy was performed on the frontal scalp mass. Histological examination with H&E staining revealed follicles lined by cuboidal or columnar epithelial cells filled with colloid (**Fig 2**). Immunostaining for thyroglobulin was positive, confirming the presence of thyroid follicular cells and supporting the diagnosis of thyroid tissue, whether ectopic or in its normal location (**Fig 3**).

Further, TTF-1 immunostaining was also positive, providing additional confirmation of thyroid cells and reinforcing the diagnosis of thyroid tissue (**Fig 4**). Ki-67 staining showed a low proliferation index, suggesting that the condition was likely benign (**Fig 5**). Positive staining for PAX8 indicated that the cells were of thyroid origin, thereby confirming the presence of ectopic thyroid tissue (**Fig 6**). Overall, these histological and immunohistochemical findings collectively supported the diagnosis of ectopic thyroid tissue in the frontal scalp mass.

3. Discussion

Ectopic thyroid tissue is most commonly found in the midline, with the lingual thyroid being the most prevalent location [8]. This condition results from aberrant migration of the thyroid gland during embryonic development, leading to the presence

of thyroid tissue in locations other than its usual pretracheal position. Typically, this abnormality occurs anywhere along the thyroglossal duct, spanning from the base of the tongue (lingual thyroid) to the mediastinum [9]. However, ectopic thyroid tissue can also be located along the path of thyroid descent, including the sublingual, pretracheal, mediastinal, and, in rare instances, lateral neck regions.

Ectopic thyroid tissue in the scalp is exceedingly rare, with very few cases reported in the literature [10]. The prevalence of ectopic thyroid tissue is estimated to be between one and three cases per 100,000 people in the general population. However, the actual prevalence may be higher, as this condition is likely underreported or undiagnosed in many cases [11]. Genetic studies have identified several transcription factors, such as TTF-1, Tg, Foxe1, and PAX-8, that may play a role in the abnormal migration of the thyroid gland during development, contributing to the formation of ectopic thyroid tissue [12].

The clinical presentation of ectopic thyroid tissue can vary widely, ranging from asymptomatic masses to symptoms associated with hypothyroidism or hyperthyroidism, depending on the functional capacity of the ectopic tissue [13]. For example, some individuals may experience no symptoms, while others may present with symptoms due to the production of too little or too much thyroid hormone by the ectopic tissue.

To establish a definitive diagnosis, iodine-131 (I-131) scintigraphy is an essential tool. This imaging technique is particularly effective in identifying thyroid tissue in ectopic locations. Additionally, computed tomography (CT) scans and magnetic resonance imaging (MRI) are valuable for precisely locating ectopic thyroid tissue, especially when it is situated away from the typical descending pathway of the thyroid gland. Histological examination through tissue biopsy or fine-needle aspiration cytology (FNAC) is critical for confirming the diagnosis. These techniques are especially useful for distinguishing between benign and malignant lesions. However, it is important to note that FNAC results can occasionally be misleading or non-diagnostic, particularly in the case of cystic masses [14]. This highlights the need for a comprehensive approach to diagnosis, utilizing multiple imaging and diagnostic techniques to ensure accurate identification and management of ectopic thyroid tissue.

4. Conclusion

This case highlights the unusual presentation of ectopic thyroid tissue as a frontal scalp mass in a Ugandan patient. It underscores the importance of including ectopic thyroid in the differential diagnosis of atypical scalp masses. An accurate diagnosis and effective management require a multidisciplinary approach, involving endocrinologists, radiologists, pathologists, cytologists, and surgeons. Further research and case reports are essential to enhance our understanding of the clinical spectrum and to develop optimal management strategies for this rare condition.

Abbreviations

FOXE1 Forkhead Box E1
PAX-8 Paired box gene 8
Tg Thyroglobulin
TTF-1 Thyroid Transcription Factor 1

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Ethical Approval:

Ethical approval was not required for this single-case presentation following local/national guidelines.

Consent

Written informed consent was obtained from the patient for publication of this case and any accompanying images. The investigation was conducted in accord with the Declaration of Helsinki (1975)

Conflicts of Interest Statement

The authors have no competing interests to disclose.

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Data Availability

All data generated and analyzed during this study are included in this article. Further inquiries can be directed to the corresponding author.

Authors' Contributions

AI: Conceptualization, methodology, investigation, data curation, **M.A.** methodology, initial pathological diagnosis; **B.M.** wrote the manuscript. **O.P., O.M., A.G., W.E., B.E., M.D., N.J., K.M., A.R., N.G.,** and **C.A.B. M.D.** was responsible for H&E staining; **L.R., B.P., O.T., M.S** conducted slide review., and **K.S.** was responsible for final pathological diagnosis. All authors have read and approved the final manuscript.



