CASE REPORT OLGU SUNUMU

DOI: 10.5336/archlung.2023-99650

A Rare Cause of Pleural Effusion in Adolescence: Ewing Sarcoma

Adölesanda Nadir Bir Plevral Efüzyon Sebebi: Ewing Sarkom

Pınar MUTLU[a], Tuğçe ÇELEN[a], Halil UYSAL[a]

[a]Çanakkale Onsekiz Mart University Training and Research Hospital, Department of Chest Diseases, Çanakkale, Türkiye

ABSTRACT Pleural effusion, defined as the accumulation of fluid within the pleural space, can manifest both as a result of local disease and as a sign of a systemic disorder. Efforts to determine the etiology should consider the patient's gender, age, symptoms, medical history and physical examination findings, and should be complemented by investigations focused on potential preliminary diagnoses. The present report describes an 18-year-old female with complaints of cough and back pain who underwent a chest X-ray at the time of presentation revealing a unilateral pleural effusion. The patient was diagnosed subsequently with an intraabdominal mass and Ewing sarcoma during follow-up. Our intention in presenting this patient is to highlight the occurrence of malignancies as an uncommon underlying cause of pleural effusion in adolescents.

Keywords: Adolescent; pleural effusion; Ewing sarcoma

ÖZET Plevral boşlukta sıvı birikmesi olarak tanımlanan plevral efüzyon, hem lokal bir hastalığın sonucu olarak hem de sistemik bir bozukluğun belirtisi olarak ortaya çıkabilir. Etiyolojiyi belirlemeye çalışırken hastanın cinsiyeti, yaşı, semptomları, tıbbi öyküsü ve fizik muayene bulguları dikkate alınmalı ve bu bulgular potansiyel ön tanılara yönelik incelemelerle tamamlanmalıdır. Olgumuzda, öksürük ve sırt ağrısı şikâyetleri olan ve başvuru sırasında çekilen posteroanterior akciğer grafisinde tek taraflı plevral efüzyon tespit edilen 18 yaşında bir adölesan hastadan bahsedeceğiz. Hastaya daha sonra intraabdominal kitle ve takip sırasında Ewing sarkom tanısı konmuştur. Bu hastayı sunmaktaki amacımız, adölesanlarda plevral efüzyonun altında yatan nadir bir neden olarak malignitelerin ortaya çıkışını vurgulamaktır.

Anahtar Kelimeler: Adölesan; plevral efüzyon; Ewing sarkom

Pleural effusions can be caused by pleuropulmonary and systemic disorders that can be benign or malignant, the most common etiologies include congestive heart failure, parapneumonic infections and malignancies.

Achieving a precise diagnosis necessitates a thorough patient inquiry of sex, age, symptoms, systemic and rheumatic diseases, malignancy symptoms, associated risk factors, medications, occupational exposure and potential sources of extra-pleural effusion, followed by a comprehensive physical examination. Imaging studies should focus on the initial diagnoses, and the initial findings should be supported by various imaging modalities when deemed necessary. Establishing a diagnosis may require the use of such invasive procedures as thoracentesis, bronchoscopy, medical thoracoscopy, video-assisted thoracoscopic surgery and thoracotomy.

Pleural effusions occurring during adolescence are typically caused by infectious lung diseases and non-pulmonary causes are uncommon. In the presented case the association of the pleural effusion with malignancy was not initially considered due to the young age of the patient, and it was only after further investigations that malignancy was identified as the cause.

CASE REPORT

An 18-year-old female patient presented with cough and back pain. The patient reported a cough persisting for 15 days. There was no fever present, but she

Correspondence: Tuğçe ÇELEN
Çanakkale Onsekiz Mart University Training and Research Hospital, Department of Chest Diseases, Çanakkale, Türkiye
E-mail: tugcecelen95@gmail.com

Peer review under responsibility of Turkiye Klinikleri Archives of Lung.

