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Original Research Article

Do Steroids Given at Early Term Before Elective Cesarean Section Reduce Neonatal Respiratory Morbidity? - Prospective Analytical Study in a Medical College Hospital

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Conflict of interest: Nil

Abstract:

Background: There is a rising trend towards Elective Caesarean Section (CS) worldwide and Neonatal Respiratory Morbidity (NRM) is one of the known complications of Elective CS conducted between gestational age of 37 to 38+6 weeks of pregnancy. The current study was planned to assess the effect of dexamethasone on respiratory morbidity in babies delivered by Elective Caesarean section in the early term.

Methods: A prospective analytical study was conducted for a year in the Government KAPV Medical College, Trichy. All singleton pregnancies planned for Elective CS between 37 weeks to 38+6 weeks with no medical disorders were included in the study. Comparisons were made between the incidence of neonatal respiratory morbidity in neonates born to mothers who were given dexamethasone (study group) and those who were not given dexamethasone (control group) before Elective CS. Statistical analysis was done using SPSS. Data was analyzed by Pearson's Chi-square test and Fisher's exact t-test.

Results: No significant differences were detected between the study and control groups concerning age and gestational age at delivery. Incidence of Respiratory Distress Syndrome (p - 0.022) and Transient Tachypnoea of Newborn ($p < 0.001$) was significantly higher in the control group compared to the study group. The rate of NICU admission was significantly higher in the control group ($p < 0.001$).

Conclusion: Prophylactic dexamethasone administration before Elective Cesarean Section at early term significantly reduces neonatal respiratory morbidity and admission to the neonatal intensive care unit. Randomized control trials with larger recruits are needed to provide a plausible result to guide clinical practice.

Keywords: Antenatal Corticosteroids, Neonatal Respiratory Morbidity, Elective LSCS, Early Term.

Introduction

The consequences of Elective Lower Segment Caesarean Section at early term(37 to 38+6 weeks) for the neonate have received little attention. The risk of neonatal respiratory morbidity is more if it is performed in the early weeks of gestation [1]. The respiratory morbidity is 11.4%,6.2%, and 1.5% at 37,38,39 weeks of gestation [2].

The development of neonatal respiratory distress leads to a chain of events, including admission to the neonatal intensive care unit (NICU), affecting mother-child bonding, cost of care, and complications from invasive procedures, including artificial ventilation. Elective LSCS should be planned after 39 completed weeks to evade this complication. [3]

If Elective LSCS is deemed necessary before 39 weeks, prophylactic dexamethasone at least 48 hours before the date of LSCS will decrease the risk of neonatal respiratory morbidity [4,5]. Corticosteroids promote surfactant synthesis, increase lung compliance, reduce vascular permeability, and generate an enhanced response to post-natal surfactant therapy. They have similar maturational effects on other organs including the brain, intestines, and kidneys [6].

During labour there is a rise in corticosteroid levels which encourages the expression of the epithelial channel gene and allows the lung to switch from fluid secretion to fluid absorption. Elective LSCS bypasses this mechanism, thereby predisposing to the increased risk of neonatal respiratory morbidity [7,8].In planning elective Caesarean, the risk of respiratory distress should be considered and the likely benefits of antenatal corticosteroids should be

compared with those of delaying delivery until 39 weeks when possible[9]. The risks and benefits of antenatal steroids in reducing transient tachypnoea of the newborn and respiratory distress should be explained to women undergoing planned Caesarean birth between 37- 38+6 weeks and after detailed discussion and informed consent, steroid can be administered [10]. Therefore, the current study was planned to assess the effect of dexamethasone on neonatal respiratory morbidity in babies delivered by early-term Elective LSCS.

Objective

To evaluate the effect of dexamethasone 48 hours before Elective Cesarean Section at early term(37 to 38+6 weeks) on neonatal respiratory morbidity.

This was a prospective analytical study conducted in the Department of Obstetrics and Gynaecology, Govt. KAPV Medical College, Trichy, Tamil Nadu for 1 year.

Inclusion Criteria

All singleton mothers with reliable dates posted for Elective LSCS at early term (37 to 38+6 weeks) with no medical or obstetric complications were included.

Exclusion Criteria

- Multiple pregnancy
- Gestational age less than 37weeks and more than 39 weeks
- Mothers with medical disorders,
- Active infection
- Fetal growth restriction
- Fetal anomaly
- H/O previous administration of steroids.

Materials and Methods

The study group included women with singleton pregnancy, with GA-37 TO 38+6 weeks with no medical /obstetric complications were administered injection dexamethasone 6mg 4 doses 12 hours apart 48 hours before Elective repeat LSCS.

The control group included 200 mothers who were not given dexamethasone. The population sample under study was instructed about the research protocol and an informed written consent was obtained. Mothers underwent Elective repeat LSCS 48 -72 hours after the completion of the antenatal steroid course. Those mothers who required emergency LSCS due to pain or PROM before this period were excluded.

