



Respiratory Morbidity in Neonates at or Near-Term in Relation to Mode of Delivery - A Retrospective Observational Study

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Authors' contributions

This work was carried out in collaboration among all authors. Author FRM designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors AN, NFP, SB, AAJ, FW and AA managed the analyses of the study and managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JPRI/2021/v33i28B31530

Editor(s):

(1) Dr. Rafik Karaman, Al-Quds University, Palestine.

Reviewers:

(1) Nimain C. Mohanty, MGM Institute of Health Sciences, India.

(2) Ikhlas Muhammad Jenie, Universitas Muhammadiyah Yogyakarta, Indonesia.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/68410>

Original Research Article

Received 01 March 2021

Accepted 06 May 2021

Published 08 May 2021

ABSTRACT

Introduction: Antenatal corticosteroids are recommended by Royal College of Obstetrics and Gynaecology for caesarean section planned before thirty-eight plus six weeks gestation. However, these steroids are, not suggested for labour induced electively after thirty four weeks.

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Objective: This study's aim is to enumerate the possibility of respiratory morbidity in neonates for various deliberated approaches of delivery between thirty-five and thirty eight weeks gestation.

Methodology: This study was carried out during June 2018 and December 2020 at a tertiary obstetric unit and analysed 3796 neonates delivered between thirty-five and thirty eight weeks gestation for neonatal admission due to respiratory morbidity.

Results: The risk for respiratory problems in spontaneous labour was 9.9% (16/161), 5.0% (12/238), 1.2% (5/426) and 0.64% (6/930) at thirty five, thirty six, thirty seven and thirty eight weeks of gestation respectively. For induced labour, it was 25% (4/16), 4.8% (5/104), 4.1% (13/318) and 0.82% (4/485) at thirty-five, thirty six, thirty seven and thirty eight weeks respectively. While the risk of respiratory morbidity in elective caesarean section, was 13.8% (4/29), 27.1% (13/48), 4.1% (5/122) and 2.8% (9/318) at thirty-five, thirty six, thirty seven and thirty eight weeks respectively. Overall chance of respiratory morbidity in neonates was 6% after elective caesarean section, 2.8% after labour induction and 2.2% after spontaneous labour ($p < 0.0001$). The number of neonates with respiratory problems born by elective C-section was only 31 out of total 132 (23.5%). Whereas this risk was 2.8% at 35-38 weeks and 5.0% at 35-37 weeks after induced labour.

Conclusion: Elective delivery at 35-38 weeks is linked to respiratory morbidity in new born babies. More research is required to assess the role of prophylactic corticosteroids preceding elective induction of labour.

Keywords: Neonatal respiratory morbidity; induction of labour; caesarean section.

1. INTRODUCTION

Induction of labour the process of artificial stimulation to initiate labour. It occurs in up to 20% of pregnancies in the United Kingdom [1-2]. Different reasons for induction of labour have been archived in the literature. Maternal conditions included preeclampsia, cardiovascular or renal causes, while fetal reasons included intrauterine growth restriction, gestational diabetes, preterm rupture of membranes or post-maturity alone or in combinations [3]. Prior Corticosteroid injection to the expectant mother if preterm birth is anticipated is an important and most critical antenatal intervention available to enhance infant outcome. Betamethasone and dexamethasone are the most widely used corticosteroids. These are generally preferred to accelerate fetal lung maturation [4-5]. The Royal college of obstetrician and Gynaecologist UK (RCOG) and NICE guidelines (National Institute for Health and Care Excellence United Kingdom) recommends that antenatal corticosteroids should be administered to all women undergoing elective caesarean section before thirty-eight plus six weeks weeks of gestation [6-7]. The NICE guidelines do not recommend administration of corticosteroids to women having a planned vaginal delivery without fetal growth restriction after thirty-eight plus zero weeks [7]. However, the risks of neonatal morbidity at 35 weeks' gestation, regardless of mode of delivery, are similar to the risks associated with elective caesarean section at 37-38 weeks gestation for which corticosteroids are recommended. If

antenatal corticosteroids are effective and cost-effective in reducing neonatal morbidity after 34 weeks' gestation, then they should be offered to all women and not restricted to those having planned an elective caesarean section. However, if corticosteroids are ineffective or are not a cost-effective intervention, these should not be offered after 34 weeks' gestation, irrespective of the mode of delivery planned.

