Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Mistaken Identity: A case report of an incidental Primary Mediastinal Large B-cell Lymphoma initially diagnosed as a Thymoma in a young female patient after a Gun-shot wound injury

Alicia Agyemang-Sarpong

seeyah16@icloud.com

St. Barnabas Hospital

Rocco Lafaro

St. Barnabas Hospital

Case Report

Keywords: Thymoma, Lymphoma, Primary Large B-cell, Median Sternotomy, R-EPOCH, CD20-positive

Posted Date: August 6th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10197538/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Abstract

Thymomas and lymphomas usually occur separately but their diagnosis is a well-recognized challenging pitfall owing to their common location and overlapping morphohistology. They present as anterior mediastinium mass with epithelial-lymphoid admixtures and lymphocyte-rich patterns respectively. We report a case of incidental discovery of an anterior mediastinal mass thought to be thymoma but later revealed by immunohistochemistry (IHC) as PMBCL (Primary Mediastinal Large B-cell Lymphoma).

Background: Differentiating thymic lymphoma from thymoma is one of the most clinically consequential diagnostic challenges in anterior mediastinal pathology, as misdiagnosis can lead to inappropriate surgery (for lymphoma) or delayed resection (for thymoma). The key pitfalls span imaging, histopathology, and immunohistochemistry. The thymus, one of two primary lymphoid organs, contains both epithelial and lymphoid cells. Accurate clinical distinction can be challenging owing to their common location and gross appearance, is essential with far-reaching clinical consequences(2). Our case is among a handful of published reports detailing such challenges of diagnosis of thymoma and lymphoma.

Case Presentation: Case of 32 year old female, history of Endometrial Carcinoma status post hysterectomy, Bilateral Salpingophorectomy(BSO) and Lymph Node dissection brought in by Emergency medical services (EMS) as a Trauma code, gunshot wound(GSW) injury to the abdomen, unresponsive and in hemorrhagic shock. Patient intubated, resuscitated and emergently taken for Exploratory Laparotomy. Finding on postoperative imaging revealed a 3.5cm right prevascular anterior mediastinal mass suggestive of thymoma or lymphoma.owing to retained bullets, a Magnetic Resonance Imaging was not obtained. Patient evaluated at outpatient cardiothoracic clinic, discussed surgical excision of mass based on an imaging review and report to obtain tissue diagnosis. Biopsy obtained via a median sternotomy with intraoperative findings of ~ 5–6 cm extra pericardial anterior mediastinal mass with no involvement of lungs or brachiocephalic vessels. An intraoperative surgical pathology was noted as thymoma, lymphocytic. A final surgical pathology review at an outside facility favored final diagnosis of CD20 + primary mediastinal large B-cell lymphoma. Patient referred to an oncologist for additional workup and management. Nuclear medicine imaging report showed no metabolically active disease. Patient immediately started on a dose-escalated six cycles of chemotherapy regimen. A three-month postop follow-up revealed patient was clinically stable with ongoing chemotherapy sessions.

Conclusion: Lymphoma, diagnosed as thymoma is not quite uncommon owing to their common gross presentation. The availability of cytoarchitecture, nuclear imaging and emerging scientific technologies have improved the challenging hurdle of diagnosis, thus impacting the direction of treatment strategies. Our case will thus add to the body of research that already exists to raise the awareness of such clinical scenarios or instances, especially in the differential diagnoses of thymomas and or lymphomas.

Background/Introduction

The thymus is one of the two primary lymphoid organs in the human body [1], located in the anterior mediastinum. Thus, it follows that most tumours in the anterior mediastinum will be either of thymic derivation, or at least intimately associated with the thymus [2].

Thymomas are the most common neoplasm of the anterosuperior compartment of the mediastinum, originate from the thymic epithelial cells and are often associated with myasthenia gravis [3].

Thymic lymphomas are primary lymphomas arising within the thymus gland, distinct from thymomas, are classified and treated according to their lymphoma subtypes. Thymomas account for 20–25% of all mediastinal and 50% of anterior mediastinal tumors; while thymic lymphomas are very rare, they account for 15% of all anterior mediastinal tumors respectively [4].

Diagnostic distinction between these two entities can be a diagnostic hurdle but not an uncommon clinical scenario, and is very critical because treatment differs fundamentally.

Thymoma is a rare malignancy of unknown etiology with unclear pathogenesis and is thought to be thymoma-induced immune dysregulation [6]. The most favored mechanism is direct relationship with Myasthenia Gravis(MG), with very similar clinical presentation. As many as 30–40% of patients with thymoma experience symptoms suggestive of MG. An additional 5% of patients who have a thymoma have other systemic syndromes [7].

Tumours derived from the lymphoid component of the thymus comprise several distinct types of non-Hodgkin's versus Hodgkin's lymphoma [8]. Thymic Lymphomas to be specific, Primary mediastinal (thymic) large B-cell lymphoma (PMBCL) are an uncommon large B-cell neoplasm recognized by the World Health Organization as a distinct entity on the basis of its unique clinical features, histogenesis, phenotype, and pathogenetic mechanisms [9]. Morphohistologic characteristics including microscopic capsular invasion are inconsequential and should be thoroughly assessed as they have significant clinical impact. There is well-documented propensity for late recurrences, long-term survival in terms of a 10-year follow-up [10]. Lymphomas are treated with chemotherapy ± radiation, while thymomas are primarily managed surgically. NCCN-preferred first-line therapy forPMBCL includes dose-adjusted EPOCH-R × 6 cycles or R-CHOP regimens [11].

