



## Pulmonary tuberculosis presenting as ruptured pneumatocele with pneumomediastinum

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**Abstract :** Pneumatocèles occur as a sequelae to acute pneumonia caused by *Staphylococcus aureus*. We present a case of 4 month old infant who was a twin with cough, breathlessness for one month and history of not gaining weight for one month. The child had contact history for tuberculosis. Chest radiograph was reported as 'rupture pneumatocele with pneumo - mediastinum'. Gastric juice aspirate showed 7 AFB in 100 oil immersion fields and thus confirmed the diagnosis of childhood tuberculosis. Anti - tubercular drugs were started in accordance to RNTCP 2013 guidelines under 'new case' category. The child, on follow up was found to be in good compliance with drugs and had gained weight. Chest radiograph was repeated after 4 months of treatment and showed resolution of pneumatocele. His parents and twin brother were screened for tuberculosis and were found to be negative. INH prophylaxis was started for his twin brother.

**Keyword :** Pneumatocele, Pneumo - mediastinum, childhood tuberculosis

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### Introduction:

Pulmonary pneumatocèles occur as a sequelae to acute pneumonia caused by *Staphylococcus aureus*<sup>16</sup>. In this article we have discussed about an infant who had developed pneumatocele due to tuberculosis

### Case Presentation:

A 4 month old, first order male child who was one of the twin was referred to our hospital as a case of failure to thrive / Acute diarrheal disease / ?Septicemia with complaints of loose stools and vomiting for 2 days and fever for 1 day. The child had 4 – 5 episodes of non-foul smelling, watery stools per day, 2 – 3 episodes of non – projectile, non – bilious vomiting and low grade fever. There was no history of feed refusal.

### Brief history:

The ante – natal scans revealed a twin gestation and ante – natal period was uneventful. Child was delivered via elective – LSCS at term (indication: first twin in breech presentation) and birth weight was 1.75 kg, the other male twin's weight was 1.25 kg, both were admitted in NICU for 5 days for low birth weight and discharged. NICU stay was uneventful. The child had achieved the developmental milestones for his age and had been immunized for age – BCG scar was present. He was on both breast feeds and

formula feed. Child was gaining weight adequately up to 3 months and then he had history of cough and breathlessness on and off for one month and stopped gaining weight for which, was investigated and treated in a private hospital in out – patient basis. A chest radiograph taken for the same, revealed a cavitary lesion in left upper lobe, for which no further evaluation was done.

**Contact history:** The care taker (neighborhood old lady) of the child was a known case of tuberculosis and was on anti - tubercular drugs for the last 4 months.

### On examination:

Child was irritable, poorly nourished with loss of buccal pad of fat, pale, with some dehydration. Child was tachypneic with respiratory rate of 66/min without retractions and was maintaining saturation of 99% with room air, other vitals were normal. The child weighed 2.5kg which was below the 3rd percentile for age, length and head circumference were normal for age. Air entry was equal on both lung fields and there were no added sounds, apical impulse was normal in position and heart sounds were normal, examination of other systems did not reveal any findings. Child was accepting feeds well.



### Index case - 4 month old male infant

#### Initial stabilization:

Child was treated with nasal oxygen, rehydrated with iv fluids and iv antibiotics were started. With rehydration irritability and effortless tachypnea settled .

#### Investigations:

Chest radiograph was repeated, a cavitary lesion in the left upper lobe was seen, radiologist opinion was "thin - walled cavity ? pneumatocele with cavitary pneumonia / necrotising pneumonia suggested CT chest"



Pneumatocele in left upper lobe



### **Ruptured pneumatocele with pneumo mediastinum**

Discharge summary for the NICU admission was reviewed and chest radiograph taken during that period was reported as normal.

### **Other investigations:**

Blood urea was 46 mg/dl and creatinine was 1.0 mg/dl, which was repeated after rehydration and found to be 34mg/dl and 0.7mg/dl respectively. Mantoaux was non reactive. He had anemia with Hemoglobin of 5.8g/dl, RBC count – 2.6 million cumm and PCV 19.2%. WBC count was 10,600 cells/cumm. Differential count was P66% L26% E6% M2%, platelet count was 2.8 lakhs/cumm. ESR was 50mm/hr. Peripheral smear showed microcytic hypochromic anemia. Urine analysis was normal There was no growth in urine culture and blood culture, ultrasound abdomen was normal.

