www.mednet.gr/archives
ARCHIVES OF HELLENIC MEDICINE: ISSN 11-05-3992

CASE REPORT
ΕΝΔΙΑΦΕΡΟΥΣΑ ΠΕΡΙΠΤΩΣΗ

Mediastinal teratoma with malignant degeneration and cardiac tamponade

Teratomas are the most frequent of mediastinal germ cell tumors, but the mature ones are uncommon and more often incidentally detected; the malignant predominate in males. We reported the case study of a 54-year-old diabetic and hypertensive woman who presented with an acute episode of chest pain and dyspnea, peripheral edema, hypophonetic cardiac sounds, and normal heart rate and arterial blood pressure. Imaging studies showed a huge mediastinal cystic lesion with calcified walls, pericardial effusion, ectasia in the inferior vena cava, and partial collapse of the right lung. She had urgent pericardial fluid drainage and total resection of the mature cystic teratoma with malignant degeneration to pancreato-biliary adenocarcinoma confirmed by the carcinoembryonic antigen and CDX2 positivity. After the postoperative bronchoaspiration she had a cardiorespiratory arrest promptly reversed, but died due to the encephalic injury, sepsis, and a refractory circulatory shock.

ARCHIVES OF HELLENIC MEDICINE 2025, 42(5):695–699
ΑΡΧΕΙΑ ΕΛΛΗΝΙΚΗΣ ΙΑΤΡΙΚΗΣ 2025, 42(5):695–699

P.V.A. Tubino,[1]
V.M. dos Santos,[2]
A.C.M. Kuhn,[3]
E.C.P.M. Bezerra[3]

[1]Cardiothoracic Surgery, Institute of Cardiology and Transplants of the Federal District, Brasília-DF
[2]Department of Internal Medicine, Armed Forces Hospital and Catholic University, Brasília-DF
[3]Catholic University, Brasília-DF, Brazil

Τεράτωμα μεσοθωρακίου με κακοήθη εκφύλιση και καρδιακό επιπωματισμό

Περίληψη στο τέλος του άρθρου

Key words

Cardiac tamponade
Malignant degeneration
Mediastinal teratoma

Submitted 24.4.2024
Accepted 10.5.2024

Mediastinal teratomas are congenital tumors derived from abnormally migrated germ cells during embryogenesis, mainly with benign patterns but causing compressions; this site is infrequent (near 10%), as malignant evolution occurs in up to 40% of them and mostly in males, and the squamous cell carcinoma is often associated with metastases.[1–10] Alpha-fetoprotein (AFP) and beta-human chorionic gonadotropin (β-HCG) are markers to diagnose malignant teratomas, even when the biopsy evaluation fails to confirm.[4,8,9] The compressive effect of teratomas and the severity of their manifestations depend upon the dimensions and the characteristics of the tumor behavior within the mediastinum.[4] Benign mature teratomas should have total resection without any delay; total resection plus adjuvant or neoadjuvant chemotherapy is a good choice for immature teratomas.[4] Delays in treatment result in the tumor size making a complete resection difficult, increasing the chance of malignant transformation of the teratoma, besides the risks of rupture, lung and heart compression and infections, as well as the perioperative demises.[4]

The aim of this case study was to enhance the awareness and suspicion index of the non-specialist health care workers about mediastinal teratoma, a very challenging condition.

CASE PRESENTATION

A 54-year-old diabetic and hypertensive woman with a suspicion of right heart failure (RHF) sought medical assistance due to an acute episode of chest pain and dyspnea. On physical exam there was peripheral edema, absence of cyanosis, hypophonetic cardiac sounds with a regular rate of 79 bpm, and the arterial blood pressure was 100/60 mmHg. Laboratory determinations on admission showed (normal ranges): hemoglobin (13–18 g/dL): 13.3; hematocrit (42–52%): 37; leukocytes (4,000–11,000/μL): 17,000; platelets (140,000–450,000/ μL): 150,000; glucose (70–100 mg/dL): 310; urea (6–20 mg/dL): 101.6; creatinine (0.6–1.1 mg/dL): 1.8; sodium (136–145 mmol/L): 107.7; potassium (3.5–5.1 mmol/L): 3.9; calcium (8.6–10.2 mg/dL): 7.5; albumin (3.4–5.4 g/dL): 3.5; alkaline phosphatase (40–130 IU/L): 182; lactate dehy-

