



## Research Article

# Adherence of Obstetrician to the Guideline Regarding the Timing of Elective Caesarean Sections and its Effect on the Neonatal Outcome

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## Abstract

### Objectives:

- Study the adherence of obstetrician to the guideline regarding the timing of elective caesarean sections.
- Study the effect of timing of the procedure on the neonatal outcome.

**Methods:** In this cross-sectional observational study, involved 210 pregnant women who underwent elective caesarean section that subdivided into two groups according to gestational age at the time of caesarean section:

- Group A: < 39 weeks.
- Group B: ≥ 39 weeks.

All neonates were examined by Pediatrician; neonates who required admission to the NCU were followed up until discharge.

**Results:** 66.7% of elective caesarean section were performed <39week gestation and remaining (33.3%) were performed at >39 weeks gestation. The commonest indication of caesarean section in all gestational age was previous scar (s) followed by malpresentation. There was statistically higher admission to NCU among neonates who were delivered before 39 weeks gestation. There were 5 cases of neonatal death among neonates who were delivered before 39 weeks. No case of neonatal death occurs among those who were delivered at or after 39 weeks gestation.

**Conclusion:** There is a high proportion of elective caesarean sections performed at earlier gestation than recommended by guideline. This was associated with increased neonatal mortality and morbidity.

**Keywords:** Cesarean section; Gestational age; Labor

## 1. Introduction

The rate of caesarean section deliveries is elevating alarmingly throughout the world [1]. In the USA, the rate of caesarean section in 2013 was 32.7% [2], which is much higher than the WHO target for caesarean section which is 10-15% [3], while in Iraq the rate of caesarean section raised from 18.0% to 24.4% in 2008 and 2012 respectively [4]. Elective caesarean section:- caesarean section is indicated, but there is no need to perform it urgently, so timing of the delivery is planned to fit the mother and the medical staff, as in asymptomatic placenta previa, malpresentation (e.g. brow, breech), previous vesico-vaginal or recto- vaginal fistulae repair, or HIV infection [5].

### 1.1 The optimal timing of elective CS

“The Royal Australian and New Zealand College of Obstetricians and Gynecologists” (RANZCOG) and “the National Institute for Health and Care Excellence” (NICE) state that the optimal time to perform planned caesarean sections is after 39<sup>+0</sup> weeks [6, 7]. Neonatal morbidities as transient tachypnea of the newborn respiratory distress syndrome, mechanical ventilation, breastfeeding difficulties and admission to the neonatal care units are more common in babies born by elective caesarean section at 37<sup>+0</sup> and 38<sup>+0</sup> week gestation compared to those born at 39<sup>+0</sup> week gestation [8-11], in addition neurological system continues to develop through the period from 37<sup>+0</sup> to 39<sup>+0</sup> weeks and the educational delay is lowest among children born at 40<sup>+0</sup>-41<sup>+0</sup> weeks [12]. 1:12 women of low risk group will develop spontaneous labour before the date of

elective caesarean section at  $\geq 39^{+0}$  week, this most commonly occur in women with previous history of spontaneous preterm labour, smoking during pregnancy and women who had two or more caesarean sections [13]. Women with repeated caesarean sections who subjected to urgent operation have higher incidence of intra-operative bleeding, this result in increasing numbers of caesarean section performed before 39 week gestation, however, it has been found that the risk of bleeding is higher if caesarean section is performed at 37-38 weeks compared to 39 weeks gestation [8]. So maternal and neonatal morbidity caused by earlier caesarean section should be balanced carefully against the risks of spontaneous labour occurring before the planned date [14].

### 1.2 Estimation of gestational age

**1.2.1 Estimation of gestational age on the basis of last menstrual period (LMP):** Naegele's rule is a simple calculation for the estimated date of delivery that involved adding 9 months and 7 days to the first day of the LMP. This calculation provides an indirect measure of the time of conception and remains the current standard for calculating the duration of pregnancy based on the LMP. Estimation of gestational age based on LMP is considered to be less reliable than sonographic examination because woman may become pregnant on any day of her menstrual cycle, including the first day [15].

**1.2.2 Estimation of gestational age based on ultrasound examination:** Between 7 and 12 weeks gestation, fetal crown-rump length (CRL) is used to estimate the gestational age [16], it is the most accurate sonographic measure (prediction of accuracy  $\pm 5$  days) [17], in the period between 15 and 22 weeks the biparietal diameter (BPD) or the head circumference (HC) is used. Between 13 and 15 weeks, ultrasound dating is less accurate, as the fetus flexes, making

difficulty in measuring CRL, also it is too early for an accurate measurement of the head (BPD, HC) [16].

