

## Bacterial tracheitis - not always primary

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A child presented with features of bacterial tracheitis with complete response to therapy. He presented with a recurrence one week later. A foreign body in the tracheal wall was diagnosed and removed by bronchoscopy.

Tracheal intubation for airway management and tracheal toileting are not enough in bacterial tracheitis; bronchoscopy should be considered to diagnose any underlying cause.

**Key words:** tracheitis, airway obstruction, bacterial infections, foreign body.

Bacterial tracheitis, an uncommon cause of upper respiratory tract obstruction, has always been described as a primary infection of the trachea. We report a child with features of bacterial tracheitis who responded very well to therapy, but subsequently developed recurrence of the symptoms. An embedded foreign body in the tracheal wall was diagnosed and was subsequently removed by bronchoscopy.

### Case Report

A 10-month-old fully immunized boy presented with a one-day history of rhinitis, brassy cough, inspiratory stridor, dyspnea and fever. There was no history suggestive of foreign body inhalation. Croup was suspected and the signs improved after one dose of intramuscular dexamethasone and one dose of nebulized epinephrine. His family declined admission but brought him back the following day with severe respiratory distress and fever. He was toxic in appearance and tachypneic, with severe chest retractions, inspiratory and expiratory rhonchi on auscultation, reduced air entry bilaterally and an oxygen saturation of 86% in air by pulse oximetry. Oxygen supplementation with repetitive doses of nebulized salbutamol with intravenous hydrocortisone led to some improvement and his oxygen saturation rose to 97%. Lateral neck X-ray showed subglottic narrowing consistent with croup and chest X-ray showed perihilar inflammatory changes, and he was started on intravenous cefuroxime.

His condition deteriorated again after two hours, with pallor, tachypnea, severe respiratory distress and signs of exhaustion. Results of arterial blood gases showed pH 7.16, PaO<sub>2</sub> 300 mmHg and PaCO<sub>2</sub> 72 mmHg. Tracheal intubation was performed; the soft tissues of the larynx were inflamed and edematous with profuse purulent secretions seen in the trachea. Tracheal suctioning was performed and an endotracheal tube was introduced to maintain airways patency. Tracheal secretions and blood cultures were taken and intravenous ceftriaxone and cloxacillin therapy was initiated. There was a peripheral leukocytosis with a total white cell count of 20,000/mm<sup>3</sup> and 85% neutrophils. The blood gases immediately improved after the tracheal intubation. The child required frequent suctioning of the copious purulent secretions. Blood culture was sterile and the culture of tracheal secretions yielded *Pseudomonas aeruginosa*, and antibiotic therapy was changed to ceftazidime. He was successfully extubated after 48 hours and was discharged home two days later as he had remained entirely asymptomatic.

He was readmitted one week later with respiratory distress, stridor and cough. A computed tomography scan of the chest with reconstruction showed an embedded foreign body in the tracheal wall. It was removed by bronchoscopy and was identified as the plastic strip around the top of a soda bottle. The child made a complete recovery.

## Discussion

Bacterial tracheitis, previously known as membranous laryngotracheobronchitis or membranous croup, is an uncommon cause of upper respiratory tract obstruction<sup>1</sup>. It is characterized by marked subglottic edema with thick mucopurulent secretions. Although the prognosis is good if management is prompt, it may be a cause of out-of-hospital respiratory arrest with a high mortality<sup>2</sup>. It may constitute up to 6% of cases of suspected croup, and is now commoner than epiglottitis since the introduction of *Haemophilus influenzae* B immunization program<sup>3</sup>.

The condition is usually caused by *Staphylococcus aureus* or *Haemophilus influenzae* but can also be caused by other organisms such as *Moraxella catarrhalis* and *Staphylococcus agalactiae* or *Pseudomonas*<sup>4,5</sup>. All reported cases have been primary bacterial infections of the trachea and, to our knowledge, there are no reports of it being caused by an infection secondary to a foreign body. Although it may initially present as croup, there is usually a partial or a lack of response to standard croup therapy, with fever in 40% of the cases, cough, inspiratory stridor, and a toxic appearance, as in our patient<sup>4</sup>. There is a rapid deterioration unless treated appropriately<sup>1</sup>. Blood cultures are of limited value as they are only occasionally positive<sup>1,5,6</sup>. Lateral X-ray of the neck may sometimes show intra-tracheal membranes and chest X-ray may show consolidation, collapse or air trapping, which should suggest the diagnosis in a child with stridor<sup>1,7</sup>. Tracheal culture is the only useful laboratory investigation. Endotracheal intubation shows subglottic edema, inflamed mucosal tissues, purulent tracheal secretions and sometimes pseudomembranes in the trachea, making it the most accurate diagnostic procedure<sup>8,9</sup>. It also allows endoscopic removal of all tracheal secretions and pulmonary toilet. The management includes securing the airway, and supporting breathing and circulation, in addition to intravenous broad spectrum antibiotics targeting the most common respiratory pathogens as well as *Staphylococcus aureus*. The results of the Gram stain and culture from the trachea will allow later adjustment of antibiotic therapy as per the organism's antibiotic sensitivities. Recurrences of bacterial tracheitis have not been reported.

Although our case had the classical features of bacterial tracheitis on initial presentation and responded completely to the recommended treatment, we believe it was not a primary infection but rather a superinfection complicating the presence of a foreign body in the trachea. Of interest is that bronchoscopy was not carried out at that time and tracheal toilet was successfully achieved with laryngeal intubation performed to secure the airway. Although the initial chest X-ray was not suggestive of a foreign body inhalation, bronchoscopy would most likely have diagnosed its presence in the trachea. Although it is theoretically possible that the foreign body aspiration occurred only after the initial episode, which was managed as bacterial tracheitis, we believe this is unlikely, especially since the embedding of the foreign body within the tracheal wall indicates a more prolonged course.

This case highlights the need to consider the possibility of a foreign body aspiration or the presence of an underlying anatomical anomaly when symptoms and signs suggestive of bacterial tracheitis are present, and especially when they recur. As illustrated by this case, bronchoscopy should be strongly considered when managing the airway of a child with suspected bacterial tracheitis, not only for the purposes of tracheal toileting and bacteriological cultures, but also to diagnose any underlying mechanical cause such as a foreign body. We believe that this is currently not clearly emphasized in the literature and we recommend that this becomes clearly stated in any clinical guideline for the management of bacterial tracheitis.

As illustrated in this case, tracheal intubation for airway management and tracheal toileting in bacterial tracheitis may not always be sufficient. We recommend that bronchoscopy should be strongly considered at the time.

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