drogenase (140–280 IU/L): 582; C-reactive protein (CRP) (0.3–1.0 mg/dL): 39.9; creatine phosphokinase (10–120 µg/L): 141; creatine phosphokinase-MB (5–25 IU/L): 18.2; aspartate aminotransferase (<40 IU/L): 128; alanine aminotransferase (<41 IU/L): 127; gamma glutamyl transferase (8–61 IU/L): 119. Computed tomography (CT) images of the chest and abdomen revealed a cystic lesion with thickened and calcified walls in the right hemithorax measuring 12.0×10.5×14 cm, massive pericardial effusion, ectasia and blood reflux in the inferior vena cava (IVC), partial collapse of the right lower lobe, small bilateral pleural effusion, and hepatomegaly. The echocardiography scans confirmed the pericardial effusion (anterior: 3.5 cm; posterior and apical: 3.0 cm), the right cavities collapse, and the compression on IVC. She underwent an urgent pericardial fluid drainage through the pericardial window, besides sternotomy for complete surgical resection of the mediastinal tumor (fig. 1). The patient persisted with arterial hypotension during the surgery time, even after the pericardial drainage, being necessary the continuous administration of vasoactive amines. On immediate postoperative period the arterial gasometry revealed pH: 7.36, PO_2: 100.6 (FiO_2: 0.4), SpO_2: 97.4%, pCO_2: 38.4; HCO_3: 21.4, BE: -3.5, lactate: 2.32 mmoL/L, and hemoglobin: 15 g/dL; while venous gasometry showed $ScvO_2$: 82.1%, and pCO_2: 45.5. The mass was a mature teratoma evolving to invasive adenocarcinoma with mucinous, tubular, acinar, villous, cribriform, and micropapillary differentiations (figures 2, 3). Immunohistochemistry evaluations revealed positivity for cytokeratin 20 (focal) and cytokeratin 7 (diffuse), besides CEA and CD×2 (fig. 4), findings which favored the diagnosis of a pancreato-biliary adenocarcinoma developed within mediastinal teratoma. Noteworthily, no immature tissues were identified in the surgical specimen examined, there were no lymph node implants, and the free surgical margin was less than 2.0 mm. After a massive bronchoaspiration on the seventh postoperative day, she had a severe hypoxemic respiratory failure and cardiorespiratory arrest promptly reversed; but was followed by a critical clinic course due to hypoxic-ischemic encephalic injury and sepsis. The control images of the thorax revealed the distal

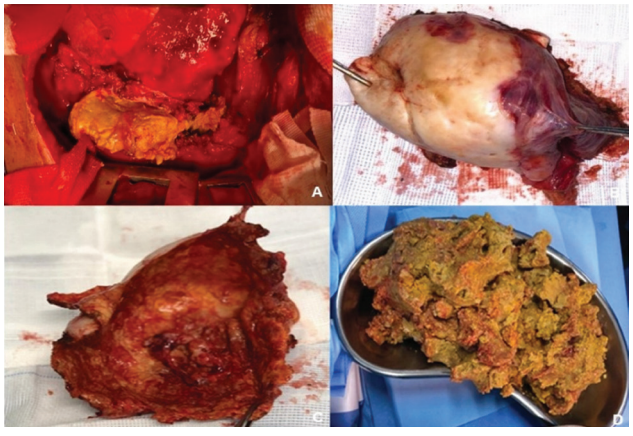

Figure 1. View of the mediastinal surgical opening (1A); gross aspects of the removed lesion (1B and 1C), and the contents of the removed lesion (1D).