Received: 24 Sep 2023 ***Received in revised form:*** 11 Feb 2024 ***Accepted:*** 12 Feb 2024 ***Available online:*** 14 Feb 2024

mentioned producing white sputum. She had been admitted to an external facility 15 days prior with similar complaints where she had been prescribed an antibiotic containing clarithromycin, and had used the medication regularly on a daily basis. The patient had nausea but did not report any accompanying vomiting, diarrhea or abdominal pain. The patient had no history of smoking. Diminished breathing sounds were noted upon auscultation at the base of the right lung (Figure 1).

Chest X-ray revealed a right-sided unilateral pleural effusion. The hemogram fell within normal ranges. C-reactive protein level was slightly elevated. The patient was admitted to a general ward for additional tests and treatments. A coagulation panel that was ordered in addition to previous tests revealed D-dimer elevated, and rheumatic markers were negative. The patient was scheduled for diagnostic thoracentesis and pulmonary computed tomography (CT) angiography.

A fluid with a serous appearance was extracted diagnostic thoracentesis and was sent for Light's criteria, pathological examination, microbiological analysis, measurement of adenosine deaminase (ADA). Diagnostic thoracentesis revealed exudative pleural effusion [effusion lactate dehydrogenase (LDH): >1,220 IU/L, serum LDH: 763 IU/L] and ADA within the normal range. No growth was observed in the pleural fluid culture, the pathological examination of the fluid revealed no evidence of malignancy.

At the time of the initial assessment of the patient, pulmonary thromboembolism and tuberculous pleuritis were considered as preliminary diagnoses due to the presence of a unilateral pleural effusion and the exudative nature of the pleural fluid observed thoracentesis.

The pulmonary CT angiography revealed no evidence of thromboembolism in the pulmonary artery or its branches, which led us to rule out pulmonary thromboembolism.

The sections of pulmonary CT angiography including the upper abdomen showed diffuse fluid in the abdomen and splenomegaly (Figure 2).

The patient was scheduled for abdominal dynamic magnetic resonance imaging (MRI) enhancement to provide a more detailed characterization of the observed lesions. MRI revealed a solid mass lesion located at the splenic hilus. There were also mass lesions (suggestive of peritoneal metastases) identified in the vicinity of the primary lesion.

The patient was discharged from the hospital after arrangements were made for a histopathological examination and positron emission tomography (PET)-CT scans.

The patient was subsequently readmitted to the outpatient clinic for assessment with PET-CT scans and a fine-needle aspiration biopsy of the liver.

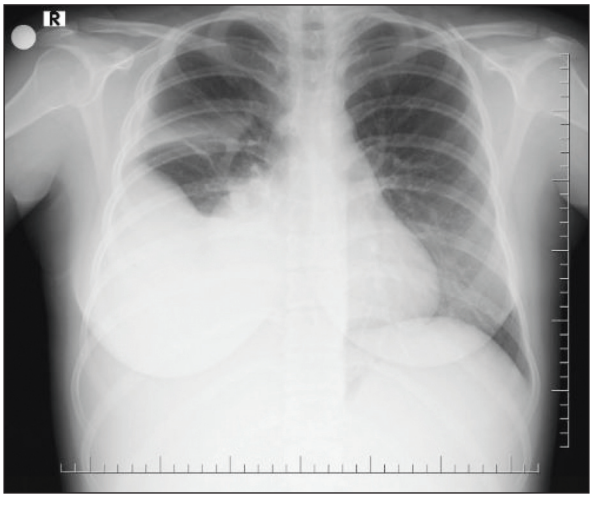

FIGURE 1: Right-sided pleural effusion.

