The Influence of the Mode of Delivery on the Respiratory Outcome of the Neonate

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Abstract

To evaluate the prevalence of neonatal respiratory morbidity in term infants, especially babies delivered by elective Caesarean section, and to assess the influence of timing of elective Caesarean section on the respiratory outcome.

This was a cross sectional prospective study of all elective Caesarean sections on mothers with a gestational age of 37 weeks or more and vaginal deliveries, that were performed in Kirkuk general Hospital from 1 January 2015 to 31 June 2015. Multiple pregnancies, fetuses with congenital anomalies, intrauterine deaths, and emergency Caesarean sections were excluded. The total number of infants delivered by elective cesarean section and vaginal delivery who were assessed for respiratory distress (RDS) and transient tachypnea of the newborn(TTN) were 6675 .

Neonatal respiratory morbidity risk ,including RDS and TTN, were significantly higher in infant group delivered by elective caeserian delivery compared with vaginal delivery. The number of term neonates who were delivered by elective caeserian section and had respiratory morbidities was 20(2.1%) and for those delivered vaginally was35(0.61%) with a p. value of(0.032).

The combined respiratory morbidity and TTN of infants delivered by elective Caesarean section before 38 weeks of gestation was significantly increased.

Introduction

A caesarean section, also known as c.section or Caesar ,is a surgical procedure in which incisions are made through a mother s abdomen (lapratomy) and uterus (hysterotomy) to deliver one or more babies.1 Delivery by caesarean section has been part of human culture since ancient times2 .

The percentage of new borns delivered by c.section had raised substantially in recent years ,reaching 19-20%3 in Israel ,more than 30% in United States4 and as high as 40% in Latin America5 .The c.section rate has increased rapidly even among women considered to be at low risk- i.e.,women with a full term –singleton infant in vertex presentation6.It has been clearly demonstrated in the literature that caesarean delivery increases the risk of transient tachypnea of the newborn and respiratory distress syndrome compared to vaginal births, even when it is performed electively at term7.

It is proposed that the increased incidence of respiratory distress following caesarean birth results from both surfactant deficiency (in the absence of the catecholamine surge accompanying labour), and from a failure to clear fetal lung fluid in labour8 .Since the main determinants of the risk of RDS and TTN are gestational age and mode of delivery , the influence of the

timing of elective caesarean delivery is receiving increasing attention9.

Respiratory distress syndrome (RDS) is one of the most common causes of neonatal respiratory failure and neonatal death10.

TTN is generally a self-limited disorder with out significant morbidity. It resolves over a 24 to 72 hour period11.

Aim of the study

To evaluate the prevalence of neonatal respiratory morbidity in term infants, especially babies delivered by elective Caesarean section, and to assess the influence of timing of elective Caesarean section on the respiratory outcome.

Patients and methods

A cross sectional prospective study was conducted at Kirkuk General Hospital for 6 months period from the first of January till the end of June 2015, that included all vaginal deliveries and elective Caesarean sections of singleton pregnancies greater than 37 weeks of gestation with (6675 live singletons) with exclusion of cases with congenital malformations, intrauterine deaths, and emergency Caesarean sections.

All caesarean sections were attended by the neonatologist. After delivery, all neonates were subjected to full clinical examination; neonates with respiratory distress were subjected to further laboratory investigations and chest X-ray.

Out of total, 150 patients who had variant respiratory morbidities (transient tachypnea of the newborn (TTN), respiratory distress syndrome (RDS), cardiopulmonary resuscitation or prolonged hospitalization (5 days or longer) due to respiratory distress) were admitted to neonatal care unit.

Fifty five patients of neonatal care unit admission were diagnosed with TTN and RDS by neonatologist on the basis of clinical features and radiological findings. Their ages range from one hour to 5 days, (35) of them were males and (20) were females. The deliveries were sub grouped and analyzed according to the number of completed weeks of gestation , mode of delivery and the respiratory morbidity. Gestational age was determined by the obstetrician after medical record review of these patients, based on clinical history (last menstrual period) and/or the earliest pregnancy ultrasound. Mode of delivery in both groups was based on usual obstetric indications. Maternal age ,birth weight and length of hospital staying were assessed for each patient.

Data was analyzed using SPSS 20 for windows 7. Baseline characteristics were compared using means and standard deviations (SD) and proportions of both groups by student's t test and Chi-square respectively.

Results

During the 6-months study period, there were a total of 6675 term babies delivered in Al-jumhory Hospital in Kirkuk . All live-birth term singletons without congenital malformations delivered during this period were included in this study, which amounted to 973 delivered by elective Caesarean section and 5702 delivered vaginally,giving an overall caesarean section rate of 30 % . Around 50% of them had dating scans in our

department to confirm the gestational age. Some of the remaining pregnant women had dating scans in the private sector.

