



Different Tuberculosis Clinics in Two Unimmunized Siblings: Caviter Pulmonary Tuberculosis and Tuberculous Pleurisy

Bağışıklanmamış İki Kardeşte Farklı Tüberküloz Klinikleri:
Kaviter Akciğer Tüberkülozu ve Tüberküloz Plörezisi

Zeynep Kemer Aktaş¹(ID), Tuğçe Tural Kara²(ID)

¹ *Clinic of Child Health and Diseases, Akdeniz University Medical Faculty Hospital, Antalya, Türkiye*

² *Clinic of Pediatric Infectious Diseases, Akdeniz University Medical Faculty Hospital, Antalya, Türkiye*

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Abstract

Tuberculosis is a health problem that preserves its importance in developing countries and populations with low socioeconomic means. The treatment process is long-term, laborious, costly and has high morbidity and mortality with many complications. The most important step to get rid against this disease is to prevent contamination. For this purpose, routine vaccination and chemoprophylaxis of the contacts are of great importance. In this case report, while examining different tuberculosis presentations in the pediatric population, we emphasized the importance of vaccination and screening the households that the index patient is in contact with, the treatment of patients, and the importance of chemoprophylaxis in contacts.

Keywords: Vaccination child, prophylaxis, protection, tuberculosis,

Öz

Tüberküloz günümüzde gelişmekte olan ülkelerde, sosyoekonomik imkanları düşük popülasyonlarda önemini koruyan bir sağlık problemidir. Tedavi süreci uzun, zahmetli, maliyetli ve birçok komplikasyonuyla morbiditesi ve mortalitesi yüksektir. Bu hastalıkla savaşta en önemli adım bulaşın engellenmesidir. Bu amaçla rutin aşılama, temaslıların profilaksisi ciddi önem taşımaktadır. Biz bu olgu sunumunda pediatrik popülasyonda farklı tüberküloz klinikleri ile başvuran olguları incelerken, aşılanmanın önemini ve indeks hasta ile temaslı hane halkının taranmasını, hastaların tedavisini, temaslılarda ise profilaksinin önemini vurgulamayı amaçladık.

Anahtar Kelimeler: Aşılama, çocuk, profilaksi, korunma, tüberküloz

Introduction

Tuberculosis infection caused by *Mycobacterium tuberculosis* bacillus is still prevalent in low-income communities and developing countries. Infection is transmitted between individuals through droplets. Patients who are acid-resistant bacillus (ARB)-positive in sputum microscopy and have cavitory pulmonary tuberculosis are the most contagious (1-3). The household contacts of the index TB patient is at serious

risk for transmission. According to research and meta-analysis, home transmission carries a high risk of infection at all time points, economic levels, and countries in proportion to contact proximity and exposure time (4,5). The World Health Organization (WHO) recommends vaccination of high-risk populations, screening of symptoms and signs in household contacts of tuberculosis patients, and appropriate treatment and prophylaxis in the fight against tuberculosis (1,6).

Correspondence Address / Yazışma Adresi

Zeynep Kemer Aktaş

Akdeniz Üniversitesi Tıp Fakültesi Hastanesi,
Çocuk Sağlığı ve Hastalıkları Kliniği,
Antalya-Türkiye

E-mail: kemerzmd@gmail.com

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Children typically acquire the bacillus from adult tuberculosis patients with whom they come into contact (3). The course of TB differs between adults and children. In adults, secondary disease is more common where the bacilli located in the lung apex is disseminated hematogenously years after infection, while in children the time between infection and disease is shorter, and primary tuberculosis is more common. In children, the disease is caused by fewer bacilli, and infectious cavitary lung infections are rare. There is a predisposition to develop extrapulmonary tuberculosis (7). In this case report, we wanted to highlight the many clinical findings that may arise in different age groups, the importance of vaccination, contact tracing within the family, and prophylaxis in two tuberculosis patients diagnosed and treated in our clinic.

