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CASE REPORT

E.P.C.M.S.

A Case of Bronchiolitis Obliterans in a 21 Month Old Infant

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BACKGROUND INFORMATION

Bronchiolitis Obliterans (BO) in children is a relatively rare diagnosis and most of the available literature dealing with BO is centered on adults [3]. The exact incidence in children is unknown [3]. It is characterized as a chronic obstructive lung disease in children that results [7] in partial or complete occlusion of the lumens of terminal and respiratory bronchioles by inflammatory and fibrous tissue [3]. Clinically, BO manifests with tachypnea, crackles, wheezing and hypoxemia for at least 30 days after the initial lung injury [7].

In children, BO occurs most commonly secondary to infection [4] a number of respiratory viruses, including Respiratory Syncytial Virus (RSV), Parainfluenza, Influenza and especially Adenovirus were associated with severe lung injury leading to BO [7]. Several text referred to RSV as a potential cause of BO (13) however, this has been the subject of skepticism as RSV is so common. Approximately 1 in 9 infants contracts RSV in their first year of life and 1 in 16 in ages 1-2 years [5], yet BO itself is so rare [3]. Research has not yet quantified the importance of specific viruses as risk factor for BO [7]. We present a case of a healthy infant which started as a simple RSV bronchiolitis complicated by H. Influenzae pulmonary infection with mechanical ventilation that evolves into a rare chronic debilitating lung condition.

CASE PRESENTATION

A 21 month old, female infant developed upper respiratory symptoms (such as cough and runny nose) and high grade fever of 105 F five days prior to admission. The patient was seen by the PCP and was prescribed albuterol nebulization every 4 hours, Omnicef and Prednisone. No improvement was noted, and few hours prior to admission the patient developed severe respiratory distress, grunting and cyanosis. The patient was brought to the ER and was immediately intubated. The patient had contacts with 2 older sick siblings who had upper respiratory tract symptoms. Review of System was unremarkable. Patient was born at Thomason by NSVD, 6.9 lbs, 35 weeks stayed in the nursery for 48 hours never intubated. No previous hospitalization, Immunizations up to date, development appropriate for age. Family history is non contributory and no history of asthma in the family.

On admission, physical examination reveals a severely distressed child with respiratory rate of 50/min, heart rate of 200/min, blood pressure of 138/93 mm Hg, and temperature of 105.3 F rectal. Oxygen saturation 92% on high flow oxygen, weight 13.1 kg (75 %). Nasal congestion was noted. Chest findings showed intercostal and subcostal retractions, decreased air entry on both lung fields, prolonged expiratory phase with wheezing diffusely throughout lung fields. Capillary refill was 3-4 secs.

Patient was admitted at the PICU with the diagnosis of Severe Respiratory Distress, Hypoxia, and Bacterial vs. Viral Pneumonia. Patient was connected to a ventilator, and complete septic work up was performed. Initial CBC showed WBC of 41.4, segs of 48, bands of 38 and CRP of 17.9. Chest x ray showed peribronchial inflammatory changes with left lower lobe atelectasis. Patient was started on Vancomycin and Ceftriaxone IV with Solumedrol IV and Xopenex nebulization. Lumbar tap was done which revealed normal results. Zithromax IV was started the next day of admission and continued for 5 days. Nasopharyngeal wash was positive for RSV, negative for Adenovirus, Influenza A and B. Sputum for Legionella was negative. PPD was negative. All cultures were negative except for the Tracheal aspirate which was positive for Haemophilus Influenzae Biotype III sensitive to Cefotaxime. Antibiotic was changed to cefotaxime given for 7 days. Patient was extubated after 6 days, tolerating room air and was discharged on the 10th hospital day on home nebulizer.

Patient came back after one week after discharge with recurrent respiratory distress and shortness of breath. Repeat NPW was done which was negative for RSV. Repeat chest x ray showed clearing of the peribronchial infiltrates. Patient was admitted and stayed for 3 days and was discharged home again on home nebulizer treatment.