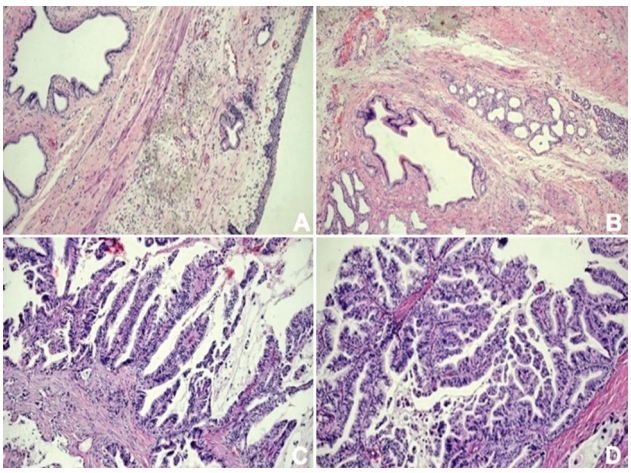

Figure 2. Aspect of the mature teratoma areas, with epithelial and mesenchymal elements in 2A and 2B (HE 100×), and the adenocarcinoma, with a papillary pattern and tubular areas infiltrating the stroma in 2C and 2D (HE 100×).

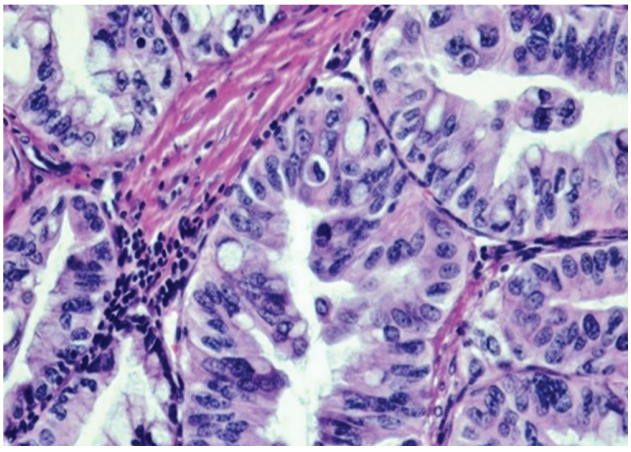

Figure 3. Histological pattern of adenocarcinoma with marked nuclear atypia (HE 400×).

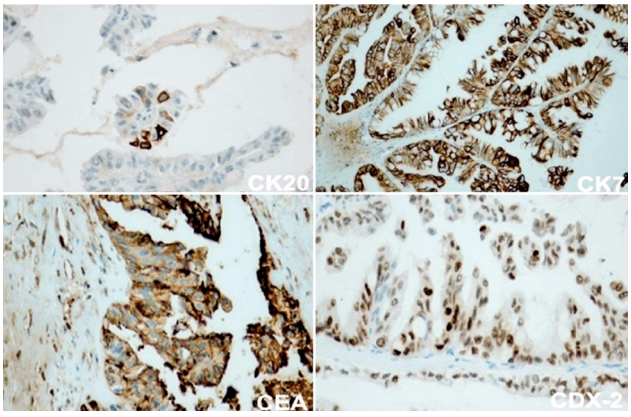

Figure 4. Positive immunohistochemistry for cytokeratin 20 (CK 20), cytokeratin 7 (CK 7), carcinoembryonic antigen (CEA), and intestine-specific transcription factor (CDX-2), favoring the diagnosis of a pancreatobiliary adenocarcinoma in a mediastinal teratoma.

ends of two substernal drains in the anterior region of the right lung, with adjacent small pneumothorax and atelectasis; a regular thin-walled cavitation in the right superior mediastinum measuring 5.2×3.3 cm; moderate left pleural effusion with an adjacent atelectasis, and a right laminar effusion; focal ground-glass opacities in the upper lobes, and peri bronchial areas of consolidation. The imaging study of the brain showed the loss of differentiation between white and gray matters, and indistinct cerebral sulci and fissures due to diffuse hypoxic cerebral edema. The microorganisms detected in fragments of the teratoma and in bronchial aspirates were *Acinetobacter baumannii*, *Staphylococcus haemolyticus*, and *Candida parapsilosis*. Diverse antimicrobials schedules were utilized to control infections including cefepime, meropenem, vancomycin, amikacin, fluconazole and anidulafungin; despite of immediate intensive care support, she irreversibly evolved to refractory shock and death on day 15.

