

Timing of planned cesarean section in relation to neonatal outcome at 37, 38 & 39 gestational weeks

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Abstract: Objective: To evaluate neonatal outcomes according to the weeks of gestation in low risk pregnancies to determine the most proper timing for elective section. **Methods:** It is a cross-sectional descriptive study including 300 women, with singleton pregnancy, without maternal morbidities or signs of fetal distress had an elective cesarean section in Sayed Galal University Hospital. Patients were divided into 3 groups, Group (A): Neonates of healthy pregnant women delivered at 37+0-6 weeks. Group (B): Neonates of healthy pregnant women delivered at 38+0-6 weeks. Group (C): Neonates of healthy pregnant women delivered at 39+0-6 weeks. History taking and complete examination were done to all patients. **Results:** There was a statistical significant difference between the 3 groups regarding the Downes score, The results showed that the number of cases develop Downes' score ≥ 4 in the 37 weeks group (A) was 15 (15%), in the 38 weeks group (B) was 7(7%), while in the 39 weeks group (C) was 4(4%). As regarding Ballard score, Table (13) shows that there was high significant statistical difference between the three groups ($P < 0.001$) as Ballard score determine gestational age which increase one week sequentially in each group. **Conclusion:** According to the results of our study, elective cesarean delivery at 37 weeks of gestation was associated with increased incidence of respiratory problems. Therefore Elective delivery before 39 completed weeks of gestation is less favorable and our findings suggest that there are benefits for waiting until 39 weeks of gestation to perform an elective cesarean delivery provided that there is no maternal or fetal risk.

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Key Words: Timing of elective section - Downes' score - Ballard score.

1. Introduction:

The main aim of obstetric practices is to reduce maternal and neonatal mortality and morbidity to the lowest possible level (*Ronsmans and Graham, 2006*).

Births by elective Cesarean section (CS) are rising, particularly before 39 weeks gestation, which may be associated with unacceptably high risk of adverse neonatal outcomes especially respiratory complications. The optimal timing of these deliveries needs to be determined with recent recommendations to delay births by elective CS until 39 weeks (*Doan et al., 2014*).

However elective Cesarean delivery at 39 weeks or more may have maternal and other fetal consequences compared to delivery at 38 weeks, which are not always addressed in these studies (*Salim and Shalev, 2010*).

Physiologic events in the last few weeks of pregnancy coupled with the onset of spontaneous labor are accompanied by changes in the hormonal milieu of the fetus and its mother, resulting in preparation of fetus for neonatal transition. Rapid clearance of fetal lung fluid is a key part of these changes, and is mediated in large part by trans-epithelial sodium reabsorption through amiloride-sensitive sodium channels in the alveolar epithelial cells, with only a

limited contribution from mechanical factors and sterling forces (*Ramachandrappa and Jain, 2008*).

Severe respiratory distress syndrome (RDS) caused by surfactant deficiency is described not only in preterm infants but also in early term cesarean section, especially when carried out before the onset of labor (*Roth-Kleiner et al., 2003*).

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*).

As the cesarean delivery rate has increased by 50% from 1996 through 2006, there has been growing concern over the impact of elective repeat cesarean delivery on neonatal health. The number of births by cesarean section was 31.8% of all births in the United States as reported in 2007. This represents the 11th consecutive year of increase in the cesarean birth rate (*Hamilton et al., 2009*).

The American College of Obstetricians and Gynecologists recommended awaiting 39 weeks of completed gestational age prior to elective repeat cesarean delivery (*ACOG, 2009*).

In recent years, although poor neonatal outcomes of elective CS before 39 weeks of gestation have been

reported, elective cesarean delivery rates before 39 weeks of gestation are still high. On the other hand, post-term deliveries are associated with increased risk of poor neonatal outcomes (Clark et al., 2009).

Timing of elective cesarean delivery has been a popular topic in recent studies. Many studies have demonstrated that cesarean deliveries have more risks for neonatal intensive care unit (NICU) admission than vaginal births; and if elective repeat cesarean delivery was performed before 39 weeks of gestation or post-term, this risk increases even more (Ashton, 2010).

2. Patients and Methods:

This study was conducted on 300 neonates delivered in SayedGalal university hospital during six months in the period from Mai 2016 to October 2016.

Cases were divided in 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).

Inclusion criteria:

1. Singleton pregnancies.
2. Sure of date of the first day of the last menstrual period or having first-trimester ultrasound examination.

May be one of the following:

- a. Previous caesarian sections.
- b. Abnormal presentation.
- c. Cephalo-pelvic disproportion.

