

Research Article

Timing of Planned Cesarean Delivery on Pregnancy Outcome



Ahmad S. Abd El-Malek¹, Haitham A. Bahaa Eldin¹,
Abd El-Rahman H. Abd El-Wahab¹ and Samer H. Sayed¹

¹Department of Obstetrics and Gynecology, Faculty of Medicine, Minia University, Egypt

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Abstract

Background: There has been a rise in cesarean section (CS) rates globally. The number of newborns delivered through CS has almost doubled increasing from 12% in 2000 to 21% in 2015. scheduling a planned CS too early in pregnancy may be associated with an increased risk for neonatal complications, Aim and objectives; to assess the effect of the scheduled gestational age for a planned CS on the risk of the need for an unplanned CS and adverse pregnancy outcome at different gestational age through a comparison between two groups 39-week group and 38 week group, **Methods:** This prospective cohort study was conducted on 750 pregnant women who scheduled for a planned CS in Minia Maternity University Hospital. **Result:** Scheduled gestational age for planned CS was statistical significantly higher in 38-week group compared to 39-week group ($p < 0.001$), **Conclusion:** There was significant positive correlation between maternal composite adverse outcome with respiratory distress, NICU admission and hypoglycemia in 38-week group while there was significant negative correlation between maternal composite adverse outcome with birth weight in 38-week group.

Keywords: Cesarean; Planned; Timing; Outcome.

Introduction

The optimal timing of delivery in the setting of various clinical conditions and scenarios remains one of the most common questions for obstetric providers^[1]. Cesarean section (CS) has an important role in reducing the risk of maternal and fetal death due to parturition. But the emerging problem of modern midwifery today is the high rates of CS performed^[2].

Cesarean and induced delivery rates have risen substantially in recent decades and currently Initiatives to encourage delaying deliveries until a gestational age of 39 weeks appear to have slowed the increases but have not led to declines^[3]. CS itself not only causes and enhances obstetric complications, but also it may place more

financial burden on families, governments and insurance companies^[4].

Several studies have documented the high incidence of respiratory distress and NICU admissions in infants born by cesarean delivery before the onset of spontaneous labor^[5]. In contrast, however, the incidence of birth asphyxia, trauma, and meconium aspiration is lower, and these advantages of elective cesarean delivery have been reviewed elsewhere in this issue of Clinics^[6].

Accurate data about the occurrence of respiratory failure and long-term outcomes in term and near-term infants are hard to obtain because of the lack of large databases such as those available for

preterm infants; however, it is estimated that a significant number of term infants delivered by ECS are admitted to neonatal intensive care units each year in the US⁹ with the diagnosis of transient tachypnea of the newborn, respiratory distress syndrome, and severe persistent pulmonary hypertension of the newborn (PPHN)/ hypoxic respiratory failure¹⁷.

To minimize the occurrence of iatrogenic respiratory distress syndrome (RDS), fetal lung maturity testing was initially recommended before elective cesarean delivery. Changes in the pulmonary vasculature, such as slowing of smooth muscle cell replication and involution at birth, increase in the small pulmonary blood vessels (up to 40 times) in the 3rd trimester, and changes in the epithelial sodium channels with increased ability to clear fetal lung fluid at term and with labor, all play an important role¹⁸.

The aim of the current study is to assess the effect of the scheduled gestational age for a planned CS on the risk of the need for an unplanned CS and adverse pregnancy outcome at different gestational age through a comparison between two groups 39 week group and 38 week group.

Patients and methods

This prospective cohort study of some women who had been scheduled for a planned CS in a Minia Maternity University Hospital during the year 2020. The study was approved by the local institutional review board.

Women were divided into two groups according to the gestational age at which the planned CS was scheduled: The 38-week group included women for whom the planned CS was scheduled at gestational age of 37+4 to 38+3 weeks, and the 39-week group which included women for whom the planned CS was scheduled at gestational age \geq 38+4 weeks and achieved the age of 39 week or not achieved. The reason for choosing these specific ranges of gestational age for each of the groups was based on the fact that when aiming to schedule a planned CS for a specific week (38 or 39 weeks) it was not always

possible to schedule the CS for the exact complete gestational week (i.e. 38 or 39).

