

Evidence Based Practice Critically Appraised Topic (CAT)

Elizabeth A. North RN, BSN, CPEN, FNP-s

March 5th, 2011

University of Mary

Case Scenario: A 2 year-old male is seen in the clinic for a barky cough and hoarse voice. He has a three day history of a clear runny nose and subjective low-grade fever. His vital signs are stable, he shows no signs of respiratory distress, and is playful. His lung sounds are mostly clear, some referred upper airway noise is noted. A barking, seal like cough is heard during his examination. The patient has no pertinent medical or family history. His exam is consistent with acute laryngotracheobronchitis or croup. Croup is one of the most common childhood respiratory illness. Studies have demonstrated that the use of corticosteroids reduce symptoms of airway swelling.

Clinical Question: In children who present with mild to moderate croup is using oral Prednisolone as effective as using oral Dexamethasone in reducing re-presentation for medical care due to relapsing croup symptoms?

Articles:

Sparrow, A. & Geelhoed G. (2006). Prednisolone versus dexamethasone in croup: a randomized equivalence trial. *Archives of Disease in Childhood, 91*: 580-583

Fifoot, A. & Ting J. (2007). Comparison between single-dose oral prednisolone and dexamethasone in the treatment of croup: A randomized, double-blinded clinical trial. *Australasian College for Emergency Medicine and Australasian Society for Emergency Medicine, 19*: 51-58

Critical Review of Study:

Sparrow & Geelhoed (2006) provides Grade A, Level 1b evidence in a double-blinded, randomized, comparative trial of prednisolone and dexamethasone in mild to moderate croup. Inclusion criteria were children ranging from 6-142 months presenting to Princess Margaret Hospital emergency room with mild to moderate croup as defined by the Modified Taussig Croup Score. In all 133 children were included in this study. The children were randomly placed into two groups: sixty-five children were given a single dose of prednisolone 1mg/kg and sixty-eight children were given a single dose of dexamethasone 0.15mg/kg. Both groups (prednisolone 1mg/kg and dexamethasone 0.15mg/kg) were given their prescribed corticosteroid. Study participants were then observed at 30 minutes after administration and then hourly until the four hour mark. Criteria for discharge was minimal stridor or chest wall retractions. As follow up, the study participants parents/guardians were contacted by telephone 7-10 days following original presentation. This follow-up was used to determine the rate of return to medical care.

Fifoot & Ting (2007) provides Grade A, Level 1b evidence in a double-blinded, randomized, comparative trial of prednisolone and dexamethasone in mild to moderate croup. Inclusion criteria were children ranging from six months to six years-old presenting to the Master Children's Hospital emergency room with a Westley Croup Score of two or more. In all 99 children were included in this study, the mean age was 1.7 years-old. The children were

randomly placed into three groups: thirty-four children were given a single dose of prednisolone 1mg/kg, thirty-four children were given a single dose of dexamethasone 0.15mg/kg and thirty-one children were given dexamethasone 0.6mg/kg. All three groups (prednisolone 1mg/kg, dexamethasone 0.15mg/kg and dexamethasone 0.6mg/kg) were given their prescribed corticosteroid. Their Westley Croup Scores were assessed at baseline and then hourly for 4 hours following corticosteroid administration. Patients could be discharged from the emergency room earlier than 4 hours if the treating clinician felt that they had adequate improvement. As follow-up, the study participants parents/guardians were contacted by telephone 1 week following original presentation. This follow-up information was used to determine the rate of return to medical care and/or additional corticosteroid need.

Results:

In *Prednisolone versus Dexamethasone in Croup: A Randomized Equivalence Trial (2006)*, quantified croup by rating patients using the Modified Taussig Croup Score. The results of this study showed no statistical significance between the two groups in the time spent in the emergency department or the duration of viral symptoms. However this study does show that there is statistical significance between study participants in the prednisolone group versus the dexamethasone group in re-presentation. Children in the prednisolone group were more likely to re-present for medical care of relapsing croup symptoms. In the prednisolone group 29% returned for medical care compared to 7% in the dexamethasone group.

