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Q/What's best for croup?

EVIDENCE-BASED ANSWER

A A SINGLE DOSE OF CORTICOSTEROIDS is the first-line treatment for croup, resulting in fewer return visits and hospital admissions, shorter lengths of stay in the emergency department (ED) or hospital, and less need for supplemental medication (strength of recommendation [SOR]: **A**, meta-analysis and randomized controlled trials [RCTs]). A 0.15 mg/kg dose of oral dexamethasone is as effective as larger doses (SOR: **B**, small RCTs).

Nebulized racemic or L-epinephrine reduces severity of symptoms in moderate-to-severe croup (SOR: **C**, limited-quality disease-oriented evidence).

The role of heliox in moderate to severe croup remains uncertain. Studies to date have been inadequate (SOR: **C**, limited-quality disease-oriented evidence).

Humidified air provides no demonstrable benefit in the acute setting (SOR: **A**, meta-analysis).

Evidence summary

Standard management for croup has included glucocorticoids, nebulized racemic epinephrine, humidified air, and, for patients with severe respiratory distress and impending respiratory failure, helium-oxygen mixtures.

Glucocorticoids have significant benefits

A 2011 Cochrane review of glucocorticoids in children with croup identified 38 RCTs with 4299 patients.¹ Effective treatments included dexamethasone (oral, subcutaneous, intramuscular, nebulized), budesonide (inhaled), and prednisolone (oral). Meta-analysis revealed a significant decrease in the rate of return visits and (re)admissions for patients treated with glucocorticoids compared with placebo (relative risk=0.5; 95% confidence interval [CI], 0.3-0.7). Glucocorticoid-treated children spent less time in the ED or hospital (weighted mean difference=-12 hours; 95% CI, -5 to -19) and were less likely to need epinephrine (risk difference=10%; 95% CI, 1%-20%).

The standardized improvement in the Westley score (TABLE) for all glucocorticoid treatments compared with placebo was -1.2 (95% CI, -1.6 to -0.8) at 6 hours and -1.9 (95% CI, -2.4 to -1.3) at 12 hours. No statis-

tically significant difference was found at 24 hours (-1.3; 95% CI, -2.7 to 0.2). The combined studies favored glucocorticoids over placebo with a number needed to treat of 5. Meta-regression analysis didn't demonstrate superiority for any single glucocorticoid.

A single 0.15 mg/kg dose of oral dexamethasone proved as effective as higher doses of 0.3 to 0.6 mg/kg in 3 RCTs (N=100, 120, and 99).²⁻⁴

Nebulized epinephrine improves moderate to severe croup

Three RCTs (N=54, 20, and 13) found that in moderate to severe croup, treatment with nebulized racemic epinephrine improved croup score within 10 to 30 minutes.⁵

A small RCT (31 children, 6 months to 6 years of age) demonstrated L-epinephrine [1:1000] to be as effective and well tolerated as racemic epinephrine in moderate to severe croup. Improvement in croup score and respiratory rate peaked at 30 minutes. The effect of epinephrine (racemic or L-form) didn't last beyond 120 minutes.⁶

In a retrospective study of 50 children with croup who were given aerosolized racemic epinephrine and observed in the ED for 2 hours after treatment, 58% received steroids

TABLE

Westley Croup Score⁵

Symptom	Score					
	0	1	2	3	4	5
Level of consciousness	Normal, including sleep	_____	_____	_____	_____	Disoriented
Cyanosis	None	_____	_____	_____	With agitation	At rest
Stridor	None	With agitation	At rest	_____	_____	_____
Air entry	Normal	Decreased	Markedly decreased	_____	_____	_____
Retractions	None	Mild	Moderate	Severe	_____	_____

Scoring: Mild croup= ≤ 2 ; moderate croup=3-7; severe croup= ≥ 8 .

during observation and 34% were prescribed prednisolone at discharge. Only 1 child required a return visit within 48 hours.⁷

Effect of helium-oxygen mixtures isn't clear

A 2010 Cochrane review identified 2 RCTs of heliox in acute croup. No significant differences in croup score changes were found when heliox was compared with 30% oxygen (n=15, mild to moderate croup) and 100% oxygen with prn nebulized racemic epinephrine (n=29, moderate to severe croup).⁸ Both studies were underpowered and had significant methodological limitations.

Humidified air shows no benefit

A Cochrane review of 3 RCTs comparing humidified air with room air in emergency settings (n=135) found no evidence of benefit in croup score, oxygen saturation, or pulse rate.⁹

Recommendations

The 2008 Alberta Medical Association guideline recommends that all children with croup be treated with 0.6 mg/kg oral dexamethasone.¹⁰ Children with mild croup can be discharged home without further observation. Children with moderate croup should be observed for at least 4 hours. Hospitalization should be considered for children who fail to show adequate improvement. The guideline advises giving both steroids and nebulized

epinephrine to children with severe croup.

The Advanced Pediatric Life Support (APLS) course of the American Academy of Pediatrics and the American College of Emergency Physicians recommends treatment with corticosteroids.¹¹ For severe croup, the APLS advocates racemic or L-epinephrine, followed by observation for 3 or 4 hours and hospital admission in the event of inadequate response or recurrence of severe distress. **JFP**

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