Our case is among a handful of published reports detailing the challenges of anterior mediastinal masses.. We report a case of incidental discovery of anterior mediastinal mass initially thought to be thymoma but later revealed as Lymphoma, in a young female after presenting with a gunshot wound (GSW) to the abdomen and back.

Case Presentation

This is a case of a 32 year old woman, history of Stage I Grade 2 Endometrial carcinoma status post robotic hysterectomy and bilateral salpingoopherectomy with Lymph node dissection (2020) with incidental imaging finding of concomitant thymoma and lymphoma on post-trauma admission.

The patient had presented initially as a Trauma code with a Gun Shot Wound(GSW) to the abdomen, becoming unresponsive and in near arrest from hemorrhagic shock.

The patient arrived unconscious, eyes open and unresponsive but was spontaneously breathing. Vital signs were noted for Blood Pressure(BP) of 80/50, heart rate(HR) 97, respiratory rate (RR) 24, saturating at 98% at room air(RA); bleeding from her GSW in the infraumbilical region and right lower back. Massive Transfusion Protocol (MTP) was immediately activated. She was noted with carotid pulses, weak femoral pulses, progressively became diaphoretic with agonal agonal breathing. Thus was emergently intubated, resuscitated with 4 units of pure red blood cell (pRBC), 4 Fresh Frozen Plasma(FFP) and 2 platelets; and emergently taken to the operative room (OR) for Exploratory Laparotomy while pending labs results **(**Table 1, 2**)**. The same day postop CT Abdomen-Pelvis with intravenous(IV) contrast (CTAP) showed expected post-operative findings; in addition, an incidental right prevascular mass approximately 3.5 cm in the anterior mediastinum, with soft tissue attenuation which represented a possible thymoma or lymphoma **(**Fig. 1,**Table 3)**. A Magnetic Resonance Imaging (MRI) of Chest for further diagnosis was suggested but not obtained owing to retained bullets from the GSW. She followed up at an outpatient cardiothoracic surgery clinic for further evaluation.

On clinical evaluation during the office visit, the patient had reported weight loss and lack of appetite which was at the time attributed to possible postoperative recovery, otherwise the patient remained clinically stable. Discussion was held with the patient about the potentiality of the anterior mediastinal mass being a malignant thymoma and the need for resection or excision. The patient agreed to proceed with the decision to obtain tissue diagnosis and an Echocardiogram obtained (Table 4).

A Median Sternotomy for Excision of anterior mediastinal mass was planned and performed as an elective surgical procedure. The site of surgery was properly marked per policy at the preoperative ambulatory area, was brought to the operating room and placed supine on the operating table. A standard surgical time-out was performed twice per institutional protocol to confirm the patient's identity, planned procedure, and operative site. General endotracheal(GET) anesthesia was induced without complication. Preoperative antibiotic prophylaxis and venous thrombosis prophylaxis were administered and surgical site prepped and draped in the usual sterile fashion using chlorhexidine solution.

The Mediastinal lesion was approached by a median sternotomy. Operative findings revealed ~ 5–6 cm extra pericardial anterior mediastinal mass with no involvement of lungs or brachiocephalic vessels. Mass was dissected away from pericardium and off the innominate vein. The left phrenic nerve was identified and protected. The right phrenic nerve was dissected away from the mass, which was adherent to the mass. Mass appeared to involve the thymus gland, a part was sent for an intraoperative frozen section reported by the pathologist as thymoma, lymphocytic(Table 8**)**. The entire mass was resected, two specimens sent for surgical pathology(Table 7), hemostasis achieved and a left mediastinal chest tube inserted. Six sternal wires were placed, sternal soft tissue closed in layers and skin closed with subcuticular sutures

The patient tolerated the procedure very well, was extubated and a two gross specimen sent to pathology for final report. The patient was transferred to the Post-Anesthesia Care Unit(PACU) in stable condition and admitted to the surgical telemetry for postop cardiopulmonary monitoring. Postoperative imaging revealed completely resected mediastinal mass. She continued to remain hemodynamically and clinically stable, was downgraded to the surgical floor postoperative day 3 and was cleared for discharge home on postop day 5, and the patient advised to return to the clinic in two weeks for postoperative visit. Postop CT imaging was obtained at 1 week(**Fig. 2, Table 5**); and at office visit, patient notified of a final review of surgical pathology at an outside facility which favored the diagnosis of CD20-positive primary mediastinal large B-cell lymphoma (Table 9, 10). In consultation with the medical oncologist, the patient was referred for further evaluation. Additional diagnostic workup with laboratory tests, a Positron-EmissionTomography (PET/CT) scans and immunohistochemistry were obtained. PET/CT results showed no metabolically-active disease(Deauville 1). The decision was made by the medical oncologist to proceed with dose-escalated R-EPOCH regimen x 6 cycles, includes Rituximab, Etoposide, Oncovin/Vincristine, Prednisone, Cyclophosphamide and Hydroxydaunoribicin/doxorubicin. The patient was seen at 3 weeks postop for evaluation, with a repeat CT imaging(**Fig. 3, Table 6**); continues to follow up with the medical oncology team for completion of all 6 cycles of chemotherapy.

