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Emergency Medicine

WHEN THE BARK ECHOES: A CASE REPORT ON CROUP WITH RADIOGRAPHIC STEEPLE SIGN

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ABSTRACT Croup, a common respiratory condition in pediatric populations, is characterized by a distinctive barking cough, stridor, and varying degrees of respiratory distress. This case report discusses a 1-year-old girl presenting with moderate croup symptoms to the emergency department. The patient exhibited classic signs, including a hoarse voice and difficulty breathing, prompting an urgent evaluation in the emergency department. Initial management involved corticosteroids and nebulized epinephrine, with subsequent monitoring and symptom improvement noted within hours. This case highlights the importance of early recognition, the classical radiological finding of "steeple sign", and appropriate treatment in managing croup. The discussion includes a review of current guidelines and management strategies, emphasizing the role of epinephrine and corticosteroids as the cornerstone of treatment for moderate to severe croup.

KEYWORDS : croup, steeple sign, modified Westley croup score

INTRODUCTION

Croup, also known as viral laryngotracheobronchitis, is often seen in children aged 6 months to 3 years and is the main source of stridor after the neonatal stage.[1] The highest occurrence happens during the autumn and early winter months, but isolated cases are observed throughout the whole year.[2] Parainfluenza virus and rhinovirus are the most prevalent viruses, with other respiratory viral pathogens like influenza, respiratory syncytial virus, metapneumovirus, enterovirus, and coronavirus following closely behind.[3]

Although a clinical diagnosis based on sign and symptoms, this case report presents a case of moderate croup with the typical "steeple sign" on X-ray due to subglottic narrowing and emphasizes on management strategy for pediatric patients presenting to the Emergency Department with clinical features suggestive of croup.[4]

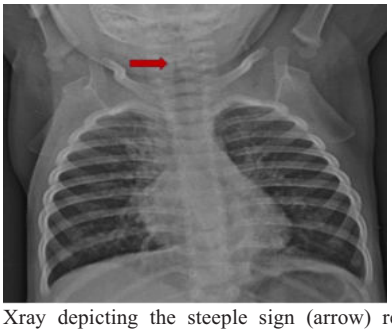

Figure 1: Xray depicting the steeple sign (arrow) representing subglottic stenosis in croup.

TABLE – 1: The modified Westley Croup Score[10]

Inspiratory stridor	None (0)	With agitation only (1)	At rest (2)
Intercostal retractions	Mild (1)	Moderate (2)	Severe (3)
Air entry	Normal (0)	Slightly decreased (1)	Severely decreased (2)
Cyanosis	None (0)	With agitation only (4)	At rest (5)
Level of consciousness	Normal (0)		Altered (5)
0–17 points total	<4 points = mild croup	4–6 points = moderate croup	>6 points = severe croup

CASE PRESENTATION

1-year-old girl was brought to Emergency Department with complaints of sudden onset breathing difficulty and cough for 30 minutes prior to arrival.

On examination, patient had harsh barking cough, room air saturation of 85%, intercostal retractions present along with inspiratory stridor and bilaterally decreased air entry. Blood Pressure of 90/60mmHg and a respiratory rate of 50/minute.

MANAGEMENT:

Based on clinical sign and symptoms patient was diagnosed to have moderate croup as per modified Westley croup score (Table 1). Epinephrine (1:1000) 2ml + 2ml nebulization followed by budesonide 2mg nebulization was administered and patient showed symptomatic improvement. Later, per oral Dexamethasone 6mg was also administered. X-ray exhibited the typical "steeple sign" suggestive of subglottic stenosis in croup (Figure 1).

Sequential modified Westley croup score assessment exhibited a decreasing trend. Patient was discharged from Emergency Department after overnight observation and did not had recurrence on short term follow-up of one week.

DISCUSSION

Children with croup commonly presenting to the emergency department. Place children in a position of comfort, often in the lap of the caretaker, and assess respiratory distress through observation, without disturbing the child. Agitation and crying increase oxygen demand, creating turbulent airflow and resulting in greater airway resistance.[5] If radiographs are requested, ensure careful supervision while the procedure is being conducted, as agitation could exacerbate current airway blockage. Radiographs can show narrowing below the vocal cords ("steeple sign"). The steeple sign as described classically in literature is suggestive of diagnosis but can be absent in about half the cases of croup.[2] Nebulized Epinephrine and corticosteroids are mainstay of treatment and a single dose of steroids (dexamethasone) has shown to reduce hospital length of stay and reduce revisits to the Emergency Department.[6] Dexamethasone is equally effective when given parenterally or orally.[1] Nebulized budesonide is the alternative to dexamethasone if the child is vomiting.[7]

Children who have been given nebulized epinephrine should be monitored in the emergency department for minimum of 3-4 hours following the treatment.[8] Beta agonists are not recommended in management of croup due to insufficient data and the theoretical risk of worsening of upper airway obstruction as beta receptor stimulation in vasculature leads to vasodilation contrary to the vasoconstrictive alpha agonistic action of epinephrine.[9] Those with persistent stridor, respiratory distress, chest retractions, and low oxygen saturation, or those needing more than two doses of epinephrine should be hospitalized.[2]

TABLE – 2: Croup treatment summary

Medication	Dose	Notes
Epinephrine (1:1000)	0.5 mL/kg nebulized (5 mL maximum)	For moderate or severe croup; may repeat if severe.
Dexamethasone	0.15–0.6 mg/kg PO/IM (10 mg maximum)	For mild, moderate, or severe croup.
Budesonide	2 mg nebulized	Consider if PO steroids vomited.

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