### 1.3 Neonatal outcome

The adverse events of the neonates result from early caesarean section include hypoglycemia, neonatal respiratory morbidity (TTN and RDS), neonatal intensive care unit (NICU) admissions, sepsis and prolonged hospitalization [18]. Transient tachypnoea of the newborn: is the most common complication after term CS deliveries, it characterized by early onset of tachypnoea, expiratory grunting and cyanosis, chest X-ray is usually clear. TTN is usually managed by 40% oxygen supply and recovery usually occur within few days [19]. Respiratory Distress Syndrome: predominantly affects preterm infants, however, term infants also can be affected mainly those of diabetic mother or after planned caesarean section, it manifested by tachypnoea, cyanosis, prominent grunting and nasal flaring. Chest X-ray shows a ground-glass appearance with air bronchograms [20].

## 2. Patients and Methods

This is a cross-sectional observational study carried out at Al-Mawany hospital, Al-Basra, Iraq through a period extended from January till July 2017. A total of 210 pregnant women who underwent elective cesarean delivery were involved in the study. All the studied women were collected from the obstetric ward. Pregnant women involved in this study were subdivided into two groups:

- Group A (n=140): include pregnant women with gestational Age of less than 39weeks at the time of caesarean section.
- Group B (n=70): those with gestational age of 39 weeks or more at the time of elective caesarean section.

Detailed history was obtained from all participants, including age, gravidity and parity, details of the present pregnancy, surgical history; if there is previous caesarean section and any medical disease. Gestational age was determined by the date of the last menstrual period and the results of earlier ultrasound examination. Women with diabetes mellitus, gestational or chronic hypertensive disorders, hemoglobinopathy, and multiple pregnancies, pregnancies with intrauterine growth retardation and congenital anomalies were excluded from the study. Full clinical examination was done including Leopold's Manoeuvres. At the time of caesarean section, all neonates were examined by Pediatrician, body weight and Apgar score at 1, 5 and 10 minutes was recorded. Neonates who required admission to the NCU were followed up until discharge. neonatal outcome, including: transient tachypnoea of the newborn (TTN), respiratory distress syndrome (RDS), feeding difficulties, prolonged hospitalization (5 days or longer) due to respiratory distress and death were recorded.

### 2.1 Statistics analysis

Data were analyzed using NCSS11, Quantitative variables as age, parity, fetal weight and Apgar score were expressed as mean and SD (standard deviation), with unpaired t-test used for comparison, Qualitative variable were expressed as frequency and percentages and compared by using Chi-square test. Statistically significant differences were considered when P values are less than 0.05.

## 3. Results

### 3.1 Maternal and fetal demographic data

Table 1 shows maternal and fetal demographic data in both groups, maternal age and parity expressed as Mean  $\pm$  SD; while fetal weight expressed as percentage. There was statistically significant difference in maternal age and parity between the two groups, women of group B

tend to be younger and of lower parity compared to group A. Regarding fetal weight there was statistically significant difference between the two groups, 69.3% of neonates born before 39 weeks gestation has body weight of <3000 g compared to only 40% in those born after 39 weeks gestation.

### 3.1 Indications of caesarean section

Table 2 shows that Previous cesarean section (s) was the commonest indication of elective cesarean section in both groups which accounted for 62.1% in group A and 47.1% in group B. 24.3% of women who underwent caesarean section before 39 week gestation had 3 or more previous caesarean sections compared to only 7.1% of those who underwent caesarean section at or after 39 week gestation which is statistically significant difference ( $P = 0.0048$ ). Caesarean section due to malpresentation is statistically higher in group B compared to group A (37.1% and 14.3% respectively). Other indications which included bad obstetric history, orthopedic surgeries and anterior-posterior vaginal wall repair account for 22.9% of women of group A and 14.3% of women of group B.

### 3.2 Gestational age distribution among various indications of elective caesarean section

Table 3 shows 66.7% of elective caesarean section were performed at gestational age of less than 39 week [7.1% at 36-36<sup>+6</sup> week, 30.5 % at 37-37<sup>+6</sup> week and 29% at 38-38<sup>+6</sup> week] and only 33.3% of elective caesarean section were performed at  $\geq 39$  weeks gestation. The commonest indication for caesarean section in all gestational age was previous caesarean section (s), 80%

of caesarean section at 36 week was due to previous scar (s), mainly three or more scars (33.3%), previous two caesarean section was the commonest cause for performing caesarean section at 38 week gestation, 37.1% of elective caesarean section at  $\geq 39$  week gestation was due to malpresentation.

