



Thymic hyperplasia associated with adult graves' disease: A case report

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Article Info

Volume 3, Issue 2, July 2026

Received : 26 February 2026

Accepted : 02 July 2026

Published : 25 July 2026

doi: [10.62587/AFRJMS.3.2.2026.1-7](https://doi.org/10.62587/AFRJMS.3.2.2026.1-7)

Abstract

Thymic hyperplasia is an uncommon finding in adults, given that the natural course of the gland is atrophy with age (Liang *et al.*, 2022). Its association with hyperthyroidism is also less recognized by clinicians, and thus its incidental finding may sometimes either go unnoticed or evoke concerns of anterior mediastinal malignancy. However, this case study reinforces the finding that thymic hyperplasia in adults with hyperthyroidism is likely a result of the trophic effect of elevated thyroid hormones and the associated Thyroid stimulating hormone Receptor-associated Antibodies (TRAbs) seen in Graves' disease and should thus not warrant the pursuit of extraneous invasive investigations when malignancy is unlikely. The case focuses on a middle-aged African female with chronic cough, shortness of breath, weight loss, palpitations, pretibial edema, resting tremors, and smooth thyroid enlargement. Initial evaluation for cardiopulmonary and infectious causes was negative, and biochemical testing confirmed the highly probable diagnosis of hyperthyroidism with evidence of suppressed Thyroid Stimulating Hormone (TSH) and elevated Free Thyroxine (FT4). Computed Tomography (CT) scan of the chest noted thymic enlargement alongside diffuse thyroid enlargement. Despite the inability to test for TRAbs due to financial constraints, the clinical, biochemical, and radiologic findings strongly suggested Graves' disease. The case highlights the importance of recognizing thymic enlargement in hyperthyroidism as a benign and potentially reversible manifestation. This awareness enhances integration of clinical and biochemical findings with imaging to correctly diagnose Graves' disease and avoid misdiagnosing mediastinal malignancy, especially in resource-limited settings.

Keywords: Thymic yperplasia, Thymus gland, Enlargement, Graves' disease, Hyperthyroidism

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1. Introduction

Thymic hyperplasia is the gross, diffuse, and symmetric enlargement of the thymus gland (Scappaticcio *et al.*, 2024). Often, this enlargement is downplayed clinically because clinicians do not find it significant in practice unless it evokes mediastinal-related symptoms in the patient. The enlarged thymus is usually incidentally

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noted on plain chest radiographs and on chest CT scans when querying other differential conditions in the chest. Some prior case studies have reported an association between Graves' disease and thymic hyperplasia, with some postulating that the Thyroid stimulating hormone-Receptor Antibodies (TRAbs) target thyroid receptors found within the thymus, which they stimulate, causing enlargement of the gland. It is even proposed that achieving control of Graves' disease leads to the disappearance of thymic hyperplasia (Scappaticcio *et al.*, 2024).

Thymic hyperplasia was first reported in association with Graves' disease in 1914, and it has been proposed that histological thymic changes can be seen in up to 38% of individuals who display thyrotoxicosis (Popoveniuc *et al.*, 2010). However, these findings are seldom identified because of minimal radiological evidence of thymic enlargement. There is evidence that thymic transformation is associated with hyperthyroidism, as noted in a study that focused on 23 untreated patients with Graves' disease whose thymus continually enlarged during the no-treatment phase and responded to treatment by downsizing when antithyroid drugs were administered (Popoveniuc *et al.*, 2010).

The case below explores a patient who presented with hyperthyroid symptoms with an incidental finding of thymic hyperplasia. The finding raises the question of whether we should always assess for thyroid function for all patients with incidental finding of thymus enlargement. It also shows that thymic enlargement in the setting of hyperthyroidism is usually benign and does not necessitate invasive diagnostic procedures.

2. Case

A middle-aged African female visited our health facility in Kenya with complaints of a persistent cough for 1-month, increased awareness of heartbeat, shortness of breath, lower limb swelling for 4 months, and significant weight loss of 14 kgs in 7 months. She did not have orthopnea nor paroxysmal nocturnal dyspnea.

She denied abdominal pain, nausea, vomiting, and diarrhea, without noticeable change in her appetite. She did not have heat intolerance but had generalized fatigue.

