



Role of antenatal corticosteroids in preterm deliveries

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Abstract

Background: Prematurity is still a major problem for health care services throughout the world. Respiratory distress syndrome (RDS) is the primary cause of morbidity and mortality in preterm newborns. Frequency of morbidity and mortality in infants treated with antenatal steroid is less than those delivered without this therapy. Many pregnant females deliver before term or 37 weeks; hence these may be advised antenatal corticosteroid therapy without creating significant maternal or fetal side effects.

Method: It was an observational study conducted in the department of obstetrics and gynecology IGMC Shimla for 1 year duration.

Results: The study sample of 244 was divided into two groups on the basis of exposure to antenatal corticosteroids. RDS was reported 57 cases (preterm neonates) in the study. It was seen in 41 out of 165 cases of steroids uncovered group and 16 cases out of 79 of steroid covered group. Mortality among steroid uncovered group was seen in 71 preterm neonates out of 165 as compared to 10 neonatal deaths out of 79 in steroid covered group.

Conclusion: Mortality in the infants treated with antenatal corticosteroid is significantly less than the group of preterm newborns delivered without this therapy.

Introduction

Prematurity is still a major problem for health centers throughout the world. The incidence of preterm birth in the developed world is between 7–12%.¹ Respiratory distress syndrome (RDS), also known as hyaline membrane disease was the primary cause of morbidity and mortality in preterm newborns before 1980's. Maturation of fetal lungs is dependent on surfactant, which is a complex molecule. The prime factor for

insufficient surfactant production and pulmonary immaturity is birth of a new-born before reaching the term. The incidence of RDS is 1–2%.² Liggins and Howie first introduced steroid therapy in 1972.³ Since the introduction of steroid therapy in clinical practice, many randomized controlled studies have concluded the positive maturational effects of antenatal corticosteroids on fetal lungs, which decrease incidence and severity of hyaline membrane disease, reduce incidence of intra-

ventricular hemorrhage, and overall reduce neonatal mortality.⁴ When prescribing the steroid therapy to the preterm pregnant women they may be informed that a single course of antenatal corticosteroid therapy is not associated with any significant side effects on the mother or foetus.⁵ However, multiple courses of antenatal corticosteroids may have adverse effects such as decreased fetal growth. Such treatment might also have long-term adverse effects; indeed, adverse neurological outcomes have been shown in follow-up studies of children given dexamethasone after birth.⁶

The incidence of RDS has an indirect relationship with the gestational age, meaning that it is high at early gestation and reduce with advancing gestation, from about 50% in babies born at 26–28 weeks to about 25% at 30–31 weeks and 5% at 35 weeks.^{7,8} It is a leading cause of mortality in preterm infants and accounts for 30% of all neonatal deaths.⁹

Dexamethasone and betamethasone are the corticosteroids recommended for antenatal therapy.^{10,11} The recommended regimen of steroid therapy according to National Institutes of Health Consensus is either of these: two doses of 12 mg betamethasone given intramuscularly 24 hours apart or four doses of 6 mg dexamethasone given intramuscularly 12 hours apart between 24 and 34 weeks of gestation in pregnancies at risk for preterm delivery.^{12,13}

Significant benefit of steroid therapy can be seen 24 hours after the first dose and before 7 days. If the delivery occurs before 24 hours of initiation of regimen, there, even then significant reductions in neonatal mortality, RDS, and IVH is seen. So antenatal corticosteroids should be given in all cases of preterm birth except in a situation when delivery is imminent.¹

Methodology

This was a one year observational study, conducted in the Department of obstetrics and gynecology IGMC Shimla Himachal Pradesh from 1st August 2017 to 31st July 2018.

Women who delivered at Gestation age >24 weeks to <34 weeks were included in the study. Data was collected from patients case sheet. Patients fell in either of these two groups depending on the time of delivery after complete course of steroid therapy. Group 1 “steroid covered” consisted of those patients who were administered 6 mg dexamethasone 1/M four doses 12 hours apart and who delivered after 48 hrs but before 7 days of corticosteroid therapy. Group 2 “steroid uncovered” consisted of the patients who either did not receive steroids or they were delivered without effectiveness of steroid therapy, i.e., before 48 hrs or after 7 days. Neonates of these patients were followed from time of birth till first 7 days of life for development of any morbidity. If death of neonate occurred, then leading cause of death was obtained from Pediatric department.

