

# Acute Bronchiolitis – Case Report and Review of Management Guidelines

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**Introduction:** *The treatment of acute bronchiolitis is controversial, despite the fact that several well-designed trials have been conducted on the subject.*

**Patient profile:** *A 10-month-old boy presented to the emergency department with a 3-day history of upper respiratory tract symptoms and an expiratory wheeze. Chest X-ray showed right upper lobe atelectasis. He was diagnosed with acute bronchiolitis.*

**Interventions:** *He received nebulized salbutamol (albuterol) and oral dexamethasone in the emergency department. He was admitted to hospital overnight for continued salbutamol treatment via a metered-dose inhaler.*

**Discussion:** *Five main treatment regimens exist for acute bronchiolitis – nebulized epinephrine (adrenaline), other bronchodilators, nebulized hypertonic saline, glucocorticoids, and combinations of these. Nebulized epinephrine decreases the rate of hospitalization, other bronchodilators improve symptoms, and nebulized hypertonic saline reduces the length of hospitalization. There is no strong evidence for glucocorticoids or combinations of these treatments. Combined treatment with epinephrine and dexamethasone reduces rate of hospitalization.*

**Keywords:** *bronchiolitis; case reports; pediatrics; practice guideline; therapeutics.*

## INTRODUCTION AND PATIENT PROFILE

**A**cute bronchiolitis, caused by respiratory syncytial virus (RSV) in approximately 50–80% of cases, is a viral infection of the lower respiratory tract mostly affecting the bronchioles.<sup>1</sup> Other causative viruses include human metapneumovirus, parainfluenza, influenza, and rhinovirus, and in approximately 10–30% of cases more than one virus is involved.<sup>1</sup> It typically presents with viral upper respiratory infection symptoms followed by wheezing and increased work of breathing, and it occurs in children younger than age 2.<sup>1</sup> This report serves as a teaching case describing a common presentation of acute bronchiolitis, and the subsequent discussion provides an overview of the evidence for different treatment options.

A 10-month-old boy presented to the emergency department with a 3-day history of wet cough and congestion. His mother brought him in because of increased work of breathing, noisy breathing, and a fever for the last 2 days. There was no clear history of sick contacts; however, he had recently started attending daycare. He was previously well, and his immunizations were up to date. His only medication was vitamin D drops, and he had no known allergies. Obstetrical history was unremarkable. He had a family history of

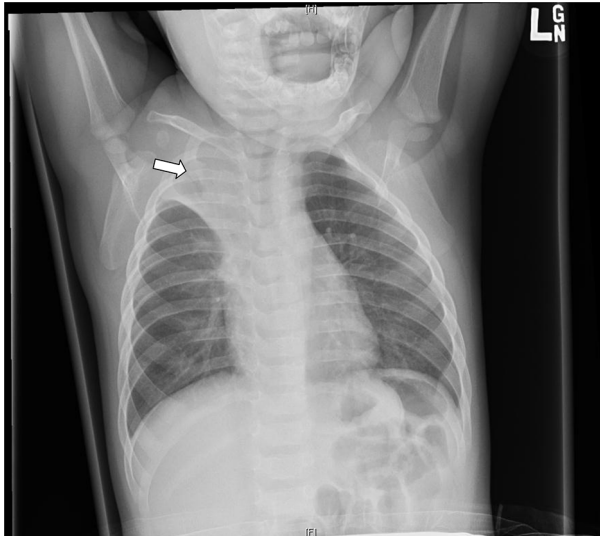
atopy, as his mother had hay fever and his father had childhood asthma.

At triage in the emergency department his oxygen saturation was 92% on room air and he displayed increased work of breathing, with subcostal and intercostal retractions with inspiration. He was audibly wheezing on expiration. On auscultation, he had significant expiratory wheezing bilaterally and decreased air entry to the right upper lobe.

Chest PA and lateral X-rays were taken (Figs. 1 and 2). Three possible interpretations were discussed: right upper lobe collapse (atelectasis), right upper lobe pneumonia, and thymus displaced from the center due to rotation/poor positioning of the patient during the X-ray. It was decided that the image likely demonstrated right upper lobe collapse, since there was a complete opacity and there was upward hilar retraction ipsilaterally. The most likely etiology of the lobar collapse was a mucus plug.

## INTERVENTIONS AND OUTCOMES

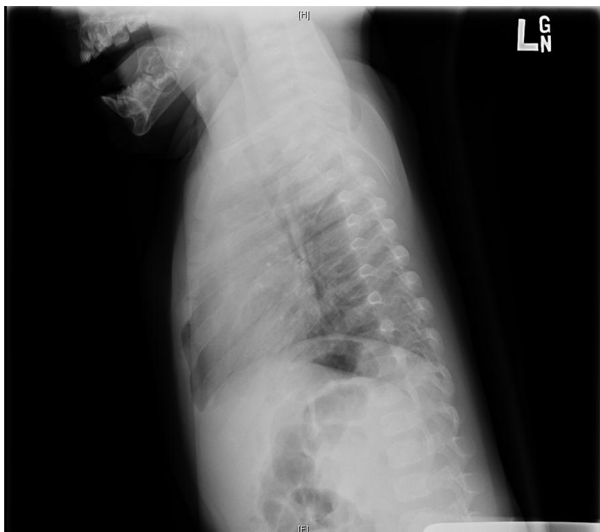
After three nebulized salbutamol (albuterol) treatments in the emergency department his oxygen saturation improved to 95% on room air. He also received a



**Figure 1.** PA chest X-ray. Note the opacity in the right upper lobe (arrow).

dose of oral dexamethasone. On examination after these treatments, he appeared generally well and was in no acute respiratory distress. He continued to have mild substernal retractions with inspiration. However, there were no intercostal retractions or tracheal tug. His wheeze was less audible; however, on auscultation wheezing was still heard bilaterally. He continued to have decreased air entry in the right upper lobe.