The genitourinary system was normal, and she was able to make and pass urine.

The general examination revealed mild pallor but no scleral or lingual jaundice, no finger clubbing, no oral thrush, and no lymphadenopathy. She, however, had mild dehydration with pretibial edema to the level of the tibial tuberosities bilaterally. She was in obvious distress, appeared wasted, and had resting tremors.

Her blood pressure was normal in the 120s/60 s mmHg with the pulse rate averaging between 122-133 bpm, respiratory rate of 18 bpm, and temperature of 37.1 °C.

Her cardiovascular examination was normal with the exception of the racing heartbeat. The respiratory examination was also normal.

The thyroid exam yielded a non-tender smooth palpable neck mass anterior to the thyroid cartilage that was symmetrical, each lobe measuring about 6 cm by 4 cm. There was no associated cervical lymphadenopathy, and no bruit was auscultated. The patient reported no dysphagia and did not display features of thyroid ophthalmopathy including proptosis, retracted eye lid, and eye lid lag.

Other systemic examinations were normal.

Various investigations were performed.

2.1. Laboratory tests

Full hemogram-shows leukopenia of $WBC\ 3.97 \times 10^9/L$, relative lymphocytosis of 45.5%, neutropenia of $1.43 \times 10^9/L$ in absolute neutrophil count, and a normal lymphocyte count of 1.81. The hemoglobin was also normal, 11.8 g/dL.

The patient was tested for Mycobacterium tuberculosis using sputum for GeneXpert, which came back negative. She also tested negative for HIV serology.

We also have a notably mildly elevated N-terminal pro-B-type natriuretic peptide (NT pro-BNP), as a result of the increased demand on the now tachycardic heart. A conclusive list of further laboratory investigations done is included in the Table 1.

Table 1: Other laboratory investigations done		
Test	Result	Our Laboratory Normal Ranges
Sputum for GeneXpert	Negative for Mycobacterium tuberculosis	
HIV test	Negative	
Urea	6.19 mmol/L (RI: 1.7-8.3)	1.7 - 8.3 mmol/L
Creatinine	39.79 umol/L	44.21-115 umol/L
Sodium	137.5 mmol/L	135-145 mmol/L
Potassium	4.56 mmol/L	3.5-5.5 mmol/L
Chlorides	106.7 mmol/L	96-105 mmol/L
Erythrocyte Sedimentation Rate	10 mm/hr	<20 mm/hr
C-Reactive Protein	<47.62 nmol/L	0-95.24 nmol/L
Troponin	0.06 ng/ml	0 to 0.04 ng/ml
NT-proBNP	173.52 pg/ml	<75 years old; 125 pg/mL;
TSH	0.1 mIU/L	0.5-5 mIU/L
FT3	2.54 pmol/L	3.1-6.8 pmol/L
FT4	28.11 pmol/L	12.0-22.0 pmol/L

2.2. Imaging reports

Chest x-ray was normal

Cardiac Point-of-Care Ultrasound (POCUS): Displayed hyperkinetic ventricular walls of the heart with otherwise normal ejection fractions and no pericardial effusion.

Formal echocardiography (done two months prior): Heart was normal with systolic function intact as evidenced by an ejection fraction of 68% and normal wall motion.

2.3. CT chest

CT chest done was done to differentiate shortness of breath and cough and increased awareness of heartbeat despite a normal plain chest radiograph and normal echocardiography.

The CT chest, as reported by the radiologist, noted the presence of an enlarged thymus gland of 3.7 cm by 2.4 cm in the anterior mediastinum with preserved triangular morphology and straight borders consistent with thymic hyperplasia. It also noted diffuse thyroid enlargement involving both lobes and the isthmus without retrosternal extension.

The images of the done CT chest are shown in Figures 1 to 4. The figures 1 and 2 show an enlarged thymus in both contrast and non-contrast enhanced imaging while figures 3 and 4 show an enlarged thyroid gland both in contrast and non-contrast enhanced imaging.