Case Report

A 16-year-old girl with no known disease was admitted with symptoms of weakness, dry cough, fever and weight loss. The symptoms had started a few months ago and gradually worsened. At the time of admission, the patient's vital signs were as follows: body temperature was 37°C (temporal measurement), peak heart rate was 110 beats/min, respiratory rate was 26/min, and BP was 110/80 mmHg. Physical examination revealed diffuse crepitant rales in both lungs, as well as tubular breath sounds in the upper zone of the left lung. The patient did not have a Bacillus Calmette-Guerin (BCG) vaccination scar. The patient's detailed history revealed that he was an immigrant, that his household was cramped, and that he had not had any vaccines. Laboratory test results were as follows: C reaktif protein (CRP)= 10.65 mg/dL, sedimentation= 70 mm/h, hemoglobin= 7.3 g/dL WBC= 13990/mm³, neutrophils= 11580/mm³, lymphocytes= 1120/mm³, platelets= 537000/mm³. The patient's chest X-ray revealed diffuse infiltration in all bilateral zones (Figure 1). Thoracic tomography with contrast revealed mediastinal lymphadenopathies, a diffuse "tree-in-bud" appearance with cavitation areas in both lungs, and infiltrative lesions (Figure 2). With a preliminary diagnosis of necrotizing pneumonia, the patient was started on intravenous ceftriaxone and vancomycin therapy. Tuberculin skin test (PPD) demonstrated an 18 mm induration, and the patient tested positive for ARB and quantiferon. *Mycobacterium tuberculosis complex* was isolated from the fasting gastric fluid of the patient. The drug susceptibility test showed sensitivity to isoniazid and rifampicin. The patient was diagnosed with cavitary pulmonary tuberculosis, and a quadruple anti-TB treatment was started with isoniazid, rifampicin, pyrazinamide and ethambutol.

The patient's family (mother, father, and five siblings) were referred to a tuberculosis clinic for TB testing. It was discovered that other family members were also unvaccinated. On



Figure 1. Disseminated infiltration in all zones bilaterally on chest x-ray.

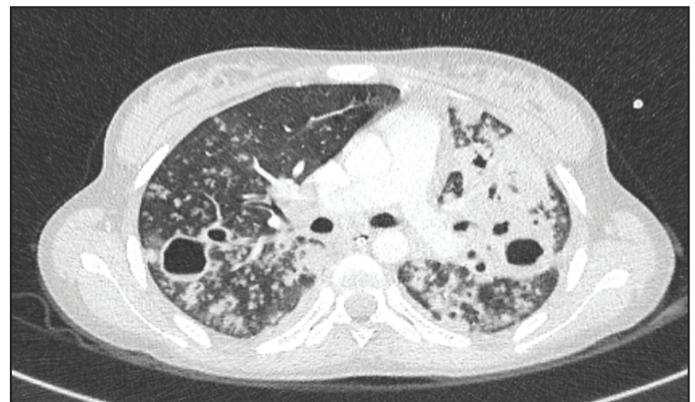


Figure 2. Thoracic CT: Mediastinal lymphadenopathies, a diffuse "tree-in-bud" appearance with cavitation areas in both lungs, and infiltrative lesions.

the chest X-ray of the patient's 10-year-old brother, who had no known disease or active complaints, the left sinus was blocked, and a consolidation area covering the left hemithorax and pushing the trachea to the right was discovered (Figure 3). The physical examination revealed no BCG scars, and breath sounds were significantly decreased in the left lung compared to the right. There were no further pathological physical examination results. Laboratory results were as follows: CRP= 2.48 mg/dL, sedimentation= 49 mm/h, hemoglobin= 11.9 g/dL, WBC= 11190/mm³, neutrophils= 6380/mm³, lymphocytes= 3690/mm³, platelets= 508000/mm³. The patient's thoracic ultrasonography revealed pleural fluid measuring seven cm in the deepest section of the left hemithorax, as well as atelectatic lung tissue. Contrast-enhanced thoracic tomography revealed complicated pleural effusion surround-



Figure 3. On the chest x-ray, the left sinus was blocked, effusion is significantly covering the left hemithorax and pushing the trachea to the right.



Figure 4. Contrast-enhanced thoracic tomography showing complicated pleural effusion surrounded by a thick wall with enhancement, spanning from basal to apical, with a depth of 50 mm in the deepest section of the left hemithorax.

ed by a thick wall with enhancement, spanning from basal to apical, with a depth of 50 mm in the deepest section of the left hemithorax (Figure 4). Since the patient did not have respiratory distress, steroid treatment was not administered. The pleural effusion was drained, and the fluid was evaluated as exudate (Table 1). Pleural fluid was ARB-negative, with

83.1 U/L (4-20 U/L) of adenosine deaminase. *Mycobacterium tuberculosis complex* was grown in the pleural fluid culture. The drug susceptibility test showed sensitivity to isoniazid and rifampicin. The patient's tuberculin skin test (PPD) result was 2 mm. Quantiferon test was positive. The patient was diagnosed with tuberculous pleurisy and started on quadruple anti-TB therapy, which included isoniazid, rifampicin, pyrazinamide, and ethambutol. During the follow-up, the amount of fluid coming from the patient's thoracic tube decreased, but the fluid was not entirely drained on the chest X-ray. A follow-up thoracic ultrasonography revealed ~5 cm of pleural effusion with septa and associated atelectatic lung tissue in the deepest section of the left hemithorax. Thereafter, the patient underwent video-assisted thoracic surgery (VATS). The patient was discharged with quadruple anti-TB therapy after his pleural effusion and exudates decreased during the follow-up.

