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Research Article

Association of neonatal respiratory morbidity with timing of elective cesarean delivery

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ABSTRACT

Background: Elective Cesarean Delivery (ECD) rate has increased in both developed and developing countries due to obstetric indications and cesarean section on request. Neonatal respiratory morbidity is one of the complications of elective cesarean delivery performed before 39 weeks gestation. The aim of this study was to compare the risk of neonatal respiratory morbidity of elective caesarean section performed at 37⁺⁰ to 38⁺⁶ weeks with those delivered at 39⁺⁰ to 41⁺⁶ weeks gestation.

Methods: A retrospective study was conducted on all pregnant women who were delivered by elective caesarean at a gestational age of 37⁺⁰ to 38⁺⁶ weeks and were compared with those delivered at 39⁺⁰ to 41⁺⁶ weeks. Maternal and neonatal characteristics, neonatal respiratory morbidity including: respiratory distress syndrome, transient tachypnea of the newborn, persistent pulmonary hypertension of newborn and serious respiratory morbidity were analyzed.

Results: Incidence of neonatal respiratory morbidity was 15.8% and 6.3% in neonates delivered at 37⁺⁰ to 38⁺⁶ weeks and ≥ 39 weeks gestation respectively. Combined respiratory morbidity risk (Odds ratio: OR 2.82; 95% Confidence interval CI: 1.34-5.94; P value <0.05) was significantly higher in the neonates delivered at 37⁺⁰ to 38⁺⁶ weeks compared with those delivered ≥ 39 weeks. Risk of TTN (OR 2.6; 95% CI: 0.95-7.45; P value 0.08) and RDS (OR 2.42; 95% CI: 0.48-12.15; P value 0.45) increased by two fold in neonates delivered before 39 weeks.

Conclusions: Neonates delivered by elective cesarean at 37⁺⁰ to 38⁺⁶ weeks gestations are at increased risk of developing respiratory morbidity compared with infants delivered beyond 39 weeks. Respiratory morbidity can be reduced by delaying the ECD until 39 weeks of gestation.

Keywords: Elective cesarean delivery, Neonatal respiratory morbidity, Transient tachypnea of newborn, Gestational age

INTRODUCTION

Elective cesarean section at term, in an obstetric population without prenatally identified risk factors, remains associated with increased resuscitation risk with related implications for the neonate compared with vaginal delivery.¹

M. Hourani and co-workers studied a total of 134 neonates delivered by elective cesarean at or beyond 37 weeks, found a significant risk for the development of respiratory complications (P = 0.0001) in the neonates delivered before 39 weeks.²

Hansen and colleagues reported that the infants delivered by elective cesarean at 37 weeks had a 10% incidence of

respiratory morbidity (defined as transient tachypnea of newborn, respiratory distress syndrome or persistent pulmonary hypertension of newborn) compared with 2.8% among infants delivered vaginally (OR 3.7; 95% CI, 2.2-6.1). The relative risk increased with decreasing gestational age.³

Proposed mechanisms for the association between ECD and respiratory morbidity include iatrogenic prematurity with surfactant deficiency^{4,5} and attenuation of the fetal catecholamine surge during labor.^{6,7}

A significant reduction in neonatal RDS would be obtained if elective caesarean delivery were performed after 39⁺⁰ gestational weeks of pregnancy.⁸

METHODS

- Hospital based retrospective study
- Conducted at Government Lady Goshen hospital between October 2013 and March 2014.

Inclusion criteria

- Pregnant women with gestation between 37⁺⁰ and 41⁺⁶ weeks who underwent elective cesarean section
- Singleton pregnancies
- No maternal and fetal complications

Exclusion criteria

Pregnancies complicated by:

- Intrauterine fetal deaths,
- Emergency caesarean sections,
- Multiple pregnancies and
- Associated maternal and/or fetal complications

Case sheets were reviewed to obtain data regarding the demographic details like maternal age and parity. Neonatal outcome analyzed included birth weight, sex of the baby, APGAR score at 1 and 5 minutes, NICU admission (admission more than 3 days), neonatal respiratory morbidity like transient tachypnea of newborn, respiratory distress syndrome and persistent pulmonary hypertension and serious respiratory morbidity (oxygen therapy for more than two days, nasal continuous positive airway pressure, or need for mechanical ventilation).

Objectives

- To determine the incidence of neonatal respiratory morbidity in elective caesarean section performed at 37⁺⁰ to 38⁺⁶ weeks of gestation and those delivered \geq 39 weeks.

- To compare the risk of neonatal respiratory morbidity after elective cesarean delivery at 37⁺⁰ to 38⁺⁶ weeks of gestation with those delivered \geq 39 weeks of gestation.

Statistical analysis

Patients' data were analyzed using SPSS 17.0. Chi-square test and unpaired t-student test used wherever appropriate. P value, odds ratio and 95% Confidence Interval were calculated. A value of P <0.05 was considered significant.