Table 1.0
Complete blood count(CBC)

Parameters	**Values**
Wbc	8.6
Rbc	3.72
Hgb	11
MCV	91
MCH	29.6
MCHC	32.4
RDW	12.9
Platelets	264
MPV	11/3
Neutrophils	77
Lymphocytes	15.3

Table 2
Basic Metabolic Panel (BMP)

Parameters	Values
Sodium	140
Potassium	4
Chloride	108
CO2	22
BUN	7
Creatinine	0.6
Glucose	112
Calcium	8.7
Anion Gap	10
eGFR	122.5

Table 3.0
P**reop CT imaging findings**

Impression
3.5 cm right prevascular mass with soft tissue attenuation, which may represent a thymoma or lymphoma. Recommend follow-up MRI chest as clinically warranted/feasible. NB: MRI not obtained due to prior retained bullets

Table 4.0
Preop Transthoracic Echocardiography (TTE)

Impression
Indication: to rule out tamponade physiology and assess ability to tolerate positive pressure ventilation during surgery. Essentially normal exam no indication of impingement on right ventricle observed, normal and deep respiratory effort and valsalva. Right ventricle dimensions within normal limit Mild left ventricular hypertrophy observed

Table 5.0
Postoperative CT Angiography(CTA) of Chest at 1 week postop

IMPRESSION:
● no evidence of pulmonary embolus, bibasilar and right perihilar subsegmental atelectasis although cannot exclude superimposed infection. Bilateral trace pleural effusions, trace pericardial effusion, small hiatal hernia.

Table 6.0
CTA chest at three months postop

IMPRESSION:
● no pulmonary embolism, resolution of previously seen soft tissue fullness/mass along the right/anterior mediastinum, resolution of previously seen atelectatic/consolidative pulmonary changes

Surgical Pathology Results

Table 7.0
Gross Pathology Description

A. Specimen received labelled "Anterior Mediastinal mass" **● received fresh, consisting of single soft tissue fragment (without orientation) measuring 6.0 x 2.5 x 0.5 cm. Inked black all around and showed solid grey white lobulated cut surface.** **● Representative section was submitted for intraoperative (frozen) consultation and specimen entirely submitted for permanent pathology.**
B. Specimen labeled "additional anterior mediastinal mass" ● received fresh, consisting of three tan colored soft tissue fragments measuring 13 x 6 x 3 cm (#1), 8 x 3 x 1 cm (#2) and 3.5 x 1.5 x 1.0 cm (#3) respectively; and were inked black on outer surface. ● fragment (#1) largest, showed a solid, grey white mass measuring 6.0 x 5.0 x 3.0 cm and abutt the outer inked surface; central part showed yellow cheesy area measuring 2.0 x 1.9 x 1.5 cm. ● fragment (#2) showed solid grey white tissue with lobulation. ● fragment (#3) showed solid tan colored tissue without any lobulation. ● representative sections were submitted for permanent pathology.

Table 8.0
Frozen (Intraoperative) Pathology Report

Impression
A. Anterior mediastinal mass, excision (frozen): Intraoperative evaluation was performed by Attending Pathologist. Thymic lesion, favor thymoma. Primary Surgeon notified, read back confirmation was provided.

Table 9.0: Final Review of Surgical pathology

A: Immunohistochemistry

Impression: Block A2 (labelled at OSH)
• malignant neoplasm (intra-thymic localization): diffuse, dense infiltrate of medium to large-sized neoplastic cells, round to irregular nuclei, speckled chromatin, variably prominent nucleoli, moderate amounts of pale cytoplasm. • thin bands of fibrosis separating the cells, reminiscent of compartmentalizing fibrosis. • frequent mitotic figures and apoptotic debris, large areas of geographic necrosis • classic Reed-Sternberg cells are not seen. • neoplastic proliferation appears adjacent to a portion of lung tissue with possible infiltration into the parenchyma. Immunophenotypes: • CD20+ (strong), CD30-/+ (variable), Cd79a+, PAX5+, CD10-, BCL6+, MUM1+/-, CD23+/-, CD21+/-, BCL2+, cMYC+/-, p53-/+ TdT-, CD15- • Ki-67 shows a highly elevated proliferation rate • CD3 stains background T-cells. EBER (ISH) appears negative (?) • Final: Involvement By Cd20 Positive Large B-Cell Lymphoma with necrosis, favor Primary Mediastinal In The Appropriate Clinical Setting

B: Part 2

Impression: Block B
• thymic tissue with overall preserved lobular architecture • fairly-well delineated lymphoid lesion with overall organized immune architecture (LN?), exhibiting B-cell follicles, surrounded by interfollicular areas • scattered large atypical cells, morphologically and phenotypically Immunophenotypes: • CD3+, CD5+, TdT+, CD20+, PAX5+, CD30+, CD15+, PAX5dim, MUM1+, cMYC+, p53+/-, EBERish-, CD3+, CD5+ (subset LEF1+) • resembles Reed-Sternberg-like cells and variants, significance unclear, may represent an early stage classic Hodgkin lymphoma (collision lymphoma?) BCL2, BCL6 and MYC FISH analysis with no evidence of rearrangement while PD-L1, PDCD1LG2 FISH analysis with low level PDL1 amplification, 60% of cells. This FISH finding of PDL1 amplification is consistent with Primary Mediastinal Large B-Cell Lymphoma.

Table 10: Final OSH Surgical Pathology Report

Final Impression
A & B. Mediastinum, anterior mass lesion, excision: Involvement by CD20 positive large B-cell lymphoma with necrosis, favor primary mediastinal in the appropriate clinical setting, see addendum report on results of IHC analysis for further characterization. Addendum on IHC report: issued to report on immunohistochemical stains for evaluation of a non-hematopoietic neoplasm. The neoplastic cells are negative for CK, CK19, p40, NUT1, SOX10 and ALK (D5F3).

Discussion and Conclusion

This patient's noncontributory initial clinical examination, with an incidental CT finding of an anterior mediastinal mass ruled in thymoma, thyroid tumors, teratoma (assumingly in a male patient), and thymic lymphomas, also known by mnemonic as the 4 T's.

