Why don't we use steroids for bronchiolitis?

PECARN Dexamethasone Study

Corneli et al. A multicenter, randomized, controlled trial of dexamethasone for bronchiolitis. N Engl J Med 2007 Jul 26;357(4):331-9.

Take Home Message: A single dose of dexamethasone did not reduce hospital admissions or improve respiratory status in infants with bronchiolitis, as compared to placebo.

Highlights: The treatment of bronchiolitis has been controversial, and prior to this study, there had been both positive and negative small studies looking at corticosteroids for bronchiolitis. The Agency for Healthcare Research and Quality (AHRQ) called for a large study to examine the efficacy of corticosteroids for bronchiolitis.

In 2007, Corneli et al[i] randomized 600 infants with bronchiolitis in 20 emergency departments over three respiratory seasons to receive either dexamethasone or placebo. At 4 hours, there was no difference in hospitalization or in respiratory status. This was true regardless of whether the infants had markers of possible atopy. It is now widely recommended that glucocorticoids not be used in infants with their *first* episode of bronchiolitis.

Later, in 2009, Plint et al. published a multicenter, double-blind, randomized controlled trial[ii] in which 800 infants with bronchiolitis in 8 Canadian emergency departments were randomized to four groups: nebulized epinephrine & six oral doses of daily dexamethasone, nebulized epinephrine & oral placebo, nebulized placebo & oral dexamethasone, and nebulized placebo & oral placebo. Only the infants in the both nebulized epinephrine & oral dexamethasone group had a significantly lower hospitalization rate within 7

days. A 2013 Cochrane Review[iii] concludes that glucocorticoids alone do not seem to reduce admission or hospitalization length, but more research is needed on combined dexamethasone/nebulized epinephrine treatment.

The Nitty-Gritty:

- **Design:**
    - Multicenter, randomized, double-blind, placebo controlled trial
    - N= 600
        - Dexamethasone group (n=305)
        - Placebo group (n=295)
    - Setting: 20 US emergency departments of the Pediatric Emergency Care Applied Research Network (PECARN)
    - Enrollment: November through April 2004-2006
    - Primary outcome: decision to hospitalize or discharge the infant 4 hours after the administration of the study medication
    - Analysis: Intention-to-treat
- **Population:**
    - **Inclusion Criteria**

- infants 2-12 months of age
- brought to the emergency department with a first episode of bronchiolitis, defined as wheezing (with no prior bronchiolitis, wheezing, or asthma and no bronchodilator use before the current illness) within 7 days after onset of symptoms
- moderate or severe episode as defined by a score on the Respiratory Distress Assessment Instrument (RDAI) which scores both wheezing and retractions

- **Exclusion Criteria**
  - prior adverse reaction to dexamethasone
  - known heart or lung disease
  - premature birth (defined as birth before 35 weeks of gestation)
  - immunosuppression or immunodeficiency
  - treatment with corticosteroids in the previous 14 days
  - active varicella or recent exposure to varicella
  - inability of the parent or guardian to speak English or Spanish
  - critically ill

- **Baseline Characteristics –** from the dexamethasone group, no significant differences between the two groups, data do not include two patients who were hospitalized prior to administration of study medication

  - Male sex: 62.5%
  - Age: 5.1+-2.6 months
  - RDAI score 9.0+-2.1 (scale is 0-17 with higher scores indicating more severe respiratory symptoms)
  - Respiratory rate: 53+-13 breaths per minute
  - Heart rate: 157+-20 beats per minute
  - Temperature: 37.6+-0.8 degrees Celsius
  - Oxygen saturation: 96+-4%
  - Number of days of illness: 3.7+-2.5
  - RSV positive: 66.9%
  - Family history of asthma: 55.9%
  - History of eczema: 26.0%
  - Either family history of asthma or history of eczema: 63.4%

- § Smoker in home 39.0%
- § Pet in home: 32.4%

- **Intervention**: randomized to receive 1 mg/kg of dexamethasone or placebo
- **Outcomes:** comparisons are dexamethasone vs. placebo
  - o **Primary outcome:** decision to hospitalize the infant 4 hours after the administration of the study medication
    - § 39.7% vs. 41.0% (absolute difference, -1.3%, 95%CI -9.2 to 6.5, P=0.74)
    - § when analyzed in the prespecified subgroup with eczema or a family history of asthma: absolute difference -1.3%, 95%CI -11.1 to 8.5)
  - o **Secondary outcome:** Respiratory Assessment Change Score (RACS) at 4 hours, calculated as the sum of the change in the RDAI score and a standardized score for the change in the respiratory rate. Negative RACS values signify improvement
    - § RACS: -5.3+-4.7 vs. -4.8 +- 4.6 (absolute difference -0.5, 95% CI -1.2 to 0.3, P=0.21)
    - § No significant difference in the prespecific subgroup with eczema or a family history of asthma

- **Criticisms**

- Strict criteria for inclusion may limit study's representation of overall population of infants with bronchiolitis[iv]

[i] Corneli et al. A multicenter, randomized, controlled trial of dexamethasone for bronchiolitis. N Engl J Med 2007 Jul 26;357(4):331-9.

[ii] Plint et al. Epinephrine and dexamethasone in children with bronchiolitis. N Engl J Med 2009; 360:2079-89.

[iii] Fernandes et al. Glucocorticoids for acute viral bronchiolitis in infants and young children. Cochrane Database Syst Rev. 2013 Jun 4;6:CD004878

[iv] Hall CB. Therapy for bronchiolitis: when some becomes none. N Engl J Med 2007 Jul 26;357(4): 402-4.