The total number of term infants suffering from respiratory morbidities was 150 giving an overall frequency of 2.2 %.

Fifty five patient of neonatal care unit admission were diagnosed with TTN and RDS and were discussed in our study. The number of term neonates in the elective Caesarean section group who had respiratory morbidities was 20 (2.1%) and for those delivered vaginally the number was 35 (0.61%), the difference being statistically significant (p 0.032). Table 1 summaries the characteristics of pregnancy with respiratory morbidity.

Of the patients with elective Caesarean section, the majority were delivered before 39 weeks (42% were delivered between 37 and 37+6 weeks, 27 % between 38 and 38+6 weeks, 18 % between 39 and 39+6 weeks and 13% between 40 and 40 +6 weeks).

The maternal age ranged between 15 and 45 years with a mean maternal age of elective Caesarean section group 30.30 ± 8.779 years , and vaginal delivery group 25.49 ± 6.943 years with significant value (p 0.021) of whom around 11% were of advanced maternal age.

Mean birth weight of the infants in the elective Caesarean section group was significantly higher compared to the vaginally delivered group, with mean 3.25 ± 0.35 and 3.07 ± 0.32 respectively.

TTN was most significantly increased in those delivered by elective Caesarean section (p=0.048) but not significant statistically according to vaginal delivery and gestational age . Infants with RDS who delivered by elective Caesarean section were increased at 37 week +0 to 38 week + 6 days (not statistically significant), while the risk in other gestation groups could not be determined due to the small numbers [Table 2].

In the general population of Kirkuk , the incidence of combined neonatal respiratory morbidities after elective Caesarean sections performed before 38 weeks of gestation was significantly increased compared to those delivered vaginally (10.2/1000 births vs 1.3/1000 births at 37 to 37+6 weeks; p=0.012) [Table 3].

Overall, term infants in this study group delivered by elective Caesarean section have an increased risk of combined respiratory morbidity (p<0.032) relative to the vaginal delivery group (Table 3). Infants born by Caesarean section at less than 38 weeks also had a significantly higher risk for combined respiratory morbidity (p=0.019) . Those delivered by elective Caesarean section between 38 and 40+6 weeks were also increased, but not significantly (p 0.074 ,p 0.26,p 0.09) respectively [Table 3].

Discussion

The risk of Increasing respiratory morbidities in term infants delivered by elective Caesarean section of < 39 weeks has been reported in many studies 12-17. In our study, the risk of combined respiratory morbidity after elective Caesarean section was nearly 5 times higher than that of vaginal delivery between 37 and 37+6 weeks, the difference was statistically significant when compared with vaginal delivery, the increased risk for infants

delivered by elective Caesarean section between 38 to40+6 weeks was not significant statistically. This was similar to large cohort study done by Morrison et al in which the earlier elective caesarean sections were associated more with respiratory morbidity than the later caesarean sections. This was found even when comparing with babies intended for vaginal delivery during the same gestational week18.

There is a significant statistical risk of TTN after elective Caesarean sections performed in compare with vaginal result . This increase may be recognized by the lack of an elevated level of catecholamine in infants with pre-labor Caesarean sections, which normally decrease fetal lung fluid secretion and the release of surfactants in the fetus during labor. This is similar to Brown MJ et al study and Bergholt T et al study19-20 .

In our study, the increased risk of combined respiratory morbidity and TTN was only statistically significant at 37(+6) weeks. For infants of 38 to 40(+6) weeks, the increased risk, though evident was not statistically significant, which may be due to insufficient numbers in our study population which similar to results of HM TSE et al study21.

In many studies, respiratory morbidities were significantly less in the group delivered at 39 weeks.Thus, our results support the previous reports suggesting that a significant reduction in the overall rate of neonatal respiratory morbidity may occur if elective cesarean section is postponed to 39 weeks' gestation16,18,22.

The maternal age ranged between 15 and 45 years with a mean 30.30 ± 8.779 and 25.49 ± 6.943 for elective Caesarean section and vaginal delivery group respectively (p 0.021). This is result is similar in significance with HM TSE et al study21.

Conclusion

The combined respiratory morbidity and TTN of infants delivered by elective Caesarean section before 38 weeks of gestation was significantly increased. Obstetricians considering elective Caesarean section before 38 weeks should carefully balance these risks and avoid them if possible.

References

1.Philip N Baker.Obstetrics by Ten Teachers ;19ed.London;Hodder Arnold;2011;224-240.

2.Richard Hayman.Obstetrics and Gynaecology;An Evidence Based Text for MRCOG;2nd ed.London.Hodder Arnold;2010;401-412.