2.4. Management

At the time of arrival, the patient was already on treatment for community-acquired pneumonia with oral azithromycin 500 mg once daily for 3 days. There was no significant change after completing the dose. Having seen the results that pointed towards thyrotoxicosis, we started her on low dose carbimazole, 5 mg 8-hourly, and propranolol 40 mg twice daily. TSH-receptor antibodies (TRAB) test for definitive Graves' disease diagnosis was cost prohibitive and so not done.

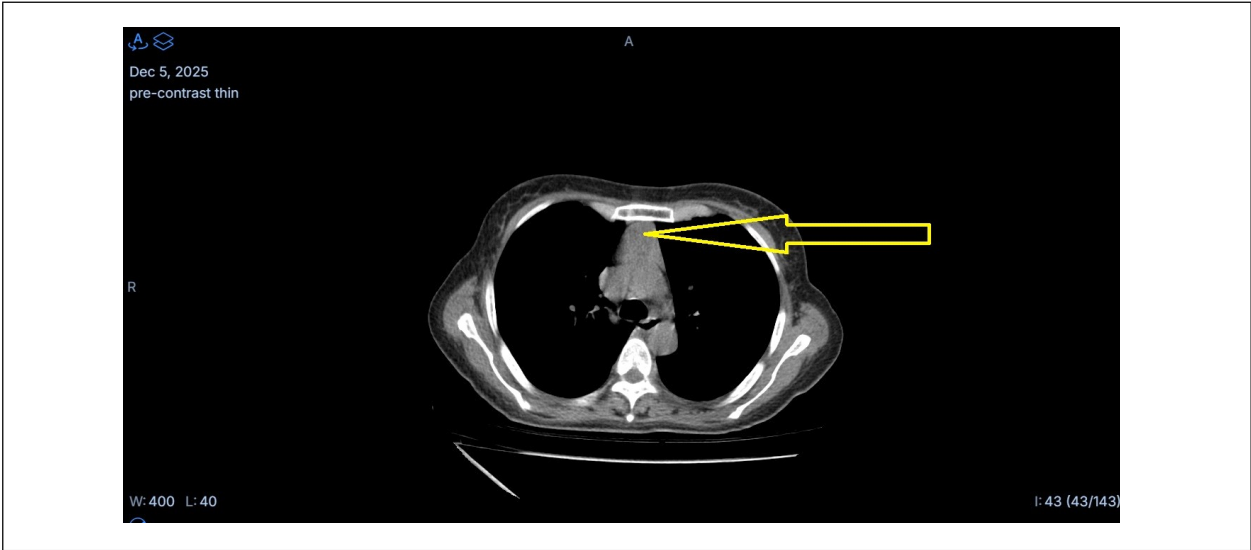


Figure 1: Axial non-contrast CT image showing an enlarged thymus

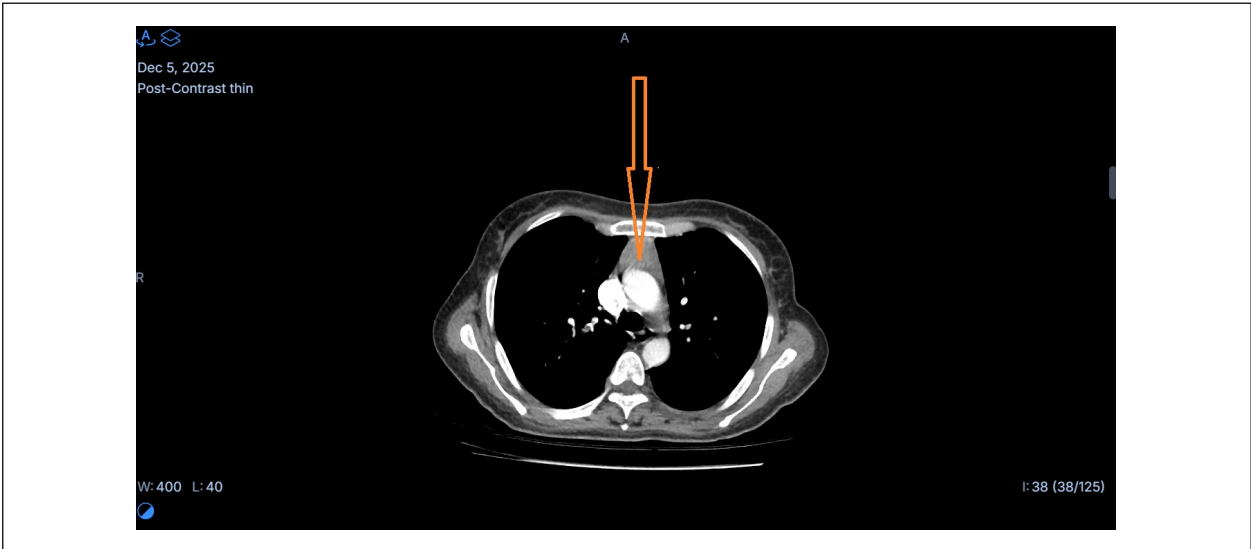


Figure 2: Axial contrast-enhanced CT scan demonstrating thymic enlargement

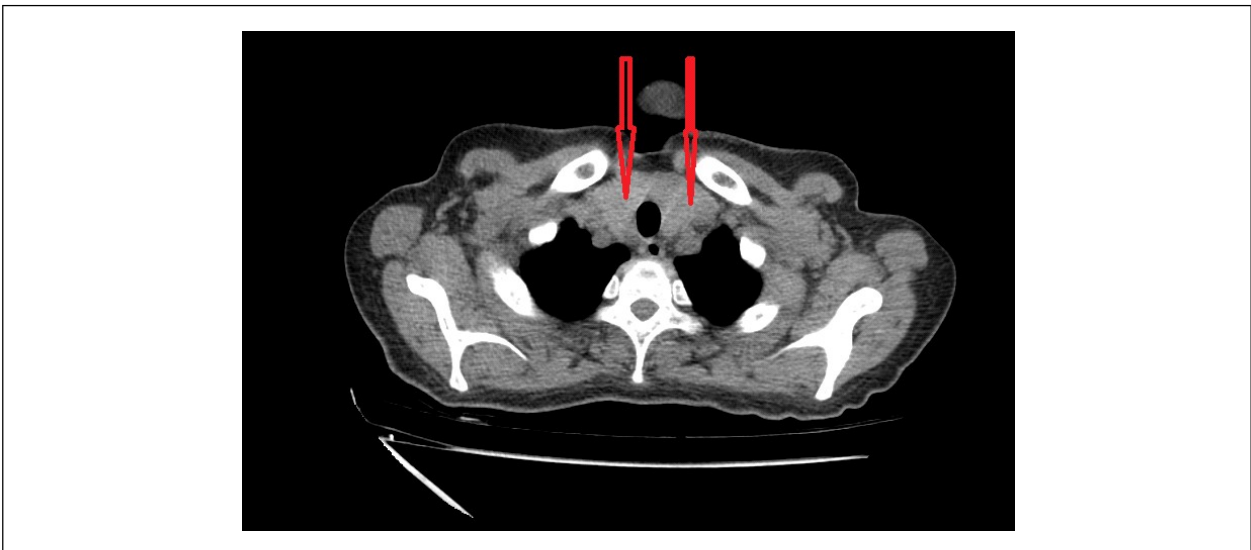
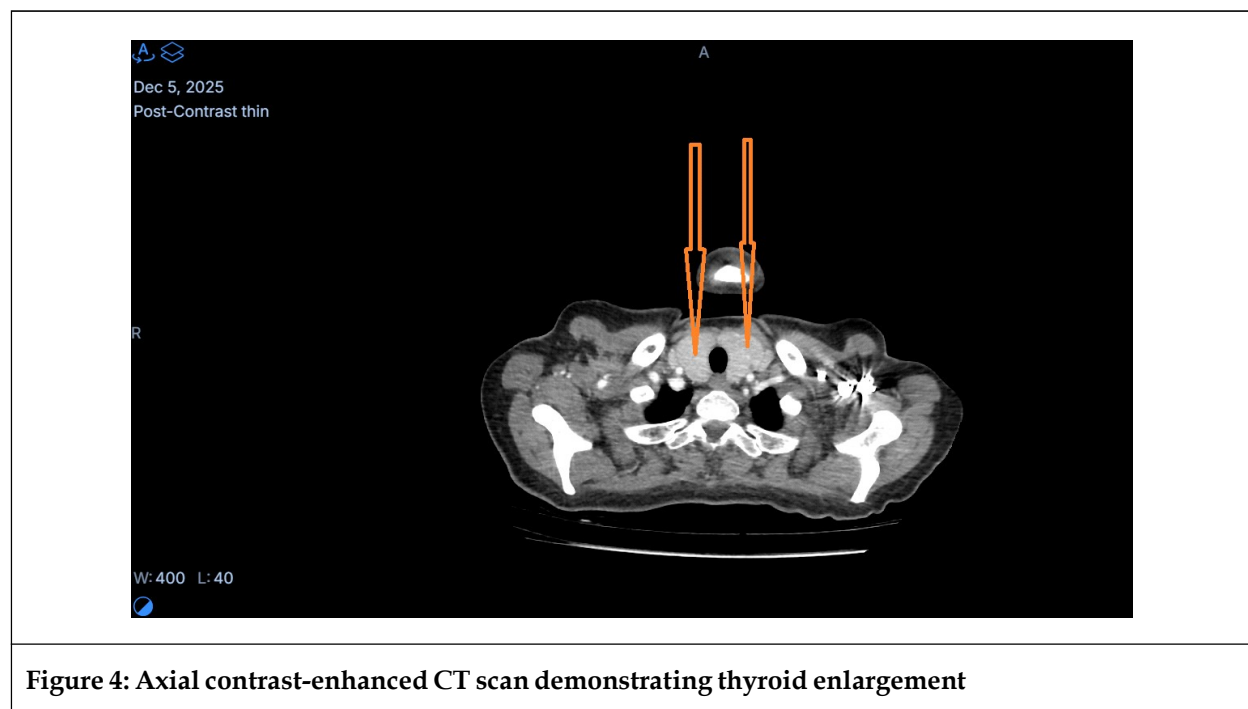


