Long-term prednisolone therapy in preterm infants with severe bronchopulmonary dysplasia

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BACKGROUND

- Bronchopulmonary Dysplasia (BPD) is a common chronic lung disease in premature and low birth weight infants.
- Due to the immaturity of the lungs, oxygen supplementation and mechanical ventilation are typically necessary, however, these forms of nonpharmacological treatment can cause damage to the lungs by scarring alveoli and damaging the capillaries surrounding the alveoli.
- The damage caused by BPD can lead to complications such as feeding intolerance and slow growth, as the body is spending significant energy on supporting an unusually increased respiratory rate.
- According to the American Lung Association, approximately 10,000 newborns will develop BPD each year.
- Severe BPD is defined by the National Institute of Health as neonates with a need for positive pressure ventilation or continuous positive pressure (PPV/CPAP) or an oxygen requirement ≥ 30%.

OBJECTIVES

To assess the efficacy and safety of long term prednisolone therapy in preterm infants with severe bronchopulmonary dysplasia (BPD).

METHODS

Study Design:

- Retrospective chart review

Study Population:

- Infants with documented severe bronchopulmonary dysplasia treated with long-term prednisolone therapy (>30 days) that had been admitted to Saint Louis Children's Hospital level IV neonatal intensive care unit.
- Infants were identified between January 1, 2009 and September 30, 2019.
- Excluded infants who received <30 days of prednisolone therapy or received steroids for other indications.

Study Measures: Dependent Variable:

- Long-term prednisolone therapy (>30 days) for treatment of severe bronchopulmonary dysplasia.

Study Measures: Independent Variables:

- Gestational age, gender, birth weight, APGAR scores, previous steroid use, repeat steroid use, duration of steroids, medications at baseline, starting dose of prednisolone, and outcomes at discharge.

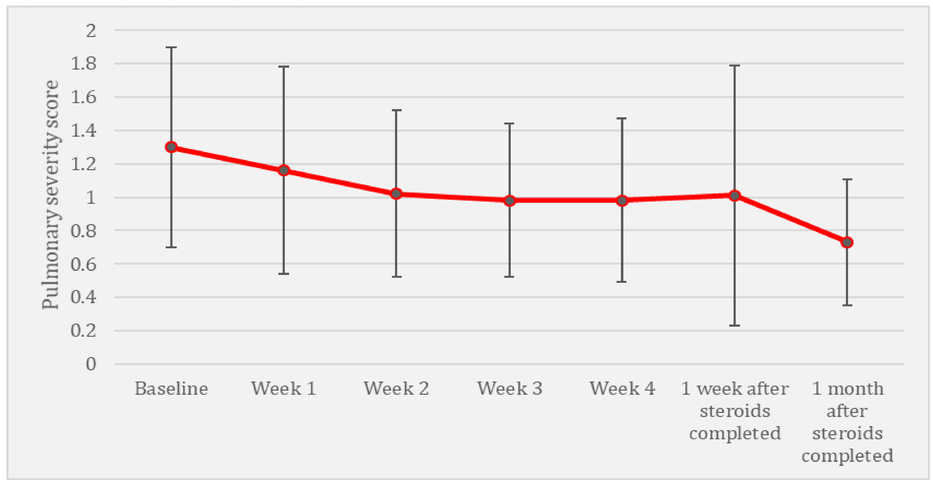
Analytical Strategy:

- Demographic characteristics of the cohort including means and frequencies were calculated.
- Performed a paired T-test to determine differences in pulmonary severity scores and growth parameters over time from baseline.
- Statistical significance was set at a p-value of <0.05.
- Statistical analysis was performed using SPSS version 25 (Armonk, NY).

