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COMPLICATED TUBERCULOSIS IN A 13-YEAR-OLD CHILD WITH DOWN SYNDROME: A CASE REPORT

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Abstract

Tuberculosis (TB) is the most common cause of infectious disease-related mortality worldwide. Most persons infected won't develop active disease, but in certain instances such as extremes of age or defects in cell-mediated immune response, TB may develop. Down syndrome (DS) is the most common neurodevelopmental disorder of know genetic causeand described simply as arising from an extra copy of chromosome 21, presenting with characteristic features. Due to immune defects, DS suffer more frequently from respiratory tract infections than normal children.

We present a case of a 13years old child with Down Syndrome who was diagnosed with lung tuberculosis, after a right sided lobectomy due to a lung abscess.

The child was hospitalized, following a period of one and a half month with fever and vomiting that did not improve with therapy. Investigations were made, including CT scan on the lungs. Due to right sided empyema and abscess on the right upper lobe, right sided lobectomy was preformed. The postsurgical pathohistological findings were in addition to pulmonary tuberculosis. Four drug antituberculosis regimen was started. The four-drug course was given for two months, and then a two-drug regime was continued. To this day the child is on the sixth month of the two-drug antituberculosis regime. CT scans, regular Chest X-rays and ultrasound of the lungs were made, with gradual improvement.

In Down syndrome patients who have a complicated pneumonia that doesn't respond to standard treatment, a tuberculosis disease should be considered.

Keywords: child, Down syndrome, tuberculosis.

Introduction

Tuberculosis (TB) caused by the bacillus *Mycobacterium tuberculosis*, a multisystemic disease with myriad presentation and manifestations, is the most common cause of infectious disease-related mortality worldwide. The most common site of affection are the lungs[1].

Most persons infected with *M. tuberculosis* won't develop active disease, with lifetime risk of 5-10% for healthy individuals [2]. In certain instances, such as extremes of age or defects in cell-mediated immune (CMI) response, TB may develop.

Down syndrome (DS) is the most common neuro developmental disorder of know genetic cause, with an incidence of between 1:750 and 1:1000 live births. DS has usually been described simply as arising from an extra copy of chromosome 21 and presenting with characteristic features, including facial dysmorphology, a proportionally large tongue, low muscle tone, short stature and intellectual disability [3].

In children with DS, increased susceptibility to infections have been linked to abnormal parameters of the immune system[4], and DS is one of the most common recognizable genetic syndromes with immune defects [5].

As from clinical practice, as well most studies agree that children with DS suffer more frequently from respiratory tract infections than normal children [6].

We present a case a child with Down Syndrome who was diagnosed with lung tuberculosis, after a right sided lobectomy due to a lung abscess.

Case presentation

At 23th of November 2022, a 13 years old girl with Down Syndrome was admitted to our hospital due to confirmed lung tuberculosis infection.

From the anamnestic data,one and a half month before the admission the child was treated with oral third generation cephalosporin antibiotic, due to fever and vomiting. As there was no improvement, the child was hospitalized at the University Clinic for Children Diseases in Skopje. Investigations were made, including CT scan on the lungs (27.10.2022). Due to high inflammatory markers and atelectasis on right upper lobe of the lung, with right sided pleural effusion (Figure 1), the child was transferred within 24 hours to the University Clinic for Pediatric Surgery. There a right sided empyema and abscess on the right upper lobe were diagnosed. A right sided lobectomy was performed.

The postsurgical pathohistological findings were in addition to pulmonary tuberculosis. Then the child is transferred to our hospital for treatment.

Previous to this, the child had regular checkups for the primary diagnosis Down syndrome and was on therapy with levothyroxine, due to hypothyroidism. Several hospitalizations are noted, due to the primary diagnosis. In 2021 the child was hospitalized due to infectious mononucleosis and in 2022 due to right sided pneumonia.

The child was regularly immunized after the calendar for immunization of Republic of North Macedonia. A contact with tuberculosis positive patient was denied.