Our initial working diagnosis of thymoma versus lymphoma was based off the imaging review and radiology report even before any surgical intervention was intended. Unable to obtain MRI for further workup, our next approach was to obtain issue diagnosis via mass excision.

The initial intent intraoperative was to perform a tissue biopsy, and then based on the frozen section report, direct the next step(s) of management.

In the setting of the official preliminary surgical report stating a primary thymoma, the decision was made intraoperatively to entitle excise the mass, which was uneventful.

The presence of histologic heterogeneity is common among thymomas and even more so lymphomas, as a result benign and malignant thymomas cannot simply be differentiated based on history or location alone[8].

For the purposes of our discussion, we will also focus on the role of the interprofessional team regarding the diagnosis of thymomas and lymphomas, and treatment of lymphomas.

The patient's incidental postoperative imaging findings raised the possibility of a number of differential diagnoses according to its location. In this specific instance, the suspicion of anterior mediastinal mass brings into scope an array of diagnoses including but not limited to the four (4) T's of anterior mediastinal mass:

- Thymomas or thymic-originating lesions
- Thyroid tumors
- Teratoma (germ cell, in male populations)
- Thymic Lymphomas

According to Laurent et al., mediastinal masses span across a wide array of histopathological and radiological spectrum. The most frequent lesions encountered in the mediastinum are thymoma (about two-thirds), while germ cell, thyroid masses and lymphomas are about one-third.

Per Whiten et al., the mediastinum is demarcated by the pleural cavities laterally, the thoracic inlet superiorly and the diaphragm inferiorly; which is further divided into anterior, middle and posterior compartments for anatomical localization.

Anterior mediastinal tumours account for 50% of all mediastinal masses, including thymoma, teratoma, thyroid disease and lymphoma. Masses of the middle mediastinum are typically congenital cysts while those arising in the posterior mediastinum are often neurogenic tumours [9].

In an otherwise asymptomatic patient with incidental imaging findings, as well as unavailability of further workup with MRI of the chest, the burden and challenge of diagnosis was stronger to differentiate between Thymoma and lymphoma.

The role of interdisciplinary tumor workup is very essential, as was in this case, which immediately helped to identify, revert diagnosis and direct appropriate therapy well-suited for their diagnosis, thus improving outcomes. The backbone of appropriate standard or care and evidence-based approach does not solely lie on a mono-disciplinary approach, but rather interdisciplinary players including but not limited to primary care providers, surgeons, medical oncologists, pathologists, radiologists, care givers, amongst others.

Diagnostic workup

Patients with thymomas may present with compressive symptoms, lymphomas usually present as asymptomatic[10]. Most mediastinal masses are often incidentally discovered on imaging tests and due to differing treatment approaches, accurate pathologic distinction is very critical [11]. Radiographic imaging is challenging because the imaging appearance of a variety of benign and malignant anterior mediastinal masses are very similar. Per the NCCN guidelines, the three primary imaging modalities recommended for differentiating thymoma from lymphoma in the anterior mediastinum are contrast-enhanced CT, FDG-PET/CT and MRI, each contributing distinct and complementary information. The NCCN Guidelines for thymomas and thymic carcinomas recommend chest CT with contrast as the initial study, with FDG-PET/CT and chest MRI as clinically indicated adjuncts[12]. CT chest with IV contrast is the most valuable imaging technique; distinguishing thymomas as well-defined homogeneous, smooth contoured anterior mediastinal mass, from lymphomas as enhancing lobular soft tissue mass, often infiltrative to vascular structures and associated with lymphadenopathy. Lymphoma on the other hand tends to have lower iodine concentration on spectral CT compared to thymoma[13].

PET/CT is the gold standard for staging FDG-avid lymphomas, and provides the most quantitative distinction with thymomas demonstrating significantly lower FDG avidity than lymphomas. PET/CT

improves staging accuracy, leading to upstaging in 10–30% of patients compared to CT alone[14]. MRI is useful in determination of compression or invasion of nearby structures.

Other key diagnostic tools essential to lymphoma differential workup include cytokeratin immunohistochemistry, flow cytometry to detect and TCR gene rearrangement studies, which are clonal in T-LBL, polyclonal in thymoma [15]. In addition, the patient should have various laboratory studies drawn including germ cell markers (beta-hCG and AFP) and lymphoma markers (LDH and CBC) since both germ cell tumors and lymphomas are in the differential of anterior mediastinal masses[16]. A thyroid-stimulating hormone should be measured for differential as well. Given the elevated risk of secondary malignancies, long-term surveillance secondary malignancies is warranted in all patients with thymoma or lymphomas [17].

Surgical Excision or Biopsy

This can be performed for diagnostic and treatment purposes; usually performed when there is high suspicion of malignancy based on results of imaging or other tests. Pulmonary function and cardiac stress tests are very essential and preclude the procedure, to determine adequate cardiopulmonary reserve preoperatively[18]. A definitive diagnosis of a thymic tumor needs tissue diagnosis either via surgical resection if small, and resectable or via a percutaneous or open biopsy. An open biopsy can be performed via thoracoscopy, cervical mediastinoscopy, or an anterior mediastinotomy (as in our case report). Fine-needle aspiration (FNA) alone is insufficient for initial diagnosis or histologic grading and thus, excisional or incisional biopsy is the preferred method for initial lymphoma diagnosis. Core needle biopsy is an acceptable alternative when excisional biopsy is not feasible or contraindicated [19–21].

A large multicenter study confirmed that surgical excision provided a definitive diagnosis in 98.1% of cases compared to 92.3% for core needle biopsy[22]. All specimens should undergo hematopathology review with immunohistochemistry (IHC), flow cytometry, and molecular studies (Ig gene rearrangements, FISH for major translocations) as appropriate[23].