Figure 3: Axial non-contrast CT scan demonstrating thyroid enlargement



Within 24 hours she seemed calmer, happier, and reported less awareness of heartbeat. Her pulse rate had improved to 106 beats per minute by day 2 and 97 by day 3 of admission. We discharged her home with a plan to repeat the thyroid function after 6 weeks and chest CT after 6 months, by which time we anticipate a normalization of TSH and T4 levels and some regression of the enlarged thymus.

3. Discussion

This case highlights a clinically important yet often under-recognized association between hyperthyroidism and thymic enlargement. The incidental CT finding of the enlarged thymus in this patient prompted further reflection on the need to assess for thyroid function in elderly patients who display thymic hyperplasia. Such an approach could help diagnose hyperthyroidic states that are probably being managed symptomatically rather than with antithyroid therapy or those that have not been diagnosed yet. Besides, noting thymus enlargement in adults without symptomatic hyperthyroidism can help clinicians initiate patient follow-ups to ensure any development of hyperthyroidism later on is caught and managed early.

Thymic hyperplasia in adults is usually uncommon, and when noted radiologically, often raises concern about anterior mediastinal masses like thymomas, germ cell tumors, or lymphomas. However, this condition can be a benign and reversible effect of Graves' Disease and other hyperthyroid states. The preserved triangular shape, smooth margins, homogenous attenuation, and absence of invasive features on CT chest imaging are typical of benign thymic hyperplasia rather than neoplasia.

The pathophysiology behind hyperthyroidism and thymic enlargement is not fully elucidated, but immunologic and hormonal mechanisms have been implicated. The thyroid hormones often exert trophic effects on the epithelial cells of the thymus, while the Thyroid-stimulating hormone Receptor Antibodies (TRAb), often noted in Graves' disease, may stimulate TSH receptors expressed on the thymus to cause thymic hyperplasia. It has been noted through experimental and clinical data that the thymus hyperplasia tends to resolve after starting anti-thyroid therapy.

In our case, testing for TRAb was not feasible due to financial constraints, a recurring theme in resource-limited settings where diagnosing Graves' disease requires a high-index of suspicion and clinical acumen (Haile *et al.*, 2025). Nevertheless, the clinical picture strongly supported Graves' disease with significant weight loss, resting tremors, diffuse thyroid enlargement, pretibial edema, palpitations, hyperkinetic ventricular wall motion on cardiac ultrasound, hematologic changes, such as neutropenia with relative lymphocytosis (Scappaticcio *et al.*, 2024), and biochemical thyrotoxicosis based on the suppressed TSH and elevated free thyroxine. The decision to manage conservatively with carbimazole and beta-blockade sought to resolve the

hyperthyroid symptoms, which should result in thymic regression as well (Chan *et al.*, 2025). Surgical intervention for the hyperthyroid gland may, however, become an option if carbimazole fails to work in 6 weeks.

