



Case report

Cavitary tuberculosis re-emerging in immigrant children

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ABSTRACT

Cavitary pulmonary tuberculosis in children is uncommon in areas with a low tuberculosis burden. We present two cases in an 11-year old immunocompetent girl and an 8-year old immunocompromised boy. Both children were immigrants. No other cavitary tuberculosis cases have been observed in a population of 103,781 children in Crete, Greece for the past 25 years.

Conclusion: Severe forms of tuberculosis may re-emerge and BCG vaccination should remain part of the immunisation programme in immigrant populations.

1. Introduction

Cavitating pulmonary tuberculosis (TB) is generally considered a disease of adults, although lung cavitations in children have been reported, in particular in immunocompromised individuals [1,4,6]. We present two cases of cavitary TB in immigrant children, one in an immunocompetent girl and another in an immunocompromised boy.

2. The cases

An otherwise well 11-year old girl presented with a 3-day history of chest pain and cough. The girl had been given clarithromycin 2 months earlier for cough and fever under the presumptive diagnosis of lower respiratory system infection. Chest X-ray revealed a cavitary lesion at the left lower lobe, and smaller lesions at the middle and upper lobes bilaterally (Fig. 1a). High resolution computed tomography (HRCT) confirmed the presence of multiple cavities which were located at the left upper lobe and at the superior segment of the collapsed left lower lobe, calcified subcarinal and hilar lymphnodes, and bilateral nodular non-cavitary parenchymal disease at the upper lobes (Fig. 1b and c). Mantoux tuberculin skin test showed an induration of 30 × 30 mm and interferon gamma release assay (IGRA, Quantiferon-TB, Cellestis) test was positive. No BCG vaccination was recorded and no BCG scar was evident. Sputum smear for acid fast bacilli stained positive, and PCR, culture of sputum and gastric aspirate all grew *M. tuberculosis*. Sensitivity to isoniazid, rifampin, streptomycin and ethambutol was shown by the BACTEC MGIT 960 SIRE test (Becton, Dickinson and Company,

USA) and no mutation indicating resistance to antituberculous drugs was detected by Genotype MTBDR plus and MTBDRsl test (Hain, Germany) based on DNA-STRIP technology. Serology for HIV was negative and immunology work-up was normal. Isoniazid, rifampin, pyrazinamide and ethambutol were given for 2 months, followed by isoniazid and rifampin for 4 more months. Methylprednisolone was given for the first 3 weeks. Sputum staining was negative after 3 weeks of treatment. The girl had not attended school for the past 6 months for social reasons and was the second of three children of a family of Bulgarian origin. Positive family history or recent contact with tuberculosis was not reported. Following contact investigation, all family members were given chemoprophylaxis for positive tuberculin skin test and IGRA assay, but normal chest X-ray.

An 8-year old boy with B-cell acute lymphoblastic leukaemia, presented with fever, cough and respiratory distress while on maintenance chemotherapy. Chest radiographs suggested prominent hilum and a cavitary lesion at the left lower lung field (Fig. 2), while HRCT showed enlargement of paratracheal, hilar and mediastinal lymphnodes, consolidation at the lingula containing a small cavity and multiple pulmonary nodular lesions at the superior segment of the left lower lobe, the lateral segment of the right middle lobe and the posterior segment of the right lower lobe. There was no evidence of significant tracheal compression. Mantoux tuberculin skin test was negative, whereas IGRA test was positive. Gastric lavage grew *M. tuberculosis* which was susceptible to all drugs. The boy was successfully treated with isoniazid, rifampin, pyrazinamide and ethambutol for a total of 18 months (for isoniazid and rifampin) and methylprednisolone for 8 weeks. Outcome

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Abbreviations

BCG	Bacille Calmette-Guérin
ESR	Erythrocyte Sedimentation Rate
HRCT	High Resolution Computed Tomography
IGRA	Interferon Gamma Release Assay
TB	Tuberculosis

under control for decades [3,9]. According to national data the notification rate of TB cases in Greece in 2015 was 4.4/100,000 population [10]. In the area of Crete, with a population of 103,781 children (2011 census), no other cases of cavitory tuberculosis have been seen in children for 25 years (1990–2014). Children presenting with adult type findings may encounter diagnostic delays because of low index of suspicion. Adult type disease seems to become more common after 8–10 years of age, and the risk of transmission is considerable in adolescence,