RESULTS

Infant Baseline Data n=34		
Gestational age, weeks, mean ± SD	26.5 ± 2.5	
Birth weight, grams, mean ± SD	846 ± 353	
Sex, male, n (%)	28 (82)	
Small for gestational age, n (%)	7 (21)	
Apgar score ≤ 5 at 1 min, n (%)	23 (68)	
Apgar score ≤ 5 at 5 min, n (%)	14 (41)	
Previous steroid use, n (%)		
	Hydrocortisone	25 (74)
	Dexamethasone	18 (53)
	Both	15 (44)
Repeat Steroid course, n (%)		
	Hydrocortisone	15 (44)
	Dexamethasone	5 (15)
	Both	1 (3)
Mean hydrocortisone duration, days ± SD		
	1st course	23 ± 9
	2nd course	20 ± 9
Mean dexamethasone duration, days ± SD		
	1st course	11 ± 3
	2nd course	12 ± 10
Baseline Medications, n (%)		
	Schedule diuretics	23 (68)
	Sildenafil	9 (26)
	Inhaled steroids	5 (15)
Maternal Baseline Data		
Antenatal steroids, n (%)	32 (94)	
Multiple gestation, n (%)	8 (24)	
Caesarian delivery, n (%)	28 (82)	
Chorioamnionitis, n (%)	11 (32)	
Pre-eclampsia, n (%)	10 (29)	

Figure 1: Changes in pulmonary severity scores compared to baseline



RESULTS

Figure 2: Changes in growth parameters compared to baseline

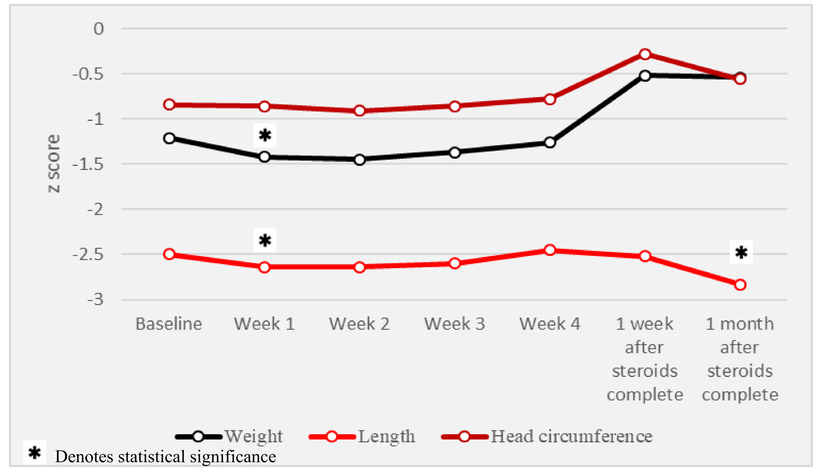
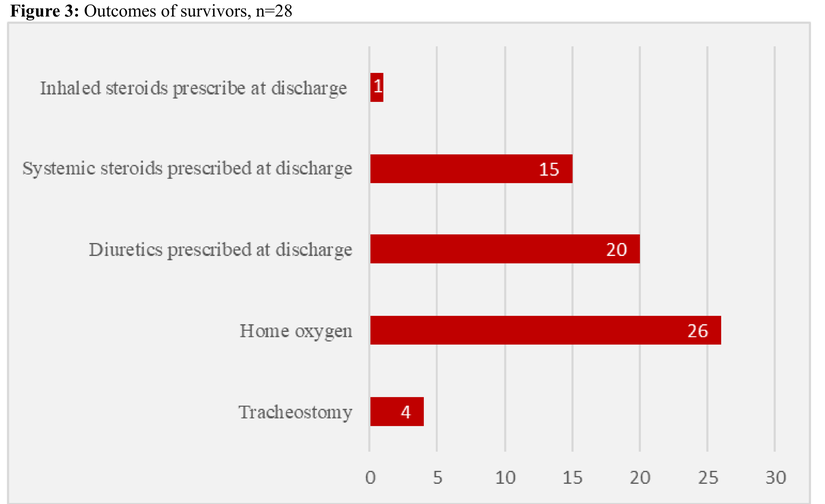


Figure 3: Outcomes of survivors, n=28



LIMITATIONS

- Single site, retrospective chart review.
- No control group, however, utilized the infants as their own control for comparison over the duration of prednisolone therapy.

CONCLUSION

In our study, we found that chronic prednisolone therapy is associated with an improvement in pulmonary function, measured by pulmonary severity scores. Despite documented short-term and long-term adverse effects with systemic steroid use, we found that linear growth was not impaired with long-term prednisolone therapy, with the exception of the first week of treatment. We hypothesize that long-term prednisolone therapy for treatment of severe bronchopulmonary dysplasia in infants may provide some benefit to pulmonary function without impacting linear growth. Additional larger studies are needed to evaluate the safety and efficacy of long term prednisolone use in infants for severe bronchopulmonary dysplasia.