Treatment Approach /Management

Surgery

There are three surgical approaches available –Median sternotomy, transverse neck incision, or thoracoscopic surgery (robotic surgery). Surgery remains a definitive treatment strategy for thymoma management with or without adjuvant therapies. Complete excision of the tumour with negative surgical margins is the optimal treatment and the best prognostic factor in thymomas[24]. Myasthenia Gravis has long been associated with thymoma (~ 50% of thymoma patients) therefore, evaluation for myasthenia gravis should be done as no patient in myasthenic crisis should be considered for surgical resection but rather should receive plasmapheresis prior to surgery, and their steroid dose be minimized [25]. These patients often may need stress dosing before thymectomy. The resection of the mediastinal pleura,

pericardium, adjacent lung, innominate vein, or unilateral phrenic nerve is sometimes required for an R0 resection – which is the most critical long-term prognostic indicator[26].

Chemotherapy vs Targeted Therapy

Treatment for thymic lymphomas are usually directed by the specific lymphoma subtype rather than by the thymic origin. PMBCL is a distinct subtype from mature thymic B cells and is highly curable with first-line chemoimmunotherapy. According to NCCN guidelines, the preferred first-line therapy is dose-adjusted EPOCH-R(Etoposide, Prednisone, Oncovin, Cyclophosphamide, hydroxydaunomycin/Doxorubicin–Rituximab) for six cycles or R-CHOP regimens. In this particular instance, our patient is currently receiving a dose-escalated R-EPOCH.

A SEER-based analysis of 233 thymic lymphoma patients (median age 33 years) found 5-, 10-, and 20-year overall survival rates of 80.0%, 77.5%, and 70.9%, respectively. Age and pathological subtype were independent prognostic factors, chemotherapy significantly improved survival, while surgery alone had limited impact on outcomes. Alternatives with targeted/novel therapies for patients who relapse or have refractory disease include, pembrolizumab (PD-1 inhibitor), nivolumab ± brentuximab vedotin, and CAR T-cell therapy (axicabtagene ciloleucel, lisocabtagene maraleucel)

Conclusion

Diagnosis of anterior mediastinal masses although challenging, must be critically handled from a multimodal and multidisciplinary approach due to the impact misdiagnosis can have on treatment approaches and patient outcomes. On the radar of differential diagnosis of any anterior mediastinal masses, lymphoma must always be considered.

Employment of IHC with CK/p63 staining comes in handy as it can identify and easily rule in or out other diagnoses, with the demonstration of the epithelial network(in the case of thymoma) or its absence favoring lymphoma. This should be used in conjunction with the epithelial marker panel.

Multidisciplinary evaluation should be highly recommended with expert hematopathology review, and given the elevated risk of secondary malignancies, long-term surveillance secondary malignancies should be warranted in all patients with thymoma or lymphomas.

Abbreviations

GSW
Gunshot wound
R-EPOCH
Rituximab-Etoposide, Prednisone, Oncovin/Vincristine, Cyclophosphamide
Hydroxydaunorubicin/doxorubicin

TTE
TransThoracic echocardiography
CD20+
Cluster of differentiation 20 positive
CTAP
computer tomography abdomen-pelvis
MRI
magnetic resonance imaging
IHC
immunohistochemistry
GET
General endotracheal
MG
myasthenia gravis
WHO
world health organization
PET
FDG-PET:fluoro deoxy glucose-Positron emission tomography
OR
Operating room
MTP
Massive transfusion protocol
EMS
Emergency medical services
DLBCL
Diffuse large B-cell lymphoma
PMBCL
primary mediastinal large B cell lymphoma
SEER
Surveillance Epidemiology and End results
TCR
T-Cell receptor
NIF
Negative inspiratory Force
IV
intravenous
FFP
fresh frozen plasma
pRBC
pure red blood cell

RA
room air
HR
heart rate
BP
blood pressure
CTA
computer tomography angiography
NCCN
National Comprehensive Cancer Network
CAR -T cell
Chimeric Antigen Receptor T-cell
PDL-1
Programmed Death-Ligand 1

Declarations

Availability of data and materials

Available on demand

Acknowledgements

Not applicable.

Funding

No funding was secured for this study.

Authors information

Alicia Agyemang-Sarpong, MD, Rocco Lafaro, MD

Affiliations

St Barnabas Hospital, Department of Surgery, Division of Cardiothoracic Surgery, 4422 Third Avenue, Bronx, NY 10457. A Agyemang-Sarpong

St Barnabas Hospital, Department of Surgery, Division of Cardiothoracic Surgery, 4422 Third Avenue, Bronx, NY 10457. R. Lafaro

Contributions

AAS and RL conceived the case report, acquired the progress reports, drafted the initial manuscript, reviewed, and revised the manuscript. All authors read and approved the final manuscript.

Corresponding author

Correspondence to Alicia Agyemang-Sarpong.

Tel: 3467171214; Email: seeyah16@icloud.com

Ethics approval and consent to participate.

Not applicable.

Consent for publication

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by

the Editor-in-Chief of this journal.

Competing interests

The authors declare that they have no competing interest to disclose.

