

Timing of Elective Cesarean Delivery and Neonatal Outcomes**¹Reda Ismail Riad, ¹Eman Aly Hussein, ²Sally R. Eid, ³Tarek M Farid, ³Maha M. A. Abou Hashish and ³Ahmed A Talaat**¹*Obstetrics and Gynecology Dept., Cairo University, Egypt.*²*Pediatrics Dept., Research Institute of Ophthalmology, Cairo, Egypt*³*Pediatrics Dept., National Research Centre, Cairo, Egypt***ABSTRACT**

Introduction: There has been a progressive increase in cesarean delivery rates recently all over the world. For this reason, the importance of the timing of elective cesarean delivery for term deliveries has increased. **Aim of Work:** To evaluate neonatal outcomes according to weeks of gestation in low-risk pregnant women at 37, 38 and 39 weeks to determine the most proper time for elective cesarean section with the least incidence of neonatal respiratory problems. **Methods:** The study was conducted on 300 term neonates delivered by elective cesarean delivery to healthy mothers in Kasr El Aini Hospital and El Monira General Hospital during a six month time period. **Results:** The mean maternal age in group A (37 weeks) was 27.28±4 year, in group B (38 weeks) 25.44±3.86 year, while in group C it was 24.21±3.182 yr (P<0.001). The mean birth weight was 3012±316 gm in group A, 3137±397 gm in group B and 3307±440 gm in group C (P=0.034). Respiratory distress was observed in 15% of group A, 7% of group B and 4% of group C (P=0.017). transient Tachypnea of newborn was observed in 5% of group A, 4% of group B compared to 2% of group C (P=0.485). Respiratory distress syndrome developed in 1% of the group A compared to none of the group B and group C (P=0.367). **Conclusion:** Respiratory complications decreased in the group delivered after 39 weeks, and delivery at 37 weeks of gestation was associated with increased incidence of respiratory problems. Delayed delivery beyond 39 weeks is a much better practice unless there is maternal or fetal risk.

Key words: Elective cesarean delivery, Gestational age, Respiratory distress syndrome, transient Tachypnea of newborn.

Introduction

There has been a progressive increase in cesarean delivery rates in recent years all over the world. The incidence of cesarean delivery has increased from 20.7% in 1996 to 31.8% in 2007 (Robinson *et al.*, 2010). Infants born by elective cesarean delivery within the range of 37 to 42 weeks are considered term infants, risk of serious perinatal morbidity and mortality may still occur and may differ according to the gestational age within this range. Delaying delivery until 41 weeks or more will increase significantly the proportion of women who may go into spontaneous labor and consequently deliver by non-elective cesarean delivery rather than an elective one. In addition it has been reported that stillbirth, is almost doubled at 41 weeks of gestation and increased up to 5 times at 42 weeks as compared with 39 weeks (Wood *et al.*, 2008). On the other hand, as compared with births at 39 to 40 weeks, births at 37 weeks have been reported to be associated with an increased risk of neonatal morbidity. Compared with newborns delivered vaginally, a significant increased risk of respiratory morbidity was found among infants delivered by an elective cesarean section at 37 compared to 39 weeks (Hansen *et al.*, 2008). Timing of elective cesarean delivery has been a popular topic in recent studies. Many studies have demonstrated that cesarean deliveries have more risks for NICU admission than vaginal births; and if elective cesarean delivery was performed before 39 weeks of gestation or post-term, this risk increase even more (Ashton *et al.*, 2010).

The purpose of this work was to evaluate neonatal outcomes according to the gestational age in low risk pregnant women at 37, 38 and 39 weeks for choosing the most proper time for elective cesarean section with minimal incidence of respiratory morbidity.

Patient and Method

This study was conducted on 300 neonates delivered by elective cesarean delivery from healthy (medical and obstetric) mothers, in Kasr EL Aini Hospital and El Monira General Hospital during a period of six months from December 2012 to May 2013.

Cases were divided into three groups:

Group (A): Neonates of healthy pregnant women who were delivered by elective cesarean section at 37+0-6 weeks (100 cases).

Group (B): Neonates of healthy pregnant women who were delivered by elective cesarean section at 38+0-6 weeks (100 cases).

Group (C): Neonates of healthy pregnant women who were delivered by elective cesarean section at 39+0-6 weeks (100 cases).

All the mothers were subjected to full detailed history including: age, parity, gravidity, previous abortions, stillbirths, neonatal deaths and excluding any chronic medical disorder or any acute problems and smoking mothers.

Gestational age was determined based on first day of last menstrual period, first trimester ultrasound examination and estimated gestational age using Ballard score (Ballard *et al.*, 1991).