In view to rule out Koch's etiology (cough for > 2 weeks, loss of weight/ lack of weight gain and contact history)<sup>5</sup> gastric juice aspirate was sent for analysis.

**Gastric juice was sent for detection of Acid fast bacilli and showed 7 bacilli in 100 oil immersion fields, which was positive.** No organisms were seen in gram staining of gastric juice aspirate. Both parents are screened for VCTC, sputum AFB, Mantoux and chest radiograph and did not reveal any finding. the child's twin brother was investigated with chest radiograph, gastric juice aspirate for AFB detection and mantoux - they were negative for tuberculosis.

### **Treatment:**

In accordance to the RNTCP guidelines 2013<sup>5</sup>, anti tubercular drugs were started under "new case" category. 20 ml of packed cells were transfused for anemia. During the course of treatment cough decreased. Cardio - thoracic surgery department's opinion was to continue conservative management as the child was not symptomatic for pneumatocele and pneumo - mediastinum. Child was discharged after 10 days with advice to continue anti TB drugs and to be on regular monthly follow up. The other twin was also screened and resting gastric juice was negative for acid fast bacilli. INH chemoprophylaxis was started for his twin brother. He is on regular follow up, is gaining weight and is continuing ATT at Palani GH. Gastric juice for acid fast bacilli became negative after 2 months of ATT. Chest radiograph taken 4 months after starting treatment showed resolution of pneumatocele.

### **Discussion:**

#### **Tuberculosis in an infant:**

One million children around the world have tuberculosis which accounts to 10% of the total tuberculosis cases<sup>1</sup>, among them half a million become ill every year and 70,000 children die due to tuberculosis every year<sup>2</sup>. Infants due to their compromised immunity are at a higher risk because, after exposure – 50% progress to TB and 30% progress to advanced or disseminated TB<sup>1</sup>. A study by Maniar et al<sup>3</sup> quotes the impact of age on the manifestation of the disease, " clinical picture and prognosis are linked with age", infants when compared to children above 1 year of age

1. Often acquires the disease from close contact,
2. Has severe disease military tuberculosis and TB meningitis
3. Have higher mortality rate

Children living with infectious cases can acquire tuberculosis even if they are vaccinated<sup>2</sup>. Our child was vaccinated with BCG, yet he acquired the disease from his contact – the caregiver

#### **Significance of a contact:**

A close contact is someone with sputum smear positive TB either living in the same household (parent) or in frequent contact (caregiver). People who are sputum smear negative but culture positive are also considered infectious but to a lesser extent.<sup>4</sup> Most of the studies with infants suffering from pulmonary tuberculosis, reported that, at least 25% of the cases were exposed to adult iden

tify the adult source cases<sup>4</sup>. sources<sup>1</sup>. After TB is diagnosed in child, efforts must be made to Though our child had a known contact history, his parents were also screened for TB and found to be negative. Children especially < 5 years who have been in close contact with a sputum smear positive case must be screened for TB. Children who are sputum positive or having a cavity visible in radiograph are also regarded infectious<sup>4</sup>.

### **Symptoms in infants:**

Infants are usually symptomatic, whereas children above one year of age can be asymptomatic. Common symptoms in infants with TB are<sup>3</sup>

1. Persistent cough 2 -3 weeks not improving with antibiotics, which will be persistent or paroxysmal
  2. Fever of unknown origin
  3. Failure to thrive or lack of weight gain
- Tuberculosis in children is usually of pulmonary type in 70 -80% of cases rather than extra – pulmonary<sup>2</sup>. A high index of suspicion is required for diagnosing TB in infants<sup>1</sup>. Our child had cough and breathlessness for one month and had history of not gaining weight.

### **TST:**

Induration more than 10 mm is read as positive in infants irrespective of BCG status. This 10 mm cut off point is applicable, provided test is done with 1 or 2 or 5 TU PPD RT23. The optimal strength to be used is 2 TU as recommended by RNTCP 2013 guidelines<sup>5</sup>. In HIV infected infants induration 5 mm is read as positive<sup>5</sup>. Lack of TST reactivity is a common finding in primary diagnosis of tuberculosis<sup>6</sup>. TST is not helpful in diagnosis of infants. In a study by Schaaf et al<sup>6</sup> with 38 infants, 74% with tuberculosis had no reaction to TST. Vallejo et al<sup>7</sup> studied 47 infants of whom 22% with tuberculosis were negative for TST. In non-HIV infected patients anergy seems to be associated with decreased activity of circulating T cells. Tuberculin test anergy does not indicate immune deficiency in the host<sup>8</sup>. TST was non—reactive in our case.