The aim of this study is to assess the risk of respiratory morbidity in newborn babies as related to various planned methods of delivery conducted between thirty five and thirty eight weeks of gestation.

2. METHODOLOGY

This study observed the neonatal morbidity in 37961 pregnancies delivered between thirty five and thirty eight plus weeks gestation at the Royal Victoria Infirmary, Newcastle-upon-Tyne between June 2018 and December 2020. Electronic medical record database was the source of the patients' data from special care baby unit and maternity records. Data were analyzed using SPSS version 23.

3. RESULTS

There were 132 (3.5%) admissions to the special care baby unit (SCBU). Data shows halving of the risk of admission to SCBU with every 1 week increase in gestation age Table 1. The risk of neonatal morbidity due to respiratory problems

for spontaneous labor was 9.9% (16/161), 5.0% (12/238), 1.2% (5/426) and 0.64% (6/930) at thirty five, thirty six, thirty seven and thirty eight weeks gestation respectively. For induced labour, the risk was 25% (4/16), 4.8% (5/104), 4.1% (13/318) and 0.82% (4/485) at thirty five, thirty six, thirty seven and thirty eight weeks respectively. For augmentation of labour following prolonged pre-labour rupture of membranes, the risk of neonatal respiratory morbidity was 8.3% (2/24), 10.1% (7/69), 3.9% (4/101) and 0.61% (1/163) at thirty-five, thirty six, thirty seven and thirty eight weeks gestation respectively. The risk with births by elective caesarean section, was 13.8% (4/29), 27.1% (13/48), 4.1% (5/122) and 2.8% (9/318) at thirty five, thirty six, thirty seven and thirty eight weeks respectively. The risk for emergency caesarean section was 8.6% (5/58) at 35 weeks 15.4% (8/52) at 36 weeks, 12.7% (8/63) at 37 weeks and 1.4% (1/71) at at 38 weeks Table 2. The admission of neonates due to respiratory problems was 6.0% after elective caesarean section, 2.8% after induction of labour and 2.2% after spontaneous labour ($p < 0.0001$). The ratio of neonates with respiratory problems delivered by elective caesarean was only (23.5%) 31 out of 132. And respiratory disorders following induction of labour was 2.8% at thirty five to thirty eight weeks and 5.0% at thirty five to thirty seven weeks. After emergency C-section, the risk of respiratory distress was 9.0% and 3.9% after labour was augmented, following prolonged spontaneous rupture of amniotic membranes. We did not include emergency caesarean section and augmentation of labour following prolonged spontaneous rupture of amniotic membranes in our comparison data as corticosteroids are recommended in elective rather than emergency mode of deliveries.

4. DISCUSSION

It has been known since decades that administration of corticosteroids to a mother before preterm birth reduces the severity of lung disease of prematurity and other related complications in new-borns [8]. A Cochrane review of 21 studies showed benefits of