Exclusion criteria involved cases scheduled for CS prior to 37 weeks due to: placenta previa, suspected placenta accretes, maternal medical disease as cardiac Renal or lung disease, and congenital fetal anomalies that affect CS outcome.

All Patients were subjected to: General examination [evaluation of vital signs, and measurements of weight, height (BMI)]; Abdominal and local clinical examination (to assess fundal level and gestational age, scar of previous operation, mass, tenderness or rigidity, and any abdominal or pelvic clinically detectable pathology). For women who will have CS done unplanned CS before the scheduled date of the planned CS, the actual gestational age at delivery, indication for unplanned CS. The presence of uterine contractions, cervical and membrane status at the time of the unplanned CS had also be documented.

Statistical Analysis

The collected data was tabulated, and statistically analyzed using SPSS program (Statistical Package for Social Sciences) software version 26.0, Microsoft Excel 2016 and MedCalc program software version 19.1. Descriptive statistics were done for numerical parametric data as mean \pm SD (standard deviation) and minimum & maximum of the range and for numerical non parametric data as median and 1st& 3rd inter-quartile range, while they were done for categorical data as number and percentage. Differential analyses were done for quantitative variables using independent t-test in cases of two independent groups with parametric data and Mann Whitney U in cases of two independent groups with non-parametric data. Inferential analyses were done for qualitative data using Chi square test for independent groups. The level of significance was taken at P value <0.05 is significant, otherwise is non-significant. The p-value is a statistical measure for the probability that the results observed in a study could have occurred by chance.

Results

This prospective cohort study was conducted on 750 pregnant women who scheduled for a planned CS in Minia Maternity University Hospital. They divided into two groups; 38-week group: 484 pregnant women for whom the planned CS was scheduled at gestational age of 37+4 to 38+3 weeks, and 39-week group: 266 pregnant women for whom the planned CS was scheduled at gestational age of 38+4 weeks and achieved the age of 39 week or not achieved. Table (1) illustrated a comparison between the two groups regarding age. The age in 38-week group ranged from 25 to 43 years with mean \pm SD was 34.87 \pm 3.71 years while the in 39-week group the age ranged from 29 to 45 years with mean \pm SD was 35.08 \pm 3.12 years with no statistical significant difference between the two groups (p=0.659).

Table (2) showed that there was statistically significant difference between 38-week group and 39-week group regarding parity (p=0.011) as in 38-week group, 10.7% were nullipara, 27.7% were para1, 31% were para 2, 19% were para 3 and 11.6 cases were para 4, while in 39-week group 9.8% cases were nullipara, 17.3% were para 1, 33.8% were para2, 21.8% were para3 and 17.3% cases were para4. Also, there was statistically significant difference between 38-week group and 39-week group regarding number of previous CS (p=0.002) as the percentage of cases that had previous CS \geq two times were significantly higher in 39-week group (65.4% Vs 43.3%). Table (3) demonstrated a comparison between the two groups regarding Scheduled gestational age for planned CS. Scheduled gestational age for planned CS was statistical significantly higher in 38-week group compared to 39-week group (p<0.001).

Figure (1) showed that there was statistically significant difference between the two group regarding indication for unplanned CS (p=0.018) as in 38-week group the causes were onset of labour in 7% of total cases, fetal distress in 0.8%,

abnormal CTG in 0.4%, oligohydramnios in 0.8% , PROM in 3.3% and scar pain or tenderness in 3.7% while in 39-week group, the causes were onset of labour in 9% of total cases, PROM in 8.3% and scar pain or tenderness in 3.8%. Meanwhile, 16.1% in 38-week group and 21.1% in 39-week group had unplanned CS with no statistically significant difference between the two groups regarding unplanned CS (p=0.091).

Table (4) illustrated that the maternal composite adverse outcome was 37.6% in 38-week group and 35.3% in 39-week group. Peritoneal adhesions were found in 66.9% in 38-week group and 51.1% in 39-week group. General anesthesia was used in 38-week group and 39-week group was 8.7% and 9% respectively. Postpartum hemorrhage was found in 5.8% in 38-week group and 4.5% in 39-week group. Hemotransfusion was done for 3.3% and 3% in 38-week and 39-week groups respectively. Overall, there was no statistically significant difference between 38-week group and 39-week group regarding maternal composite adverse outcome (37.6% versus 35.3%) or hospitalization days (p=0.535).