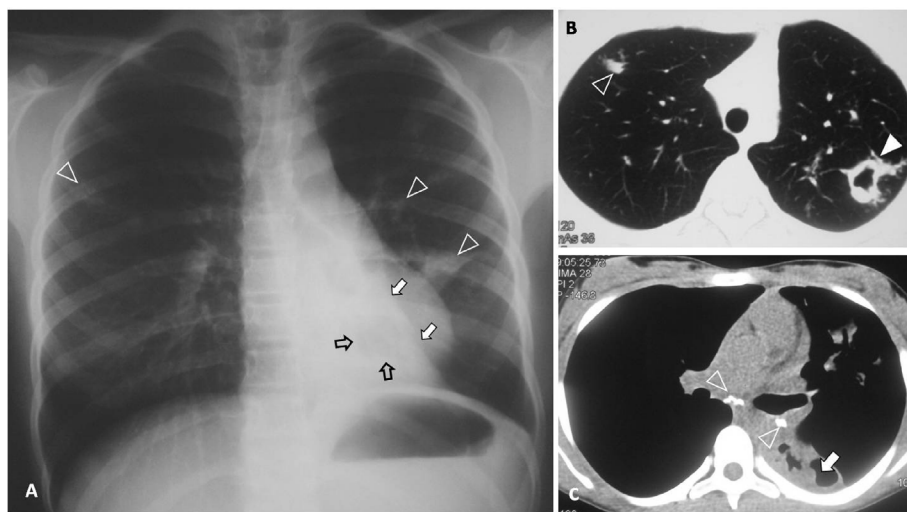


Fig. 1. Chest imaging of patient 1 A: Chest x-ray showing large cavities at the left lower lobe (open black arrows) adjacent to a retrocardiac collapse-consolidation (white arrows) and oval and nodular infiltrates at the mid-lung fields (open arrowheads). B: HRCT transverse section through the upper lobes showing a nodular lesion at the right upper lobe (open arrowhead) and a cavitory lesion at the left upper lobe (arrowhead). C: HRCT transverse section through the lung bases demonstrating calcified small subcarinal and left hilar nodes (open arrowheads) and a cavity (arrow) inside the collapse-consolidation at the left lower lobe.

was uneventful over a 4-year follow-up period. CD4:CD8 ratio was 0.3 and remained low for a long period. The child originated from Albania and occasionally made visits to relatives there. He was not vaccinated with BCG. The source of infection was not identified, despite an investigation which included family and contacts as well as school mates and staff (34 individuals). A school teacher had recently received chemoprophylaxis, but did not have cavitory lesions. All children at school had already received BCG according to the Greek national immunisation programme. Chemoprophylaxis was given to three of them who presented with positive Mantoux test and positive IGRA assay, normal chest x-ray and normal first-line investigation results.

3. Discussion

Poverty, social unrest and migration have been linked to the re-emergence of tuberculosis even in countries where the disease was

especially in schools [2,5–7]. In children with poor cell-mediated immunity, including those who undergo treatment for malignancies, progressive lung damage is the result of unrestrained proliferation of bacilli. Despite the increased risk of infection by both typical and opportunistic pathogens after chemotherapy, pulmonary TB in children has only rarely been reported [4]. The first case depicted cavitating pulmonary disease in an immunocompetent child coming from a country with high incidence of tuberculosis [8]. The second case elaborated that in young children on chemotherapy, tuberculosis should be suspected in atypical pulmonary lesions. None of the school mates was found with active TB, and this should be attributed to their BCG vaccination. BCG was part of the routine national immunisation programme until recently, when there was a change in national recommendations regarding BCG, that currently is administered only in high-risk populations at birth or until the age of 5 years. These cases suggest that severe tuberculosis may re-emerge in children, especially in immigrant populations or in conditions of social deprivation and that BCG should remain a part of routine immunisation in these populations.

Authors' contributions

Chrysoula Pedikiogianni drafted and edited the manuscript. Maria Raissaki was responsible for the presentation and discussion of imaging findings. Athanasia Christidou was responsible for the presentation of bacteriology findings. Emmanouil Galanakis cared for the children, supervised the drafting process and co-drafted and edited the manuscript.

Ethical standards

No photographs or any other detail that might disclose the identity of the subjects have been used and therefore it is impossible for the patients to be identified from the case description.



Fig. 2. Chest x-ray of patient 2 showing prominent hilums and a cavitory lesion at the left lower lung field.

Conflicts of interest

The authors declare that they have no conflict of interest.

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