Exclusion criteria:

- 1) Medical disorder:
 - a. Gestational hypertension, pre-eclampsia, eclampsia, Chronic hypertension.
 - b. Diabetes mellitus, gestational diabetes.
 - c. Chronic diseases as history of maternal cardiac disease, renal disease.
- 2) Obstetric cause:
 - a. Multiple pregnancies.

- b. Intrauterine growth restriction.
 - c. Fetal distress.
 - d. Oligohydramnios.
 - e. Polyhydramnios.
 - f. Placental abruption.
 - g. >12 hours spontaneous membrane rupture.
 - h. Emergency cesarean delivery.
 - i. Delivery before 37 weeks.
- 3) Unsure of date.

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

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

Primary neonatal outcome were recorded in the form of Neonatal birth weight, 1minute 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 complication as Death.

Data were statistically described in terms of mean±standard deviation (±SD), and range, or frequencies (number of cases) and percentages when appropriate.

Results:

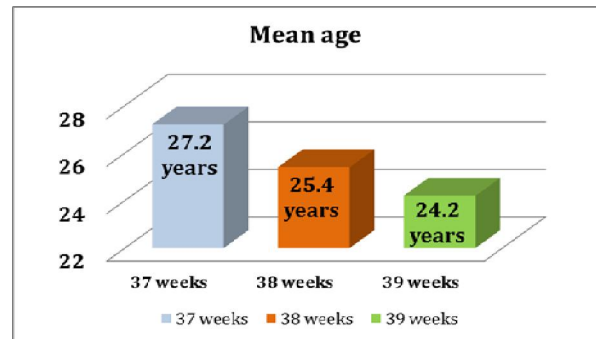


Table (1) Comparison between the three groups regarding maternal Age.

	Group (A) 37 weeks	Group (B) 38 weeks	Group (C) 39 weeks
Mean	27.28	25.44	24.21
± SD	±4.000	±3.334	±3.182
P value	Comparison to 37		0.001*
	Comparison to 38	0.001*	
	Comparison to 39	< 0.001* (HS)	0.042*
	Overall	< 0.001* (HS)	

* P-value: It is considered significant if it is less than 0.05.

Table (2) Distribution of indications of cesarean section in the 300 studied women.

	Group (A) 37 weeks				Group (B) 38 weeks				Group (C) 39 weeks				Overall P-Value
	N	%	P- value		N	%	P- value		n	%	P- value		
			To 38	To 39			To 37	To 39			To 37	To 38	
Repeated CS	82	82	0.592	0.015*	79	79	0.592	0.056	67	67	0.015*	0.056	0.032*
CPD	0	0	0.007*	<0.001*	7	7	0.007*	0.007*	20	20	<0.001*	0.007*	<0.001*
Breech	6	6	0.756	0.421	5	5	0.756	0.268	9	9	0.421	0.268	0.498
precious baby	7	7	0.352	0.030*	4	4	0.352	0.174	1	1	0.030*	0.174	0.096
Previous Hystrotomy	5	5	0.097	0.024*	1	1	0.097	0.316	0	0	0.024*	0.316	0.028*
Bad obs. Hist.	0	0	0.155	0.155	2	2	0.155	1.000	2	2	0.155	1.000	0.363
Transverse Lie	0	0	0.155	0.316	2	2	0.155	0.561	1	1	0.316	0.561	0.364

Table (3) Comparison between the three groups regarding Neonatal Birth Weight.

		Group (A) 37 weeks	Group (B) 38 weeks	Group (C) 39 weeks
<i>Mean</i>		3012	3137	3307
\pm <i>SD</i>		\pm 316	\pm 397	\pm 440
<i>P value</i>	<i>Comparison to 37</i>		0.025*	< 0.001*(HS)
	<i>Comparison to 38</i>	0.025*		0.013*
	<i>Comparison to 39</i>	< 0.001*(HS)	0.013*	
	<i>Overall</i>	0.034*		

* P-value: It is considered significant if it is less than 0.05.

Table (4) Comparison between the three groups regarding 5-minute Apgar score.

		Group (A) 37 weeks	Group (B) 38 weeks	Group (C) 39 weeks
<i>Mean</i>		8.40	8.64	8.54
\pm <i>SD</i>		\pm 0.829	\pm 0.560	\pm 0.702
<i>P value</i>	<i>Comparison to 37</i>		0.050	0.485
	<i>Comparison to 38</i>	0.050		0.951
	<i>Comparison to 39</i>	0.485	0.951	
	<i>Overall</i>	0.056		

* P-value: It is considered significant if it is less than 0.05.

