The Administration of Antenatal Corticosteroids in the Late-Preterm Period

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Introduction

The administration of corticosteroids in the late-preterm period (34 to 36+6 weeks' gestation) remains a topic of ongoing debate. The landmark Antenatal Late Preterm Steroids (ALPS) trial demonstrated a significant reduction in neonatal respiratory morbidity with the use of late-preterm corticosteroids, leading to updated recommendations by the Society of Maternal-Fetal Medicine in August 2016 supporting their administration for patients at risk of late-preterm delivery. Given that late-preterm births accounted for 7.4% of live births in the United States in 2020, optimizing neonatal outcomes in this population is a critical public health concern.

Antenatal corticosteroid administration between 24 and 33+6 weeks' gestation is an established standard of care, following evidence from the pioneering study by Liggins and Howie (1972) that demonstrated reductions in respiratory distress syndrome (RDS) and neonatal mortality. However, extending this practice to the late-preterm period has generated controversy, with conflicting study results. While the ALPS trial found improved neonatal respiratory outcomes, other studies, such as those by Porto et al., found no significant differences in respiratory morbidity between treated and untreated groups. Additionally, concerns remain regarding long-term effects and appropriate patient selection criteria for late-preterm corticosteroid administration.

Given these uncertainties, our study aims to report on the use of late-preterm corticosteroids and to evaluate primary neonatal and secondary maternal health outcomes following the implementation of a late-preterm corticosteroid protocol at our institution. Our study is limited to births before December 2019 to minimize confounding effects from the COVID-19 pandemic. Evaluating compliance and understanding the real-world impact of this protocol will contribute to the ongoing discussion regarding the benefits and potential risks of late-preterm corticosteroid use.

Aims and Objectives

We seek to report on the use of late-preterm corticosteroids and to evaluate primary neonatal and secondary maternal health outcomes following the implementation of a late-preterm corticosteroid protocol at our institution.

Methods

Retrospective cohort study that included patients who delivered at Corewell Health William Beaumont University Hospital between January 1, 2017, and December 31, 2019, and received at least one dose of corticosteroids between 34 to 36+6 weeks' gestation. IRB approval was obtained.

Inclusion: Patients that received at least 1 dose out of the 2 doses of corticosteroids for fetal lung maturity between 34 and 36+6 weeks of gestation. Patients could have been delivered in the late-preterm period or not.

A comprehensive chart review with data abstraction was conducted and was analyzed using SPSS.

Neonatal outcomes such as APGAR scores, neonatal intensive care unit (NICU) admission, mechanical ventilation, respiratory distress syndrome (RDS), among others were estimated. Maternal demographics and outcomes such as intensive care unit admission, sepsis, stroke among others were estimated. Both overall and by year neonatal and maternal outcomes were assessed. Statistical significance was assessed using ANOVA F-test, Fisher Exact test, and Chi-Square test, with a p-value threshold of <0.05.

Results

- 147 patients received late-preterm steroids from 2017 to 2019 corresponding to 161 newborns.
- Among those, the mean gestational age at delivery was 35+5 weeks' gestation.
- Two-dose corticosteroid completion occurred in 51% of cases.
- No cases of intraventricular hemorrhage or necrotizing enterocolitis were observed.
- Comparison across years showed no significant differences in neonatal outcomes except for a higher incidence of hyperbilirubinemia in 2019.
- Among the cohort, 1 and 2 cases of maternal intensive care unit admission occurred in 2018 and 2019, respectively.
- No cases of maternal sepsis, stroke, and death were observed.
- There was no difference in maternal postpartum hemorrhage among the study period..

Table 1: Neonatal Outcomes after the Implementation of the Late-Preterm Corticosteroids

	Year				
	2017 (N=39)	2018 (N=57)	2019 (N=65)	Total (N=161)	P-Value
Median 1 min. APGAR	9	8	8	8	0.37
Median 5 min. APGAR	9	9	9	9	0.96
NICU Admission, n (%)	22 (57.9%)	37 (64.9%)	45 (69.2%)	104 (65.0%)	0.51
Neonatal Mechanical Ventilation, n (%)	2 (5.1%)	1 (1.8%)	1 (1.5%)	4 (2.5%)	0.56
Neonatal Sepsis, n (%)	0 (0.0%)	0 (0.0%)	1 (1.5%)	1 (0.6%)	1.00
Neonatal Respiratory Distress Syndrome, n (%)	8 (20.5%)	15 (26.3%)	22 (33.8%)	45 (28.0%)	0.32
Neonatal Hyperbilirubinemia, n (%)	11 (28.2%)	15 (26.3%)	41 (63.1%)	67 (41.6%)	<.00012
Neonatal Hypoglycemia, n (%)	8 (20.5%)	16 (28.1%)	13 (20.0%)	37 (23.0%)	0.52
Neonatal Meconium, n (%)	1 (2.6%)	4 (7.0%)	3 (4.6%)	8 (5.0%)	0.73

Table 2: Maternal Demographics among those Receiving Late-Preterm Corticosteroids

	Year				
	2017 (N=34)	2018 (N=53)	2019 (N=60)	Total (N=147)	P-Value
Mean Maternal Age	31.7	29.2	32.1	31.0	0.02
Mean BMI	32.0	32.5	32.0	32.2	0.92
Marital Status, n (%)					0.02
Married	9 (26.5%)	24 (45.3%)	13 (21.7%)	46 (31.3%)	
Single	24 (70.6%)	29 (54.7%)	47 (78.3%)	100 (68.0%)	
Race, n (%)					0.80
African-American	8 (23.5%)	9 (17.0%)	9 (15.0%)	26 (17.7%)	
White	25 (73.5%)	38 (71.7%)	47 (78.3%)	110 (74.8%)	
Asian	1 (2.9%)	3 (5.7%)	2 (3.3%)	6 (4.1%)	
Other	0 (0.0%)	3 (5.7%)	2 (3.3%)	5 (3.4%)	
Insurance Type, n (%)					0.02
Medicaid	9 (26.5%)	20 (37.7%)	8 (13.3%)	37 (25.2%)	
Private	23 (67.6%)	32 (60.4%)	49 (81.7%)	104 (70.7%)	

Conclusions

- Given the controversy in evidence and the lack of long-term studies on the usage of corticosteroids in the late-preterm period, it is imperative that administration is not very liberal and in fact compliant with the proposed selection criteria for those patients that are eligible to receive corticosteroids in the late-preterm period.
- Our study shows that most of our patients delivered in the preterm period with a mean gestational age of 35+5 weeks.
- The implementation of a late-preterm corticosteroid protocol has yielded variable neonatal outcomes, with persistent NICU admissions and respiratory morbidity.
- However, the absence of significant neonatal differences over time, suggests that the administration of antenatal corticosteroids is likely associated with stable and consistent health outcomes.
- Further research is needed to expand patient recruitment and assess long-term neonatal and maternal implications.

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