Figure (2) showed that neonatal birth weight was significantly higher in the 39-week group compared to 38-week group (p<0.001). Figures (3, 4) described that the respiratory morbidity and need of mechanical ventilation were significantly higher in the 38-week group compared to 39-week group (p= 0.003& 0.017 respectively). There were differences in neonatal adverse outcome between the 38- and 39-week groups as regards perinatal mortality, 5-min Apgar score <7, NICU admission, transient tachypnea of the newborn (TTN), respiratory distress syndrome (RDS), Pneumothorax and Birth trauma (p>0.05).

According to table (5), there was significant positive correlation between maternal composite adverse outcome with respiratory distress, NICU admission and hypoglycemia in 38-week group while there was significant negative correlation

between maternal composite adverse outcome with birth weight and hypoglycemia in 38-week group. In 39-week

group, there was significant negative correlation between maternal composite adverse outcome and birth weight.

Table (1): Comparison between the two groups regarding age.

		38-week group (No. = 484)	39-week group (No. = 266)	Test value	P-value
Age (years)	Mean± SD	34.87± 3.71	35.08± 3.12	$Z_{MWU}=0.441$	0.659
	Median	35.0	35.0		
	Range	25.0- 43.0	29.0- 45.0		

p≤0.05 is considered statistically significant, *p*≤0.01 is considered high statistically significant, SD= standard deviation, -comparison between groups done by Mann-Whitney test

Table (2): Comparison between the two groups regarding obstetric history.

		38-week group (No. = 484)		39-week group (No. = 266)		Test value	P-value
		No.	%	No.	%		
Gravidity	G1	46	9.5%	29	10.9%	$X^2= 6.53$	0.163
	G2	97	20.0%	42	15.8%		
	G3	125	25.8%	89	33.5%		
	G4	114	23.6%	58	21.8%		
	G5	102	21.1%	48	18.1%		
Parity	P0	52	10.7%	26	9.8%	$X^2= 13.12$	0.011
	P1	134	27.7%	46	17.3%		
	P2	150	31.0%	90	33.8%		
	P3	92	19.0%	58	21.8%		
	P4	56	11.6%	46	17.3%		
Abortion	No	152	31.4%	106	39.8%	$X^2= 5.48$	0.065
	Once	154	31.8%	76	28.6%		
	Twice	178	36.8%	84	31.6%		
Number of previous CS	0	52	10.7%	26	9.8%	$X^2= 18.01$	0.001
	1	174	36.0%	66	24.8%		
	2	196	40.5%	122	45.9%		
	3	36	7.4%	40	15.0%		
	4	26	5.4%	12	4.5%		
	Mean± SD	1.61± 0.96		1.80± 0.97		$Z_{MWU}=3.09$	0.002
Median	2.0		2.0				
Range	0.0- 4.0		0.0- 4.0				

Table (3): Comparison between the two groups regarding Scheduled gestational age for planned CS.

		38-week group (No. = 484)	39-week group (No. = 266)	Test value	P-value
Scheduled gestational age for planned CS (weeks)	Mean± SD	37.97± 0.29	38.83± 0.17	$Z_{MWU}=22.79$	<0.001
	Range	37.57- 38.43	38.57- 39.0		

Table (4): Comparison between the two groups regarding maternal outcome.