treatment with single dose of corticosteroids in women with risk of preterm birth in reducing the risk of neonatal mortality by 31%, RDS by 44% and intraventricular haemorrhage by 46%. Antenatal corticosteroids have definitively shown to reduce neonatal morbidity and mortality in neonates born at or before thirty four weeks. The evidence that antenatal corticosteroids reduce neonatal morbidity after 34 weeks gestation is weak and there is no evidence that antenatal corticosteroids are a cost-effective intervention at this gestation age. The RCOG and NICE recommends that corticosteroids should be administered to all women undergoing elective caesarean section before thirty-eight plus six weeks gestation [6-7]. This is based on the results of studies which-revealed that new born delivered by elective caesarean section at less than 39⁺⁰ weeks of gestation had more chances of respiratory morbidity for which they required admission to the neonatal intensive care unit (NICU) [9-12]. An earlier cohort study mentioned that, compared with elective caesarean section, births at thirty nine weeks of gestation, at thirty seven weeks of gestation and at thirty eight weeks of gestation were related to an increased risk of neonatal death and/ or respiratory complications; were treated for hypoglycaemia, early neonatal sepsis and admission to the NICU. The present study shows that the risk of admission to SCBU following elective caesarean section between 35⁺⁰ and thirty-eight plus six weeks weeks (5.3%) is similar to the risk if labour was induced (6.5%) but corticosteroids not recommended. Our study also shown decreasing trend of neonatal intensive care admission (NICU) with each advancing week of gestation. This finding is in consistence with other study in the literature by Ghardey K et al. [13] that shown a 2-fold increased risk in primary outcome of respiratory morbidity among neonates delivered in near term as compared with those delivered at 39 weeks. Delivery between thirty-eight plus zero weeks and thirty-eight plus six weeks gestation is associated with significant neonatal morbidity, irrespective of the planned mode of delivery. The NICE guidelines do not recommend administration of corticosteroids to

Table 1. Risk of admission to SCBU in relation to gestation age between 35⁺⁰ and 38⁺⁶ weeks

Gestation age (Weeks+Days)	Number of women (%)	Admission to SCBU (%)
35+0 – 35+6	288 (8)	31 (10.8)
36+0 – 36+6	511 (14)	45 (8.8)
37+0 – 37+6	1030 (27)	35 (3.4)
38+0 – 38+6	1967 (52)	21 (1.1)

Table 2. Admission to SCBU for respiratory morbidity by planned mode of delivery for babies born at 35+0 to 38+6 weeks' gestation

Weeks in Gestation	Spontan. Labour	AugmentSROM	IOL	EI CS	Em CS	Total
35+0 – 35+6	161 (16) 9.9%	24 (2) 8.3%	16 (4) 25%	29 (4) 13.8%	58 (5) 8.6%	288 (31) 10.8%
36+0 – 36+6	238 (12) 5.0%	69 (7) 10.1%	104 (5) 4.8%	48 (13) 27.1%	52 (8) 15.4%	511 (45) 8.8%
37+0 – 37+6	426 (5) 1.2%	101 (4) 3.9%	318 (13) 4.1%	122 (5) 4.1%	63 (8) 12.7%	1030 (35) 3.4%
38+0 – 38+6	930 (6) 0.64%	163 (1) 0.61%	485 (4) 0.82%	318 (9) 2.8%	71 (1) 1.4%	1967 (21) 1.1%
Total	1755 (39) 2.2%	357 (14) 3.9%	923 (26) 2.8%	517 (31) 6.0%	244 (22) 9.0%	3796 (132) 3.5%

women having a planned vaginal delivery without fetal growth restriction after thirty-eight plus zero weeks. However, the risks of neonatal morbidity at 35 weeks gestation (regardless of mode of delivery) are similar to the risks associated with elective caesarean section at 37-38 weeks gestation for which corticosteroids are recommended. The long-term risks of corticosteroids administered after 36 weeks gestation are unknown [6-7] Long-term follow-up of survivors from various randomised trials of antenatal corticosteroid therapy shows no clear adverse neurological, cardiovascular, cognitive functioning, working memory and attention, psychiatric morbidity or health-related quality of life effects [14-17]. As antenatal corticosteroids are effective in reducing neonatal morbidity after 34 weeks' gestation, it should be offered to all women having a planned delivery and not restricted to those having an elective caesarean section only.

5. CONCLUSION

Neonates delivered by elective delivery at thirty-five to thirty eight weeks have high incidence of respiratory morbidity. Therefore, further research is mandated for role of prophylactic corticosteroids before elective induction of labour for better neonatal outcome.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT

It is not applicable.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:

The peer review history for this paper can be accessed here:
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