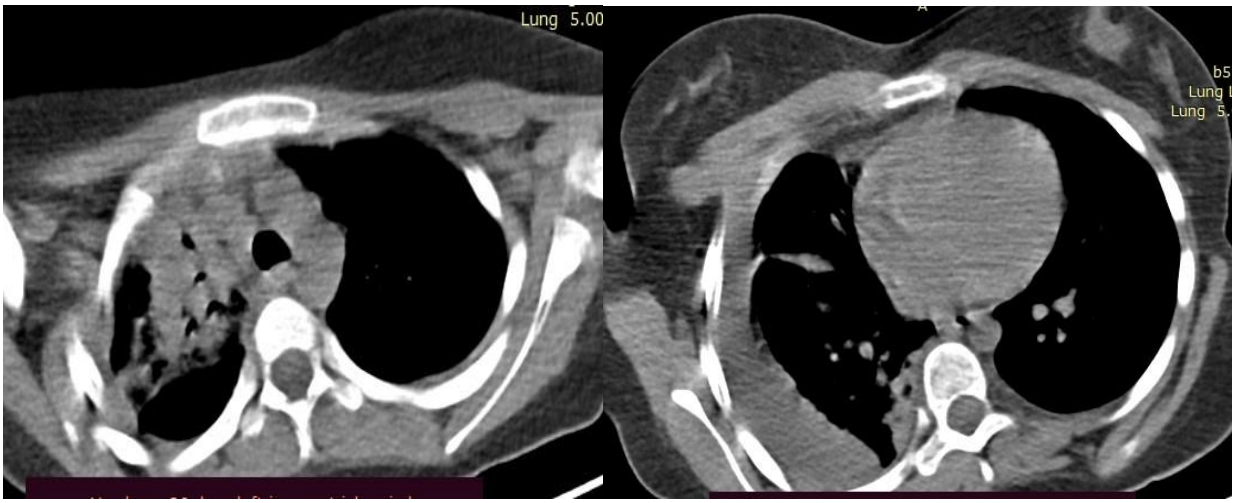

Figure 1. CT scan – lungs

At admissionshe was afebrile, pale, without dyspnea, and auscultatory on the lungs with weakened to inaudible breathing on the right and a vesicular breathing without additional findings on the left side. The heart sound were rhythmic, without heart murmurs. The child had dysmorphic features in addition to its primary diagnosis Down syndrome.

Diagnostic findings

Complete blood count - hemoglobin 120g/L, erythrocytes 4,6 × 10^{12}, leukocytes 8,3 × 10^{9} , Platelets 436 × 10^{9} , ESR 90/120 mm/h, CRP 136,4 mg/l, procalcitonin 0,29 ng/ml.

Blood biochemistry: total protein 64 g/L, albumin 33 g/L, Na 128 mmol/l, K 4,9 mmol/l Ca 2,17 mmol/l, Hepatic enzymes: AST 17 u/l, ALT 10 u/l, bilirubin 6,6 mcmol/l, gamma GT 90 u/l. Urea 3,7 mmol/l, Creatinine 58 mmol/l, fibrinogen 8,15 g/l, immunoelectrophoresis: IgG 16,8 g/l, IgA 4,12 g/l, IgM 1,21 g/l.

Lung ultrasound was made – Left costodiaphragmatic recess free. On the right a small pleural effusion and heterogenic threads are noted in addition to organization of the effusion.

Chest X-ray – condition after right sided lobectomy. The right lung in re-expansion without consolidation, with small pleural effusion in the right costodiaphragmatic recess. Left lung with normal transparency, with free left costodiaphragmatic recess (Figure 2).