RESULTS

During the study period of six months, there were 2890 deliveries. Of these, 1739 (60.2%) neonates were delivered vaginally and 1151 (39.8%) by cesarean section. Of 1151 cesarean sections, 202 (17.5%) elective cesarean delivery (ECD) performed between 37⁺⁰ and 38⁺⁶ weeks and 160 (13.9%) between 39⁺⁰ and 41⁺⁶ weeks (Figure 1). Maternal and neonatal characteristics are shown in (Table 1). Mean maternal age \pm SD (years) was 27.3 \pm 4.9 and 26.2 \pm 4.6 years respectively in both the groups found to be statistically significant (P value <0.05). There were no significant differences in both groups in relation to parity of the mothers and birth weight of neonates (P = 0.76; 0.6 respectively). We found that 20 (9.95%) neonates delivered before 39 weeks and 6 (3.75%) neonates born after 39 weeks gestation by ECD were admitted in NICU for more than 3 days (statistically significant differences found between two groups i.e. P value <0.05).

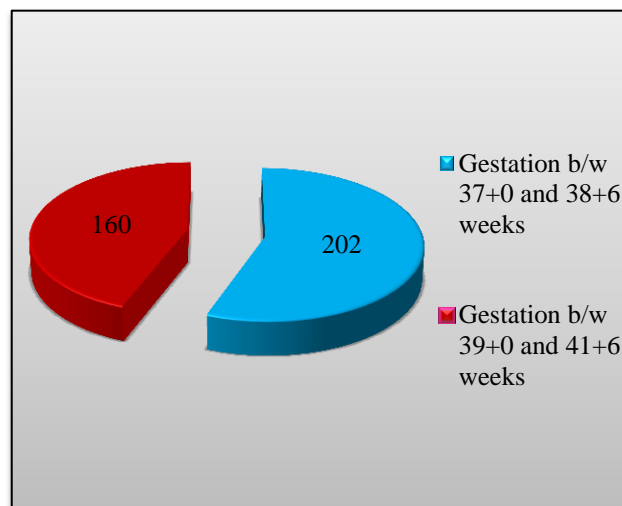


Figure 1: Number of elective cesarean delivery.

Indications of elective caesarean section shown in (Figure 2) shows that previous LSCS was the commonest indication for elective caesarean delivery in both the groups i.e., 150 (74.3%) between 37⁺⁰ and 38⁺⁶ weeks and 128 (80%) between 39⁺⁰ and 41⁺⁶ weeks.

Table 1: Maternal and neonatal characteristics.

Maternal & neonatal characteristics	Gestational age (week)		P value
	37 ⁺⁰ to 38 ⁺⁶ N (%)	39 ⁺⁰ to 41 ⁺⁶ N (%)	
Maternal characteristics			
Maternal age (years)			
< 35	179 (88.6)	146 (91.3)	0.52
≥35	23 (11.4)	14 (8.7)	
Mean age ± SD (years)	27.3 ± 4.9	26.2 ± 4.6	0.03*
Parity			
0	39 (19.3)	28 (17.5)	0.76
≥1	163 (80.6)	132 (82.5)	
Neonatal characteristics			
Male	90 (44.5)	95 (59.4)	0.007*
Female	112 (55.4)	65 (40.6)	
Birth weight (kilograms)			
Mean birth wt. (kg)	3.02 ± 0.55	2.99 ± 0.54	
<2.5	29 (14.4)	17 (10.6)	0.60
2.5-4	160 (79.2)	128 (80)	
>4	13 (6.4)	15 (9.4)	
**NICU admission	20 (9.9)	6 (3.75)	0.041*

*Statistically significant P value

**Admission >3 days

The number of infants who developed respiratory morbidity after elective cesarean between 37⁺⁰ and 41⁺⁶ weeks are shown in (Table 2). The incidence of combined respiratory morbidity was 15.8% and 6.3% after elective caesarean delivery at 37⁺⁰ to 38⁺⁶ weeks and 39⁺⁰ to 41⁺⁶ weeks respectively (Figure 3).

The neonatal respiratory morbidity risk (OR 2.82;95% CI:1.34-5.94; P value <0.05) was significantly higher in the neonatal group delivered by ECD at 37⁺⁰ weeks to 38⁺⁶ weeks compared with those delivered at 39⁺⁰ to 41⁺⁶ weeks. Risk of TTN (OR 2.6; 95% CI: 0.95-7.45; P value 0.08) and RDS (OR 2.42; 95%CI: 0.48-12.15; P value 0.45) increased by two fold at 37⁺⁰ and 38⁺⁶ weeks. Serious respiratory morbidity included oxygen therapy

for more than two days, nasal continuous positive airway pressure, or need for mechanical ventilation. (OR 2.15; 95% CI: 0.56-8.27; P value-0.40) was found in 3.8% and 1.9% neonates delivered before and after 39 weeks respectively (Table 2).