Third hospitalization was 5 days after the second discharge. At this time the patient was requiring oxygen at 2 L NC with saturation of 92%. In moderate respiratory distress, repeat chest x ray showed central infiltrate suggestive of bronchiolitis. Patient was seen by a pulmonologist and started on Aminophylline drip, solumedrol IV, Singulair, Xopenex , Ipatropium and Pulmicort nebulization. Very minimal improvement was noted. Sweat chloride test revealed a negative result and Mycoplasma titer were negative. Immunoglobulin levels IgA, IgM and IgG were normal except for IgE :120 (NV 0-10 U/ML). High resolution CT findings (Presented on Figure 1) was done which showed diffuse small airway disease consistent with Obliterative Bronchiolitis with findings being worse on the right. Patient was discharged with home oxygen and oral steroids and nebulization on the 10th hospital day. More then 2 months after the acute event patient is still requiring oxygen.

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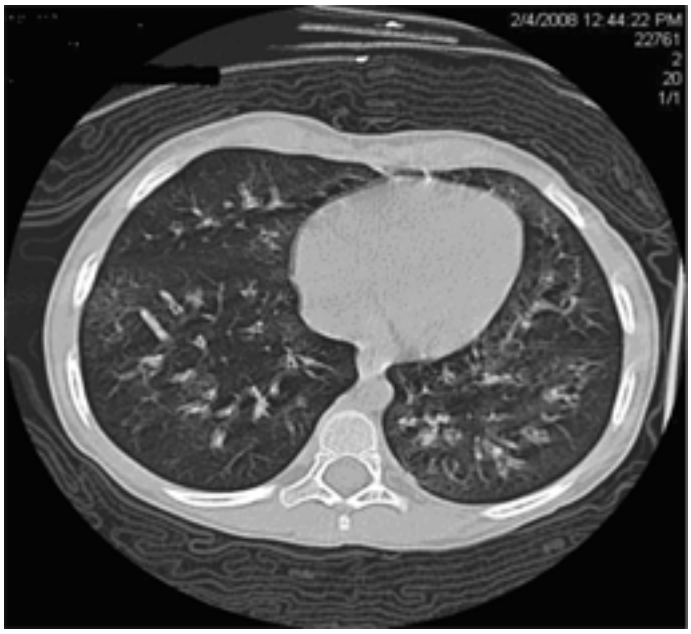

Figure 1: CT of the Chest

DISCUSSION

Acute Bronchiolitis is the most frequent lower respiratory tract disease in children. RSV is the most frequent causal agent. An association between RSV and BO has rarely been reported [2]. However Tristram and Miller reported that simultaneous infection of RSV and other respiratory tract pathogens (i.e. H influenzae) promotes a more severe evolution of infection [2]. Other agents associated with BO are adenovirus types 3, 7 and 21, Measles, Mycoplasma Pneumonia and Influenza A infection [1]. Adenovirus is by far the most common cause of post infectious BO [6]. The additional finding that mechanical ventilation is an independent risk factor for the development of BO [6] do not indicate whether it causes injury to the lung which increases the risk for developing post infectious BO or whether it merely serves as an indicator of severity of illness [7].

BO is a clinical syndrome of chronic airflow obstruction associated with inflammatory changes in the small airways in which a chronic, necrotizing, and ultimately fibrosing process may occur in response to epithelial injury associated with infections and considered a long term sequela of viral infections [1]. BO should be strongly suspected based on clinical and radiologic findings such as continuous wheezing, cough and tachypnea following an acute bronchiolitis [4]. Chest x-ray findings are often non specific and can appear normal [1] .

Diagnosis of BO in children can be based on clinical features and noninvasive investigations without the need for open lung biopsy or bronchography because of the patchy distribution of airway involvement [1]. High resolution CT is more sensitive in predicting the presence of BO than transbronchial biopsy [1]. High resolution CT shows characteristic geographic areas of increased and decreased lung attenuation (mosaic pattern) [8]

The course of the disease in patients with BO varies from mild, asthma like symptoms to rapidly progressive deterioration and death. Clinical course in children is not well defined. In a study by Zhang et al [1] clinical remission was reported in 22% and persistence of respiratory symptoms and signs in 67%. None of the patients recovered completely [1].