In *Comparison Between Single-Dose Oral Prednisolone and Oral Dexamethasone in the Treatment of Croup: A Randomized Double-Blind Clinical Trial (2007)*, quantified croup by rating patients using the Westley Croup Score. The results of this study show that there was no statistical significance between the three groups during the first four hours after corticosteroid treatment in decline of Westley Croup Score. The greatest change in the Westley Croup Score occurred during the first hour after corticosteroid treatment, but there was no statistical difference between the three groups. For the follow-up interview, 86 parents (or 87%) participated. One-third of all participants re-presented for medical care of recurrent croup symptoms; of this 17% in the prednisolone 1mg/kg group, 13% dexamethasone 0.15mg/kg group and 11% dexamethasone 0.6mg/kg group. There was no statistical difference between the re-presentation of the participants between the three groups.

Clinical Bottom Line:

Sparrow & Geelhoed (2006) found that both prednisolone and dexamethasone are beneficial in the treatment of croup. This was the first study that made a direct comparison of the two corticosteroids. This results of this study suggest that prednisolone 1mg/kg and dexamethasone 0.15mg/kg are equally effective at treating croup at the onset of symptoms. However study participants given prednisolone 1mg/kg were found to be at a greater risk for re-presentation for medical care due to relapsing croup symptoms. The clinical bottom line of this study is that a single dose of oral prednisolone is less effective compared to a single dose of oral

dexamethasone in reducing re-presentation to medical care in children with mild to moderate croup.

Fifoot & Ting (2007) found that prednisolone 1mg/kg and low-dose dexamethasone 0.15mg/kg were just as effective as the currently recommended dexamethasone 0.6mg/kg. This is the second study that made a direct comparison of the corticosteroids prednisolone and dexamethasone in the treatment of croup. The results of this study suggest that prednisolone 1mg/kg, dexamethasone 0.15mg/kg and dexamethasone 0.6mg/kg are equally effective at treating croup at the onset of symptoms. The study further found no clinical significance between the three groups in re-presentation for medical care due to relapsing croup symptoms.

Strengths/Limitations:

Sparrow & Geelhoed (2006) and Fifoot & Ting (2007) have both strengths and limitations. A strength of both studies is that they were both conducted as double-blind, randomized, comparative trials. Limitations of both studies include the sample size and subjective information obtained from the study participants parents/guardian in the follow-up telephone conference.

Implications for Clinical Practice:

There are a limited number of studies directly comparing prednisolone and dexamethasone corticosteroids and their effectiveness at treating mild to moderate croup. Studies have demonstrated that the use of corticosteroids reduce symptoms of airway swelling (Fifoot & Ting, 2007; Sparrow & Geelhoed, 2006). Dexamethasone is a long acting corticosteroid and has a half-life of 36-72 hours (Fifoot & Ting, 2007; Sparrow & Geelhoed, 2006). Prednisolone is an intermediate acting corticosteroid and has a half-life of 12-36 hours (Fifoot & Ting, 2007; Sparrow & Geelhoed, 2006). Both dexamethasone and prednisolone suppress the hypothalamic-pituitary axis; dexamethasone suppresses the hypothalamic-pituitary axis for up to 2.5 days where as prednisolone suppresses it for up to 1.5 days (Fifoot & Ting, 2007; Sparrow & Geelhoed, 2006). These differences between the two corticosteroids could explain why in the Sparrow & Geelhoed (2006) study prednisolone lead to more re-presentations for medical care due to relapse of croup symptoms. Currently there are no published studies which support multiple dose corticosteroid therapy over single dose corticosteroid therapy for treatment of mild to moderate croup. Given the data reviewed, both prednisolone and dexamethasone are appropriate choices in the treatment of mild to moderate croup. However in answering the clinical question: in children who present with mild to moderate croup is using oral Prednisolone as effective as using oral Dexamethasone in reducing re-presentation for medical care due to relapsing croup symptoms? The answer is not clearly defined, but left to the clinicians discretion.