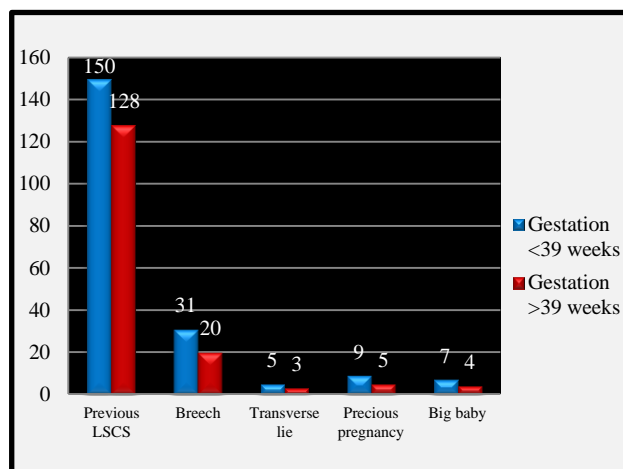


Figure 2: Indications of elective cesarean delivery.

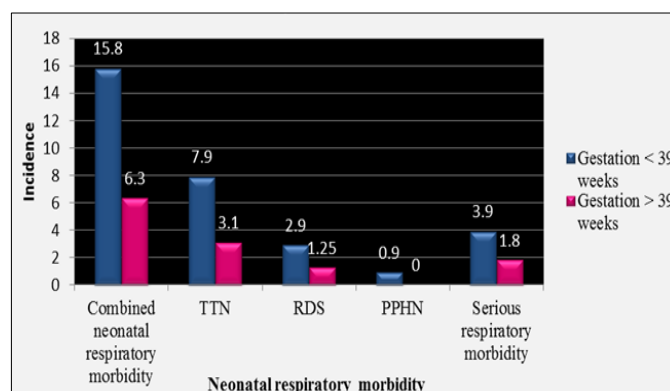


Figure 3: Incidence of neonatal respiratory morbidity following ECD beyond 37 weeks.

Table 2: Neonatal respiratory morbidity following elective cesarean delivery.

Neonatal respiratory morbidity	ECD b/w 37 ⁺⁰ & 38 ⁺⁶ weeks (n=202) N (%)	ECD b/w 39 ⁺⁰ & 41 ⁺⁶ weeks (n=160) N (%)	OR (95%CI)	P value
Total no. of infants with combined respiratory morbidity	32 (15.8)	10 (6.3)	2.82 (1.34-5.94)	0.007*
Transient tachypnea of new-born	16 (7.9)	5 (3.1)	2.6 (0.95-7.45)	0.08
Respiratory distress syndrome	6 (2.9)	2 (1.25)	2.42 (0.48-12.15)	0.45
Persistent pulmonary hypertension	2 (0.9)	0	-	0.58
Serious respiratory morbidity **	8 (3.9)	3 (1.8)	2.15 (0.56-8.27)	0.40

*Statistically significant p value (<0.05)

**Oxygen therapy for more than 2 days; Nasal continuous positive airway pressure; Need for mechanical ventilation
OR: Odds ratio; CI: Confidence interval; ECD: Elective cesarean delivery

DISCUSSION

In our study, we analyzed 202 neonates delivered by elective cesarean section before 39 weeks and 160 neonates delivered beyond 39 weeks of gestation. The incidence of neonatal respiratory morbidity was 15.8% in elective cesarean section performed between 37⁺⁰ and 38⁺⁶ weeks and 6.3% between 39⁺⁰ and 41⁺⁶ weeks while TTN and RDS was observed in 7.9% and 2.9% compared to 3.1% and 0.9% respectively. The incidence of respiratory morbidity after elective cesarean delivery was 25% at 38 weeks compared to 11% in elective cesarean delivery beyond 39 weeks while TTN was observed in 10% compared to 7% of newborns respectively in a study conducted by S. Hefny and colleagues.⁹ We found that neonatal respiratory morbidity risk (OR 2.82; 95% CI: 1.34-5.94; P value <0.05) was significantly higher in elective cesarean section performed before 39 weeks of gestation, similar results were observed in Zanardo V et al. study.⁸

In the present study, TTN (OR 2.6; 95% CI: 0.95-7.45; P value 0.08) and RDS (OR 2.42; 95%CI: 0.48-12.15; P value 0.45) risk is increased by two fold in elective cesarean delivery performed before 39 weeks. Hansen and co-workers³ reported that there was a fivefold increased risk of respiratory morbidity in infants delivered by ECD at 37 weeks (OR 5.0; 95%CI: 1.6-16.0).

Hamida Ben and colleagues observed that there was a significant reduction in the incidence of respiratory distress from elective caesarean performed after 39 weeks gestation.¹⁰ In the present study, 3.8% neonates delivered by Elective cesarean delivery before 39 weeks developed serious respiratory morbidity while in the Hansen study, 1.9% of infants delivered by ECD at 37 weeks experienced serious respiratory morbidity.³

CONCLUSIONS

Neonatal respiratory morbidity risk is significantly increased in neonates delivered by elective cesarean section before 39 weeks gestation. Our results suggest that reduction in the neonatal respiratory morbidity would be achieved by delaying the elective cesarean delivery until 39 weeks.

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Conflict of interest: None declared

Ethical approval: Not required

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