Miliary Tuberculosis Complicated by Pulmonary Cavitations and Pneumothorax in a 14-Month Old Boy

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Surgical management of tuberculosis is uncommon in children. We report a case of a 14-month-old boy with miliary tuberculosis and recurrent pneumothorax due to cavities in the left lung. This boy had no previous medical history and was referred to our hospital for a severe pneumonia. Initial chest radiograph showed bilateral miliary pattern. Direct microscopy of gastric lavage showed the presence of tubercle bacilli, providing definitive diagnosis. In spite of effective medication, his status rapidly worsened. A cardiac resuscitation was followed by intubation, and he required high-pressure ventilation for four weeks. He developed left pneumothorax, for which several drainages were performed. Computed tomography revealed a huge cavern system involving the entire lingula and surrounded by the left pneumothorax. Eventually, a massive enlargement of the initial cavity necessitated a thoracotomy and wedge resection.

Keywords: tuberculosis, pneumothorax, cavitations

Introduction

Tuberculosis mainly affects adults, yet children account for 15%–20% of cases in high-burden countries. Childhood tuberculosis is a neglected global disease, particularly in Europe, a low-burden region that is increasingly challenged with migration effects, with respect to tuberculosis. In Germany, the pediatric population represents less than 5% of official cases (4543 new cases in 2008, of which 124 children were under the age of 15), and hematogenous disseminated forms represent 1.2% of these cases. Tuberculosis responds well to chemotherapy, and only in rare cases is surgery required. We present an unusual case of miliary tuberculosis, complicated by cavitition and recurrent pneumothorax in a 14-month-old boy.

Case Presentation

A 14-month-old boy with a 1-month history of night cough, loss of weight, but without fever, was brought to our establishment. The chest radiograph showed a bilateral, pulmonary miliary pattern associated with a bulla-like cystic lesion of the left lung (Fig. 1). Cystic fibrosis or viral pneumonia with bacterial superinfection was eliminated as causes. Although no index case was found initially, gastric aspirate and direct microscopy provided the diagnosis of tuberculosis (wild-type strain). The patient’s father was subsequently diagnosed with infectious pulmonary tuberculosis. The computed tomography scan (CT) of the boy’s lung showed multiple bullae (hypodense areas) of the left lung with hilar lymphadenopathy, and
biological analysis confirmed malnutrition and immuno-
logical anergy.

The patient’s status rapidly deteriorated after admis-
sion, in spite of his taking effective tuberculosis medica-
tion (isoniazid, rifampicin, ethambutol and pyrazinamide)
and adjuvant prednisolone. Cardiac resuscitation was fol-
lowed by intubation and drainage of the pneumothorax.
This was followed by the application of several tube tho-
racostomies; however, their removal was not possible due
to the immediate recurrence of pneumothorax and medi-
iastinal shift (Fig. 2). Surgery was indicated because of
enlargement of the cavitating areas and symptoms of ten-
sion.

A left posterolateral thoracotomy through the sixth in-
tercostal space was performed. Exposure required the re-
lease of adhesions between the chest wall and lung to re-
veal a 5 × 5 cm cavity involving the lingula. The thick-
walled cavity was mobilized, and granuloma shaped ad-
hesions between lung parenchyma and pericard were re-
leased. Then, a wedge resection of the lingula was per-
formed using a stapler (roticator™ stapler 30-V3) with-
out suture reinforcement. Due to lymph node infiltra-
tion around the left phrenic nerve, the common trunk was
injured and immediately repaired by direct suture. The
postoperative course was uneventful. The first chest tube
was removed on postoperative day 3 while the second
chest tube was removed on postoperative day 8 because
of mild air leakage. The patient was extubated on postop-
erative day 6. A slight elevation of the diaphragm per-
sisted when the child was discharged from the intensive
care unit (Fig. 3).

The histopathology of the parenchymal cavity was
typical of tuberculosis: displaying granuloma with epith-
eloid cells and Langerhans cells, in addition to fibrosis
and vasculitis. The antituberculous chemotherapy was
continued. The initial lack of CD3-positive T-cells cou-
ped with anergy was due to the severe infection, which
subsided after 6 weeks, whereby, we observed subnormal
numbers and functioning of T-cells. However, there was an onset of an IRIS (immune reconstitution inflammatory syndrome) reaction with clinical deterioration (tachypnea, high fever, increasing demand of oxygen supply), which resulted in the prolongation of oxygen and prednisolone therapy for several weeks. Full recovery was observed at the 1-year follow-up without sequelae of phrenic nerve palsy.

