

Bronchiolitis Obliterans in a One Year Old Child: A Treatment Conundrum

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ABSTRACT

1 year old child presented with severe persistent pneumonia not responding to antibiotic treatment. Imaging investigations showed patchy atelectasis in right upper lobe of lung with peribronchial thickening suggestive of bronchiolitis obliterans. Addition of steroids and few modifications in the mechanical ventilation lead to miraculous improvement in lung symptoms and the child was discharged after complete recovery.

Keywords: bronchiolitis obliterans, persistent pneumonia, atelectasis

INTRODUCTION

Bronchiolitis obliterans is one rare chronic pulmonary disease which is obstructive and that follows a lower respiratory tract insult.¹ It results in small airway fibrosis.¹ In the pediatric population, usually post infectious and adenovirus infection is the commonest cause for bronchiolitis obliterans.² Treatment of the condition is mainly supportive.^{1,3} Prognosis depends on the underlying cause and initial insult's severity.¹ Systemic steroids have been used in treatment of bronchiolitis obliterans but evidences are scarce and outcome is controversial.⁴ Few modifications in mechanical ventilation and accepting a high pCO₂ has been done in management of few cases of refractory airway trapping and obstructive airway disease.^{5,6}

CASE DESCRIPTION

1 year old male child presented with cough, cold and respiratory distress for two weeks. Chest X-ray showed bilateral perihilar infiltrates with right upper lobe collapse and child was treated as a case of pneumonia. But the child did not respond to antibiotics and had persistent worsening of respiratory symptoms with severe carbon dioxide retention in venous blood gas. The child was investigated for the same. Viral RNA Polymerase chain reaction (PCR) test of endotracheal aspirate was done and respiratory syncytial virus was isolated. Imaging investigations were also done to confirm the diagnosis. CT chest showed patchy atelectasis in right upper lobe of lung with peribronchial thickening suggestive of bronchiolitis obliterans.

Hence the child was intubated and mechanically ventilated. The child also had multiple episodes of bronchospasm requiring ketamine, terbutaline and magnesium sulphate. Methyl prednisolone was added as a trial to decrease airway inflammation. The child was intubated and mechanically ventilated. Initially the child was kept on synchronized intermittent mandatory ventilation (SIMV) with pressure support for three days. Few mechanical ventilation modifications were then done like keeping low respiratory rate of 6 to 12 breaths/minute, inspiratory time (Ti) was kept between 1 and 1.5 seconds, allowing for expiratory time (Te) between 4 and 9 seconds thereby keeping I:E -1:4 to 1:8, accepting high pCO₂ upto 80 mm Hg, and

keeping a minimal positive end expiratory pressure (PEEP) of 7 for which the child responded well.

Gradually the child was weaned off mechanical ventilation to pressure support ventilation for two days and then the child was extubated. The child was then kept on nasal continuous positive airway pressure (CPAP) ventilation for one day which was later changed into oxygen prongs for one day and then into room air. Post extubation there was no airway complications and the child responded well to the treatment. Steroids were slowly tapered and the child was discharged.

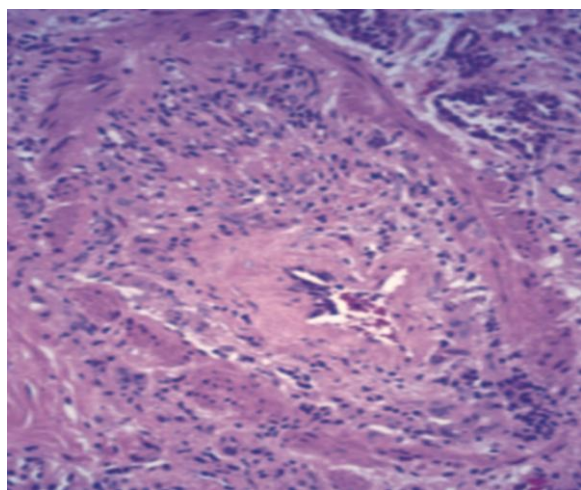


Fig.1: Lung biopsy picture of the child showing obliterative fibrosis



Fig 2: CT film of the child: Bronchiolitis obliterans

DISCUSSION

Bronchiolitis obliterans is an obstructive airway disease of small airways.³ It is comparatively a rare disease

which shows features of terminal bronchiole fibrosis and spirometry shows features of obstructive lung disease.³ Bronchiolitis obliterans can occur as a complication of persistent pneumonia or after lung transplantation or hematopoietic stem cell transplantation, after exposure of inhaled toxins or gases, in association with autoimmune disorders like rheumatoid arthritis or after viral infections.² It usually cause severe obstructive airway manifestations and bronchospasm leading to a high index for respiratory complications.³ The clinical symptoms develop over a time period ranging from weeks to months. Therefore bronchiolitis obliterans should be treated appropriately and a trial of systemic steroids may be given and changes in mechanical ventilation adjustments should be done when respiratory symptoms worsen in spite of treatment.⁵⁻⁷

Pulmonary function testing should be done whenever possible for the diagnosis. Blood gas analysis is done in most cases to analyse carbon dioxide retention and to adjust mechanical ventilation thereby. Chest radiographs can be normal in early stages of the disease while chest CT imaging shows bronchial wall thickening and patchy areas of hypoattenuation in the lung fields.⁵ A lung biopsy is not mandatory for the diagnosis of bronchiolitis obliterans where there is a classic setting of airway symptoms and imaging suggestive of airtrapping and obstructive airway pattern on spirometry.⁴ However it is the gold standard for diagnosis. In the index case lung biopsy showed obliterative changes with fibrosis.

Bronchiolitis obliterans is an obstructive airway disease and therefore carbon dioxide trapping can be seen in this disease. However there is evidence based information that carbon dioxide retention is acceptable upto a certain range of 80 mm Hg in obstructive airway disorders and emphasis should be given over improving the general condition of the lung rather chasing high $p\text{CO}_2$.⁴

There have been few recommendations in management of airway diseases through mechanical ventilation which have been followed in this case to which the child responded well.^{5,6}

The management team of bronchiolitis obliterans in a child should include a pulmonologist, paediatrician, transplant surgeon, and a radiologist. Most patients need close medical follow up to keep their symptoms under control. Severe cases may require immunosuppression and daily steroids post hospital discharge.

Here in the index case, few modifications in mechanical ventilation and introduction of systemic steroids lead to substantial improvement in the respiratory symptoms of the child and the child was discharged after full recovery.

CONCLUSION

Although a rare disease, bronchiolitis obliterans should be suspected in children with treatment unresponsive persistent pneumonias and appropriate imaging investigations should be done and/or lung biopsy should be performed if required.

Addition of steroids and few modifications in mechanical ventilation can lead to substantial improvement in air trapping in bronchiolitis obliterans in children.

Declaration of patient consent

The authors certify that they have obtained appropriate patient consent documentation, and the patient has given permission for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed. Applicable reporting guideline for case reports (CARE) was followed by the authors.

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Conflicts of interest

There are no conflicts of interest.

Research quality and ethics statement

The authors of this manuscript declare that this scientific work complies with reporting quality, formatting, and reproducibility guidelines set forth by the EQUATOR network. The authors also attest that this clinical investigation was determined not to require Institutional Review Board / Ethics Committee review.

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