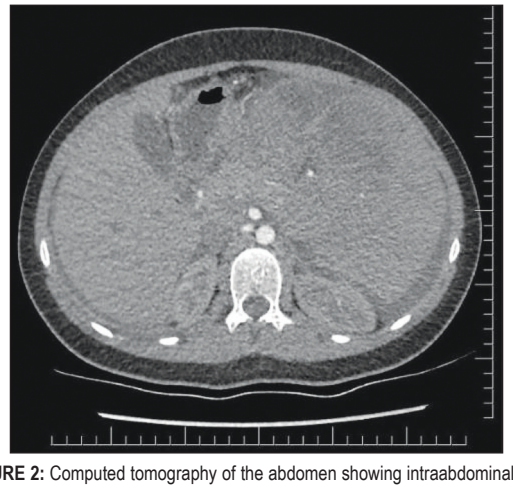

FIGURE 2: Computed tomography of the abdomen showing intraabdominal fluid collection, splenic enlargement and a well-defined splenic lesion that could not be distinguished from the surface of the spleen.

PET-CT sequences of the abdomen revealed a mass lesion in the vicinity of the spleen revealed an increased fluorodeoxyglucose (^{18}F) (FDG) uptake. As a further finding, numerous mass lesions were observed occupying the left side of the abdomen which exhibited a moderate to intense uptake of FDG.

The diffuse hypermetabolic appearance observed in the patient's bone structures was attributed to hematopoietic activation. A collection of fluid was noted within the abdomen with a diffuse FDG uptake.

A pathological examination of the liver biopsy and peritoneal fluid revealed tumor infiltration characterized by cells with partially uniform, round-to-oval nuclei and scant cytoplasm, as well as reactive mesothelial cells interspersed among the peripheral blood cells and small sporadic clusters of atypical epithelial cells with small, hyperchromatic nuclei and scant cytoplasm, accompanied by neutrophils, leukocytes and lymphocytes.

Staining with CD99 and vimentin antibodies revealed widespread positive staining in the neoplastic cells. Tumor cells did not exhibit staining with CK7, CK20, CD20, CD3, CD56, synaptophysin, desmin or S100 antibodies. Based on the findings of the analyses, the patient was diagnosed with Ewing sarcoma/primitive neuroectodermal tumor (pNET) and was subsequently enrolled in a follow-up of an oncologist.

Informed consent form was taken from the patient.

DISCUSSION

Ewing sarcoma ranks as the most common bone tumor in children and young adults, after osteosarcoma. Ewing sarcoma can manifest as osseous, extraosseous or peripheral pNETs, and its incidence is slightly higher in males than in females, with a male-to-female ratio of 1.2 and a median age of 15 years at the time of diagnosis.[1] The case presented here was a female patient who was diagnosed at a higher age than expected. Ewing sarcoma most commonly affects the bones (85%), the rate of soft tissue involvement is reported to be approximately 15% in cases.[1]

Ewing sarcoma primarily affects the major bones of the lower extremities (most frequently the femur), as well as pelvic bones, and less frequently, the spine, hands, feet and skull.[2-4] Our patient had no bone involvement; had rather hepatic, splenic and peritoneal involvement.

Palpable mass and pain are the most common complaints. The median duration of complaints is between 2-9 months changes.[5] These complaints were not observed in our patient. The most common systemic symptoms are fever and malaise.[6] Presentation of pleural effusion as in our case, is an unusual finding. While infections and inflammation can be initially considered for patients presenting with pleural effusion during childhood and adolescence, malignancy should be included differential diagnoses for those who do not respond to therapy. Initially, we considered infectious processes as a preliminary diagnosis in our patient. Therefore, diagnostic thoracentesis was performed. The patient was scheduled to undergo pleural biopsy to explore the possibility of a tuberculous pleuritis diagnosis, which was subsequently excluded as a potential diagnosis upon the observation of a diffuse collection of fluid in the abdominal regions identified in the imaging sequences, along with the finding of pleural fluid ADA enzyme levels within the normal range.

Imaging and diagnostic thoracentesis results suggested that pleural effusion was due to transdiaphragmatic migration due to intra-abdominal events. This was confirmed by the results of liver biopsy.