Exclusion Criteria

- Pregnancy beyond 34 weeks.
- Any congenital malformations such as anencephaly, hydrocephalus or multiple congenital anomalies.
- Multiple pregnancies.
- Contraindications to steroids

Statistical Analysis

Data collected was transformed into MS excel sheet for further processing and analysis. Statistical analyses were performed using SPSS Parametric and non-parametric test of significance were used wherever applicable to find the association between different quantitative and qualitative variable of interest. P-value less than 0.05 were considered as statistically significant.

Results

Neonatal Morbidity: There were 244 live births before 34 weeks of gestation, out of which 165 were steroid uncovered and 79 belonged to steroid covered group. Out of 165 steroid uncovered cases neonatal morbidity was seen in 99 (60%) while in case of steroid covered group, neonatal morbidity was seen 38 (48.1%) cases out of 79 cases. RDS was most common morbidity in both groups. p-

value was more than 0.05 which was not significant. Neonatal morbidity was not affected in babies below 34 weeks by beneficial effect of antenatal corticosteroids.

Table 1 Relationship between steroids and neonatal morbidity at <34 weeks
(Total live birth <34 weeks = 244)

Morbidity	Steroid uncovered n=165	Steroid covered n=79
RDS	41	16
NNJ	39	15
Sepsis	10	4
IVH	6	2
Pulmonary hemorrhage	2	0
NEC	1	1
Total	99	38
Percentage	60%	48.1%

p-value>0.05

Neonatal Mortality: Out of 165 births who were steroid uncovered, neonatal deaths occurred in 71 (43%) babies while out of 79 babies who received steroid, neonatal deaths occurred in only 10 (12.6%) babies. p-value was <0.05 which was significant. Hence neonatal mortality was significantly reduced in cases where some time was gained for steroid coverage.

Table 2. Relationship between steroids and neonatal mortality at <34 weeks
(Total live birth <34 weeks = 244)

Outcome	Steroid uncovered n=165	Steroid covered n=79
Neonatal death	71	10
Neonatal mortality	43%	12.6%

p-value<0.05

Discussion

A leading cause of respiratory distress in preterm newborns is hyaline membrane disease or RDS. The lungs of preterm newborns do not have sufficient pulmonary surfactants which normally forms a thin layer on alveolar surfaces. The main function of these surfactants is to increase the surface tension at the air-liquid interface in the alveoli and terminal airways and prevent alveoli to collapse. The etiology of RDS is surfactant deficiency which leads to atelectasis, impairment of gas exchange, and cause secondary lung

damage. Surfactant deficiency is due to prematurity of lungs. The condition usually deteriorates for 2–4 days after birth with slow improvement thereafter. Severe respiratory distress syndrome can lead to death of new-born, although this is least likely to happen on the day 1 of life. Mortality usually occurs between days 2–7.¹

Antenatal steroid treatment for women who are at risk of preterm delivery has evolved as the most effective treatment for the prevention of RDS, reducing early neonatal morbidity and mortality¹⁴ In a study by Singh U et al¹⁵. morbidity and mortality was seen in 52.1% and 31% of the cases respectively, who did not receive steroids and in 37.5% and 29.2% of cases respectively who had received it. In our study neonatal mortality was significantly reduced, while in study by Singh U et al¹⁵. neonatal morbidity was significantly reduced by a course of steroids.

In the study of Shahzad F¹ also mortality due to Respiratory distress syndrome among all preterm neonates was also significantly reduced in exposed group as compared to non-exposed group.

The mortality and major neonatal morbidity rates according to antenatal steroid therapy in the preterm SGA and non-SGA groups were significantly reduced in steroid covered group as compared to non covered group in the study by S Riskin-Mashiah et al.¹⁶

Conclusion

This study proves that respiratory distress syndrome is quite common among preterm newborns and antenatal dexamethasone significantly reduces its severity along with early neonatal mortality due to this disease in preterm newborns. This effect is more marked if newborn delivers after a period of effectiveness of antenatal corticosteroids. Hence it is proven that a single course of dexamethasone to a woman in preterm labour is highly cost-effective and gives promising results. Steroid therapy can lead to a drastic change in the profile of complications for preterm

babies in developing countries, where preterm labour is a significant cause of neonatal mortality and where care for preterm babies is still not up to the mark, and the use of antenatal steroids remains a good opportunity in many hospitals.

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