Details of the resuscitation at the operation theatre were recorded by the Paediatrician and NICU staff nurse. APGAR scores at 1 and 5 minutes were recorded. All neonates were assessed for signs of RDS which was defined as the presence of at least 2 of the following criteria: tachypnea, central cyanosis in room air, expiratory grunting, and subcostal, intercostal or jugular retraction and nasal flaring or transient tachypnea of newborn, TTN which was defined as a period of rapid breathing higher than the normal range of 40-60 times per minute. Neonates admitted to NICU were subjected to chest X-ray for exclusion of other associated pathologies and confirmation of the diagnosis of RDS. Data about the need for admission to neonatal intensive care unit (NICU) or the need for mechanical ventilation within 24 hours after birth were recorded.

Main Outcome Measures

Primary outcome was to find the incidence of Neonatal Respiratory Morbidity(NRM) in each group .Secondary outcome was to find the incidence of admission to NICU & need for mechanical ventilation

Statistical Analysis

The data were collected and analyzed using the Statistical Package for Social Science (SPSS).The demographic data were compared between groups. Student t-test was used to compare the continuous outcome measures. For dichotomous variables, chi-square was used to estimate the significance value. For analysis, $p<0.05$ was considered to be significant.

Results

1.Demographic Variables

There were no significant differences between the two groups with regard to age, gestational age at delivery and the indications for Cesarean Section. (Table 1)

2.Neonatal Outcome

There were no significant differences between the two groups concerning neonatal birth weight and gender. There were significantly higher APGAR scores at 1 and 5 minutes after delivery in the study group ($p<0.001$)(Table 2).

Regarding the primary outcome of the study, the incidence of RDS was significantly higher in the control group compared to the study group (6.5% versus 1.5%, respectively; $p=0.022$). Also, the incidence of TTN was significantly higher in the control group compared to the study group (11% versus 1.5%, respectively; $p<0.001$).

The incidence of neonatal respiratory morbidity in the study group was 3% whereas in the control group, it was 17.5%. Of the 200 cases in the study group, 3 cases (1.5%) of RDS and 2 cases ((1%) of TTN were admitted to NICU whereas 13 cases (6.5%) of RDS and 11 cases (5.5%) of TTN out of the 200 cases in the control group required NICU admission.(Figure 1)

In the study group, out of 3 cases of RDS admitted to NICU,2 required mechanical ventilation and in the control group out of 13 cases of RDS admitted to NICU,5 cases required mechanical ventilation. On the contrary,2 cases of TTN in the study group & 11 cases of TTN in the control group admitted to NICU were managed with CPAP & nasal O2 alone. No cases of TTN required mechanical ventilation. The number of neonates admitted to the NICU was significantly higher in the control group than in the study group($p<0.001$). The same was observed in the number of neonates who needed CPAP & nasal O2 in the first 24 hours after birth due to respiratory complications ($p=0.001$& $p<0.001$ respectively). There were no significant differences observed for the requirement of mechanical ventilation between the two groups ($p=0.582$). (Table 3). There was no mortality both in the study and control group in neonates who required mechanical ventilation due to respiratory morbidity.

Table 1: Demographic variables and Indications for LSCS in study and control group

Variables	Study group	Control group	p value
AGE	26.75± 3.23	26.28±3.26	0.53
GA at delivery	37.77±0.5	37.72±0.49	0.273
Indication for CS			
• Repeat CS	172 (86%)	138 (69%)	
• Breech	6 (3%)	8 (4%)	
• CPD	22 (11%)	49 (24.5%)	
• Others	0	5 (2.5%)	

Table 2: Comparison of Neonatal gender, birth weight & APGAR scores in study and control group

Variables	Study group (n=200)	Control group (n=200)	p value
Neonatal gender (M/F)	110/90	102/92	0.463
Birth weight mean ±SD	2.99±0.36	3.02±0.35	0.451
APGAR			
At 1 min	8.87±0.38	8.49±0.6	**<0.001**
At 5 min	8.95±0.24	8.82±0.45	**<0.001**

Table 3: Comparison of NICU admission and treatment in study and control group

Variables	Study group (n=200)	Control group (n=200)	p value
NICU admission, n%	5 (2.5%)	24 (12%)	**<0.001**
Mechanical ventilation, n%	2 (1%)	5 (2.5%)	0.582
CPAP ,n%	3(1.5%)	19(9.5%)	**0.001**
Nasal oxygen, n(%)	4(2%)	30 (15%)	**<0.001**