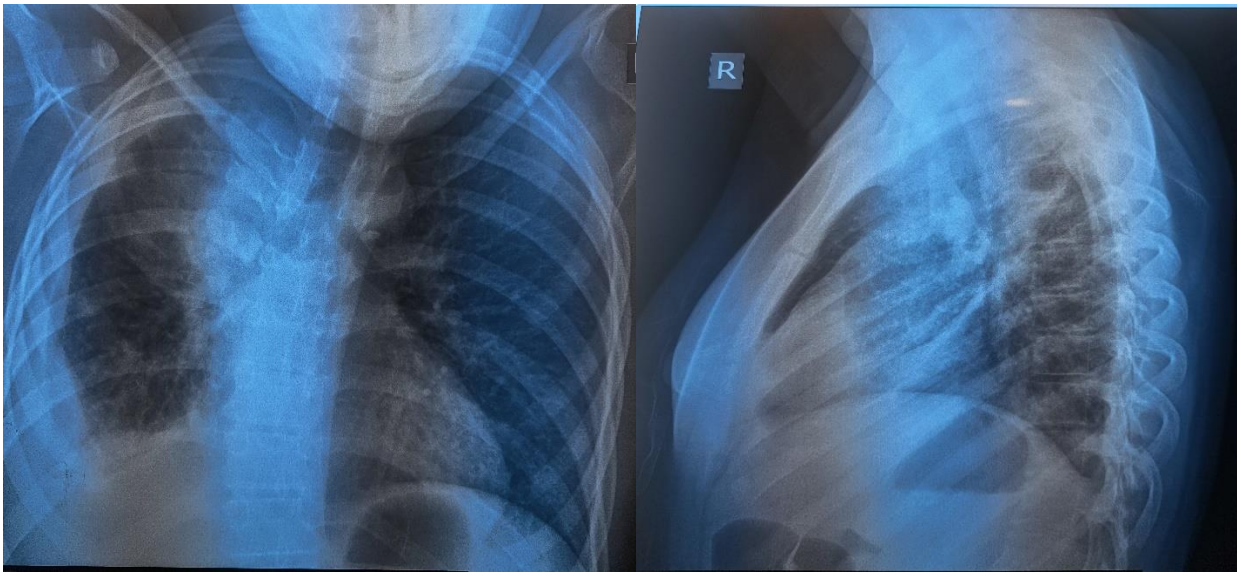

Figure 2. Chest X-ray

Lung CT with contrast (01.12.2022) – condition after drainage of right sided pleural effusion, evacuation of apical abscess in the right upper lobe, and condition after atypical partial resection of the right upper lobe. Apical, an almost fully emptied abscess cavity with thick, irregular wall and meaty vegetations which emerge in to the cavity are noted.

A drainage segmental bronchus with free lumen is noted. Distally from the abscess cavity there is a zone of necrotic lung tissue which extends to the hilum. There is a residual, organized and on spots encapsulated pleural exudate with maximal diameter of 2cm. Rough, fibro-reticular changes in the right basal part are noted. A fistula is seen on the front lateral wall of the right hemithorax, probably from the sight of the previously extracted drain, now with inflammation of the local fatty tissue. On the left there is a normal transparency of the lung. There are noted significantly enlarged, with central colliquationlymph nodes with short axis up to 1,8cm, right paratracheal, pre and subcarinal, and hilar right. Artery lusoria is with retroesophageal flow. A hypertrophy of the right hepatic lobe is noted. (Figure 3)

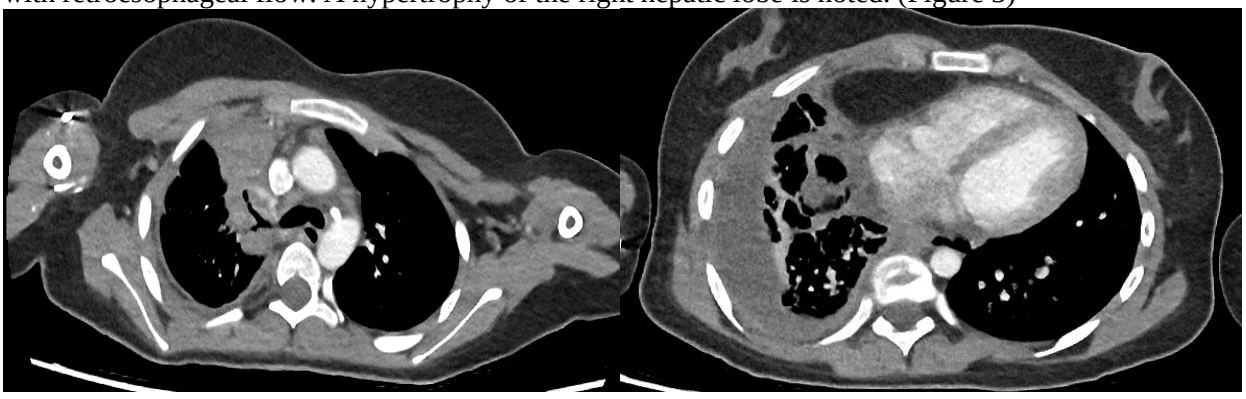

Figure 3. CT scan lungs

Therapy

A double parenteral antibiotic therapy was continued with vancomycin and meropenem, which was started at the University Clinic for Pediatric Surgery in Skopje, post-surgical. Also a four drug antituberculosis regime was started with isoniazid, rifampicin, pyrazinamide and ethambutol.

