Clinico-etiological profile of persistent pneumonia in children: An observational study at a tertiary care hospital

Hari Mohan Meena[1,*], Sunil Gothwal[2], Ramesh Choudhary[3]

[1]Senior Resident, [2,3]Assistant Professor, Department of Pediatrics, SMS Medical College Jaipur, India

Corresponding Author:
Email: mohanmdped@gmail.com

Abstract

Background: Pneumonia is the most common cause of childhood morbidity and mortality in developing countries, especially in those younger than 5 years of age. This study was conducted to evaluate the clinical and etiological profile of persistent pneumonia in these children.

Materials and Methods: 74 hospitalized children with persistent pneumonia were evaluated for clinical and etiological profile.

Results: Out of 74 children, 19 had aspiration syndrome, 18 had pulmonary tuberculosis, 8 had immunodeficiency and 8 had congenital heart disease. As far as the clinical profile was concerned, out of 74 children, all had cough, 65 had respiratory distress, 60 had fever and 22 had cyanosis.

Conclusions: The common underlying etiologies of persistent pneumonia in children found in our study were aspiration syndromes followed by pulmonary tuberculosis, congenital heart disease (CHD), immunodeficiency and bronchiectasis.

Keywords: GERD; Persistent Pneumonia; Tuberculosis

Introduction

Acute lower respiratory tract infections still have significant contribution in childhood health problems [1]. The incidence rate of pneumonia in developing countries is quite high. It is almost 10 per 100 children per year. A subset of these children has persistent pneumonia [2]. There are limited data on clinical and etiological profile of persistent pneumonia in children in developing countries. Hence, this study was planned to evaluate the clinical status and etiology of persistent pneumonia in these children.

Materials and Methods

This was a hospital based prospective observational study conducted in department of pediatrics, SMS Medical College Jaipur, from October 2015to September2016. We enrolled 74 children aged 2 months to 17 years, who admitted in hospital with persistent pneumonia. Persistent pneumonia is defined as features of lower respiratory tract infection (i.e., cough, tachypnea and fever with or without chest retractions) with radiological evidence of infiltrates or consolidation in the lungs persisting for one month or more, despite receiving antibiotics for a minimum period of 10 days [3]. Detailed history including age, sex, duration of symptoms, treatment given, birth history, immunization status, developmental milestone, contact with tuberculosis and history of foreign body(FB) aspiration was taken and thorough clinical examination including growth and nutritional status was done. Relevant investigations were done according to clinical presentation and suspected clinical diagnosis and included as following:

- Complete haemogram including hemoglobin, total and differential leukocyte count, absolute eosinophil count, peripheral smear, erythrocyte sedimentation rate (ESR), blood culture and sensitivity
- ELISA for human immunodeficiency virus (HIV) infection.
- Mantoux test was done for tuberculin sensitivity using 1 TU PPD with RT Tween 80 which was administered intradermally and reading was taken after 48-72 hours.
- Gastric aspirate for young children and sputum for older children were collected on two consecutive days. Tracheal aspirate was taken from those were admitted in PICU and incubated. Ultrasonography of thorax was performed in suspected cases of pleural effusion and pleural aspirate was obtained.
- Gastric aspirate, sputum, tracheal aspirate and pleural fluid were sent for Gram staining, ZN staining for acid fast bacilli, culture sensitivity, and gene Xpert MTB/RIF. Pleural fluid was also sent for biochemistry.
- Chest radiograph was done to document the presence of infiltrates or consolidation, hilar lymphadenopathy/meditastinal widening.
- Computed tomogram of thorax with contrast was done, whenever necessary.
- Barium-meal study was performed in suspected cases of aspiration syndrome to evaluate esophageal anatomical defect.
- The radionuclide scan was done to ascertain Gastro esophageal reflux(GER)
- Echocardiography.
- X-ray paranasal sinuses.

The study protocol was approved by ethical committee of SMS Medical College, Jaipur (India).

Written informed consents were obtained from the parents/guardians of the children.

At the end of study data were subjected to statistical analysis and it was done by using the Statistical Package for Social Sciences (SPSS) version 16 (SPSS Inc., Chicago, IL, USA) to find out the clinical profile and etiology of persistent pneumonia in children.