A multidisciplinary approach is of utmost importance when planning treatment, commencing from the diagnosis stage, following a general principle that involves the establishment of a diagnosis through biopsy, followed by the administration of induction chemotherapy, local therapy (surgery/radiotherapy) and adjuvant chemotherapy.[7]

This report was authored to underscore the significance of considering the possibility of transdiaphragmatic migration of a primary malignancy in young patients with no established risk factors based on a case in which a diagnosis of intraabdominal malignancy was confirmed through imaging studies and biopsy examinations.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Pınar Mutlu, Tuğçe Çelen, Halil Uysal;* ***Design:*** *Pınar Mutlu, Tuğçe Çelen, Halil Uysal;* ***Control/Supervision:*** *Pınar Mutlu, Tuğçe Çelen, Halil Uysal;* ***Data Collection and/or Processing:*** *Pınar Mutlu, Tuğçe Çelen, Halil Uysal;* ***Analysis and/or Interpretation:*** *Pınar Mutlu, Tuğçe Çelen, Halil Uysal;* ***Literature Review:*** *Tuğçe Çelen, Halil Uysal;* ***Writing the Article:*** *Tuğçe Çelen, Halil Uysal;* ***Critical Review:*** *Pınar Mutlu, Tuğçe Çelen, Halil Uysal;* ***References and Fundings:*** *Pınar Mutlu, Tuğçe Çelen, Halil Uysal;* ***Materials:*** *Pınar Mutlu, Tuğçe Çelen.*

REFERENCES

1. Hawkins DS, Brennan BMD, Bölling T, Davidson DJ, Dirksen U, DuBois SG, et al. Ewing sarcoma. In: Pizzo PA, Poplack DG, eds. Principles and Practice of Pediatric Oncology. 7th ed. Philadelphia: Wolters Kluwer; 2016. p.855-76.
2. Ginsberg JP, Woo SY, Hicks MJ, Horowitz ME. Ewing's sarcoma family of tumors: Ewing's sarcoma of bone and soft tissue and the peripheral primitive neuroectodermal tumors. In: Pizzo PA, Poplack DG, eds. Priniciples and Practice of Pediatric Oncology. 4th ed. Philadelphia: Lippincott, Williams and Wilkins; 2002. p.973-1016.
3. Cotterill SJ, Ahrens S, Paulussen M, Jürgens HF, Voûte PA, Gadner H, et al. Prognostic factors in Ewing's tumor of bone: analysis of 975 patients from the European Intergroup Cooperative Ewing's Sarcoma Study Group. J Clin Oncol. 2000;18(17):3108-14. [Crossref] [PubMed]
4. Rehman R, Osto M, Parry N, Awada N, Agemy J, Arianpour K, et al. Ewing Sarcoma of the Craniofacial Bones: A Qualitative Systematic Review. Otolaryngol Head Neck Surg. 2022;166(4):608-14. [Crossref] [PubMed]
5. Brasme JF, Chalumeau M, Oberlin O, Valteau-Couanet D, Gaspar N. Time to diagnosis of Ewing tumors in children and adolescents is not associated with metastasis or survival: a prospective multicenter study of 436 patients. J Clin Oncol. 2014;32(18):1935-40. [Crossref] [PubMed]
6. Gladish GW, Sabloff BM, Munden RF, Truong MT, Erasmus JJ, Chasen MH. Primary thoracic sarcomas. Radiographics. 2002;22(3):621-37. [Crossref] [PubMed]
7. Kreyer J, Ranft A, Timmermann B, Juergens H, Jung S, Wiebe K, et al. Impact of the Interdisciplinary Tumor Board of the Cooperative Ewing Sarcoma Study Group on local therapy and overall survival of Ewing sarcoma patients after induction therapy. Pediatr Blood Cancer. 2018;65(12):e27384. [Crossref] [PubMed]