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Original Research Article

ASSESSING RESPIRATORY MORBIDITY IN TERM NEONATES POST-ELECTIVE CAESAREAN SECTION

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ABSTRACT

Background: The prevalence of caesarean sections is on the rise, observed consistently across both developed and developing nations. Research indicates that infants delivered via C-section may face a higher risk of respiratory issues compared to those born through vaginal delivery. This difference is attributed to the lack of lung compression during delivery and the absence of certain hormonal changes that typically occur in a natural birth process. This study aimed to assess the incidence of respiratory issues in term neonates who underwent elective caesarean sections, with a focus on the relationship to gestational age.

Materials and Methods: Our study encompassed all infants delivered via elective caesarean section over the course of one year. A total of 238 cases underwent elective caesarean sections, with only 200 cases included in the analysis. Gestational age was determined based on the last menstrual history. In cases where menstrual history is unavailable, the first trimester scan is utilised for assessment. The gathered information encompassed gestational age, reasons for caesarean section, gender, signs of respiratory complications, and length of hospital stay.

Results: The study analysed a total of 200 cases, categorised by gestational age: 57 cases were recorded between 370/7 to 376/7 weeks, 78 cases between 380/7 to 386/7 weeks, 47 cases between 390/0-7 to 396/0-7 weeks, and 18 cases between 400/0-7 to 416/0-7 weeks of gestation. A total of 19 cases were admitted to the NICU, representing 9.5% of the overall admissions. The analysis revealed no statistically significant relationship between gender and gestational age, with a p-value greater than 0.05. In the analysis of respiratory morbidity among the 19 cases, tachypnoea was observed in 17 instances, grunting in 15, and retractions in 16. Additionally, 18 cases necessitated oxygen support for a duration of 4 hours.

Conclusion: The likelihood of respiratory complications following elective caesarean delivery is associated with the gestational age of term infants. Elective caesarean sections conducted after 39 weeks of gestation are associated with lower rates of respiratory morbidity compared to those performed between 37 and 39 weeks. These findings suggest that delaying elective caesarean delivery until 39 weeks can be advantageous for newborn health.

Keywords: Cesarean Section, Gestational Age, Respiratory Morbidity, Tachypnoea.

INTRODUCTION

The rise in caesarean section deliveries is a notable trend observed in both developed and developing nations. The initial decision for a C-section was often driven by obstetric complications or significant maternal health concerns. The evolution of aesthetic procedures and surgical techniques has led to a reduction in risks for mothers. This shift may have influenced the rise in elective caesarean

sections for breech presentations or those with a history of previous caesarean deliveries, ultimately impacting obstetric practices and patient preferences. There has been a notable rise in the frequency of elective caesarean sections, occurring in the absence of clear or widely recognised medical or obstetric reasons.[1,2]

Infants born through elective caesarean section may face a heightened risk of respiratory complications. The potential outcomes of respiratory morbidity include admission to neonatal intensive care units, separation of mother and child, the necessity for respiratory support, painful procedures, treatment with antibiotics and mechanical ventilation, along with the risk of severe complications such as pulmonary air leaks, progression to more serious conditions like persistent pulmonary hypertension, and sequelae resulting from hypoxaemia.[3]

The occurrence of labour and/or the rupture of membranes prior to a caesarean section is associated with a decreased risk of respiratory complications during the neonatal period.[4] Labour may trigger a significant increase in catecholamines in the foetus, a crucial factor for postnatal lung adaptation. Research indicates that infants delivered via elective caesarean section at a gestational age of more than 39 weeks experience a notably lower incidence of respiratory morbidity compared to those born before 39 weeks.[5] This study aimed to assess the occurrence of respiratory issues in term neonates after elective caesarean delivery, with a focus on gestational age as a contributing factor.

MATERIALS AND METHODS

This study is an observational one conducted in a hospital setting, utilising retrospective data collection methods. Our study encompassed all infants delivered via elective caesarean section over a one-year period. A C-section was deemed appropriate if it was elective and free from complications such as rupture of membranes, sepsis, pregnancy-induced hypertension, multiple gestation, and significant congenital anomalies, provided that the pregnancy had reached 37 weeks of gestation. The medical records of all mother-infant pairs admitted to the hospital after elective C-sections were thoroughly reviewed. A total of 238 cases underwent elective caesarean sections, with only 200 cases included in the analysis.

Gestational age is determined based on the history of the last menstrual period. In cases where the menstrual history is unclear, the first trimester scan is utilised for assessment. The gathered information encompassed gestational age, reasons for LSCS, gender, signs of respiratory complications, and length of hospital stay.

Statistical Analysis

The collected data was organised and input into a spreadsheet application (Microsoft Excel 2019) before being transferred to the data editor interface of SPSS version 19 (SPSS Inc., Chicago, Illinois, USA). Quantitative variables were characterised using means and standard deviations or medians and interquartile ranges, depending on their distribution patterns. Qualitative variables were reported in terms of counts and percentages. The confidence level for all tests was established at 95%, while the level of significance was set at 5%.

RESULTS

A total of 238 cases underwent elective C-sections, with 200 cases included in the analysis and 38 excluded for reasons outlined in the methods section. A total of 57 cases were recorded between 370/7 and 376/7 weeks of gestation, 78 cases between 380/7 and 386/7 weeks, 47 cases between 390/0-7 and 396/0-7 weeks, and 18 cases between 400/0-7 and 416/0-7 weeks of gestation. A total of 19 cases were admitted to the NICU, representing 9.5% of the overall admissions. The analysis of infants admitted to the NICU revealed a significant association between those experiencing respiratory morbidity and those without, with a notable ratio of 19 out of 200 cases. Statistical significance was observed with a p-value of less than or equal to 0.05. As gestational age advances, there is a notable reduction in the occurrence of respiratory morbidity. A total of 10 babies, representing 17.54%, were born between 370/0-7 and 376/0-7 weeks, while 5 babies, or 6.41%, were born between 380/0-7 and 386/0-7 weeks. Additionally, 3 babies, accounting for 6.13%, were born between 390/0-7 and 396/0-7 weeks, and 1 baby, or 5.55%, was born after 40 weeks. All of these infants developed respiratory illness.