DISCUSSION

Mature teratomas are often asymptomatic and incidentally found in routine examinations; however, they may present with non-specific signs or causing compression on the adjacent structures and development of cardiac tamponade, as occurred in this case.[1–10] The occurrence of IVC compression can simulate RHF by compromising the venous drainage, causing dyspnea, jugular distension, hepatomegaly, and edema in extremities; pleural effusions are also associated with mediastinal teratomas, as in this case.[1–10] The management of these tumors is essentially surgical, through mediastinal access and aiming the complete resection of the teratoma, which usually results in good prognosis. Complete histopathological study is mandatory, due to the rare possibility of malignant degeneration of the teratoma, making necessary the chemotherapy and or radiotherapy.[10] In this setting, it would be better to address some comments on more recent literature.

A 14-year-old female with longstanding dyspnea and presenting a right parasternal swelling had chest imaging studies revealing a mass (16×13×19 cm) occupying the middle and lower areas of the right hemithorax.[1] The lesion containing numerous calcified cysts and fat, indicative of a mature teratoma, was compressing the heart, superior vena cava, pulmonary artery and pulmonary vena. The tumor was resected *en bloc* (pericardium, phrenic nerve and azygos vena) through median sternotomy and right anterior thoracotomy extension, after the content aspiration; the diagnosis was a mature cystic teratoma, with an unremarkable postoperative course.[1] The authors emphasized the successful evacuation of the teratoma contents, besides the complete excision of the giant mature teratoma through the right hemiclamshell approach.[1]

A 41-year-old female was reported presenting RHF by compression of a benign mediastinal teratoma on the main pulmonary trunk, which was successfully controlled by the tumor total excision, and with an uneventful postoperative evolution.[2] Her chest images showed a mass with characteristics of teratoma, compression on the main pulmonary artery and obstruction of the right ventricular outflow tract; the tumor removed by left thoracotomy contained hair, teeth and bone, typical findings of teratoma. The authors emphasized the rarity of teratoma compression on the pulmonary artery simulating a valvular change, and only 15 cases of this arterial occlusion by the mass.[2]

A 31-year-old woman was described with a mediastinal tumor causing the pulmonary supravalvular stenosis manifested by exertional dyspnea and thoracic pain.[3] Chest images showed a 9.0×7.2×6.0 cm left anterior and superior mediastinal cystic mature teratoma further successfully removed by median sternotomy surgical procedure; this teratoma contained skin sebaceous glands, besides adipose and muscle tissues.[3] Postoperative course was unremarkable, and the authors highlighted the total careful resection of teratomas as the best option to avoid complications and local recurrences.[3]

A 21-year-old woman with chronic productive cough was misdiagnosed and treated as tuberculosis, and chest control images showed a mediastinal cystic lesion adherent to the trachea and compressing blood vessels, corrected by surgery.[5] The surgical procedure was uneventful and the postoperative period without recurrence; and the histopathology study confirmed the diagnosis of a mature mediastinal teratoma. The authors emphasized initial diagnostic challenges between this tumor and tuberculosis mainly in cases with development of accentuated adhesions needing surgical procedure; and in benign teratomas part of the residual tissue can be left to be naturally absorbed.[5]

A 30-year-old female had episodic severe headache and visual disturbances, besides the classical Claude Bernard-Horner's syndrome.[6] The chest imaging study showed a mass (12×11×10 cm) in the right hemithorax, slightly compressing the heart to the left, occupying the superior mediastinum till the jugular notch, and containing cysts, calcifications, and fat suggestive of a mediastinal teratoma. The patient underwent the tumor *en bloc* excision (R0) plus thymectomy with success, and the histopathology study revealed a mature mediastinal teratoma (60%) and somatic type malignancy (40%) including neuroblastoma and intestinal type of adenocarcinoma. The patient returned to former physical fitness and sports activity without any symptoms. The authors highlighted that there was no

need for further oncological treatment of the malignant component of the huge mediastinal teratoma completely *en bloc* removed.[6]

A 43-year-old woman incidentally had the finding of an anterior mediastinal mass during the investigation of intermittent cough.[7] The chest images and biopsy samples confirmed the diagnosis of a benign mediastinal teratoma, unremarkably followed up until 2018, when a malignancy was suspected and a robotic-assisted thoracoscopic resection was performed utilizing single lung ventilation. The excised tumor presented a tan-pink color and a cystic cavity with gummous and fatty materials; histopathological study showed a mature cystic teratoma and negative margins; the asymptomatic patient was then discharged to home on the third postoperative day.[7]