Table (5) Comparison between the three groups regarding Ballard score.

		Group (A) 37 weeks	Group (B) 38 weeks	Group (C) 39 weeks
<i>Mean</i>		32.82	35.32	37.43
\pm <i>SD</i>		\pm 1.224	\pm 1.024	\pm 1.538
<i>P value</i>	<i>Comparison to 37</i>		< 0.001*(HS)	< 0.001*(HS)
	<i>Comparison to 38</i>	< 0.001*(HS)		< 0.001*(HS)
	<i>Comparison to 39</i>	< 0.001*(HS)	< 0.001*(HS)	
	<i>Overall</i>	< 0.001*(HS)		

* P-value: It is considered significant if it is less than 0.05.

Table (6) Comparison between the three groups regarding incidence of respiratory distress determined by Downes' score more than or equal 4.

		Group (A) 37 weeks	Group (B) 38 weeks	Group (C) 39 weeks
<i>N</i>		15	7	4
<i>%</i>		15	7	4
<i>P value</i>	<i>Comparison to 37</i>		0.036	< 0.001 (HS)
	<i>Comparison to 38</i>	0.036		0.243
	<i>Comparison to 39</i>	< 0.001 (HS)	0.243	
	<i>Overall</i>	0.017*		

* P-value: It is considered significant if it is less than 0.05.

Table (6) Incidence of Respiratory problems in the three studied groups.

		Group (A) 37 weeks	Group (B) 38 weeks	Group (C) 39 weeks
<i>N</i>		6	4	2
<i>%</i>		6	4	2
<i>P value</i>	<i>Comparison to 37</i>		0.516	0.149
	<i>Comparison to 38</i>	0.516		0.407
	<i>Comparison to 39</i>	0.149	0.407	
	<i>Overall</i>	0.353		

* P-value: It is considered significant if it is less than 0.05.

4. Discussion:

The aim of this study was to evaluate neonatal outcomes according to the weeks of gestation in selected low-risk pregnant women at 37 weeks, 38 weeks and 39 weeks to determine the most proper time for elective cesarean section with the least incidence of respiratory morbidity.

In our study, as regarding the Maternal age, there was highly significant statistical difference between the three groups ($P < 0.001$).

This is in agreement with Herstad and his co-worker study who recorded that Cesarean delivery increased substantially with increasing maternal age, especially elective cesarean section. (2012).

In our study, as regarding the Neonatal birth weight, there was significant statistical difference between the three groups ($P = 0.034$). as all neonate are term and there was no maternal medical disorder that affect neonatal birth weight like causes which increase neonatal birth weight as Diabetes mellitus, gestational diabetes or cause which decrease neonatal birth weight as Gestational hypertension, pre-eclampsia, eclampsia.

Our results confirm previous reports that fetal growth (birth weight) is positively associated with gestational age in neonate born to medically free mothers (Matte et al.,2001).

In our study, as regarding the Apgar score in 5 min, there was non-significant statistical difference between the three groups ($P = 0.056$) as Apgar score is index of the severity of intrapartum asphyxia and all neonate are term and fetal distress was excluded.

Locatelli and his co-worker after excluding Chorioamnionitis, umbilical cord prolapse, placental abruption, uterine rupture, shoulder dystocia, premature rupture of the membranes, and small-size for gestational age in his studied population reported that neonatal outcome was not correlated with $AS^{5min} < 7$. (2008).

This fact may be explained by the low frequency of these complications in a low-risk population, but further studies are necessary in high-risk pregnancies. (Odd et al., 2008).

Lie and his co-worker reported that $AS^{5min} < 7$ is useful to predict postnatal outcomes, such as neonatal respiratory distress, need for orotracheal intubation and NICU, and hypoxic-ischemic-encephalopathy (2010).

In our study, as regarding Ballard score, there was high significant statistical difference between the three groups ($P < 0.001$) as Ballard score determine gestational age which increase one week sequentially in each group.

Alexander and his co-worker reported Ballard Score sensitivity of 72.2%, specificity of 97.1%, positive predictive value of 83.2% and negative predictive value of 94.6 %. (1992).

According to Moraes and his co-worker the sensitivity of Ballard score to identify premature babies was <70% and the specificity was 90%. (2000).

In the current study, the incidence of respiratory distress detected by using Downes' score was 15% of 37 weeks group, 7% of 38 weeks group compared to

4% of 39 weeks group with significant statistical difference between the three groups ($P = 0.017$).

In agreement with our findings, Chiossi and his co-worker recommend that elective repeat CS be scheduled to 39 weeks to decrease neonatal morbidity. (2013).

