PRIKAZ SLUČAJA – CASE REPORT

Pulmonary Tuberculosis and Spontaneus Pneumothorax in an Adolescent – Case Report

Tuberkuloza pluća I spontani pneumotoraks kod adolescentkinje – prikaz slučaja

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Summary Tuberculosis (TB) is a preventable and curable disease, but it continues to impact the lives of millions of children and adolescents. Children are more susceptible than adults to development of infection after contact with an infectious adult person and/or an adolescent. However, children are rarely contagious or source of Mycobacterium Tuberculosis (MTB). Although Serbia is considered to have a low burden of tuberculosis, there is a great need to draw attention to the importance of screening, preventive measures, early detection and treatment of tuberculosis in order to reduce the number of active disease patients.
We present the case of a 16-year-old girl without known contact with an infective patient who developed complicated form of TB with an early-stage sequels.
Key words: tuberculosis, children, pneumothorax

Sažetak Tuberkuloza (TB) je bolest koja se može sprečiti i izlečiti, ali nastavlja da utiče na živote i razvoj miliona dece i adolescenata. Deca su podložnija razvoju tuberkuloze od odraslih nakon kontakta sa zaraznom osobom, a adolescenti su značajna rizična grupa za prenošenje zbog sposobnosti da prenesu bolest i velike socijalne mobilnosti. Iako se smatra da Srbija ima nizak stepen tuberkuloze, postoji velika potreba za skretanjem pažnja na značaj preventivnih mera, ranog otkrivanja i lečenja tuberkuloze u cilju smanjena broja obolelih.
Prikazujemo slučaj devojčice od 16 godina bez utvrđenog prethodnog kontakta sa osobom obolelom od aktivnog oblika tuberkuloze i kasnije dijagnostikovane bacilarne plućne tuberkuloze sa posledičnim komplikacijama.
Ključne reči: tuberkuloza, deca, pneumotoraks

Introduction

Tuberculosis (TB) is a curable disease, but it continues to impact the lives and development of millions of children and adolescents. Children contribute to 3–6% of the total number of TB cases in developed countries and a significant proportion of TB morbidity and mortality cases are reported in childhood. Children and young adolescents aged under 15 years represent about 11% of all TB cases globally. This means 1.1 million children and young adolescents aged less than 15 years will contract TB every year.
TB is also common in adolescents, especially older adolescents aged 15 to 19 years, with an estimated half a million cases globally each year. TB has a major impact on the health and well-being of adolescents. Unlike young children, adolescents are an important risk group for transmission due to infectiousness of disease and high social mobility. (1)

The Republic of Serbia records a continuous trend of reducing the rate of reporting tuberculosis, from 37/100,000 in 2003 to 9/100,000 inhabitants in 2019, which ranks it among the countries with a low burden of tuberculosis in the European region. According to the reports submitted on form number 1, in 2019, 623 cases of all forms of tuberculosis were reported, which are subject to mandatory reporting, which makes a notification rate of 9.02/100,000 per 100,000 inhabitants.
The burden of tuberculosis in the Republic of Serbia in the last 15 years has been significantly reduced thanks to the consistent implementation of the National Program, which is based on WHO strategies, which resulted in the reduction of the notification rate of tuberculosis by 80% to 9/100,000 inhabitants in 2019, which strengthened Serbia's position among countries with a low tuberculosis burden in Europe. During 2020, the tuberculosis notification rate was 5/100,000, which indicates incomplete reporting due to the COVID-19 epidemic. (2)

However, TB control in children has often been oversight due to the fact that they are ineffective bacillus transmitters, frequently escaping the attention of TB control programs.

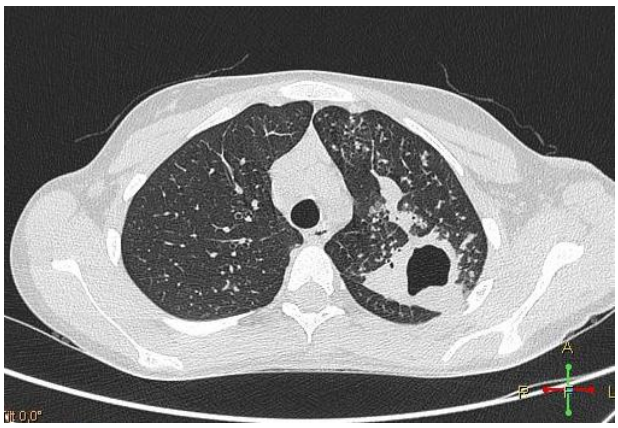
Children are infected with Mycobacterium Tuberculosis (MTB) always by contacting with infected patients/caregivers, household members and are thus considered excellent measure for estimate TB status in the public, as well as the efficacy of applied epidemiological preventive measures. Childhood infection is always suggestive of recent Mycobacterium tuberculosis

transmission, indicating failure of the public health system in controlling the disease within the community.(3)

