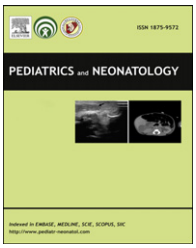
Pediatrics and Neonatology (2012) 53, 178–183

Available online at www.sciencedirect.com

SciVerse ScienceDirect

journal homepage: http://www.pediatr-neonatol.com



ORIGINAL ARTICLE

Effects of Antenatal Corticosteroids on Neonatal Outcomes in Very-Low-Birth-Weight Preterm Newborns: A 10-Year Retrospective Study in a Medical Center

Ya-Chen Wang [a,b,c], Hsing-I. Tseng [a], San-Nan Yang [a,c], Chu-Chong Lu [a], Jiunn-Ren Wu [a,d], Zen-Kong Dai [a,d], Jong-Hau Hsu [a,c,d], Hsiu-Lin Chen [a,e,*]

[a] *Department of Pediatrics, Kaohsiung Medical University Hospital, Kaohsiung Medical University, Kaohsiung, Taiwan*
[b] *Department of Pediatrics, Kaohsiung Municipal Ta-Tung Hospital, Kaohsiung, Taiwan*
[c] *Graduate Institute of Medicine, Kaohsiung Medical University, Kaohsiung, Taiwan*
[d] *Department of Pediatrics, Faculty of Medicine, College of Medicine, Kaohsiung Medical University, Kaohsiung, Taiwan*
[e] *Department of Respiratory Therapy, College of Medicine, Kaohsiung Medical University, Kaohsiung, Taiwan*

Received Jul 7, 2011; received in revised form Oct 7, 2011; accepted Oct 30, 2011

Key Words
antenatal corticosteroids;
patent ductus arteriosus;
prematurity;
respiratory distress syndrome;
very low birth weight

Objective: To evaluate the effects on neonatal outcomes between very-low-birth-weight (VLBW) preterm newborns with and without maternal use of antenatal corticosteroids (ACS).
Methods: We retrospectively reviewed medical records of VLBW premature infants who were admitted to Kaohsiung Medical University Hospital between 1999 and 2008. A total of 256 infants were enrolled in this study. A total of 174 neonates did not receive any ACS, and 82 neonates received ACS. A total of 37 neonates received one dose of ACS, and 45 neonates received more than one dose of ACS, referred to as "multiple-dose ACS." In addition, these 82 infants were divided to betamethasone group ($n = 8$) and dexamethasone group ($n = 50$) with 24 infants excluded because of inadequate information.
Results: Neonates with multiple-dose ACS had lower incidence of surfactant use and lower rate of intubation than neonates without ACS. There were no differences in the occurrences of intraventricular hemorrhage, necrotizing enterocolitis, retinopathy of prematurity, sepsis, and chronic lung disease with one-dose vs. multiple-dose ACS and in the betamethasone group vs. the dexamethasone group.

* Corresponding author.
E-mail address: ch840062@kmu.edu.tw (H.-L. Chen).

doi:10.1016/j.pedneo.2012.04.004

Conclusions: ACS reduces the need for exogenous surfactant, and the need for endotracheal tube insertion at birth in VLBW premature infants.

1. Introduction

The morbidity and mortality rates of premature infants are much higher than those of full-term babies. Lung maturation is one of the main problems. Premature infants have higher incidence of respiratory distress syndrome (RDS), which is one of the main causes of early neonatal mortality. Corticosteroids can stimulate the maturation of alveolar type 2 cells to produce surfactant and elicit architectural maturation of the fetal lung.[1] Therefore, antenatal corticosteroid (ACS) can reduce the incidence of RDS, perinatal and neonatal death, and severe morbidity in premature infants below 32 weeks' gestation.[2]

The National Institute of Health[3] recommended that for mothers with gestational age between 24 and 34 weeks, use of ACS may improve the outcome of preterm infants, and, in particular, reduce the incidence and severity of RDS. Recommendation of ACS treatment consists of two doses of 12 mg of betamethasone given intramuscularly 24 hours apart or four doses of 6 mg of dexamethasone given intramuscularly 12 hours apart.

Several studies regarding repeated courses or weekly courses of ACS for preterm infants to enhance their lung maturation were reported. One Cochrane systematic review[4] in 2007 suggested that weekly courses of ACSwere associated with reduced occurrence and severity ofneonatal lung disease, and of serious infant morbidity. Subsequently, some studies showed multiple courses of ACS do not improve preterm-birth outcomes,[5,6] and are associated with a decreased weight, length, and head circumference at birth,[5] and would increase the risk of leukomalacia and 2-year infant neurodevelopmental abnormalities.[7]

This study was a clinical retrospective study to analyze the beneficial effects and possible adverse effects on neonatal outcomes in premature infants with and without maternal use of ACS.

2. Participants and Methods

2.1. Participants

This study was a retrospective study including all the neonates with very low birth body weight (VLBW; birth body weight less than 1500 gm) who were admitted to the neonatal intensive care unit of Kaohsiung Medical University Hospital between 1999 and 2008. The babies with major structural anomalies, chromosomal abnormalities, and steroid use for other indications were excluded. Patients without information regarding prenatal ACS were also excluded.

Infants were divided into no-ACS group, one-dose ACS group, and multiple-dose ACS group to evaluate the different outcomes between these three groups. The no-ACS group included babies who did not receive ACS. The one-dose ACS group included babies who received one dose of antenatal betamethasone or dexamethasone. The multiple-dose ACS group included infants who received more than one dose of betamethasone or dexamethasone. We further separated infants into a no-ACS group, betamethasone group, and dexamethasone group to evaluate the different outcomes between these three groups.

These groups were compared for basic characteristics such as gestational age, birth weight, small for gestational age (SGA), and male sex. The data of maternal age, gravida, the incidence of twins, gestational diabetes mellitus (GDM), toxemia, the incidence of caesarean section, and emergency delivery were also evaluated between these groups.

The neonatal outcomes including survival rate, Apgar scores at 1 minute and 5 minutes, the need for intubation, the need for surfactant treatment, and the incidence and duration of mechanical ventilation were analyzed. In addition, the duration of oxygen dependence, the incidence and treatment rate of patent ductus arteriosus (PDA), intraventricular hemorrhage (IVH), necrotizing enterocolitis (NEC), early- and late-onset neonatal sepsis, retinopathy of prematurity (ROP), and chronic lung disease (CLD) were also reviewed. Neurologic outcomes were measured by the Bayley Scales of Infant Development II at the corrected ages of 6, 12, 18, and 24 months.

PDA was diagnosed by a pediatric cardiologist under echocardiography and then followed up until the PDA had closed. All neonates had cerebral ultrasound scans for detection of IVH by a pediatric neurologist. NEC was clinically and radiographically diagnosed by using modified Bell's criteria.[8] Neonatal sepsis was defined by clinical manifestation with positive blood cultures. ROP survey was performed by ophthalmologists. CLD was defined as a need for supplemental oxygen at the postconceptional age (PCA) of 36 weeks.

2.2. Statistical analysis

Continuous data are expressed as mean $\pm$ standard deviation (SD). In the comparison of ACS groups, analysis of variance (ANOVA)/*t*-test for numerical measurement and Chi-square test for categorical measurement. Tukey's pairwise comparison was used if the *p* value of ANOVA was significant. The odds ratio of multiple-dose ACS group compared with one-dose ACS group for developing outcomes was estimated by a logistic regression model with adjusting of birth body weight and gestational age at delivery. Statistical analyses were conducted by software JMP 8.0 (SAS Institutes Inc., Cary, NC, USA), and *p* values less than 0.05 were considered statistically significant in all testing.