CLINIC IQ

Question: Do Inhaled Corticosteroids Improve Oxygen Saturation in Infants with Respiratory Syncytial Virus (RSV) Bronchiolitis?

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Answer: Probably not.
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The level of evidence for the answer: B
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Summary of the issues

RSV bronchiolitis is one of the most common lower respiratory tract infections resulting in hospital admissions among infants under the age of 1 year. Room air hypoxia often serves as an important admission indicator. RSV produces bronchial hyperreactivity that often persists after a hospital discharge leading in some children to possible asthma development. Inhaled corticosteroids are believed to reduce the airway inflammation and prevent bronchial edema. It might take 1 to 2 weeks for inhaled corticosteroids to help. Their side effect in children when used in high doses is decreased linear growth velocity. However, their side effect profile is much more favorable when compared to systemic corticosteroids.

Summary of the evidence

The literature search revealed one systematic review about treatment of bronchiolitis (not only caused by RSV). The authors of that review concluded that there was no evidence found that short term treatment (1-12 weeks) with inhaled steroids was effective. The question of improvement in oxygen saturation was not specifically addressed in that review. In addition, they commented that studies of inhaled corticosteroids were on average of lower quality compared to studies on oral and parenteral steroids.

Three small RCTs looked at efficacy of inhaled corticosteroids in those patients. None of the studies demonstrated improvement in oxygen requirement with inhaled corticosteroid administration when compared to placebo. However, those results need to be considered with caution due to poor statistical significance.

The first study from 1998 involved 40 infants with bronchiolitis (83% with confirmed RSV infection) that were randomized in a group receiving inhaled budesonide 1mg every 12 hours for 5 days, then 500mcg every 12 hours continuing for a total of 6 weeks (to assess its role in the postbronchiolitic wheezing prevention), and a second group receiving the same schedule of inhaled 0.9% normal saline. No difference was noted in days the oxygen was required after the trial entry: budesonide group median 1.0 versus placebo 1.0 ($p = 0.29$) or in maximum oxygen requirement after the trial entry (30% for both groups; $p = 0.33$). Small number of participants makes results of this study statistically insignificant.

The second RCT, also from the United Kingdom, studied 161 infants admitted with their first episode of RSV bronchiolitis. They were randomized to receive either 1mg of nebulised budesonide or placebo twice a day until 14 days after discharge. The infant was considered fit for a hospital discharge only when at least 12 hours passed since the first administration of budesonide or placebo, he was feeding well and no longer required supplemental oxygen. Additional medications including oral and intravenous steroids were allowed in that study which makes its result difficult to interpret. Even though the length of time supplemental oxygen was needed is listed as one of inpatient secondary end points, it is not directly accounted for among inpatient end point results. No difference was noted in the number of days from the first nebulizer treatment until fit for hospital discharge (median 2 days for both groups).

Sixty-one infants with RSV bronchiolitis were enrolled in the most recent RCT from Israel. They were treated with either 0.25mg inhaled dexamethasone + 1 ml epinephrine or 0.5 ml 0.9% saline + 1 ml epinephrine, using a face mask every 6 hours. Oxygen saturation was assessed as a part of clinical score: >92%: 0 points; 88-92%: 1 point and <88%: 2 points. No significant differences were noted between the groups with respect to total clinical score at discharge (2.1 ± 0.5 vs 2.2 ± 0.4, dexamethasone vs placebo group respectively) or duration of supplemental oxygen therapy in hours (93.84 ± 45.4 vs. 100.6 ± 37.6, dexamethasone vs. placebo respectively). The dexamethasone study showed some promising results regarding reduction of hospitalization among prematurely born infants (6.5 ± 1.7 days in the dexamethasone group vs 9.1 ± 1.9 in the placebo group). Those findings may warrant further investigation.

Search terms: RSV bronchiolitis, inhaled steroids, oxygen saturation

Exclusion criteria: Studies that involved patients requiring mechanical ventilation as well as studies with other routes of corticosteroid delivery e.g. oral, IM or IV.

List of Articles Reviewed

1. King VJ, et al.: Pharmacologic treatment of bronchiolitis in infants and children: a systematic review. *Arch Pediatr Adolesc Med.* 2004;158(2); 127-37.
2. Richter H, Seddon P: Early nebulized budesonide in the treatment of bronchiolitis and the prevention of postbronchiolitis wheezing. *J Pediatr.* 1998;132(5); 849-53.
3. Cade A, Brownlee KG at al: Randomised placebo controlled trial of nebulised corticosteroids in acute respiratory syncytial virus bronchiolitis. *Arch Dis Child* 2000; 82(2); 126-30.
4. Bentur L et al: Dexamethasone inhalations in RSV bronchiolitis: a double-blind, placebo-controlled study. *Acta Paediatr* 2005;94(7); 866-71.