	38-week group (No. = 484)		39-week group (No. = 266)		Test value	P-value
	No.	%	No.	%		
Maternal composite adverse outcome	182	37.6%	94	35.3%	$X^2 = 0.379$	0.538
General anesthesia	42	8.7%	24	9.0%	$X^2 = 0.025$	0.873
Postpartum hemorrhage	28	5.8%	12	4.5%	$X^2 = 0.552$	0.458
Hemotransfusion	16	3.3%	8	3.0%	$X^2 = 0.049$	0.824
Bladder laceration	8	1.7%	2	0.8%	$X^2 = 1.06$	0.303
Dehiscence of uterine scar	22	4.5%	14	5.3%	$X^2 = 0.193$	0.660
Rupture of uterine scar	2	0.4%	2	0.8%	$X^2 = 0.371$	0.542
Accidental extension of uterine incision	14	2.9%	6	2.3%	$X^2 = 0.268$	0.604
Need for inverted-T incision	4	0.8%	2	0.8%	$X^2 = 0.012$	0.913
Difficulty in fetal extraction	26	5.4%	12	4.5%	$X^2 = 0.264$	0.607
Wound infection	30	6.2%	16	6.0%	$X^2 = 0.01$	0.920
Pelvic hematoma	6	1.2%	2	0.8%	$X^2 = 0.387$	0.534
Wound hematoma	14	2.9%	12	4.5%	$X^2 = 1.344$	0.246
Venous thromboembolism	2	0.4%	0	0.0%	$X^2 = 1.10$	0.294
Admission to intensive care unit	4	0.8%	0	0.0%	$X^2 = 2.21$	0.137
Hospitalization days	Mean± SD	3.55± 1.07	3.50± 1.12		$Z^{MWU} = 0.621$	0.535
	Median	4.0	3.0			
	Range	2.0- 5.0	2.0- 5.0			

Table (5): Correlation between Maternal composite adverse outcome and neonatal outcome.

	Maternal composite adverse outcome			
	38-week group		39-week group	
	r	p- value	r	p- value
1-min Apgar score	-.010-	.828	-.038-	.536
5-min Apgar score	.043	.340	.062	.315
Birthweight (g)	-.127-	.005	-.136-	.026
NICU admission	.094	.039	-.011-	.854
Respiratory morbidity	-.021-	.639	-.009-	.882
transient tachypnea of the newborn (TTN)	-.017-	.704	-.006-	.918
respiratory distress syndrome (RDS)	.100	.028	-.064-	.296
Mechanical ventilation	-.059-	.192	.038	.538
Pneumothorax	.083	.068	.118	.055
Birth trauma	-.101-	.027	.038	.538
Infectious morbidity	.070	.126	-.091-	.137
Hypoglycemia	.096	.035	-.091-	.137
Phototherapy	-.017-	.704	.011	.853

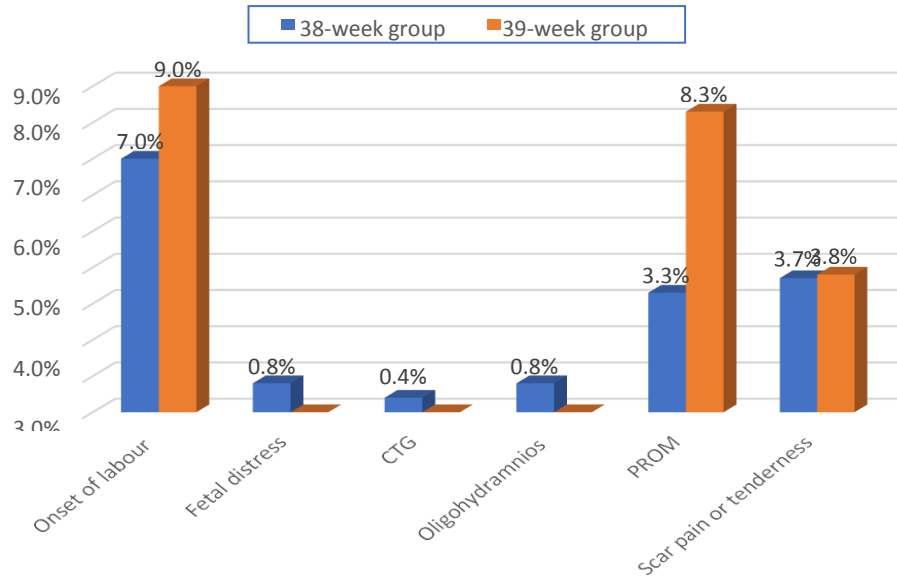


Figure (1): Comparison between the study groups regarding indication for unplanned CS.