Among the 20 infants identified with transient tachypnea of the newborn (TTN), there was 1 case of respiratory distress syndrome (RDS) and 1 case of meconium aspiration syndrome (MAS). The rationale for elective caesarean sections revealed that, among 200 cases, 150 were performed due to a history of previous caesarean deliveries, 40 were conducted in light of cephalopelvic disproportion (CPD), and 10 were necessary due to breech presentation. The total number of male infants recorded was 116, while the count for female infants stood at 84. A total of 12 male and 8 female infants were admitted to the NICU. The analysis revealed no statistically significant relationship between gender and gestational age, with a p-value greater than 0.05.

In the analysis of respiratory morbidity among the 19 cases, tachypnoea was observed in 17 instances, grunting in 15, and retractions in 16. Additionally, 18 cases necessitated oxygen support for a duration of 4 hours.

Table 1: Comparison of gestational age and respiratory morbidity

Gestational age	Total cases	Respiratory morbidity
37 weeks	57	10 (17.54%)
38 weeks	78	5 (6.41)
39 weeks	47	3 (6.38)
>40 weeks	18	1 (5.55)

Table 2: Type of respiratory morbidity and weeks of gestation. Gestation weeks Tachypnoea Grunt Retractions

Gestation weeks	Tachypnoea	Grunt	Retractions	Requiring O2
37 weeks	11	9	10	13
38 weeks	4	4	4	3
39 weeks	2	1	1	1
>40 weeks	1	1	1	1

DISCUSSION

The current study revealed a total respiratory morbidity rate of 9.5%, with a notable decline in the percentage of affected infants as gestational age increases. As gestational age advances, there is a notable reduction in the occurrence of respiratory morbidity. A total of 10 babies, representing 17.54%, were born between 370/0-7 and 376/0-7 weeks, while 5 babies, or 6.41%, were born at 380/0-7 to 386/0-7 weeks. Additionally, 3 babies, accounting for 6.13%, were born between 390/0-7 and 396/0-7 weeks, and 1 baby, which is 5.55%, was born after 40 weeks, all of whom developed respiratory illness. Research indicates that the occurrence of respiratory issues in full-term newborns after elective caesarean delivery notably diminishes as gestational age increases. The findings align with earlier research.

Hasen noted that elective C-sections are associated with a heightened risk of serious respiratory complications, with this risk increasing fivefold when the procedure is performed at 37 weeks of gestation. Studies conducted by Tita and Lewins reveal that conditions such as transient tachypnea of the newborn, respiratory distress, and the need for mechanical ventilation may be preventable by avoiding premature termination of pregnancy.[6.7] A prior extensive cohort study sought to determine if the timing of elective caesarean delivery between 37 and 42 weeks of gestation had an impact on respiratory issues in newborns.[8] The study examined elective caesarean sections performed at various gestational ages, contrasting them with vaginal deliveries occurring at 40 weeks' gestation, while excluding cases of intended vaginal deliveries that ultimately led to emergency caesarean sections. The decision to exclude emergency caesarean sections from the comparison group may have led to an inflated perception of the benefits associated with elective caesarean sections, particularly due to the omission of newborns with health complications. The findings align with the elevated risks identified by the authors, who reported a respiratory morbidity rate of 5.2 per 1000 infants in their comparison group, while our comparison group exhibited a significantly higher rate of 16 per 1000 infants. Our analysis was conducted using an adapted intention to treat approach, incorporating emergency caesarean sections into the comparison group. This methodology resulted in odds ratios that were lower than those observed in the large cohort study.[8]

In the developing foetal lung, the process of active sodium transport across the pulmonary epithelium facilitates the movement of liquid from the lung lumen into the interstitium, which is then absorbed into the vasculature.[9] Sodium reabsorption in the lung occurs through a two-step mechanism. The initial phase involves the passive transport of sodium ions from the lumen through the apical membrane and into the cell via sodium-permeable ion channels. The next phase involves the active transport of sodium ions from within the cell through the basolateral membrane into the surrounding serosal space. The underdevelopment of sodium transport mechanisms plays a significant role in the onset of TTN and respiratory distress syndrome. In the later stages of pregnancy, the surfactant system experiences significant maturation characterised by enhanced production, secretion, and alterations in composition. The elevated lecithin to sphingomyelin ratio in amniotic fluid serves as a significant indicator of lung maturation.[10]

Vaginal delivery serves as another mechanism, with approximately one third of foetal lung fluid being expelled through the compression of the baby's chest during the process.[4] The absence of this mechanism during a C-section result in residual lung volume and reduced surfactant secretion at the alveolar surface, placing these infants at an increased risk for respiratory distress.

Current research on the risks and benefits of elective caesarean sections for both pregnant women and newborns has primarily relied on observational studies.[11] Additional evidence-based insights regarding the impact of timing and caesarean section during labour could be gathered through randomised controlled trials that involve substantial populations.

CONCLUSION

Research indicates that the likelihood of respiratory complications following an elective caesarean section is influenced by the gestational age of term infants. Elective caesarean sections conducted after 39 weeks of gestation are associated with lower rates of respiratory morbidity compared to those performed between 37 and 39 weeks. These findings

suggest that delaying the elective procedure until 39 weeks can be advantageous for newborns.

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