We report a case of 16 years-old adolescent with a severe adult like form of pulmonary tuberculosis, characterized by extensive cavitary, highly contagious lesions. Contact tracing was a failure with no confirmed source of infection.
An adolescent of 16 years was admitted due to suspicion of pulmonary tuberculosis. Her complaints started four weeks before admission with cough and pain in the left side of the chest. She denies other symptoms and signs of infection. Chest X ray was highly suspicious on pulmonary tuberculosis: in the upper left lung field, consolidation and an annular shadow with a wall thickness of up to 2 mm and a diameter of 32 mm.

Tuberculin skin test was performed, 5 x 8mm induration. BCG scar visible on her left arm.
Quanti FERON test was performed and found positive.
Personal history unremarkable.
Family history unremarkable, parents with no symptoms, no contact of TB traced to the girl.

Before she was transferred to our department for pediatric tuberculosis MSCT of the chest was performed. (Picture 1)

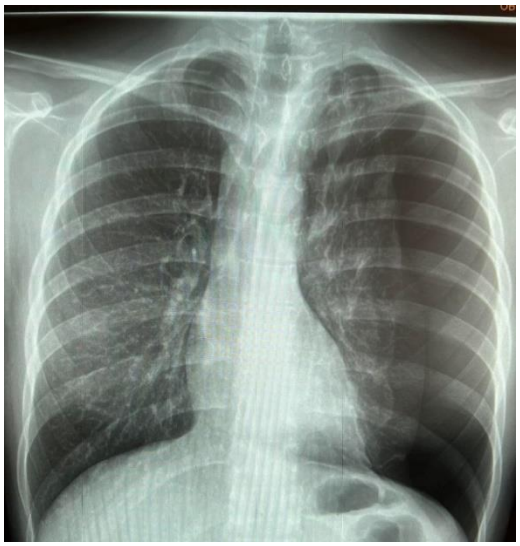


Picture 1. In the apicoposterior segment of the left lung next to the pleura, a cavity with a diameter of 25 mm was observed, with a draining bronchus. Spotty consolidations are present in the rest of the parenchyma of left lung. Hilar or mediastinal lymphadenopathy was not detected.
Slika 1. U apikoposteriornom segmentu levo subpleuralno prisutna šupljina dijametra 2,5mm, sa drenažnim bronhom. Tačkaste zone konsolidacije difuzno rasprostranjene u levom plućnom krilu. Uvećane limfne žlezde u hilusima I medijastinumu nisu uočene.

On admission she was in good condition, afebrile, eupnoic, normal oxygen saturation. On auscultation symmetrical normal breathing sound bilaterally, inspiratory crackles were audible apically, on the left side.

Her blood tests were within normal range, leukocytes 11.8x10^9/L, neutrophils 77%, lymphocytes 14%, monocytes 6.8%, CRP 53.2 mg/l.
Three sputum samples were smear positive on direct microscopy.
Culture Jansen Lowenstein was positive after 8 weeks.
Regular four anti-tuberculosis drugs were stared, which she tolerated well, remained in a good general condition throughout hospitalization.
Control sputum samples were taken after one month of full antituberculotic therapy and were negative on direct microscopy.
She was dismissed to home treatment (Isoniasid and Rifampicin) after 2 months of daily observed full therapy in hospital. At that time and 2 months later on regular check up she was completely fine, no complains or symptoms.