The patient was admitted to hospital for continued salbutamol treatment via a metered-dose inhaler (MDI)



**Figure 2.** Lateral chest X-ray. The opacity in the upper lung field is also seen in the lateral view.

and supportive management. After one night in hospital his work of breathing decreased, his wheeze was no longer present, and he was eating and drinking well. Salbutamol was discontinued and his symptoms did not return, so he was discharged home with appropriate follow-up for his right upper lobe collapse. The RSV nasopharyngeal swab taken in the emergency department came back negative on the day of discharge.

## DISCUSSION

Acute bronchiolitis is a common condition, and a common reason for emergency department visits for children under the age of two. However, management of this condition can be highly variable, as no clear treatment guidelines exist despite several well-designed trials and meta-analyses having been performed. Five main management principles exist; however, there are many treatment options.

Nebulized epinephrine (adrenaline) has been shown to reduce admissions to hospital on the day of presentation and to improve short-term clinical scores.<sup>2</sup> However, there is no strong evidence that epinephrine reduces the length of stay among patients admitted with bronchiolitis.<sup>2,3</sup> Other bronchodilators such as salbutamol and ipratropium bromide alone have not been reliably shown to reduce the rate or the length of hospitalization for acute bronchiolitis.<sup>4</sup> They may, however, temporarily improve symptoms.<sup>4</sup> Additionally, it is not always possible to be certain that a child is presenting with bronchiolitis, since it is primarily a clinical diagnosis and other conditions such as reactive airways or asthma can present very similarly. When assessing the patient it is important to determine if there is a personal or family history of atopy. If so the likelihood of asthma increases, and one can consider administering a bronchodilator such as salbutamol in addition to oral or inhaled steroids even if bronchiolitis is still the most likely diagnosis. This is how our patient was treated due to his family history of atopy; however, bronchiolitis was the more common diagnosis due to the presence of fever.

For non-severe acute bronchiolitis, nebulized hypertonic saline (3% and possibly 5%) has been shown to reduce the length of hospitalization.<sup>5</sup> Glucocorticoids alone have not been reliably shown to reduce the rate or the length of hospitalization for acute bronchiolitis.<sup>6</sup>

The pathophysiology in bronchiolitis leading to airway obstruction and breathing difficulties is multifaceted. Underlying processes include inflammation, mucous plugging, and bronchospasm.<sup>7</sup> Therefore, it makes sense that combining treatments which alleviate

different components of the overall pathophysiology could be superior to any single treatment. Unfortunately, not many strong trials have specifically looked at combination regimens for the treatment of acute bronchiolitis. One large, well-designed randomized controlled trial reported that patients presenting to the emergency department with bronchiolitis who were treated with both epinephrine and dexamethasone had a decreased rate of admission to hospital over the week following their initial presentation to the emergency department.<sup>8</sup>

In addition to the five treatment regimens discussed, another common approach is to limit treatment to supportive care, including supplemental oxygen, fluids, and antipyretics as necessary. These treatments are given to all children with bronchiolitis in addition to any of the treatments mentioned thus far. Bronchiolitis is fundamentally a self-limited condition, and more aggressive management should be reserved for cases with advanced symptoms such as significant respiratory distress.

Other management principles being investigated include nebulized deoxyribonuclease,<sup>9</sup> chest physiotherapy,<sup>10</sup> high-flow nasal cannula therapy,<sup>11</sup> and steam inhalation or humidified oxygen.<sup>12</sup> For each of these treatments, there is either insufficient evidence of effectiveness or good evidence of ineffectiveness in the management of bronchiolitis. Heliox (helium and oxygen mixture) inhalation therapy may temporarily reduce respiratory symptoms among infants admitted to an intensive care unit with respiratory distress.<sup>13</sup> As bronchiolitis is caused by a viral infection, it does not intuitively make sense to routinely include antibiotics in the treatment, and studies support this.<sup>14</sup> However, in the subset of patients who have a superimposed bacterial infection or secondary respiratory failure, antibiotics are indicated, in keeping with standard treatment of these conditions. In addition, children at increased risk for significant morbidity due to RSV, such as severely premature infants and infants with certain heart and lung conditions, can receive palivizumab, a monoclonal antibody against the RSV virus, to prevent infections.<sup>15</sup>

### KEY LEARNING POINTS

1. Acute bronchiolitis is a common pediatric condition, affecting approximately 15% of infants in the first year of life. It is diagnosed clinically and presents with wheezing, upper respiratory tract infectious symptoms, and increased respiratory effort, typically in children younger than 2 years of age. It often presents similarly as reactive airway syndrome, general viral upper respiratory tract infections, and viral-induced asthma. It is most common in the winter months, coinciding with when the causative viruses are more prevalent.
2. The course of acute bronchiolitis is generally mild and self-limited; however, complications can occur and severe cases often require hospitalization.
3. There is no single universally recommended treatment for acute bronchiolitis. Epinephrine with and without dexamethasone decreases hospital admissions, bronchodilators decrease symptoms, and hypertonic saline decreases length of hospital stay.

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