Neonatal outcome were recorded in the form of Neonatal birth weight, one minute and 5 minute Apgar score, respiratory distress, adverse respiratory outcomes (respiratory distress syndrome or transient tachypnea of the newborn), neonatal intensive care unit admission, mechanical ventilation and other complications as death.

Ethical approval was obtained from the local research ethics committee and parents of all neonates gave an informed written consent prior to the study.

Statistical Methods

Data were statistically described in terms of mean \pm standard deviation (\pm SD), median and range, or frequencies (number of cases) and percentages when appropriate. Comparison of numerical variables between the study groups was done using one way analysis of variance (ANOVA) test with posthoc multiple2-group comparisons. For comparing categorical data, Chi square test was performed. Exact test was used instead when the expected frequency was less than 5. p values less than 0.005 was considered statistically significant. All statistical calculations were done using computer programs SPSS (Statistical Package for the Social Science; SPSS Inc., Chicago, IL, USA) version 15 for Microsoft Windows.

Results

The study was conducted on 300 neonates delivered in Kasr El Aini Hospital and El Monira General Hospital during a six month period from Dec 2012 to May 2013. Our results showed that the mean maternal age was 27.28 ± 4 years (group A), 25.44 ± 3.3 years (group B), and 24.21 ± 3.2 years (group C). Maternal age showed a highly statistical significant difference between the three groups ($P < 0.001$). As regard the neonatal birth weight, the mean was 3012 ± 316 gm (group A), 3137 ± 397 gm (group B) and 3307 ± 440 (group C) with a significant statistical difference between the three groups ($P=0.034$) (Table 1).

There was no significant statistical difference among the three groups regard the Apgar score (Table 1). The mean Ballard score was 32.82 ± 1.224 (group A), 35.32 ± 1.024 (group B), 37.43 ± 1.538 (group C) with a highly significant statistical difference ($P < 0.001$) (Table 1). Respiratory distress (Downes' score ≥ 4) was observed in 15(15%) in group A, 7(7%) in group B, 4(4%) in group C showing a significant statistical difference ($P=0.017$) between the three groups (Table 2). Transient tachypnea of the newborn (TTN) was observed in 5% of group A, 4% of group B and 2% of group C. However this was statistically non-significant ($P=0.48$). (Table 3). Respiratory distress syndrome (RDS) developed in 1% of group A, compared to none in group B or C ($P=0.367$) (Table 3). The percent of NICU admissions was 6% in group A, 4% in group B and 2% in group C with no significant statistical difference ($P=0.353$).

Table 1: Comparison between the three groups as regard neonatal birth weight, Ballard score and Apgar score at 5 minute

	Group A (37 weeks)	Group B (38 weeks)	Group C (39 weeks)	P value
Birth weight (gm)	3012 \pm 316	3137 \pm 397	3307 \pm 440	0.034*
Ballard score	32.82 \pm 1.22	35.32 \pm 1.02	37.43 \pm 1.54	0.001**
Apgar score (5 min)	8.4 \pm 83	8.64 \pm 0.56	8.54 \pm .70	0.056

P value is considered significant if it is less than 0.05

Table 2: Comparison between the three groups as regard incidence of respiratory distress determined by Downes' score ≤ 4

	Group A (37 weeks)	Group B (38 weeks)	Group C (39 weeks)	P value
No.	15	7	4	0.017*
%	15	7	4	

P value is considered significant if it is less than 0.05

Table 3: Comparison between the three groups as regard incidence of respiratory distress syndrome (RDS) and transient tachypnea of newborn (TTN)

		Group A (37 weeks)	Group B (38 weeks)	Group C (39 weeks)	P value
TTN	No.	5	4	2	0.485
	%	5	4	2	
RDS	No.	1	0	0	0.367
	%	1	0	0	

P value is considered significant if it is less than 0.05

Discussion

The purpose of this study was to evaluate neonatal outcomes according to weeks of gestation in selected low-risk pregnant women at 37, 38 and 39 weeks to determine the most proper time for elective cesarean section with the least incidence of respiratory morbidity. Regarding maternal age, there was a highly significant statistical difference between the three groups ($P < 0.001$), the maternal age being older in groups delivered earlier. Herstad *et al.* (2012) recorded that Cesarean delivery increased substantially with increasing maternal age, especially elective cesarean section. As all neonates in our study were full term with no maternal medical disorders that affect neonatal birth weight, the neonatal birth weight was significantly higher as the gestational age increased. This confirms previous reports that fetal growth (birth weight) is positively associated with gestational age in neonates born to medically free mothers (Matte *et al.*, 2001).