The principal treatment is supportive. Despite the prominent role of inflammation in the pathogenesis, the use of corticosteroid therapy remains controversial. Corticosteroids are used in the early phase of illness in an attempt to modify the fibroblastic response. Because BO is an infrequent condition in children, no controlled study of the effect of steroid therapy has been established [1].

The overall prognosis was poor and dependent on the degree of viral load, initial immune status, as well as persistence of the virus within the pulmonary tissue probably contributes to the chronic pulmonary damage [1]. Clinical improvement throughout the disease process may be due to the growth of the lungs and airways and does not irrefutably indicate regression of the pathology in the small airways [1].

Strategies to prevent viral infection, such as the development of vaccines should be encouraged to prevent this devastating illness. In the meantime, early recognition is vital so children can be isolated to prevent spread of infection to others [7]. Surrogate markers of disease activity need to be developed for better follow up of the disease activity [6]. Family support and education is very important due to the chronicity of this disease.

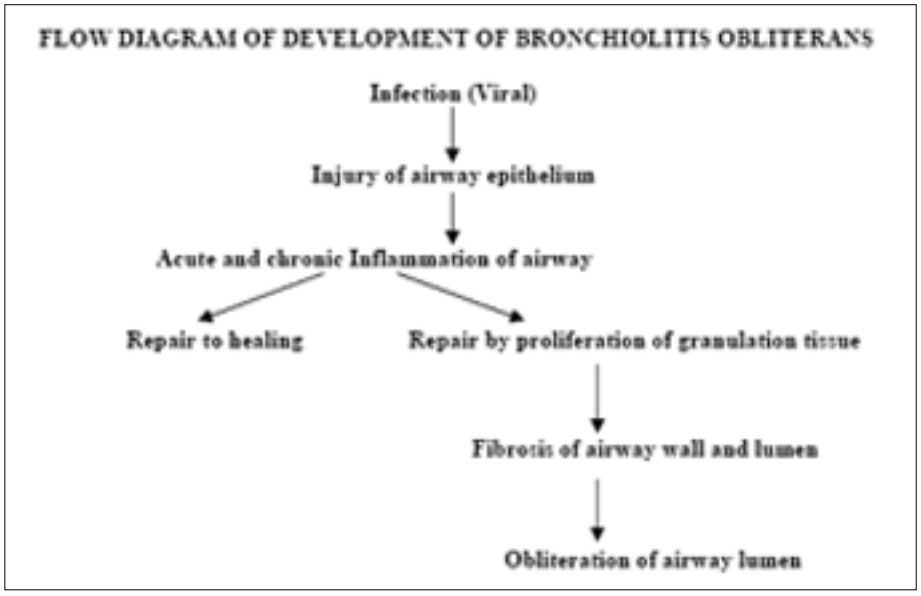

Figure 2: Flow diagram of development of bronchiolitis obliterans following airway epithelial damage. This diagram was modified after Kurklant et.al. [3]

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REFERENCES

1. Yalcin, et al, "Post Infectious BO in Children: Clinical and Radiological Profile and Prognostic factors". Respiration 2003;70:371-375

2. Hirschheimer, Mario et al,"Simultaneous Viral Infection and Childhood BO" Brazilian Journal of Infectious Diseases Vol 6 No3 Salvador June 2002

3. Kurkland, Geoffrey, Michelson, Peter, "BO in Children" Pediatric Pulmonology 39:193-208 (2005)

4. Govaere, Elke et al "Case Report: Massive Lung Collapse with Partial Resolution after several years" Biomed Central, Pediatrics 2005, 5:39 doi:10.1186/147-2431-5-39

5. Louden, Mark, MD "Bronchiolitis" E Medicine Nov. 2007

6. Smith K J and Fan L L, "Insights into Post Infectious BO" Thorax 2006;61;462-463

7. Colom A J et al " Risk Factors for the Development of BO in children with Bronchiolitis" Thorax 2006;61;503-506

8. Lynch, David et al " Pediatric Diffuse Lung Disease: Diagnosis and Classification Using High Resolution CT" AJR 1999;173: 713-718

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