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## **Original Research Article**

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# Respiratory morbidity in term neonates following elective caesarean section

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#### **ABSTRACT**

**Background:** Cesarean sections continue to increase day by day in both developed and developing countries. The chances of respiratory morbidity are more in babies born by C-section compared to normal deliveries due to absence of squeezing of lung during delivery and also absence of changes in maternal-fetal hormonal milieu. As gestation progresses lung maturation improves and less chances of respiratory morbidity. The objective of this study is to determine respiratory morbidity and to correlate weeks of gestation and respiratory morbidity in term neonates following elective C- section.

**Methods:** The records of babies born by elective C-section in Father Muller Medical College Hospital between 1<sup>st</sup> June 2015 to 31<sup>st</sup> May 2016 were reviewed data entered in predesigned proforma and analyzed.

**Results:** A total 324 babies were included in the study, of which 89, 123, 77 and 35 babies were born in 37<sup>th</sup>, 38<sup>th</sup>, 39<sup>th</sup> and >40 weeks of gestation. 28 babies had developed respiratory morbidity requiring NICU admission. 17.6% of babies born in 37<sup>th</sup> week, 5.6% of 38<sup>th</sup> week, 5.1% of 39<sup>th</sup> week and 2.8% of babies born >40weeks had developed respiratory illness. Type of morbidity varied from tachypnea (89.2%), grunt (75%), needing CPAP (7%), needing mechanical ventilation (3.5%).

**Conclusions:** This study suggests that respiratory morbidity increases in elective C-sections and as gestation progresses the respiratory morbidity decreases.

Keywords: Cesarean section, Respiratory morbidity, Term neonate

### INTRODUCTION

There is a rising trend towards elective caesarean section in both developed and developing countries. Initially C-section carried out because of obstetric complications or serious maternal illness. Now to decrease risk to mother due to improved aesthetic procedures and surgical techniques, elective caesarean section for breech presentation, or previous caesarean section may have contributed to changes in obstetric practice and patient choice. Thus, increased rates of elective caesarean section

without any obvious or generally accepted medical or obstetric indication have been reported.

The association of neonatal respiratory morbidity with elective caesarean section was first time highlighted in 1964. Respiratory morbidity is one of the known complications of elective caesarean section conducted between 37<sup>0/7</sup>-38<sup>6/7</sup> weeks of pregnancy. It ranges from transient tachypnoea of newborn to respiratory failure. Respiratory distress syndrome defined as the presence of at least two of the following clinical signs: tachypnoea

(>60/min), dyspnoea with inspiratory subcostal or intercostals retractions, nasal flaring, expiratory grunting and cyanosis in room air.<sup>2</sup> Presence of labour and/or rupture of membranes before caesarean section reduces the risk of respiratory morbidity in neonatal period.<sup>3</sup> This is possibly that labour induce a surge of catecholamines in the fetus, which is important for postnatallung adaptation. Many studies have shown that the incidence of respiratory morbidity is significantly lower in infants with gestational age progresses (>39<sup>07</sup>) at elective caesarean section than less than 39 weeks.<sup>4</sup>

The aim of this study was to determine the incidence of respiratory morbidity in term neonates following elective caesarean section in relation to gestational age.

#### **METHODS**

This is a hospital based observational study with retrospective collection of data. All babies born by elective C-section from June 2015 to June 2016 were included in our study. C-section was considered if elective without complications like rupture of membranes, sepsis, PIH, multiple gestation and major congenital anomalies and completed 37 weeks of gestation. In patient, medical records of all mother- infant pair admitted in hospital following elective C-section from 1st June 2015 to 30th June 2015 were reviewed. Gestational age calculated using last menstrual history. If menstrual history not known first trimester scan taken into consideration. The collected data included gestational age, indication for LSCS, gender, symptoms of respiratory morbidity, duration of hospital stay. Data was analyzed using SPSS version 16. A Fisher's Exact test was used for statistical analysis and a p<0.05 was considered significant.

#### **RESULTS**

Total 365 cases undergone elective C-section, only 324 cases included and 41 excluded for the reason stated in

method section. Of which 89 cases at  $37^{0/7}$ - $37^{6/7}$  weeks of gestation, 123 cases at  $38^{0/7}$ - $38^{6/7}$  weeks of gestation, 77cases at  $39^{0/7}$ - $39^{6/7}$  weeks of gestation and 35 cases at  $40^{0/7}$ - $41^{6/7}$  weeks of gestation.

Total 28 cases admitted in NICU (8.6%). The babies admitted in NICU with respiratory morbidity 28/324 and without respiratory morbidity showed significant association ( $\chi^2$ -0.4 and p<0.05). The incidence of respiratory morbidity significantly decreases as gestational age progresses. 16 (17.6%) babies born in  $37^{0/7}$ - $37^{6/7}$  weeks, 7 (5.6%) at  $38^{0/7}$ - $38^{6/7}$  weeks, 4 (5.1%) of  $39^{0/7}$ - $39^{6/7}$  weeks and 1 (2.8%) babies born >40weeks had developed respiratory illness.