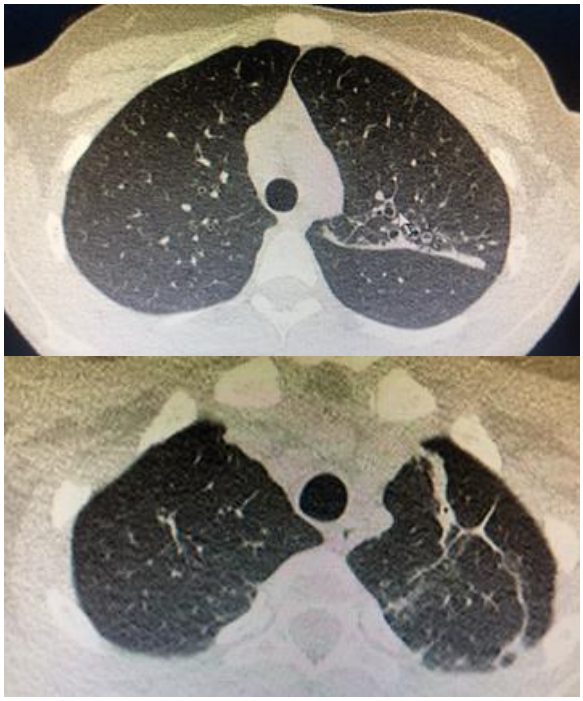
Three months later, our adolescent patient complained of sudden severe left sided thoracal pain. Chest X ray revealed partial left sided pneumothorax. She was referred to regional hospital, received underwater drainage under surgical supervision. After 6 days her left lung expanded completely. (Picture 2)



Picture 2. Left sided partial pneumothorax in an adolescent with pulmonary tuberculosis
Slika 2. Pracijalni pneumotoraks levog plućnog krila kod adolescentkinje sa plućnom tuberkulozom

After detailed evaluation, it can be assumed that this severe complication may be a consequence of her singing lessons and active participation in a school choir. Since her MSCT at the beginning revealed subpleural cavity and possible communication with drainage bronchus, we are very convinced that this early-stage sequels happened due to these circumstances. Regular treatment with 2 medications (Isoniazid and Rifampicin) was continued.

In January 2023. she was referred for final evaluation after almost 9 months of regular antituberculotic therapy. She had no complaints, no cough, fever or pain, had been completely fine.
Sputum sample was negative on direct microscopy. MSCT performed, fibrotic lesions and cystic bronchiectasis had been seen. (Picture 3,4).



Picture 3,4. MSCT after 8 months of antituberculotic therapy, fibrotic lesions and cystic bronchiectasis
Slike 3,4. MSCT nakon 8 meseci lečenja antituberkuloticima, fibrozne promene i cistične bronhiektazije viđene

Discussion

Children can present with TB disease at any age, but most commonly between the ages of 1 and 4 years in high TB burden settings. Children who develop TB disease usually develop it within a year of exposition to TB infection. The presentation of TB in children is an indicator of recent and ongoing transmission of MTB.
While preschool age children might have been mildly affected with MTB, school age children and specially adolescents might have been severely ill and presented with adult forms with subsequent sequels. (4,5)

The utmost importance of managing TB in children and adolescents is precious investigation of close contacts with bacteriologically confirmed TB patient. Procedure consists of identification of close contacts, clinical assessment, testing (in children first line is tuberculin test, second line IGRA), and decision on treatment if LTBI or TB detected. (6,7)

WHO recommends that household contacts and other close contacts of patients diagnosed with infectious pulmonary TB should be systematically screened and monitored in order to validate the development of the infections or disease. Crucial for pediatric population has been clinical estimation based on BCG vaccination, age, tuberculin test, IGRA if available, clinical course or symptoms. Failure to locate the possible patients early in the course of infection definitely would lead to severe and complicated primary or post primary TB forms in later life, particularly in adolescent ages (8)
In reality, exposed infants and children who had evidence of TB infection and did not receive chemoprophylaxis could be faced with risk of developing TB disease within 2 years of being evaluated as a contact. Children less than 5 years of age should be given chemoprophylaxis and regularly observed. Children with close contact with contagious patient should be diagnosed as latent TB infection. Obviously, children exposed to MTB who failed to be tracked and to get chemoprophylaxis might have been silent for many years but in adolescent ages development of severe adult like TB disease would be possible. (9,10)
In majority of these cases the source of infection could not be detected or defined, at the time when pulmonary TB symptoms occurred. That was the possible explanation for our adolescent patient without contact with TB patient. The intensity and severity of pulmonary lesions verified on chest X ray and MSCT, evidently confirmed the long duration of MTB infection in otherwise healthy female adolescent. Evidently, the early and vigorous tracking of TB contacts would be the most important for detection of primary stage and avoidance of occurrence of post primary forms.

