Concept Article

Glucocorticoid for croup in children

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NNT Color recommendation	Green (benefits > harms)
Summary Heading	Glucocorticoids reduced symptoms, shortened hospital stay, and reduced return visits.
Benefits in NNT	1 in 7 were helped (return visit or admission prevented)
Benefits in Percentages	14% were helped (return visit or admission prevented)
Harms in NNT (NNH)	Not Reported
Harms in Percentages	Not Reported
Efficacy Endpoints	1. Change in croup score 2. Return visit or admission to the hospital 3. Length of stay
Harm Endpoints	Adverse reactions including infection, symptoms, vomiting, rashes, tongue irritation
Who was in the studies	4,565 children in 43 randomized trials who visited emergency departments or outpatient clinics with croup

Narrative

Croup is a viral upper airway infection in children that presents with a hallmark barky or seal-like cough. The cough, like the infection, is typically self-limited but can progress to respiratory distress or hypoxia. The objective of this evidence-based summary is to quantify the therapeutic effects of glucocorticoids in children with croup, updating a 2011 summary[1].

The Cochrane systematic review discussed here[2] included 43 randomized trials comprising 4565 patients. We primarily focus on glucocorticoid versus placebo trials. Patients were recruited from emergency departments or outpatient clinics. The primary outcomes reported were change in clinical croup score from baseline to 2, 6, 12 and 24 hours as well as a composite outcome of return visits or hospital admissions[2].

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When compared to placebo, glucocorticoids (any type) improved clinical croup scores at 2 hours, with a mean difference of -0.65 (95% confidence interval [CI], -1.1 to -0.2). The Cochrane authors report this this degree of difference is generally considered clinically 'moderate'. Croup scores continued to improve at 6, 12, and 24 hour endpoints with differences that were considered 'large' compared to placebo. The second primary endpoint, return visit or admission, was also reduced significantly (relative risk [RR]: 0.5; .95CI, 0.4 to 0.8, absolute risk difference [ARD]: 14%, NNT: 7, 95%CI, 5 to 12). The ARD of 14% was calculated based on the average admission rate for the placebo group. The Cochrane analysis reports admission rates which ranged from 2% to 31% for the placebo group; generating NNTs ranging from 3 to 102[2].

The Cochrane systematic review also reports a shorter length of stay for patients in the glucocorticoids group compared to the placebo group by an average of 15 hours (95%CI, 6 to 26). However, the review combined emergency department and inpatient length of stay. Thus, it is not clear how this treatment specifically affects the length of the emergency department visit[2].

Only half of the included trials included (13/26) reported adverse events associated with steroids, although these events occurred infrequently and were not consistently different from those in placebo groups[2].

Of note, the review also compared epinephrine to glucocorticoids, showing no difference at 2, 6, 12, and 24 hours[2].

Caveats

While interpreting the results of this review, the spectrum of severity of disease must be considered. Approximately half of studies enrolled children with mild to moderate croup. However, most guidelines recommend administering glucocorticoids to all children with croup except those who are immunocompromised or those have recently been exposed to varicella[3,4].

The trials included were conducted in the emergency department as well as outpatient settings, and the heterogeneity was judged to be moderate to high.

Dexamethasone was studied more than other steroids, using various routes of administration. No differences were found between oral and intramuscular dexamethasone, and both reduced return visits and admissions compared to the nebulized route.

Dexamethasone for treatment of croup has also been studied in various doses: (0.6mg/kg, 0.3mg/kg, 0.15mg/kg) and based on limited data no differences in clinical effect were seen.

Most studies had an unknown or high risk of bias, often due to unclear randomization and blinding practices, a problem the review authors felt did not affect their primary outcomes.

The primary endpoint of return visit or admission was a composite endpoint. We generally avoid reporting composite endpoints because of challenges in interpreting them[5]. However, extracting the numbers for these endpoints separately was not possible since the review did not report them individually.

Finally, the readers need to be aware that the croup scores used in research for comparing treatment modalities do not necessarily correlate with clinical outcomes[6]. In clinical practice, the croup severity is judged clinically based on presence of barking cough plus: no stridor (mild), stridor when agitated (moderate), or stridor at rest (severe)[4].

In conclusion, glucocorticoids improved clinical symptoms in croup at the two-hour mark and this improvement continued and increased over 24 hours. Glucocorticoids also reduced return visits and admissions. Though less well reported, it appears that glucocorticoids may also cause few if any adverse effects. Therefore, we have assigned a color recommendation of Green (benefits> harm) to this intervention.

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Authors contribution

Khan AS and Hom J developed the study concept and design. JH summarized the evidence and drafted the manuscript. Khan AS reviewed and edited the manuscript. Khan AS and Hom J had significant contribution in the data interpretation, manuscript preparation, and critical revisions.
Both authors approve the final version.

Competing interests

No financial, legal or political competing interests with third parties (government, commercial, private foundation, etc.) were disclosed for any aspect of the submitted work (including but not limited to grants, data monitoring board, study design, manuscript preparation, statistical analysis, etc.).

References:

1. Russell KF, Liang Y, O'Gorman K, Johnson DW, Klassen TP. Glucocortocoids for croup. Cochrane Database of Systematic Review. 2011;19(1):CD001955. doi: 10.1002/14651858.CD001955.pub3

2. Gates A, Gates M, Vandermeer B, Johnson C, Hartling L, Johnson DW et al. Glucocorticoid for croup in children. Cochrane Database of Systematic Reviews. 2018;8:(CD001955). doi: 10.1002/14651858.CD001955.pub4

3. Gates A, Gates M, Vandermeer B, Johnson C, Hartling L, Johnson DW et al. Glucocorticoids for croup in children. Cochrane Database of Systematic Reviews 2018;8(CD001955). doi: 10.1002/14651858.CD001955.pub4

4. American College of Emergency Physicians. Pediatric Emergency Medicine. [Internet]. [accessed in 2019 dez 12]. Available at: https://www.acep.org/how-we-serve/sections/pediatric-emergency-medicine/pedemmorsels/croup

5. McCoy CE. Understanding the Use of Composite Endpoints in Clinical Trials. West J Emerg Med. 2018;19(4):631-634. doi: 10.5811/westjem.2018.4.38383

6. Chan AKJ, Langley JM, Leblanc JC. Interobserver variability of croup scoring in clinical practice. Paediatr Child Health. 2001;6(6):347-51. doi: 10.1093/pch/6.6.347