Discussion

Mycobacterium tuberculosis infection is transmitted by droplets from people with active tuberculosis (1,4). Infection is prevalent among low-income populations in developing countries (2). The BCG vaccination, developed by two French scientists in the early 1920s and named after their initials, is a live vaccine with low virulence that provides immunity without inducing disease. This prevents serious disease involvements such as miliary tuberculosis, tuberculous meningitis, and cavitary pulmonary tuberculosis (9,10).

Although our fight against tuberculosis has yielded significant victories over the centuries, the highly resistant structural features of *Mycobacterium tuberculosis*, the disease's causative agent, render the immune system defenseless against the disease, and multiple drug use and a lengthy treatment period reduce patient compliance. It is not possible to eradicate tuberculosis without a concerted effort to prevent the spread of the disease (1). Martinez et al. discovered in their international meta-analysis of children aged 0-14, 13,999 of whom had household exposure and 174,097 who did not, that contact raised the probability of becoming infected 3.79 times (1). Household contact results in the highest probability of infection and a very high risk of primary progressive disease in all age groups, particularly children under the age of five (1,4).

Table 1. Evaluation of the patient's pleural fluid transudate/exudate with Light's criteria

	Case 2	Exudate	Transudate
Pleural fluid protein/serum protein	6.42/5.06	>0.5	<0.5
Pleural fluid LDH/serum LDH	1221/257	>0.6	<0.6
Pleural fluid LDH concentration	1221 U/L	Higher than 2/3 of the normal serum LDH level	Lower than 2/3 of the normal serum LDH level
Pleural fluid density	1034	>1020	<1010

The conclusive diagnosis of tuberculosis disease in children, like in adults, is made by microbiological demonstration of the bacillus in sputum culture. Unlike adults, it is more challenging to demonstrate the bacillus in pediatric cases. At that point, modern molecular tests (polymerase chain reaction), tuberculin skin tests (PPD), and quantiferon tests should be performed (3,7).

Tuberculosis in children may not have the same clinical and radiological manifestations as in adults. The most essential guide in tuberculosis diagnosis is the history of contact with a TB patient (3,8,12). Laboratory testing and radiological examination of household contacts is a WHO-recommended practice adopted in our country for early case detection and transmission prevention. (3,6,8,11). Martinez et al. discovered in a meta-analysis of 46 cohort studies from 34 countries, that prophylaxis prevented the disease by 63% in children who had contact with a TB patient (11).

The incidence of tuberculosis has a bimodal age pattern. Infants and young children have the highest propensity to pulmonary and disseminated TB due to age-related immune development. In this age group, the clinical and radiological features of the disease differ from those seen in adults. Typical systemic symptoms such as fever, night sweats, and weight loss are not observed. The most common symptom is a dry cough. Air trapping, wheezing and respiratory distress may also be seen due to anatomical narrowing of the airways. Radiological findings may be incompatible with the disease's clinical presentation. While the frequency of disease increases with tuberculosis reactivation in older children and adolescents, they may have clinical and radiological features comparable to adults, and symptoms such as fever, weight loss, cough, night sweats that persist for weeks. Cavitory pulmonary tuberculosis can be observed in this age group (3,7,12). Tuberculous pleurisy is less common in children under the age of six, and although it is often unilateral, it can also be bilateral. In most cases, only pleural effusion is observed, and lung parenchyma remains intact (12).

In our case, the index patient was unvaccinated and lived in a crowded house with unvaccinated family members in a poor socioeconomic setting. There was no previous tuberculosis diagnosis in the family. Following the diagnosis, the patient's household contacts were referred to a tuberculosis clinic for screening, and one of the patient's siblings was diagnosed with tuberculosis pleurisy, an uncommon form of the disease. Other family members were initiated on isoniazid (INH) prophylaxis.

Chemoprophylaxis refers to preventive pharmacological therapy. There are multiple prophylactic regimens of several

drugs as monotherapy or dual combinations. Some examples of prophylaxis from our national TB prevention guidelines include isoniazid monotherapy for 6-9 months, rifampicin monotherapy for four months, isoniazid and rifampicin combination therapy for three months, and isoniazid and rifapentine combination therapy for three months (3). 2017 meta-analysis, Zenner et al. discovered robust evidence for the efficacy and safety of the monotherapy and combination therapy with isoniazid and rifampicin (14). World Health Organization (WHO) guidelines and national prevention programs in many countries, including ours, recommend isoniazid prophylaxis for six months following contact with a patient, particularly in children under the age of five (3,14,15). Compliance with and continuation of prophylaxis has been shown to improve protection by 80% (15).

In conclusion, tuberculosis may have varying clinical presentations in different age groups. Immunization is the most critical method of prevention. Furthermore, screening contacts and administering prophylaxis are critical steps in preventing the disease.

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