The case study shows the importance of integrating clinical, biochemical, and radiologic data rather than relying on isolated findings to make a diagnosis. In resource-limited settings, such as ours, advanced immunologic testing, such as for TRAbs, may be unavailable. A pragmatic approach guided by the clinical presentation, thyroid function tests, and imaging findings can guide management for the patient.

Ultimately, this report seeks to reinforce the need for heightened clinician awareness of the link between hyperthyroidism and thymic enlargement. This recognition can help reinforce hyperthyroidism diagnosis while also preventing unnecessary invasive procedures when thymic hyperplasia, in the context of hyperthyroidism is noted.

4. Conclusion

An enlarged thymus in an adult is a rare finding, one which may represent a reversible manifestation of hyperthyroidism rather than a primary mediastinal pathology. This case shows the value of a holistic diagnostic approach that incorporates the clinical features of a patient, coupled with the biochemical evidence of thyrotoxicosis, and radiologic features of thymic enlargement. Where advanced immunologic testing is unavailable, as in resource-limited settings, the recognition of the association between hyperthyroidism and thymic hyperplasia helps facilitate timely diagnosis, inform appropriate conservative management, and reduce exposing the patient to unnecessary invasive interventions that seek to explore the enlarged thymus. A heightened clinician awareness of this relationship between thyroid dysfunction and the thymus is critical for optimizing patient outcomes.

Ethical consideration

All patient data were fully anonymized, and the case study was prepared in compliance with local institutional research, ethical, and publication guidelines. Ethical approval was obtained through the Chogoria Institutional Scientific and Ethics Review Committee, approval number is CH/ISERC/A0015-CC2.

Conflict of interest

The authors declare that they have no conflicts of interest and received no specific funding for this case study.

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Appendix

Notes on Patient's Informed Consent

The 52-year-old African female was briefed about the plan to use her patient data regarding this case in a written case study with plans to publish for purposes of sharing the details with the scientific, medical community. She consented to the article as evidenced by the attached consent form below.

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CONSENT FORM FOR CASE REPORTS

For a patient's consent to publication of information about them in a journal or thesis

Name of person described in the article or shown in the photograph: [REDACTED]

Subject matter of the photograph or article: Thymic hyperplasia in hyperthyroidism ("Graves' Disease")

Title of article: Medical practitioner or corresponding author: Thymic Hyperplasia Associated with Graves' Disease: A Case Report

I, [REDACTED], give my consent for this information about MYSELF OR MY CHILD OR WARD/MY RELATIVE (insert full name): [REDACTED] relating to the subject matter above ("the Information") to appear in a journal article, or to be used for a thesis or presentation.

I understand the following:

1. The Information will be published without my name/child's name/relatives' names attached, and every attempt will be made to ensure anonymity. I understand, however, that complete anonymity cannot be guaranteed. It is possible that somebody somewhere - perhaps, for example, somebody who looked after my child/relative, if I were in hospital, or a relative - may identify me.
2. The Information may be published in a journal that is read worldwide or an online journal. Journals are aimed mainly at health care professionals but may be seen by many non-doctors, including journalists.
3. The Information may be placed on a website.
4. I can withdraw my consent at any time before online publication, but once the Information has been committed to publication, it will not be possible to withdraw the consent.

Signed: M. Opari

Date: 9/12/25

Signature of requesting medical practitioner/healthcare worker: [Signature]

Date: 9/12/25

Caring with love
f o t i n
1st Corinthians 13:13- these three remain: faith, hope & love. But the greatest is love.

Cite this article as: Fedinand Getankwa and Paul Opare-Addo (2026). *Thymic hyperplasia associated with adult graves' disease: A case report. African Research Journal of Medical Sciences.* 3(2), 1-7. doi: 10.62587/AFRJMS.3.2.2026.1-7.