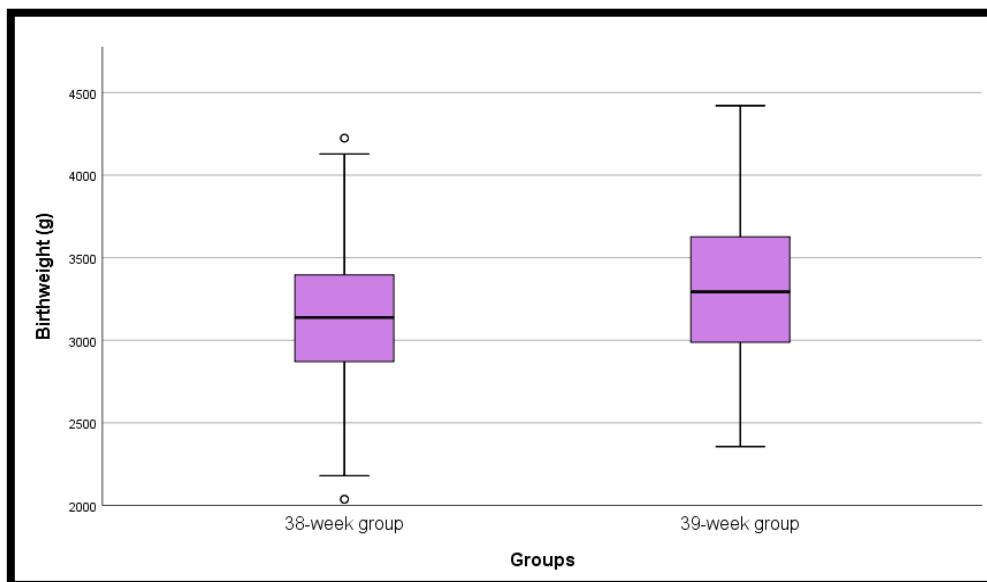


Figure (2): Boxplot showing difference between the study groups regarding neonatal birth weight.

Discussion

Despite the World Health Organization’s recommendation that CS rates should not exceed 10–15% of births, most countries (63%) reported a CS rate above the recommended level. This increase is explained by the rise in both primary and repeat CS [9]. These high elective CS rates have become a global constant despite an established increased risk of neonatal adverse respiratory morbidities among

uncomplicated term pregnancies after elective CS compared to vaginal delivery. This risk, however, decreases after 39 weeks of gestation. Accordingly, recent studies have focused on the effect of timing of elective term CS on adverse neonatal outcomes [10]. Studies assessing the effect of timing of elective CS on newborn outcomes are lacking in the Middle East despite the alarmingly high rates of elective CS. Lebanon, a country in the Middle East,

has witnessed a tremendous increase in CS from 18% in 2000 to 47% in 2017, a 161% increase over an 18-year time ^[11].

Regarding age, the age in 38-week group ranged from 25 to 43 years with mean \pm SD was 34.87 ± 3.71 years while the in 39-week group the age ranged from 29 to 45 years with mean \pm SD was 35.08 ± 3.12 years with no statistically significant difference between the two groups ($p=0.659$). In accordance with our results, study of Melamed et al., ^[12] as they reported that 448 women who were scheduled for a planned repeat CS following two or more previous CS were identified, seventy-one women were excluded from the study, and there were no significant differences in the demographic characteristics of the two groups. Also, in the study of Shinar et al., ^[13], the characteristics of women in the elective CD and expectant management groups were similar with regards to maternal age and gestational weight gain.

The present study showed that there was statistically significant difference between 38-week group and 39-week group regarding parity ($p=0.011$). The present results were in agreement with study of Doan et al., ^[14] as they showed that there was statistically significant difference between 38-week group and 39-week group regarding parity. Our results were supported by study of Pirjani et al., ^[15] as they reported that repeated caesarean was more frequent in mothers who delivered between 38 and 39 gestational weeks compared to mothers who delivered after 39 gestational weeks (64.7% vs. 45.1%, $P < 0.001$). The current study showed that regarding scheduled gestational age for planned CS.