Results

The study population comprised 74 hospitalized children with persistent pneumonia. The age ranged from 2 month to 17 years with mean age 3.5 years at the time of presentation. Out of 74 children 45 were male and 29 were female. At the time of presentation all children had cough. Other complaints at the time presentation were fever (81%), respiratory distress (60.8%), weight loss (67.5%), pallor (22.5%), cyanosis (20.2%) and wheezing (13.5%). Table 1 is showing clinical profile of children with persistent pneumonia.

Aspiration syndromes were found in 19(25.7%) patients (Table 2). Out of them, 8 had gastro-esophageal reflux disease (GERD) those were showing positive technetium scan for GER. while 5 had definite history of foreign body aspiration. The foreign body was confirmed and removed by rigid bronchoscopy. Three children with foreign body had right middle lobe pneumonia and two right lower lobe pneumonia. Barium swallow study had revealed that 2 children had achalasia cardia, 2 children had H- type trachea-esophageal fistula and 2 children had esophageal stricture.

Pulmonary tuberculosis was diagnosed in 18 children with persistent pneumonia. Twenty one (28.3%) children had positive history of contact with tuberculosis patient. Forty five(60.8%) children had BCG scar. All children were subjected for Mantoux test and it was positive in twenty four (32.4%) children. All those children who were diagnosed tuberculosis had positive Mantoux test. GeneXpert MTB/RIF was positive in gastric aspirate of five children, in sputum of three children and in pleural fluid of two children with persistent pneumonia. Acid fast bacilli were also demonstrated in Z-N staining of gastric aspirate of two children those geneXpert MTB/RIF were also positive. None of child, among all suspected children of tuberculosis had demonstrated acid fast bacilli in Z-N staining of sputum and pleural fluid. Remaining 8 children had clinical and radiological finding strongly suggestive of pulmonary tuberculosis; all of them had contact with adult tuberculosis patient. All these children did not respond to antibiotic therapy and responded well to anti tubercular therapy.

Congenital heart disease was confirmed by echocardiography in 8 children with persistent pneumonia. Out of 8, four had ventricular septal defect (VSD), two had transposition of great arteries (TGA) and two had total anomalous pulmonary venous return (TAPVR).

Eight children (10.8%) had immunodeficiency; five of them had ELISA positive for HIV and three children had selective IgA deficiency. Seven (9.5%) children had bronchiectasis.

Computed tomography of two children had revealed congenital cystic adenoid malformation (CCAM) and one child had congenital lobar emphysema. One child had cystic fibrosis, his sweat chloride test was positive for cystic fibrosis. This child also had fat globules in stool on examination and signs of vitamin deficiencies. Primary ciliary dyskinesia was considered in one child who had sinusitis, dextrocardia with situs in versus and persistent pneumonia. In nine (12.2%) children with persistent pneumonia, we could not find the etiology.

Table 1: Clinical profile among children with persistent pneumonia

Clinical parameter	Persistent pneumonia	
	No. of children	% of children
Cough	74	100
Fever	60	81
Respiratory distress	45	60.8
Underweight	50	67.5
Pallor	17	22.2
Cyanosis	15	20.2
Wheezing	10	13.5
Rickets	9	12.1
Clubbing	7	9.5
Global developmental delayed	5	6.75

Table 2: Etiological profile of children with persistent pneumonia

Underlying illness	Persistent pneumonia	
	No. of children	% of children
Aspiration syndromes: ➢ GERD (8) ➢ Foreign body (5) ➢ H- type tracheoesophageal fistula (2) ➢ Achlasiacardia (2) ➢ Esophageal stricture (2)	19	25.7
Pulmonary tuberculosis	18	24.3
Congenital heart disease: VSD(4) TGA(2) TAPVR(2)	8	10.8
Immunodeficiency HIV(5) IgA deficiency(3)	8	10.8
Bronchiectasis	7	9.5

Anomalies of respiratory tract: CCAM(2) Congenital lobar emphysema(1)	3	4.0
Cystic fibrosis	1	1.3
Primary ciliary dyskinesia	1	1.3
Idiopathic/ unknown cause	9	12.2
Total	74	100%

Discussion

Persistent pneumonia carries a significant challenge to treating physician in developing countries. Therefore we aimed to evaluate clinical and etiological profile of persistent pneumonia.