### **Isolation of bacteria:**

Demonstration of AFB from any body fluid or tissue is confirmatory of tuberculosis<sup>5</sup>. Bacterial isolation should be done in all cases suspected to have TB. If sputum could not be expectorated, alternate specimens that can be used are

1. Gastric aspirate
2. Induced sputum by nebulized 3% hypertonic saline
3. Bronchial washings

Gastric aspirate from our case under microscopy showed 7 cells in 100 oil immersion fields, which is confirmatory of tuberculosis.

Cultures are used to confirm the diagnosis in paucibacillary state, in cases with suspected drug resistance and in cases needing retreatment<sup>5</sup>

### **Radiological findings in infants:1**

The common findings are hilar adenopathy with central necrosis and consolidation. Less common findings are

1. Disseminated nodules
2. Airway complications like obstruction by enlarging lymph node
3. Bronchial wall thickening
4. Bronchiectasis

CT is more effective than x ray in finding parenchymal lesions and lymphadenopathy<sup>1</sup>. Our child had pneumatocele formation in chest radiography which was confirmed with CT of chest.

### **Pneumatocele in TB:**

Pneumatocele occur as a sequela to acute pneumonia, commonly caused by Staphylococcus aureus. However, pneumatocele formation also occurs with other agents, including Streptococcus pneumoniae, Haemophilus influenzae, Escherichia coli, group A streptococci, Serratia marcescens, Klebsiella pneumoniae, adenovirus, and

tuberculosis Tuberculosis is considered as one of the cause of pneumatocele<sup>17</sup>. Pneumatocoles occurring in tuberculosis is a rare finding<sup>9</sup>. Such findings are reported in adults<sup>10, 11</sup> and a 1 year 5 month old male Taiwanese child<sup>9</sup>. BCG test, sero - diagnostic test, IGRA, PCR test are the tests not recommended for use in diagnostic algorithm for TB in India

#### **Poor prognostic indicators in childhood tuberculosis:**

Children with vulnerable immune system as

1. Very young children
  2. HIV infected
  3. Malnourished
- are at a risk of dying from TB

#### **Treatment:**

First line anti TB treatment is well tolerated and effective in infants<sup>12</sup>. There are only 2 treatment categories one for “new cases” and one for “previously treated cases”<sup>5</sup> The tablets are to be crushed with pestle and mortar and given to the infant. If the child vomits within 30 mins of consuming the drug a fresh dose has to be repeated.

#### **Ethambutol in infancy:**

Children of all ages can be given ethambutol in daily doses 15 – 25mg/kg or thrice weekly doses 30mg/kg without undue concern Our child is registered under the “newcase” category and is continuing treatment. He is gaining weight with treatment.

#### **TB preventive therapy:**

INH 10mg/kg daily for 6 months to be given for

1. All asymptomatic contacts of smear positive cases after ruling out active disease and irrespective of BCG and nutritional status
  2. TST positive children who are under immunosuppression
  3. TST positive HIV infected children
  4. Child born to mother who was diagnosed to have tuberculosis during pregnancy after ruling out congenital tuberculosis
- BCG vaccination can be given, even if INH chemoprophylaxis is planned<sup>5</sup>. Our case's twin brother was thriving well, tested with TST and was negative. Chest radiographs were normal and gastric aspirate did not show any AFB. He is continuing INH prophylaxis.

#### **Congenital vs acquired TB:**

Diagnostic criteria for congenital tuberculosis as suggested by Cantwell et al<sup>14</sup> Child must have at least one of the following

1. Lesions in first week of life,
  2. Primary hepatic complex or caseating hepatic granuloma,
  3. Tuberculosis infection of placenta or maternal genital tract,
  4. Exclusion of postnatal transmission by thorough contact investigation
- Our child was thriving well for first 3 months of life, ultrasound abdomen did not reveal ant hepatic lesions, investigations done for his mother were negative for tuberculosis and had contact in the form of a caregiver, who was case of smear positive TB

Hageman et al<sup>15</sup> suggest a term “perinatal tuberculosis” rather than differentiating congenital from perinatally acquired tuberculosis since modes of presentation, treatment and immediate prognosis do not differ.

## **Conclusion:**

Tuberculosis has to be considered as one of the differential diagnosis for pneumatocele, if the child has chronic cough, weight loss or contact history.

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