3.Bar Y,Kubo M.Obstetrics in Israel-Annual report 2010.Israel Sociaty of Maternal Fetal Medicine 2011NovemberAvailablefrom:URL:http/ismfm/org.il/upload/ infocente/.info images.bar.pdf.

4.Menacker F,Hamilton BE.Recent trends in cesarean delivery in United States.NCHS Data Brief 2010;35:1-8.

5.Ronsman C,Holtz S,Stanton C.Socioeconomic differentials in caeserian rates in developing countries:a retrospective analysis.Lancet 2006;368:1516-23.

6.MacDorman MF,Declercq E,Menacker F,Malloy MH.Neonatal mortality for

primary cesarean and vaginal births to low-risk women:application of an "intention-to-treat"model .Birth 2008;35:3-8.

7.Parillab BV,Dooly SL ,Jansen RD,Socol ML.Iatrogenic respiratory distress syndrome following elective repeat caeserian delivery.Obstet Gynaecol;81:392-5

8.Royal Australian and New Zealand College of Obstetrician and Gynecologist.Timing of elective Caeserian section at term.201411. Christian L. Hermansen, MD, and Kevin N. Lorth, MD .Respiratory distress in the newborn. Am Fam Physician;2007. 76(7):987-94

9.Jing Liu.Respiratory distress syndrome in full term neonates.Neonatal Biol.2012;2167

10.NCCU Clinical Guidelines.Respiratory problems and management.Section 2014.

11.Stephen D Kicklighter, MD. Transient Tachypnea of the Newborn.APN.2008.Vol.6,N.2.

12. .Wilmink FA, Hukkelhoven CW, Lunshof S, et al. Neonatal outcome following elective cesarean section beyond 37 weeks of gestation: a 7-year retrospective analysis of a national registry. Am J ObstetGynecol2010; 202:250.e1-8.

13. Tita AT, Landon MB, Spong CY, et al. Timing of elective repeat cesarean delivery at term and neonatal outcomes. NEngl J Med 2009; 360:111-20.

14. Antenatal corticosteroids to reduce neonatal morbidity and mortality. London (UK): Royal College of Obstetricians andGynaecologists, 2010.

15. American College of Obstetricians and Gynecologists. ACOG Committee Opinion No. 394, December 2007. Cesarean delivery on maternal request. ObstetGynecol2007 ; 110:1501.

16. Hansen AK, Wisborg K, Uldbjerg N, et al. Risk of respiratory morbidity in term infants delivered by elective cesarean section: cohort study. BMJ 2008; 336:85-7.

17. Kolås T, Saugstad OD, Daltveit AK, et al. Planned cesarean versus planned vaginal delivery at term: comparison of newborn infant outcomes. Am J ObstetGynecol2006; 195:1538-43.

18.Morrison JJ, Rennie JM, Milton PJ. Neonatal respiratory morbidity and mode of delivery at term: influence of timing of elective caesarean section. Br J ObstetGynaecol 1995;102:101-6.

19.Brown MJ, Olver RE, Ramsden CA, et al. Effects of adrenaline and of spontaneous labour on the secretion and absorption of lung liquid in the fetal lamb. J Physiol 1983; 344:137-52.

20. Bergholt T, Stenderup JK, Vedsted-Jakobsen A, et al. Intraoperative surgical complication during cesarean section: an observational study of the incidence and risk factors. ActaObstetGynecolScand 2003; 82:251-6.

21.Hm TSE, Kc AU , Hc LEE , Stephen PY. The Timing of Elective Caesarean Section on Neonatal Respiratory Outcome in Hong Kong . HKJGOM 2012; 12: 13-20.

22.Smith GC, Pell JP, Dobbie R. Caesarean section and risk of unexplained stillbirth in subsequent pregnancy. Lancet 2003;362:1779-84.

Table (1) characteristics of the pregnancy with respiratory morbidity

characters	No. (%) of elective C.S (n = 973)	No. (%) of V.D (n=5702)	P value
Maternal age ± SD (years)	30.30 ± 8.779	25.49 ± 6.943	0.021
Birth weight (kg)	3.25 ± 0.35	3.07 ± 0.32	0.043
Male	14	21	0.12
Female	6	14	0.06
Length of hospital stay ± SD (days)	1.6 ± 0.994	1.74 ± 1.441	0.33
Gestational age (weeks)	37.7 ± 0.801	38.20 ± 1.158	0.032
Total no.	20 (2.1%)	35 (0.61%)	0.032

C.S= Caesarean Section,V.D= vaginal delivery,

Table 2. Number of respiratory outcomes after elective caesarean section and vaginal delivery.