Discussion

The global incidence of tuberculosis remains high. In developed countries, the incidence of tuberculosis is considered unimportant; however, this incidence is gradually increasing as a result of global migration. The increased incidence is particularly important for multi-drug-resistant tuberculosis (3% of all cases in Europe; 10%–15% in republics of the former Soviet Union).3)

Infants, principally, neonates and young children in close contact with a source case are at high risk; a risk that is often associated with rapid progression of disease into severe forms.5) Indeed, primary tuberculosis in early childhood remains under diagnosed because of poor clinical signs. Indices of exposure are often the most pertinent diagnostic tool.

Though our patient did not present with any of the archetypal risk factors for tuberculosis (HIV positive, low social class, chronic malnutrition, or origin from high-incidence country), tuberculosis was not excluded from the diagnosis, since evidence for tuberculosis was observed in the X-Ray analysis. We believe that the child was infected by his father, whose tuberculosis was detected later on.

Cavitating pulmonary tuberculosis follows the evacuation of caseous material from the primary focus. This technique can be performed in children under the age of 2 who show progressive lung tuberculosis.6) Residual, thin-walled cavities may be seen in both active and inactive forms of the disease. Differential diagnoses include bullae, bronchiectasis, congenital and hydatid cysts. After chemotherapy, the primary treatment choice, the tuberculosis cavity may disappear. However, cavitating tuberculosis is typically more often encountered in adolescent and adult patients after reactivation of primary tuberculosis infection (postprimary). In the current case, high pressure ventilation changed the initial cavity in a mass effect with a right mediastinal shift.

Paediatric reports, detailing non-conservative surgical therapy for refractory respiratory infections, are rare. Usually, surgical therapy is reported in older children, with a mean age at surgery ranging from 6.6 to 13 years.7–9) Indication for surgery includes the resistance to medical treatment and sequelae rather than acute complications with conventional medical therapy. In cases where the immunological defense declines or is compromised, resection can be carried out safely and provide significant improvement in children.

Surgery provides a complementary role in the complex treatment of children with primary pulmonary tuberculosis. Despite the benefits, most pediatric surgeons in low-burden areas have little to no experience with tuberculosis. Instead, parenchyma resection in young children is performed mainly for congenital lung lesions. Tuberculosis can be difficult to diagnose since its prevalence is considered low; thus, it is often unanticipated by diagnostic histopathology.10) Acute respiratory presentation requiring emergency surgery is infrequent. Following extensive literature searches, we found only two case reports describing young children with respiratory distress presentation and paracardial mass.11,12) Our reported case is highly unusual, given the age of our patient and the extraordinary complication that involved cavitating, persistent pneumothorax, despite several drainage attempts. Pneumothorax is a common complication of ventilator therapy and usually responds well to tube thoracostomy. Other iatrogenic mechanisms include inappropriate insertion of the chest tube, trauma from vigorous endotracheal suction with excessively deep passage of suction catheter or cardiac pulmonary resuscitation. We found that chemical pleurodesis is considered ineffective in the management of recurrent pneumothorax in children.13) In our case, the recurrence of pneumothorax with a large air leak indicated the presence of a bronchopleural fistula. The imperative surgical management was intended for a resection of a complicated cyst, thereby aiming to treat the underlying cause for pneumothorax and chemotherapy resistance. The mass effect and tension of the cavern contra indicated thoracoscopy; even so, the severe adhesions into the pleural cavity would have likely led to a conversion. Segmental resection was not possible due to inflammatory changes. The actual site of air leakage appeared to be localized at the bottom of the dilated and destroyed lingula.

Conclusion

By this stapler resection, we felt compelled to excise some pulmonary parenchyma. Beside considerations of
future lung function, this thoracotomy was a life-saving procedure. As our case illustrates, surgery is necessitated and is the appropriate treatment when such tuberculosis complications arise.

Disclosure Statement

The authors declare that they have no competing interests.

References