Of these 25 babies diagnosed as TTN, 2 babies as RDS and 1 baby as MAS. Indication for elective C-section was, out of 324 cases, 241 cases for previous C-section, 67 cases in view of CPD and 16 cases in view of breech presentation. Total male babies were 189 cases and 135 female babies. Of which 17 males and 11 female's babies admitted in NICU. There was no statistical significance found between gender and gestational age (p-0.071).

Table 1: Comparison of gestational age and respiratory morbidity.

Gestational age	Total cases	Respiratory morbidity
37 weeks	89	16 (17.6%)
38 weeks	123	7 (5.6%)
39 weeks	77	4 (5.1%)
>40 weeks	35	1 (2.8%)

Type of respiratory morbidity in these 28 cases, tachypnoea was seen predominantly in 25 cases, grunt seen in 21 cases, retractions seen in 18 cases, 24 cases requiring oxygen for 4hrs.

2 babies with respiratory distress were on CPAP. 1 baby was intubated in view of meconium aspiration.

Gestation weeks	Tachypnoea	Grunt	Retractions	Requiring O <sub>2</sub>
37 weeks	15	13	13	17
38 weeks	6	6	5	4
39 weeks	3	1	1	2
40 weeks	1	1	1	1

#### **DISCUSSION**

Total respiratory morbidity in present study was 8.6%, while the percentage of affected infants decreases with gestation. 16 babies born in  $37^{0/7} - 37^{6/7}$ week, 7 babies in  $38^{0/7}$  - $38^{6/7}$ week, 4 babies in  $39^{0/7}$  - $39^{6/7}$ week and 1 baby

born >40weeks had developed respiratory illness. The incidence of respiratory morbidity in term neonates following elective C-section decreases significantly with increase in gestational age.<sup>4</sup> These results were in agreement with previous studies. Other studies where Hasen observed that elective C-section found to have

increased risk of serious respiratory morbidity, which is increased by fivefold if it elective C-section conducted at 37 weeks of gestation.<sup>1,5</sup>

Table 3: Comparison of respiratory morbidity with other studies.

Gestation al age	Morrison et al	Vrije university	Present study
37 weeks	27/366 (7.4%)	8/95 (8.4%)	16/89 (17.6%)
38 weeks	45/1063 (4.2%)	8/183 (4.4%)	7/123 (5.6%)
39 weeks	11/912 (1.2%)	1/55 (1.8%)	4/77 (5.1%)

Similar findings observed in studies done by Tita, Lewins where transient tachypnoea of newborn, respiratory distress and mechanical ventilation can be preventable if avoided premature termination of pregnancy.<sup>6,7</sup>

Madar et al showed that pulmonary immaturity increases respiratory morbidity in term neonates born by elective C section before 39 weeks of gestation.<sup>8</sup> It was due to relative deficiency of surfactant in elective C-section plays role in respiratory morbidity. When labour precedes the section, respiratory morbidity was less frequent. Term neonates born by vaginally had less respiratory distress than compare to elective LSCS. This may be due to catecholamines, which stimulate the reabsorption of fetal lung liquid, which inhibit secretion of lung fluid and increase release of surfactant.<sup>2</sup> Infants born by C-section have less pronounced perinatal catecholamines surge than infants born by vaginally.

In fetal lung, active sodium transport across the pulmonary epithelium drives liquid from lung lumen to the interstitium, with subsequent absorption into the vasculature. In the lung, sodium reabsorption is a two-step process. The first step is passive movement of sodium from lumen across the apical membrane into the cell through sodium permeable ion channels. The second step is active extrusion of sodium from the cell across the basolateral membrane into the serosal space. Immaturity of sodium transport mechanisms contribute to the development of TTN and respiratory distress syndrome.

During late gestation surfactant system undergoes maturation in terms of increased production, secretion and changed composition. Increased ratio of lecithin to spingomyelin ratio in amniotic fluid indicates lung maturation.<sup>1</sup>

Another mechanism was vaginal delivery, about one third of fetal lung fluid is removed by squeezing the baby's chest.<sup>1</sup> During C-section this mechanism is missing causing residual volume in lung and secrete less surfactant to the alveolar surface and are therefore at higher risk to development of respiratory distress.

Some limitations of the study should be noted. The study done was retrospectively, during which sufficient data was not available regarding mother received antenatal steroids before 37 weeks of gestation, study did not give any information about still births occurred due to delaying delivery until 39 weeks of gestation and gestational age assessment done mainly by LMP, gestational age assessment in which some cases USG report showed <37weeks.

#### **CONCLUSION**

In conclusion, the risk of respiratory morbidity after elective C-section is related to gestational age in term neonates. If elective C-section performed after 39 weeks of gestation respiratory morbidity lower than if performed between 37-39 weeks these results indicate that waiting until 39 weeks of gestation before performing elective C-section is of benefit to newborn.

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Institutional Ethics Committee

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