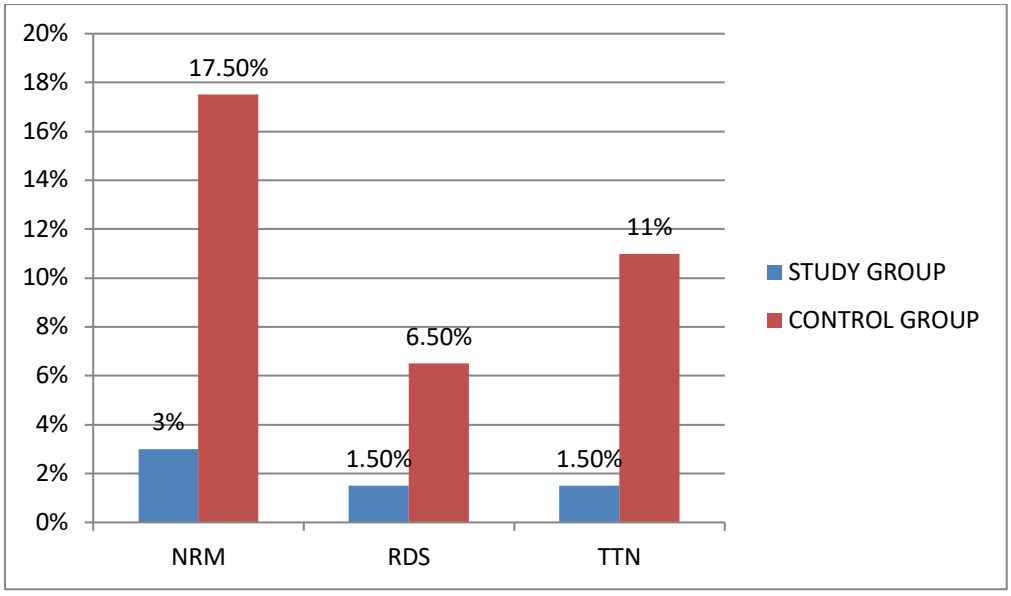

Figure 1:ComparisonofRespiratoryMorbidityamongStudyandControlGroups

Discussion

In the present study, administering corticosteroids before an Elective Caesarean Section at early term led to a significant improvement in fetal respiratory function and reduced fetal respiratory complications.

In a randomized control trial by Stutchfield et al,998 women were studied of which 503 women were randomized to the treatment group and received corticosteroids before Elective Caesarean Section, and 495 women were assigned to the control group and did not receive steroids [11]. A reduction in the incidence of transient tachypnoea in the newborn from 4% to 2.1% and respiratory distress syndrome from 1.1% to 0.2% was observed. Investigators concluded that antenatal steroids before Elective Caesarean Section at term reduce NICU admissions due to respiratory distress [12]. In a case-control study conducted by Salem et al in 2016,246 women planned for elective LSCS after 37 weeks were administered steroids and 275 women were not given steroids(control group).

The incidence of RDS was significantly higher in the control group compared to the study group (4.7% versus 0.8%, respectively; p=0.001) and the incidence of TTN was significantly higher in the control group compared to the study group (14.9% versus 2%, respectively; p=0.001) and hence the rate of admission to NICU was significantly lower in study group [13].

Prophylactic dexamethasone administration 48 hours before Cesarean section reduces neonatal respiratory morbidity [14,15]. Similar results were obtained in the present study. In meta-analysis by Sotiriadis et al, four trials with a moderate risk of bias were included. Prophylactic antenatal corticosteroid administration appeared to decrease the risk of respiratory distress syndrome, transient tachypnoea of the neonate, admission to the neonatal intensive care unit (NICU) for respiratory morbidity and admission to neonatal special care for respiratory complications, and reduced length of stay in NICU by 2.7days. No reduction was found in the need for mechanical ventilation, perinatal death, or neonatal sepsis [16]. A similar result was obtained in a meta-analysis of randomized control trials of antenatal steroids in planned Cesarean after 34 weeks of delivery [17]. Though antenatal steroids reduce respiratory morbidity and NICU admission in these populations, the effect is mainly seen in self-limiting conditions, TTN.

On the contrary, in a pilot study conducted in a University hospital, in Malaysia, Elective CS at early term was associated with a modest incidence of neonatal respiratory illness, and antenatal dexamethasone administration in the intervention group did not diminish infants needing respiratory support, NICU admission and length of stay [18]. The long-term effects of steroids on the neurodevelopmental aspect of the newborn require continuous follow-up. Administration of steroids in later gestation needs to be individualized till large trials attest to their safety [19,20]A feasibility study of corticosteroids to reduce respiratory morbidity in planned Cesarean birth in late preterm and term gestation was conducted in secondary and tertiary obstetric units in New Zealand and barriers identified were concerns over safety [21]. Trial participation can be enhanced provided a proper explanation and understanding of the effects of steroids was provided.

The main strength of the current study was the use of dexamethasone which is inexpensive, has no major side effects or complications, and has proven benefits. The main limitation of our study is it is not a randomized controlled trial. Also, a comparison of neonatal outcomes at different gestational ages after 37 weeks to determine the most beneficial time for dexamethasone administration was not done.

Conclusion

Elective Cesarean Section should be scheduled after 39 completed weeks to reduce neonatal respiratory morbidity. In mothers where Elective Cesarean is imperative before 39 completed weeks, antenatal corticosteroid administration should be individualized after counselling with the family about the bones of contention. Reduction in the rate of neonatal respiratory morbidity and the incidence of NICU admission needs to be highlighted but the long-term effect of steroids on neurodevelopmental outcomes remains unanswered. Further studies are needed to analyse the effects of steroids at different gestational ages after 37 weeks in reduction of respiratory morbidity and long-term effect on developmental outcome of the newborn needs to be analysed.

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