From the very beginning the extension of the lung destruction and localization in the apical zone (lack of ventilation and vascularization), we were faced with the warning that clinical course would be complicated and healing would be difficult without sequels. What we didn't expect was the early-stage sequel, only 3 months after discharge from the hospital. Although the general condition and clinical outcome of our patient was excellent, the spontaneous pneumothorax developed probably due to high intrathoracic pressure during the singing classes 3 times weekly.
Spontaneous pneumothorax is defined as the sudden presence of air in the pleural cavity, accompanied with intensive pain on the sick side of the lungs. If there is no evident cause it can be classified as primary spontaneous pneumothorax, mainly in the young people without associated pulmonary or general disease. Secondary spontaneous pneumothorax is associated with clinical or radiological evidence of pulmonary disease. In children it might have been related to congenital lung disease, acquired cystic lesions and most frequently as a consequence of subpleural cavitary lesions due to pulmonary tuberculosis as it was diagnosed in our patient. (11)

In adult patients the presence of spontaneous pneumothorax during the active pulmonary TB disease is well defined. The prevalence rate has been 0,6 to 1,4% (11).

However, it has been rarely evaluated in pediatric and adolescent age group. Honestly, there are very few studies on tuberculosis and spontaneous pneumothorax as consequence, on treatment, surgical drainage, evolution and recurrence, which cannot be rule out. (12,13)

In conclusion, our case is a real -life presentation of uneventful sequel of severe cavitary tuberculosis, rarely seen in children and adolescents but exactly define the pulmonary tuberculosis as respectable disease with many features, clinical outcomes and complications.

References:

1. Global tuberculosis report 2021. Geneva: World Health Organization; 2021 (https://apps.who.int/iris/handle/10665/346387, accessed 1 December 2021).
2. Institut za Javno zdravlje Srbije "Dr Milan Jovanović Batut". Godišnji izveštaj o zaraznim bolestima u Republici Srbiji u 2017. Godini. Beograd 2018.
3. WHO consolidated guidelines on tuberculosis. Module 5: management of tuberculosis in children and adolescents. Geneva: World Health Organization; 2022 (https://apps.who.int/iris/bitstream/handle/10665/352522/9789240046764-eng.pdf).
4. Marais B. The natural history of childhood intra-thoracic tuberculosis: a critical review of literature from the pre-chemotherapy era. Int J Tuberc Lung Dis. 2004;8(4):392–402.
5. Roadmap towards ending TB in children and adolescents. Geneva: World Health Organization; 2018 (https://apps.who.int/iris/handle/10665/275422, accessed 1 December 2021).
6. Guidance for national tuberculosis program on the management of tuberculosis in children, second edition. Geneva: World Health Organization; 2014 (https://apps.who.int/iris/handle/10665/112360, accessed 1 December 2021).
7. WHO operational handbook on tuberculosis. Module 2: screening – systematic screening for tuberculosis disease. Geneva: World Health Organization; 2021 (https://apps.who.int/iris/handle/10665/340256, accessed 1 December 2021)
8. WHO consolidated guidelines on tuberculosis. Module 2: screening – systematic screening for tuberculosis disease. Geneva: World Health Organization; 2021
9. Martinez L, Cords O, Horsburgh CR, et al. The risk of tuberculosis in children after close exposure: a systematic review and individual-participant meta-analysis. Lancet. 2020;395(10228):973–984. (https://apps.who.int/iris/handle/10665/340255, accessed 1 December 2022).
10. Dodd PJ, Yuen CM, Sismanidis C, et al. The global burden of tuberculosis mortality in children: a mathematical modelling study. Lancet Glob Health. 2017;5(9):e898-e906.
11. Freixinet J, Caminero J, Marchena J, Rodrıgue P, Casimiro J. Hussein M. Spontaneous pneumothorax and tuberculosis: long-term follow-up. Eur Respir J 2011; 38: 126–131 DOI: 10.1183/09031936.00128910
12. Botianu PV. Spontaneous pneumothorax in tuberculosis. Chest 2004; 126: 894S
13. Weissberg D, Refaely Y. Pneumothorax: experience with 1,199 patients. Chest 2000; 117: 1279–1285.

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