

BRONCHODILATOR-RESPONSIVE CROUP IN AN INFANT: A CASE REPORT

Bamiro T.A¹, Obaya F.D¹, Olawoye O.J¹, Anwanane A¹

¹Department of Paediatrics, Babcock University Teaching Hospital, Ilishan-Remo, Ogun State, Nigeria

Abstract

Background: Croup is a common viral illness of early childhood, typically presenting with barking cough, stridor, and respiratory distress. Most cases resolve with corticosteroid therapy. Atypical presentations can pose diagnostic challenges. This case highlights an infant with croup-like symptoms responsive to bronchodilators.

Case Report: An 8-month-old girl presented with nasal discharge, barking cough, and stridulous breathing. A diagnosis of moderate croup was made, and she received intravenous dexamethasone with supplemental oxygen. Stridor resolved, but oxygen saturation and respiratory distress persisted. Auscultation later revealed rhonchi. A chest radiograph was unremarkable. Salbutamol nebulisation led to rapid clinical improvement and normalisation of oxygen saturation. She was discharged in stable condition and remained well at follow-up.

Conclusion: This case illustrates an atypical croup presentation with features suggestive of lower airway involvement. A favourable response to bronchodilators highlights the importance of flexible management when clinical progression deviates from the typical course of croup.

Keywords: Croup, Stridor, Bronchodilator, Infant, Hypoxaemia, Wheeze

BACKGROUND

Croup, or laryngotracheobronchitis, is a common viral respiratory illness in children aged 6 months to 3 years [1], most frequently caused by parainfluenza viruses. It typically presents with a characteristic barking cough, inspiratory stridor, and hoarseness due to inflammation and narrowing of the subglottic airway [1]. Management is largely supportive, with corticosteroids being the mainstay of treatment, and nebulised epinephrine reserved for more severe cases to rapidly reduce airway oedema [1].

While most cases are mild and resolve within 48 to 72 hours, atypical presentations can occur. These may include prolonged symptoms, poor response to corticosteroids, the presence of wheeze, or signs of lower airway involvement [2]. Such scenarios can complicate diagnosis and may prompt consideration of alternative or concurrent conditions such as bacterial tracheitis,

bronchiolitis, anatomical airway anomalies, or reactive airway disease [2]. Infants are more vulnerable to such atypical courses due to smaller airway calibres and heightened mucosal reactivity.

We present the case of an 8-month-old girl with typical croup symptoms who developed persistent hypoxaemia and wheezing, ultimately improving with bronchodilator therapy. This report aims to highlight an atypical presentation of croup with features suggestive of lower airway involvement and to underscore the importance of maintaining diagnostic flexibility and tailoring management to evolving clinical features in paediatric respiratory illnesses.

CASE REPORT

An 8-month-old previously healthy girl presented to the paediatric emergency unit with a 2-day history of nasal discharge and a 1-day history of noisy breathing and a barking cough. There was no

fever, vomiting, or feeding difficulty. She was fully immunised for age and had no relevant perinatal or family history. She had not been exclusively breastfed.

On examination, she was alert but tachypnoeic (respiratory rate: 64 breaths per minute), with moderate respiratory distress evidenced by subcostal retractions and nasal flaring. Oxygen saturation on room air was 88%. She had a harsh inspiratory stridor without cyanosis or altered consciousness. Her Westley Croup Score was 4, consistent with moderate croup.

Auscultation revealed vesicular breath sounds with transmitted upper airway sounds and a few scattered rhonchi. A clinical diagnosis of moderate croup (acute laryngotracheobronchitis) was made based on the characteristic barking cough, stridor, and examination findings. She was commenced on intranasal oxygen at 1 L/min and received intravenous dexamethasone (0.3 mg/kg) as a single dose.

Following initial treatment, she became calmer and more interactive, with resolution of stridor. Her oxygen saturation improved with supplemental oxygen, rising above 95%. However, her oxygen saturation on room air remained suboptimal, dropping to as low as 83%, and moderate respiratory distress persisted. In view of this, repeated doses of intravenous dexamethasone (0.15 mg/kg) were administered over the next 24 hours.

Despite steroid therapy, the respiratory distress and desaturation on room air persisted. Repeat auscultation revealed widespread rhonchi, suggesting evolving lower airway involvement.