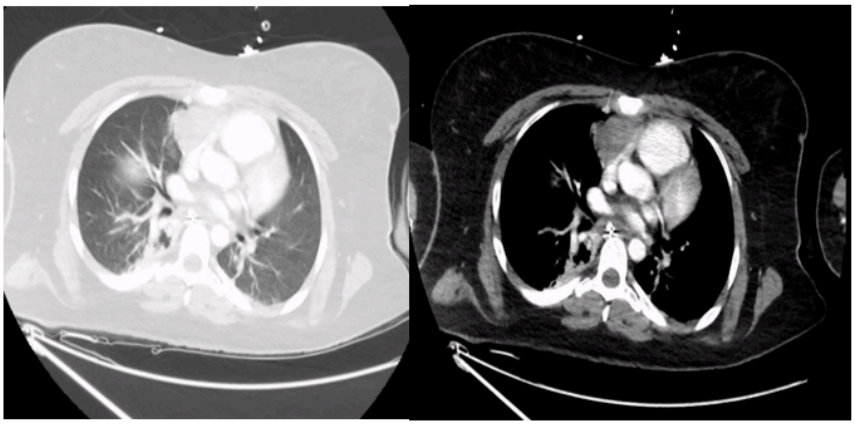
References

1. Shen W, Cao Y, Wang X, Zhang P, Zhou Q. Invasive thymoma with intravascular growth into the great veins and right atrium: A case report. Thorac Cancer. 2020 May;11(5):1326-1329.
2. Rubinstein MM, Goss C, Avecilla ST, Dubé GP, Riely GJ, Mones JV. Management of thymoma-associated pure red cell aplasia: A novel use of blood substitute HBOC-201 in a Jehovah's Witness. Clin Case Rep. 2020 Feb;8(2):289-292.
3. Sideris A, Huang J. Commentary: Toward a better understanding of the natural history of surgically treated thymoma associated with paraneoplastic syndromes. J Thorac Cardiovasc Surg. 2020 Jul;160(1):316-317
4. Rajan A, Zhao C. Deciphering the biology of thymic epithelial tumors. Mediastinum. 2019 Sep;3
5. Hashimoto S, Hayasaka K, Suzuki K, Endoh M, Yanagawa N, Shiono S. Thymic Small Cell Carcinoma Associated With Lambert-Eaton Myasthenic Syndrome. Ann Thorac Surg. 2020 May;109(5):e347-e348
6. Hsu CH, Chan JK, Yin CH, Lee CC, Chern CU, Liao CI. Trends in the incidence of thymoma, thymic carcinoma, and thymic neuroendocrine tumor in the United States. PLoS One. 2019;14(12):e0227197.
7. Alothaimeen HS, Memon MA. Treatment Outcome and Prognostic Factors of Malignant Thymoma - A Single Institution Experience. Asian Pac J Cancer Prev. 2020 Mar 01;21(3):653-661.

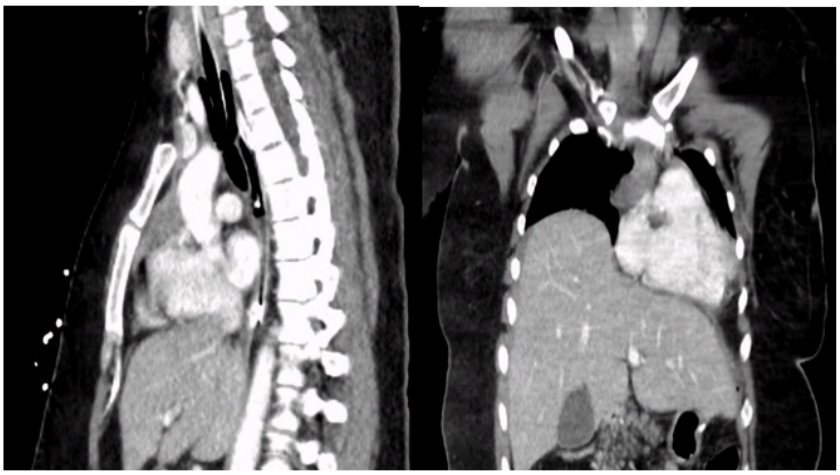
8. Yu L, Zhang BX, Du X, Yu Z, Yang XG, Jiang YX. Evaluating the effectiveness of chemotherapy for thymic epithelial tumors using the CD-DST method. Thorac Cancer. 2020 May;11(5):1160-1169.
9. Yang CJ, Hurd J, Shah SA, Liou D, Wang H, Backhus LM, Lui NS, D'Amico TA, Shrager JB, Berry MF. A national analysis of open versus minimally invasive thymectomy for stage I to III thymoma. J Thorac Cardiovasc Surg. 2020 Aug;160(2):555-567.e15. 10.Tian W, Li X, Tong H, Weng W, Yang F, Jiang
10. Wang J. Surgical effect and prognostic factors of myasthenia gravis with thymomas. Thorac Cancer. 2020 May;11(5):1288-1296
11. Laurent F, et al. Mediastinal masses: diagnostic approach. Eur Radiol. 1998;8:1148–1159. doi: 10.1007/s003300050525.
12. 11. Whiteen CR, et al. A diagnostic approach to mediastinal abnormalities. Radiographics. 2007;27:657–671. doi: 10.1148/rg.273065136.
13. Mary et al; Marx A, Chan JK, Coindre JM et al. The 2015 World Health Organization classification of tumors of the thymus: continuity and changes. J. Thorac. Oncol. 2015; 10; 1383–1395
14. Wang X, Miao Y, Cao Z, Zheng S, Xue X, Feng X. Characterization of molecular genetics and clinicopathology in thymic MALT lymphoma. Ann Hematol. 2022 Jan;101(1):91-97. doi: 10.1007/s00277-021-04671-0. Epub 2021 Oct 4. PMID: 34605949
15. Shi W, Ren Y, Liu S, Liu Y, Xia Y, Li S, Wang X, Zhang L, Guo X, He L, Peng H, Zhang Y, Liu Y, Fan L, Sun X, Li J, Yu W, Feng X, Miao Y. Clinical characteristics and survival outcomes of thymic mucosa-associated lymphoid tissue lymphoma: A multicenter analysis of 82 patients. Cancer. 2025 Dec 1;131(23):e70183. doi: 10.1002/cncr.70183. PMID: 41273346.
16. Zhou MX, Chen YY, Zhang JQ, Bai WL, Huang C, Guo C, Liu HS, Li SQ. A systematic review and meta-analysis of thymic mucosa-associated lymphoid tissue lymphoma. J Thorac Dis. 2022 Aug;14(8):2894-2907. doi: 10.21037/jtd-22-81. PMID: 36071772; PMCID: PMC9442531.
17. Ferreri AJ. Risk of CNS dissemination in extranodal lymphomas. Lancet Oncol. 2014 Apr;15(4):e159-69. doi: 10.1016/S1470-2045(13)70568-0. PMID: 24694639.
18. 13. National Comprehensive Cancer Network:Thymic and Thymic Malignancies, version 2.2026
19. Marx A, Chan JK, Coindre JM, Detterbeck F, Girard N, Harris NL, Jaffe ES, Kurrer MO, Marom EM, Moreira AL, Mukai K, Orazi A, Ströbel P. The 2015 World Health Organization Classification of Tumors of the Thymus: Continuity and Changes. J Thorac Oncol. 2015 Oct;10(10):1383-95. doi: 10.1097/JTO.0000000000000654. PMID: 26295375; PMCID: PMC4581965.
20. Travis WD, Brambilla E, Müller-Hermelink HK, et al. Pathology and Genetics of Tumours of the Lung, Pleura, Thymus and Heart. IARC Press; 2004.
21. Rosai J, Sobin L. Histological Typing of Tumours of the Thymus. 1999
22. Travis WD, Brambilla E, Burke AP, et al. WHO classification of tumours of the lung, pleura, thymus and heart. IARC Press; 2015.
23. Strobel P, Hartmann E, Rosenwald A, et al. Corticomedullary differentiation and maturational arrest in thymomas. Histopathology. 2014;64:557–566.