We had observed that, the most common cause of persistent pneumonia in children was aspiration syndrome (25.7%) followed by pulmonary tuberculosis (24.3%), CHD (10.8%), immunodeficiency (10.8%), bronchiectasis (9.5%). Other less common causes were anomalies of respiratory tract, cystic fibrosis and primary ciliary dyskinesia. No etiology could be identified in 12.2% of children with persistent pneumonia.

Aspiration pneumonia occurs after inhalation of oropharyngeal contents into the lungs. Also, aspiration of foreign bodies into the lung reveals an important cause of intraluminal airway obstruction in the pediatric population. Retained foreign bodies occur most commonly in the 6 month to 3 year age group [4,5]. Foreign body inhalation should be suspected in the presence of sudden-onset cough, dyspnea, and recurrent pneumonia/ persistent pneumonia with a history of choking episodes. However, there may be no definite history and this can lead to long delays in diagnosis that enhance the risk of long-term complications such as bronchiectasis [5].

Kumar et al. had evaluated 41 children to identify underlying etiology of persistent pneumoniain these children and found that 29.3% children with persistent pneumonia had aspiration syndrome. Among them GERD and oil instillation in nose were main cause of aspiration. 19. 2% had pulmonary tuberculosis, 7.3% had immunodeficiency, 4.9 had congenital malformation, 4.9% had CHD and 2.4% had foreign body [6].

Tuberculosis is one of the most common infectious diseases among children in the world [7]. TB is suspected when an ill child has a history of chronic illness of usually more than 2 weeks of duration that includes a cough and a fever, weight loss or failure to thrive, history of contact with an adult case of pulmonary TB and a non-response of symptoms to potent antibiotics [7].

In the current study, pulmonary TB was diagnosed in 18 (24.3%) children with persistent pneumonia. All cases had positive tuberculin by Mantoux test. Ten children had positive geneXpert MTB/RIF. Eight children diagnosed as pulmonary tuberculosis on the basis clinical and radiological features with presence of history of contact with tuberculosis patient.

Lodha et al., were evaluated 19 children with persistent pneumonia and reported pulmonary TB as a cause in 31.5% of patients. This relatively high prevalence of pulmonary TB should alarm the physicians and health authorities in our locality to take more intensive measures for prevention and control of this disease [8].

Congenital heart diseases are important causes for recurrent/persistent pneumonia in children [9]. Dilated blood vessels or chambers of the heart may compress the bronchi, causing impaired drainage of pulmonary segments. Also patients with congenital lesions causing left-to-right shunting and an increased pulmonary blood flow have an increased susceptibility to respiratory to respiratory infections [9].

In our study 8 (10.8%) children with persistent pneumonia had congenital heart disease(CHD).

Owayed et al., reported that 9% of children with recurrent/persistent pneumonia had CHD as the underlying etiology of persistent / recurrent pneumonia [10].

In this study we found that the immunodeficiency disorders were identified in 8 children (10.8%) with persistent pneumonia. Five children were HIV positive and 3 children had selective IgA deficiency.

Hoving et al. had demonstrated that 16.1% children with persistent/ recurrent pneumonia had immunodeficiency [11]. Children with immune defects usually present with highly recurrent and/or severe bacterial infections of the respiratory tract, recurrent gastrointestinal infections and recurrent skin infections. Lymphadenopathy and a failure to thrive are also common features [5].

In the present study 7(9.5%) children had bronchiectasis. This was revealed by computed tomography of thorax in children with persistent pneumonia.

Saad et al. was found bronchiectasis in 7.4% children who suffered with persistent pneumonia [12]. Saad et al. did find out the etiology of persistent pneumonia in 27children [12]. They had identified the etiology of persistent pneumonia as following: aspiration syndrome (26.0%), pulmonary TB (22.2%), congenital heart disease (14.8%), immunodeficiency disorders (14.8%), bronchiectasis (7.4%), anomalies of respiratory tract (3.7%) and unknown (11.1%).

Conclusions

The common underlying etiologies of persistent pneumonia in children found in our study were aspiration syndromes followed by pulmonary tuberculosis, congenital heart disease (CHD), immunodeficiency and bronchiectasis.

Conflicts of interest: None declared

Acknowledgments: None

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