Respiratory morbidity	No. (%) of elective C.S (n = 973)	No. (%) of V.D (n=5702)	P value
TTN	13(1.3%)	21 (0.36%)	**0.048**
RDS	7(0.8%)	14 (0.25%)	0.14
Total No. of infants with combined respiratory outcome	20 (2.1%)	35 (0.61 %)	0.06

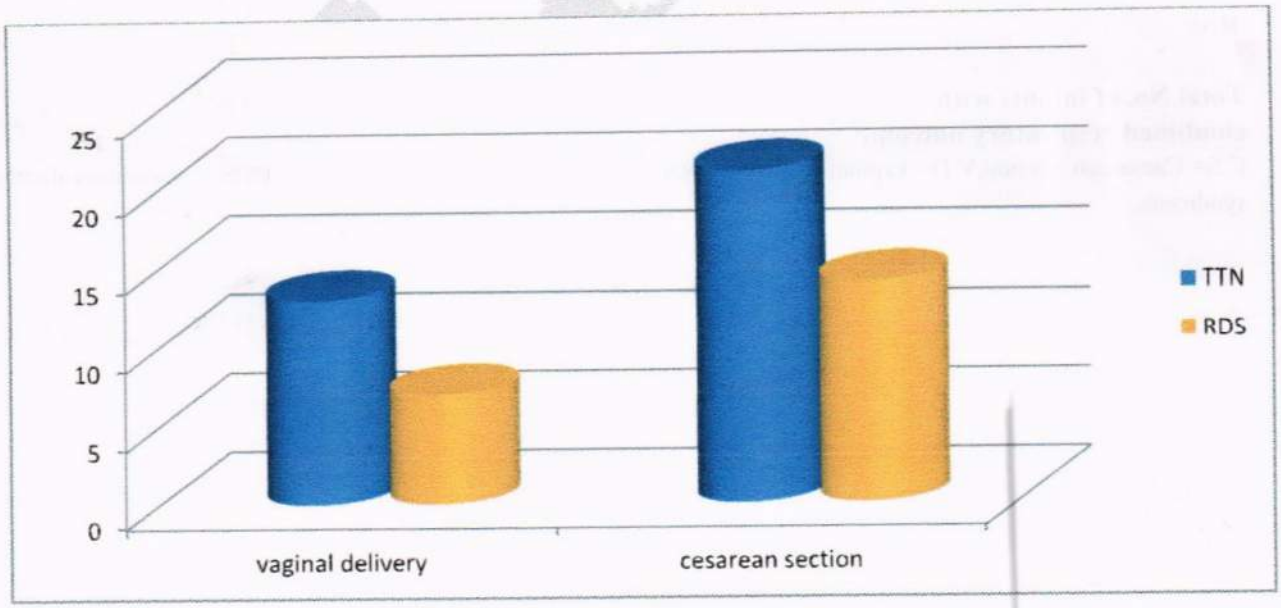
C.S= Caesarean Section,V.D= vaginal delivery, TNN = transient tachypnea of newborn; RDS = respiratory distress syndrome.

Table (3) Number of selective neonatal respiratory morbidities after elective Caesarean Section and vaginal delivery according to gestation age.

Gestational age	No. (%) of elective C.S (n = 973)	No. (%) of V.D (n=5702)	P value
37 week + 6days			
RDS	6 (0.61%)	7 (0.12%)	0.14
TTN	4 (0.41%)	6 (0.11%)	0.06
COMBINED	10 (1.02%)	13 (0.23%)	**0.03**
38 week + 6 days			
RDS	1 (0.10%)	4 (0.07%)	0.24
TTN	5 (0.51%)	5 (0.09%)	0.25
COMBINED	6 (0.61%)	9 (0.16%)	0.059
39 week + 6 days			
RDS	0 (0%)	1 (0.017%)	0.1
TTN	4 (0.41%)	5 (0.09%)	0.1
COMBINED	4 (0.41%)	6 (0.1%)	0.26
40 week + 6 days			
RDS	0 (0%)	2 (0.03%)	0.16
TTN	0 (0%)	5 (0.09%)	0.052
COMBINED	0 (0%)	7 (0.12%)	0.09
Total	20 (2.1%)	35 (0.61%)	**0.032**

C.S= Caesarean Section,V.D= vaginal delivery, TNN = transient tachypnea of newborn; RDS = respiratory distress syndrome.

Figure (1) Respiratory outcomes after elective Caesarean section and vaginal delivery in general population.



TNN = transient tachypnea of newborn; RDS = respiratory distress syndrome.

Figure (2) Frequency of selective neonatal respiratory morbidities after elective Caesarean Section and vaginal delivery according to gestation age.