24. Marx A, Strobel P, Badve SS, et al. ITMIG consensus statement on the use of the WHO histological classification of thymoma and thymic carcinoma: refined definitions, histological criteria, and reporting. Journal of thoracic oncology: official publication of the International Association for the Study of Lung Cancer. 2014;9:596–611.
25. Swerdlow SH, Campo E, Harris NL, et al. WHO Classification of Tumours of Haematopoietic and Lymphoid Tissues. IARC; 2008.
26. Fletcher CDM, Bridge JA, Hogendorn PCW, et al. WHO Classification of tumours of soft tissue and bone. IARC Press; 2014.
27. Detterbeck FC, Nicholson AG, Kondo K, et al. The Masaoka-Koga stage classification for thymic malignancies: clarification and definition of terms. Journal of thoracic oncology: official publication of the International Association for the Study of Lung Cancer. 2011;6:S1710–1716.

Figures



A: axial View, with lung and abdomen window



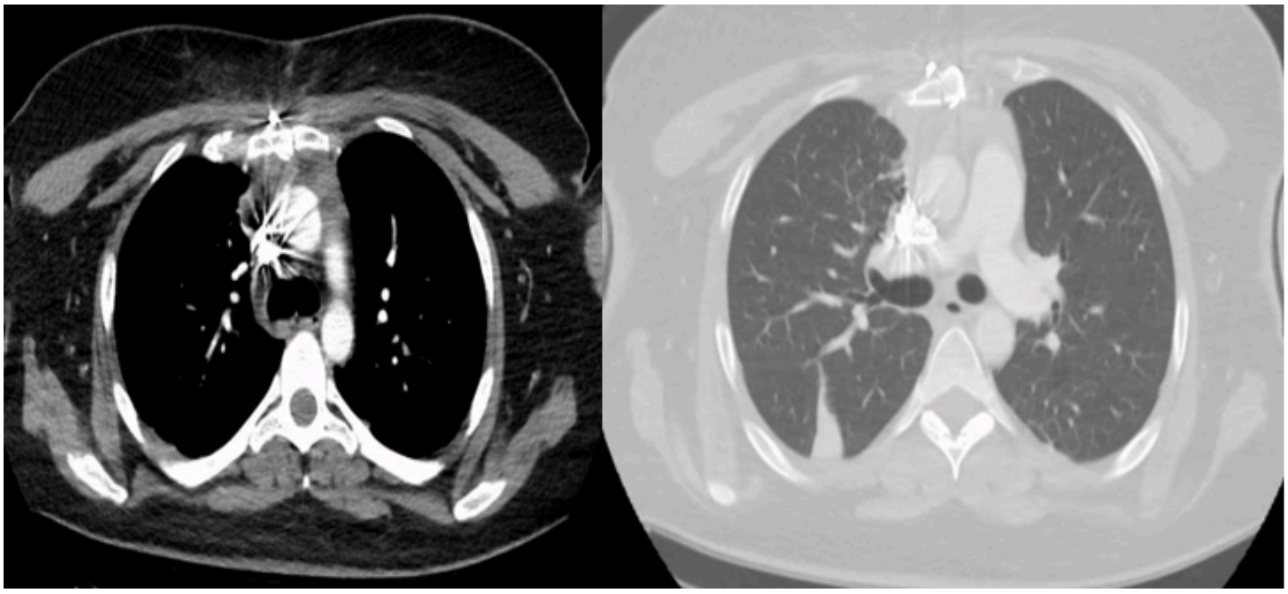
B: sagittal view, in abdomen window C: coronal view in (i) abdomen and