Also Serkan and his co-worker reported that Elective cesarean delivery at 37 weeks of gestation was associated with a statistically significant increase in neonatal mortality and 39 weeks of gestation appears to be the ideal timing for elective cesarean delivery. (2013).

The American College of Obstetricians and Gynecologists recommends that cesarean delivery should not be performed before gestational age of 39 weeks have been accurately determined unless there is documentation of lung maturity (ACOG, 2007).

The Royal Australian and New Zealand College of Obstetricians and Gynecologists guidelines stated that "On balance, weighting up the risk of respiratory morbidity following elective caesarean section and the risk of laboring prior to caesarean section it is recommended that elective caesarean section in women without additional risks should be carried out at 'approximately' 39 weeks gestation. (RANZCOG, 2009).

The National Institute for Clinical Excellence (NICE) recommended that, in general, planned CS should be scheduled at 39 weeks of gestation. (2004).

In our study, Respiratory problems was observed in 6% in 37 weeks group, 4% in the 38 weeks group compared to 2% in the 39 weeks group where there was non-significant statistical difference between the three groups ($P = 0.353$). The incidence of Respiratory problems increased with decreasing gestational age.

In agreement with our finding, Farchi and his co-worker in a retrospective cohort studies of elective repeated cesarean section at term reported that 55-60% was performed prior to 39wks and that respiratory morbidity was increased among these neonates as compared with those delivered at or after 39wks and also found that the odds ratio for respiratory morbidity in elective repeated cesarean section at 37 vs. 39 weeks was 2.70; 38 vs. 39 weeks was 1.34 (2010).

In agreement with our findings Nirand his co-worker in study on timing of planned repeat cesarean delivery after two or more previous cesarean sections did not detect differences in neonatal outcome between and 38-week and 39-week groups which can be attributed by the relatively small difference in the actual gestational age at delivery between the two groups (2013).

Similarly, we confirmed that elective deliveries at 39 and 40 weeks of gestation are associated with fewer adverse neonatal outcomes than is pregnancy continuation. (Titaet al., 2009).

In the current study, Transient Tachypnea of the newborn (TTN) was observed in 5% of 37 weeks group, 4% of 38 weeks group compared to 2% of 39 weeks group where there was non-significant statistical difference between the three groups ($P = 0.485$). The incidence of TTN decreased as gestational age advanced.

This is in agreement with a large, systematic review examining cesarean delivery on maternal request concluded that elective cesarean section carried a higher risk of respiratory morbidity from TTN compared to vaginal delivery. The risk was reduced in with advancing gestational age approaching 39 through 40 weeks (Viswanathan et al., 2006).

And also in agreement with 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 caesarean section or labor induction in early-term infants should be avoided if there is no medical indication (Gouyon et al., 2010).

In our study, Respiratory distress syndrome (RDS) developed in 1% of newborns of the 37 weeks group compared to none of the 38 weeks group and the 39 weeks group, which was non-significant statistical difference between the three groups ($P = 0.367$). The incidence of RDS decreased as gestational age advanced.

This is in agreement with recent Italian study that found that RDS is an exceptional disease after 39 weeks (Farchi et al., 2010).

Also in agreement with study done by Yee and his co-worker who found that incidence of RDS decrease as the GA increase from 1.8 at 37 w to 0.59% at 38 w to 0.0075% at 39w (2008).

In the current study, 6% of 37 weeks group were admitted to the NICU, 4% of 38 weeks group compared to 2% of 39 weeks group ($p = 0.353$) which was non-significant statistical difference between the three groups ($P = 0.353$). The rate of NICU increased with decreasing gestational age.

In agreement with our findings, Wilmlink and his co-worker recorded an increased risk of NICU admission rate for 37 and 38 weeks of gestation (2010).

In agreement with our findings, Tita and his co-worker recorded an increased risk of NICU admission rate for 37, 38, 41 and 42 weeks (2009).

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 and delivery at 37 weeks of gestation was associated with increased incidence of respiratory problems. Therefore we can conclude that delayed delivery beyond 39 weeks is a much better practice.

Conclusions:

According to the results of our study, elective cesarean delivery at 37 weeks of gestation was associated with increased incidence of respiratory problems. Therefore Elective delivery before 39 completed weeks of gestation is less favorable and our findings suggest that there are benefits for waiting until 39 weeks of gestation to perform an elective cesarean delivery provided that there is no maternal or fetal risk.

Further study with a bigger sample size is needed to detect the best timing for elective cesarean section.

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