In our study, there was no significant statistical difference between the three groups ($P = 0.056$) regarding 5 min Apgar score as all neonates were term and fetal distress was excluded. Hogan *et al.* (2007) reported that no neonate had a 5-min Apgar score of less than 7 born to women delivered by elective cesarean delivery at term. In our study, using the Ballard score to determine the gestational age which increases one week sequentially in each group, there was a highly significant statistical difference between the three groups ($P < 0.001$). Alexander *et al.* (1992) reported sensitivity of 72.2%, specificity of 97.1%, positive predictive value of 83.2% and negative predictive value of 94.6%. In the current study, the incidence of respiratory distress detected by using Downes' score was 15% in those delivered at 37 weeks, 7% in the 38 weeks group and 4% in the 39 weeks group and this was statistically significant ($P = 0.017$). In agreement with our findings, Chiossi *et al.* (2013) recommend that elective repeat CS be scheduled to 39 weeks to decrease neonatal morbidity.

A French study reported an intermediate risk of respiratory morbidity in the early-term infants especially TTN. Therefore, birth at 37 and 38 weeks of gestation is not low risk for the newborn, and cesarean section or labor induction in early-term infants should be avoided if there is no medical indication (Gouyon *et al.*, 2010). In our study, the incidence of TTN decreased as gestational age advanced, however, this was not statistically significant. Also we found that RDS developed in 1% of newborns at 37 weeks compared to none of the 38 and 39 groups, but again, this was not statistically significant. Since neonatal respiratory morbidity at 37 and 38 weeks is still slightly higher compared to 39 weeks, the literature is nearly unanimous in recommending elective cesarean delivery at 39 weeks of gestation. However, delaying elective cesarean delivery from 38 to 39 weeks may have maternal and other fetal consequences that are not always addressed in studies that recommend delaying delivery to 39 weeks (Salim & Shalev, 2011).

Conclusion

Despite the relatively small sample size of the current study in view of the low incidence of TTN and RDS, respiratory complications decreased in the group delivered after 39 weeks, compared to neonates delivered at 37 weeks of gestation which was associated with increased incidence of respiratory problems. Therefore we can conclude that delayed delivery beyond 39 weeks is a much better practice.

References

- Alexander, G.R., F. de Caunes, T.C. Hulsey, M.E. Tompkins, M. Allen, 1992. Validity of postnatal assessments of gestational age: A comparison of the method of Ballard *et al.* and early ultrasonography. *Am. J. Obstet Gynecol*, 166: 891-5.
- Ashton, D.M., 2010. Elective delivery at less than 39 weeks. *Curr Opin Obstet Gynecol.*, 22: 506-510.
- Ballard, J.L., J.C. Khoury and K. Wedig, 1991. New Ballard score, expanded to include extremely premature infants. *J Pediatr*, 119: 417-423.
- Chiossi, G., Lai Y., M.D. Landon, *et al.*, 2013. Timing of delivery and adverse outcomes in term singleton repeat cesarean deliveries. *Obstet Gynecol* 2013; 121:561-9.
- Gouyon, J.B., A. Vintejoux, P. Sagot, A. Burguet, C. Quantin, C. Ferdynus, 2010. and the Burgundy Perinatal Network. Neonatal outcome associated with singleton birth at 34-41 weeks of gestation. *Int. J. Epidemiol.*, 1-8.
- Hansen, A.K., K. Wisborg, N. Ulbjerg, T.B. Henriksen, 2008. Risk of respiratory morbidity in term infants delivered by elective cesarean section: cohort study. *British Medical Journal*, 336: (7635), 85-87.
- Herstad, L., K. Klungsoyr, R. Skjaerven, T. Tanbo, I. Eidem, L. Forsen, T. Abyholm, S. Vangen, 2012. Maternal age and elective cesarean section in a low-risk population. *Acta Obstet Gynecol Scand.*, 91(7):816-23.
- Hogan, L., I. Ingemarsson, K. Thorngren-Jerneck, A. Herbst, 2007. How often is a low 5-min Apgar score in term newborns due to asphyxia? *Eur J Obstet Gynecol Reprod Biol.*, 130:169-75.
- Matte, T.D., M. Bresnahan, M.D. Beg, *et al.*, 2001. Influence of variation in birth weight within normal range and within sibships on IQ at age 7 years: cohort study. *BMJ*; 323(7308):310-314.

- Robinson, C.J., M.S. Villers, D.D. Johnson, K.N. Simpson, 2010. Timing of elective repeat cesarean delivery at term and neonatal outcomes: A coct analysis. *Am. J. Obstet. Gynecol.*, 202:632.
- Wood, S.L., S. Chen, S. Ross, R. Sauve, 2008. The risk of unexplained antepartum stillbirth in second pregnancies following cesarean section in the first pregnancy. *British Journal of Obstetrics and Gynecology*, 115:(6), 726-731.