Also a hepato-protective drug was given.The four drug course was given for two months, and then a two drug regime was continued with isoniazid and rifampicin.

About four months after the first hospitalization the child was treated in our hospital due to pneumonia, threated with double parenteral antibiotic therapy in course of 21 days.

At this stay a control CT scan was made (04.04.2023), with conclusion – compared to the previous CT scan, a good post therapy response is noted, with reduced volume of the abscess cavity, with resolution on the previously described inflammatory reaction, as well as the quantity of the right sided pleural effusion (Figure 4).

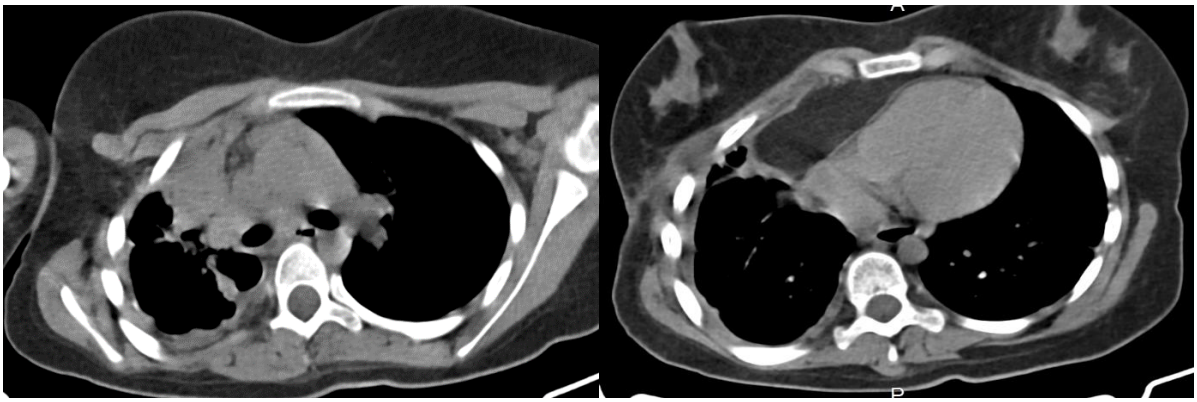

Figure 4. CT scan lungs

To this day the child is on the sixth month of the two-drug antituberculosis regime. Due to complicated tuberculosis disease, a treatment of nine months antituberculosis therapy is planned. Regular Chest X-rays andultrasound of the lungs are made, with gradual improvement.

Discussion

This case report represents a 13year old girl with primary diagnosis of Down syndrome, that developed tuberculosis disease. Due to the abnormalities of the immune system associated with DS like: mild to moderate T and B cell lymphopenia, with marked decrease of naive lymphocytes, impaired mitogen-induced Tcell proliferation, etc. [6], children may be more prone to developing tuberculosis disease. However, so far there are no studies that would confirm this.

There are few case reports, that report individuals with Down syndrome who had tuberculosis infections with associated complications like cardiac tamponade, septic shock,myelofibrosis, stroke from brain tuberculoma and Rasmussen's aneurysm[7 - 11].

When a lung abscess is suspected, a differential diagnosis of tuberculosis should be considered. Contrast enhanced CT should be preformed. Findings such as multiple and irregular necrotic areas, positive CT angiogram sign, no marginal enhancement surrounding necrosis shouldsuggest pulmonary tuberculosis rather than lung abscess[12].

Conclusion

Even though there are rare reported cases, individuals with Down syndrome can be infected with *M. tuberculosis.* Due to their abnormalities of the immune system, they will most likely develop tuberculosis disease.

In Down syndrome patients who have complicated pneumonia that doesn't respond to standard treatment, tuberculosis disease should be considered.

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