A 31-year-old male had the incidental diagnosis of an anterior mediastinal teratoma (measuring 70 mm), besides multiple pulmonary metastases during the imaging investigations conducted to clear the etiology of his anterior chest discomfort.[8] Histopathological evaluation of the thoracoscopic biopsy samples established the diagnosis of a teratoma with an angiosarcoma component in the mediastinal mass, associated with the very elevated levels of the AFP (849 ng/mL), β-HCG (26,548 mIU/mL), as well as lactate dehydrogenase (314 IU/L). Therefore, he underwent four cycles of bleomycin, etoposide, and cisplatin followed by two cycles of paclitaxel, ifosfamide and nedaplatin, and the levels of tumor markers normalized, with diminution in the size of mediastinal tumor (6%) and a reduction in the pulmonary metastases (35%); one month later, a residual tumor resection and partial lung resection were performed.[8] The analysis of data, between 1975 and 2016, of 5,550 patients with diagnosis of malignant teratoma (133 of mediastinum and 5,417 of other sites) revealed that mediastinal tumors had larger size (median: 11 cm; mean: 11.3 cm), compared with the other sites (median: 5.5 cm; mean: 8 cm), with predominance (81.2%) among males.[9] Mediastinal malignant teratomas had a lower rate of surgery (75.9%) but higher rate of chemotherapy (69.2%) or radiotherapy (19.7%), than malignant teratoma of other sites.[9] The authors stressed that most patients with mediastinal tumors had earlier diagnosis besides more elevated number of cases with the diagnosis at T1/T2, N0 and M0 stages, and commented on the role of alpha-fetoprotein and β-human chorionic gonadotropin levels, additionally to miR-371 and miR-302 as useful biomarkers to clinical diagnosis.[9] They concluded that mediastinal malignant teratoma is rare and has worse prognosis; compared with chemotherapy and radiotherapy, surgery results in more survival benefits for the early- or all-staged cases; and the adjuvant use of chemotherapy or radiotherapy to surgery do not improve but may potentially harm the patient outcome.[9] The review of Yuan et al about clinicopathological data of 1,179 cases of mature teratomas between 1999 to 2019 found 14 patients with teratoma malignant transformation; 4 of them with less than 40 years of age, 13 tumors were localized in the ovaries, and one in anterior mediastinum.[10] Clinical manifestations were atypical, the cystic solid masses had surgical management and the diagnoses were: 5 squamous cell carcinomas, 3 carcinoids, 2 serous carcinomas, 2 thyroid papillary carcinomas, besides 1 carcinosarcoma, and 1 strumal carcinoid.[10] The authors concluded that malignant transformation is a rare phenomenon, and more common in patients over 40 years, mainly among the female patients in menopause. However, the squamous cell carcinoma is the most frequent type and prone to give metastasis. Regardless, mature teratomas must be removed as soon as possible after detection.[10]

In conclusion, this report exemplifies a case of uncommon mediastinal mature teratoma with malignant degeneration to invasive adenocarcinoma, which manifested mimicking right heart failure due to the vascular compression and cardiac tamponade, besides the ominous postoperative course. The antecedents of diabetes mellitus and arterial hypertension played some role in the unfavorable evolution of cardiac tamponade caused by voluminous mediastinal teratoma.

ΠΕΡΙΛΗΨΗ

Τεράτωμα μεσοθωρακίου με κακοήθη εκφύλιση και καρδιακό επιπωματισμό

P.V.A. TUBINO,[1] V.M. DOS SANTOS,[2] A.C.M. KUHN,[3] E.C.P.M. BEZERRA[3]

[1]Cardiothoracic Surgery, Institute of Cardiology and Transplants of the Federal District, Brasília-DF,
[2]Department of Internal Medicine, Armed Forces Hospital and Catholic University, Brasília-DF,
[3]Catholic University, Brasília-DF, Βραζιλία