Scheduled gestational age for planned CS was statistical significantly higher in 38-week group compared to 39-week group ($p < 0.001$). This results were supported by study of Al Bizri et al., ^[16], as they reported that the distribution of gestational ages differed between primary and repeat elective CS (P -value < 0.001). However, Melamed et al., ^[12] revealed that the mean gestational age for the scheduled planned

CS was significantly lower for the 38-week group (38.0 ± 0.3 versus 38.9 ± 0.3 weeks, $p, 0.001$). In the study in our hands, there was statistically significant difference between the two group regarding indication for unplanned CS ($p=0.018$). In accordance with our results study of Ramadan et al., ^[17] as they reported that labor accounted for around 80% ($n = 63/78$) of unplanned cesarean deliveries, while the remaining 20% ($n = 15/78$) were attributed to the following obstetric conditions: premature rupture of membrane (PROM) ($n = 8$), fetal growth restriction/distress ($n=4$), preeclampsia ($n = 1$), abruptio placenta ($n = 1$), and placenta previa ($n = 1$).

In the study of Melamed et al., ^[12], the rate of unplanned CS was significantly higher in the 39-week group than in the 38-week group (23.0% versus 13.3%, $p, 0.02$). The most common indications for unplanned CS were uterine contractions and premature rupture of membranes. However, in the study of Pirjani et al., ^[15], indications for elective caesarean delivery were prior caesarean section in 54.5% (1137 women), breech presentation in 7.2% (150 women), suspected cephalopelvic disproportion in 4.6% (96 women), maternal requested CS in 28.8% (601 women), and other causes such as retinopathy or myopathy and a history of infertility in 4.9% (102 women).

The present study showed that regarding maternal composite adverse outcome was 37.6% in 38-week group and 35.3% in 39-week group. Peritoneal adhesions were found in 66.9% in 38-week group and 51.1% in 39-week group. Overall, there was no statistically significant difference between 38-week group and 39-week group regarding maternal composite adverse outcome. This result was supported by study of Shinar et al., ^[13], as they reported that the incidence of the composite maternal outcome was comparable between elective delivery at 37 0/7 to 37 6/7 weeks' gestation and expectant management and between elective delivery at 38 0/7 to 38 6/7 weeks' gestation and expectant management. While, in the study of Tita et al., ^[1], the incidence of individual and composite adverse maternal outcomes

by gestational age at delivery is presented. There were two maternal deaths (at 38 and 39 weeks) and no cases of uterine rupture.

Whereas, in the study of Phaloprakarn et al.,^[18], maternal outcomes in relation to the GA for a scheduled cesarean delivery (CD) are presented. Using 39 weeks as the reference group, a blood loss rate of > 1 L was significantly increased when CDs were performed electively at 37 or 40 weeks ($P = 0.004$ and $P = 0.003$, respectively). In contrast with our results, study of Melamed et al.,^[12], as they revealed that women in the 39-week group had a higher rate of maternal composite adverse outcome (31.9% versus 21.6%, $P, 0.03$).

The current study showed that regarding comparison between the two groups regarding neonatal outcome, respiratory morbidity and need of mechanical ventilation were significantly higher in the 38-week group compared to 39-week group. However, in the study of Pirjani et al.,^[15], the weight of neonates born after 39 gestational weeks was significantly higher than neonates born between 38 and 39 gestational weeks (mean difference: 136.76, 95% CI: 103.61 to 169.91, $P < 0.001$).

Ertuğrul et al.,^[19] demonstrated the incidence of adverse neonatal outcomes according to the gestational age at delivery. The rate of NICU admission was 8.7%. Whereas Doan et al.,^[14] revealed that the rates of most adverse outcomes were significantly different between the two groups, including the primary outcome, low Apgar score, NCCU admission, respiratory outcomes (RDS, TTN, pneumothorax), oxygen use, CPAP, jaundice requiring phototherapy, hypoglycemia, and SGA. The primary outcome of serious respiratory morbidity occurred in only 0.5% of full term (FLT) babies compared to 1.2% of early term (ET) ($P < 0.001$). However, in the study of Melamed et al.,^[12], planned repeat CS scheduled to week 39 was independently associated with a 1.8-fold increased risk for maternal adverse outcome compared with repeat CS scheduled to week 38. The only other factor that was associated with maternal

adverse outcome was the presence of severe intraperitoneal adhesions.

Conclusion

CS at around 38 weeks compared with at around 39 weeks is associated with an increased risk for neonatal adverse outcomes. Respiratory morbidity and need of mechanical ventilation were significantly higher in the 38-week group compared to 39-week group.

Conflict of interest: None.

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