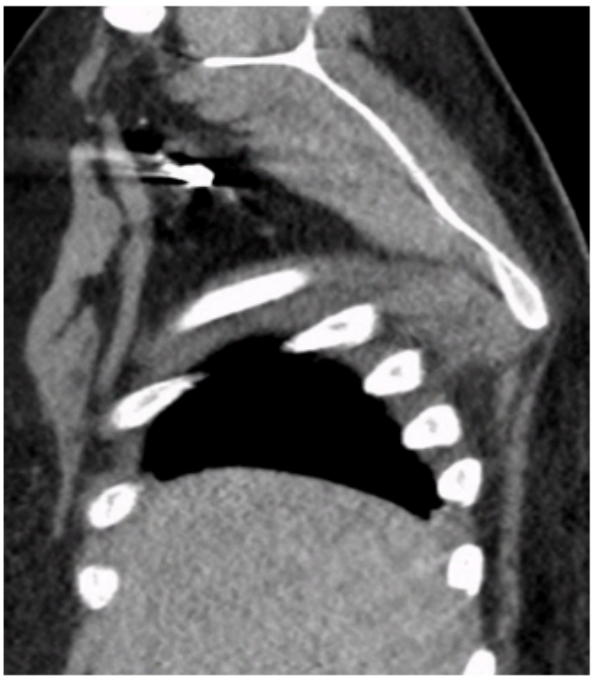
(ii) bone window

Figure 1

Preop CT chest with IV contrast



A: Axial abdomen and window views;



and B: sagittal cut in abdomen view

Figure 2

Postop CTA Chest at one week

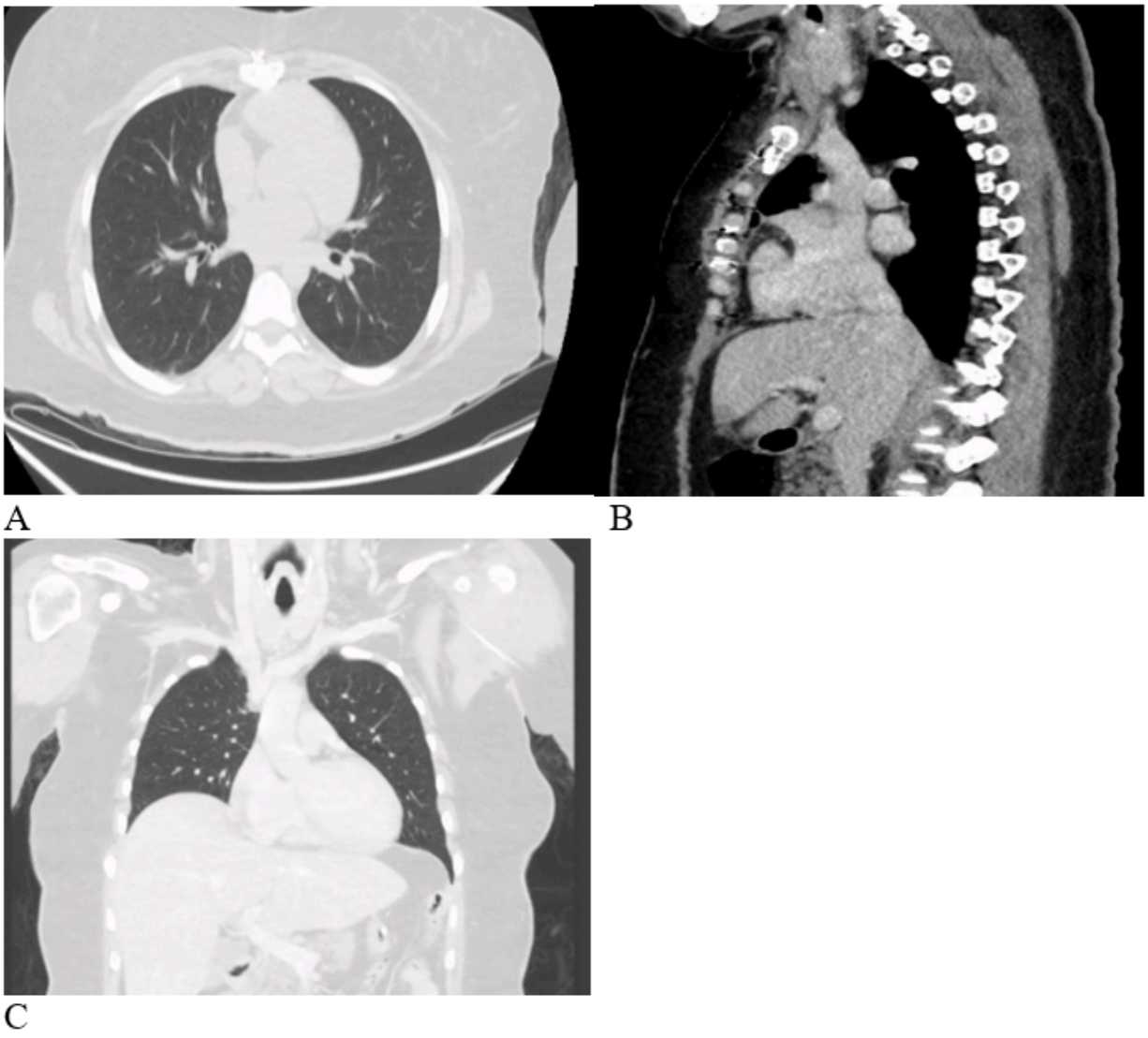


Figure 3

Postop CT Angiography of Chest at 3-months

A: axial view, B: Sagittal view C: Coronal view