Αρχεία Ελληνικής Ιατρικής 2025, 42(5):695–699

Το τεράτωμα είναι ο πιο συχνός από τους όγκους των γεννητικών κυττάρων του μεσοθωρακίου, αλλά οι ώριμοι όγκοι είναι ασυνήθιστοι και συχνότερα αποτελούν τυχαίο εύρημα. Τα κακοήθη τερατώματα επικρατούν στους άνδρες. Αναφέρεται περίπτωση μιας 54χρονης διαβητικής και υπερτασικής γυναίκας που παρουσίασε οξύ επεισόδιο θωρακικού πόνου και δύσπνοιας, περιφερικό οίδημα, βύθιους καρδιακούς ήχους με φυσιολογικό καρδιακό ρυθμό και αρτηριακή πίεση. Οι απεικονιστικές μελέτες ανέδειξαν μια τεράστια κυστική βλάβη του μεσοθωρακίου με ασβεστοποιημένα τοιχώματα, περικαρδιακή συλλογή, εκτασία στην κάτω κοίλη φλέβα και μερική πίεση του δεξιού πνεύμονα. Έγινε επείγουσα παροχέτευση του περικαρδιακού υγρού και ολική εκτομή του ώριμου κυστικού τερατώματος με κακοήθη εκφύλιση σε αδενοκαρκίνωμα παγκρεατο-χοληφόρου δένδρου, που επιβεβαιώθηκε από το καρκινοεμβρυϊκό αντιγόνο και τη θετικότητα CD×2. Μετά τη μετεγχειρητική βρογχική αναρρόφηση η ασθενής παρουσίασε καρδιοαναπνευστική ανακοπή που αποκαταστάθηκε αμέσως, αλλά τελικά κατέληξε λόγω της εγκεφαλικής βλάβης, της σήψης και ενός ανθεκτικού κυκλοφορικού shock.

Λέξεις ευρετηρίου: Κακοήθης εκφύλιση, Καρδιακός επιπωματισμός, Μεσοθωρακικό τεράτωμα

References

1. BOUASSIDA I, AYED AB, OUHICHI S, SAAD A, ZAIRI S, MARGHLI A. A huge mediastinal teratoma in a 14-year-old girl. *Int J Surg Case Rep* 2023, 113:109003
2. CHAUDHRY IUH, CHEEMA A, AQEEL C, ALSHAER AA, ALRADEI FG, ALI MG. A rare cause of right ventricle outflow tract obstruction: Anterior mediastinal teratoma. *Ann Med Surg (Lond)* 2021, 62:258–260
3. DALY H, HORCHANI A. Mature teratoma of the anterior mediastinum revealed by supravalvular pulmonary stenosis: A case report. *Pan Afr Med J* 2022, 43:109
4. JILANI TN, KILLEEN RB, SIDDIQUI AH. Mediastinal cancer. In: *StatPearls* [Internet]. StatPearls Publishing, Treasure Island, FL, 2023
5. LUO Q, QU W, CHEN C, LIU Y, WEI Y, SONG Y ET AL. Compression of superior vena cava and azygos vein by a giant mediastinal mature cystic teratoma: A case report. *Transl Cancer Res* 2021, 10:4577–4581
6. RACHWALIK M, KOSIOROWSKA K, BOCHENEK M, JASINSKI M, PRZYBYLSKI R. Mature mediastinal teratoma with somatic type malignancy including neuroblastoma and intestinal type of adenocarcinoma: A case report. *Int J Surg Case Rep* 2021, 80:105680
7. RAMCHARRAN H, WALLEN J. Robotic-assisted thoracoscopic resection of anterior mediastinal cystic teratoma: A case report and literature review. *J Cardiothorac Surg* 2022, 17:67
8. TANI M, NAGAHARA A, TAKADA S, FUJITA K, FUKUHARA S, UEMURA M ET AL. A case of mediastinal teratoma with malignant transformation into angiosarcoma and relapse with multiple bone metastases that was cured by a multidisciplinary treatment. *IJU Case Rep* 2022, 6:93–96
9. WANG R, LI H, JIANG J, XU G. Incidence, treatment, and survival analysis in mediastinal malignant teratoma population. *Transl Cancer Res* 2020, 9:2492–2502
10. YUAN Y, LI H, YANG H. Clinicopathological observation of mature teratoma with malignant transformation, a single center retrospective study. *Indian J Pathol Microbiol* 2022, 65:369–373

Corresponding author:

Prof. V.M. dos Santos, Hospital das Forças Armadas, Estrada do Contorno do Bosque s/n, Cruzeiro Novo, Zip code: 70.658-900, Brasília-DF, Brazil
e-mail: vitorinomodesto@gmail.com