Figure 1. Frontal scalp mass

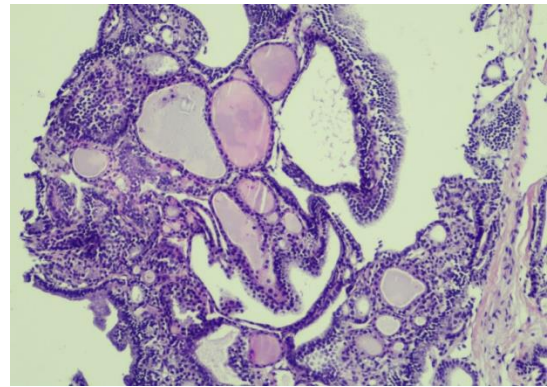


Figure 2: H&E staining showing follicular cells filled with colloid, x100

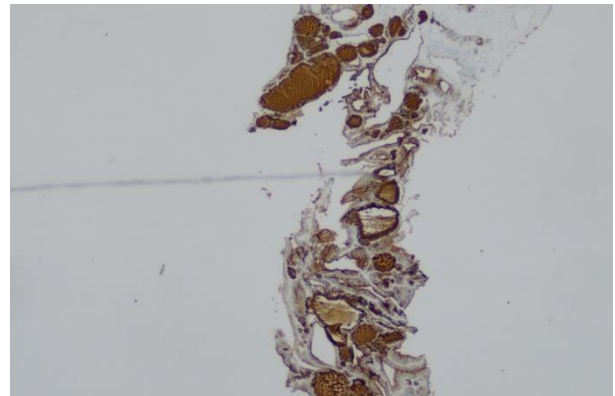


Figure 3: Positive immunostaining for Thyroglobulin, x100

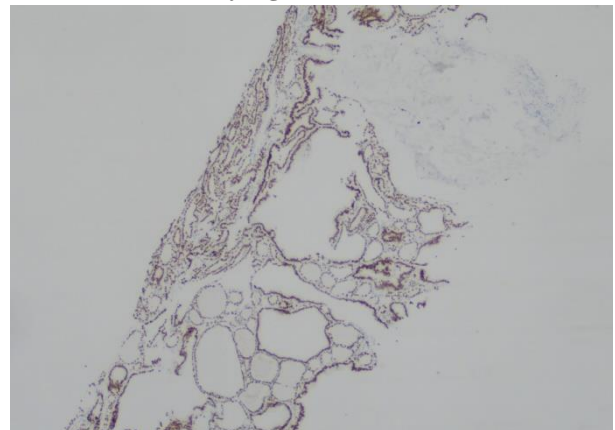


Figure 4: Positive immunostaining for TTF-1, x100

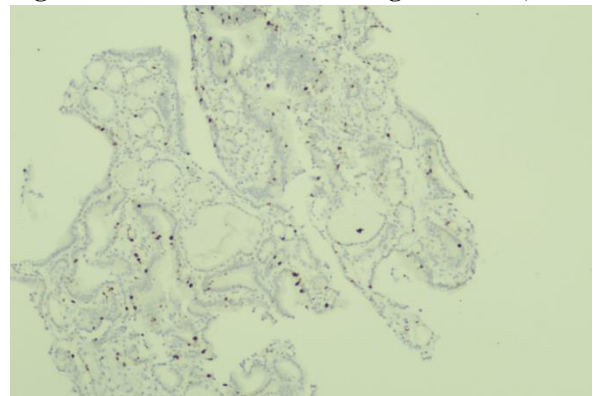


Figure 5: Weak immunostaining for Ki-67, x100

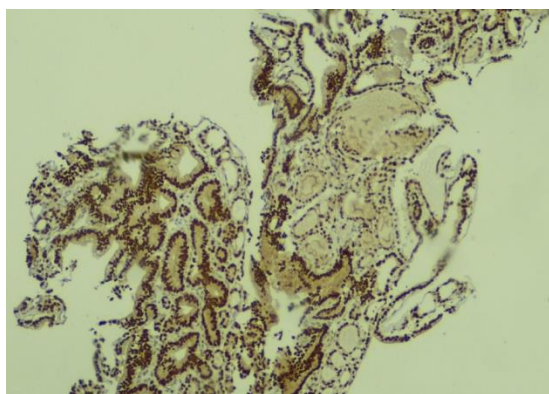


Figure 6: Positive staining for PAX 8, x100

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