A chest radiograph was unremarkable, showing no evidence of pneumonia or subglottic narrowing. Full blood count revealed leucocytosis (WBC $13.79 \times 10^9/L$) with lymphocyte predominance (73.1%). Based on the new findings, nebulised salbutamol (2.5 mg) was administered twice at six-hour intervals. Within 12 hours, there was marked

clinical improvement: oxygen saturation rose to 98% on room air, respiratory distress resolved, and rhonchi were no longer audible. She was weaned off oxygen and discharged in stable condition after 72 hours of admission. At follow-up on day five, she remained symptom-free.

DISCUSSION

Croup is primarily characterised by upper airway inflammation resulting in inspiratory stridor, barking cough, and mild respiratory distress, typically improving within 48–72 hours following corticosteroid therapy [1,3]. Nebulised epinephrine may be added in moderate to severe cases [1,5]. Standard teaching distinguishes croup (upper airway) from bronchiolitis or asthma, which involve the lower airway and present predominantly with wheeze [2,6]. Bronchodilators such as salbutamol are traditionally reserved for lower airway wheezing disorders and are not indicated in uncomplicated croup [2,6].

Our patient deviated from this typical course: despite resolution of stridor with dexamethasone, she exhibited persistent hypoxaemia and scattered rhonchi—signs more in keeping with lower airway involvement. The rapid and sustained response to salbutamol in this infant suggests coexistent bronchospasm or reactive airway disease. While uncommon, such overlap has been described. A systematic review by Smith et al. identified atypical croup variants featuring prolonged symptoms, wheezing, and steroid non-responsiveness, though bronchodilator use was not extensively studied [6]. In neonates, Ezenwa et al. demonstrated that bronchodilator-responsive bronchial obstruction can occur in hyperreactive airway disease and respond well to salbutamol [7]. Moreover, bronchodilator responsiveness in wheezy infants has been shown to predict ongoing respiratory morbidity, including recurrent wheezing or asthma-like illness [8]. Together, these findings support the

concept that airway hyperreactivity may coexist with viral laryngotracheitis, particularly in younger infants [7,8]. This case further reinforces the need to individualise treatment when the clinical course of croup deviates from expectations.

Croup is primarily a clinical diagnosis; however, the cases of atypical croup reviewed often required further investigation [2]. Chest radiography and basic laboratory tests helped exclude alternative diagnoses such as pneumonia, bacterial tracheitis, or foreign body aspiration. The absence of fever and a normal consciousness level further supported a non-bacterial aetiology. The decision to use a second-line intervention—salbutamol—was guided by clinical progression rather than protocol, emphasising the importance of flexible, individualised care in atypical cases.

This case underscores the limitations of rigid protocol-based management in paediatric respiratory illnesses and reinforces the need for continuous clinical reassessment. When symptoms persist or evolve despite standard therapy, clinicians should broaden the differential diagnosis to include coexisting lower respiratory tract pathology—especially in infants with smaller airway calibres and heightened susceptibility to mucosal oedema and obstruction. This highlights the need for adaptable protocols that accommodate evolving clinical findings in paediatric respiratory cases.

CONCLUSION

Although typical croup is self-limiting and confined to the upper airway, clinicians should remain alert to atypical features—such as persistent oxygen desaturation and wheeze—that may warrant broader diagnostic consideration and

individualised management. Recognising and appropriately managing such deviations from the classical disease course is essential, especially in infants who may present with mixed respiratory phenotypes.

REFERENCES

1. Sizar O, Carr B. Croup. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025.
2. Hanna R, Lee F, Drummond D, Yunker WK. Defining atypical croup: A case report and review of the literature. *Int J Pediatr Otorhinolaryngol*. 2019;127:109686.
3. Aregbesola A, Tam CM, Kothari A, Le M-L, Ragheb M, Klassen TP. Glucocorticoids for croup in children. *Cochrane Database Syst Rev*. 2023;1:CD001955.
4. Tristram D. Laryngitis, Tracheitis, Epiglottitis, and Bronchiolitis. In: *Introduction to Clinical Infectious Diseases*. Cham: Springer; 2018. p. 75–85.
5. Rajapaksa S, Starr M. Croup – assessment and management. *Aust Fam Physician*. 2010;39(5):280–3.
6. Smith DK, McDermott AJ, Sullivan JF. Croup: diagnosis and management. *Am Fam Physician*. 2018;97(9):575–580.
7. Ezenwa BN, Gai A, Kujabi E, et al. Bronchodilator-responsive bronchiolar obstruction in term neonates: a case series. *J Med Case Reports*. 2023;17:326.
8. Bisgaard H, Klug B, Bryant P, et al. Bronchodilator responsiveness in wheezy infants predicts continued early childhood respiratory morbidity. *Am J Respir Crit Care Med*. 2016;193(6):629–636.