### 3.3 Neonatal outcome according to gestational age

Table 4 shows there was significantly higher admission to the NCU among neonates who delivered before 39 week compared to those who delivered at  $>39$  week (23.6% and 10% respectively). The commonest cause for admission in both groups was TTN (11.4% in group A and 5.7% in group B), the second commonest cause for admission was RDS which occur more frequently in group A (5.7%) than group B (1.4%), but this difference didn't reach statistical significance. Four cases of RDS required hospitalization for  $>5$  days and treated by oxygen supplement with no need for mechanical ventilation, these cases belong to group of neonates who were delivered before 39 week gestation. Statistically, there was no significant difference in the frequency of hypoglycemia (due to breastfeeding difficulty) between group A and B. There were 5 cases of neonatal death (2.4% of total number of caesarean section), all of them occur among neonates who were delivered before 39 week gestation, three of them (1.4%) occurred among neonates who were delivered at 37 weeks gestation, one neonatal death occur among neonates delivered at 36 weeks and one at 38 weeks gestation. There was no statistically significant difference in Apgar score between both groups.

AGE (Years)	Group A	Group B	P value
	29.23 ± 6.70	25.84 ± 6.67	0.001
Parity	2.58 ± 1.90	1.16 ± 1.51	<0.0001
Fetal weight (g)	3.07 ± 0.39	3.36 ± 0.37	<0.0001
3000≤	97 (69.3%)	28 (40%)	0.0001
>3000	43 (31.7%)	42 (60%)	

Group A: gestational Age <39weeks; Group B: gestational Age ≥ 39 weeks; P value <0.05 consider significant

**Table 1:** Maternal and fetal demographic data.

	Group A (n) % N=140	Group B (n) % N=70	P value
Malpresentation	(20) 14.3%	(26) 37.1%	0.0003
Previous scar	(87) 62.1%	(33) 47.1%	0.0545
CS1	(18) 12.9%	(18) 25.7%	0.0327
CS2	(35) 25%	(10) 14.3%	0.1084
CS3≥	(34) 24.3%	(5) 7.1%	0.0048
Patient's request	(1) 0.71%	(1) 1.43%	0.8017
Other causes	(32) 22.9%	(10) 14.3%	0.2002

Group A: gestational Age <39weeks; Group B: gestational Age ≥ 39 weeks; P value <0.05 consider significant; CS- Caesarean section

**Table 2:** Indications of Caesarean section in both groups.

	36-36wk <sup>+6days</sup>	37-37wk <sup>+6days</sup>	38-38wk <sup>+6days</sup>	≥39wk	P value
Number of cases	(15) 7.1%	(64) 30.5%	(61) 29.1%	(70) 33.3%	< 0.0001
Malpresentation	(1) 6.7%	(10) 15.6%	(9) 14.8%	(26) 37.1%	0.0020
Previous scar	(12) 80%	(46) 71.9%	(42) 68.9%	(33) 47.1%	0.0033
CS1	(4) 26.7%	(11) 17.2%	(16) 26.2%	(18) 25.7%	0.5824
CS2	(3) 20%	(15) 23.4%	(17) 27.9%	(10) 14.2%	0.2844
CS3≥	(5) 33.3%	(20) 31.3%	(9) 14.8%	(5) 7.1%	0.0014
Patient's request	(0) 0%	(1) 1.6%	(0) 0%	(1) 1.43%	0.7662
Other causes	(2) 13.3	(7) 10.9%	(10) 16.3	(10) 14.3%	0.3264

P value <0.05 consider as significant; Total number of cases=210

**Table 3:** Gestational age distribution at time of caesarean section among various indications.

	Group A (n) % N=140	Group B (n) % N=70	P value
Admission to NCU	(33) 23.6%	(7) 10%	0.0277
<b>Causes of NCU Admission</b>			
RDS	(8) 5.7%	(1) 1.4%	0.187
TTN	(16) 11.4%	(4) 5.7%	0.1989
Hypoglycemia	(4) 2.8%	(3) 4.3%	0.5886
Neonatal death	(5) 3.6%	(0) 0%	0.2442
APGAR score at 1minute	6.09 ± 1.59	6.76 ± 1.07	0.2961
APGAR score at 5minute	7.51 ± 1.51	8.17 ± 1.13	0.2831
APGAR score at >5minute	8.34 ± 1.27	8.77 ± 0.995	0.4064

Group A: gestational Age <39 weeks; Group B: gestational Age ≥ 39 weeks; P value <0.05 consider significant

**Table 4:** Neonatal outcome.

#### 4. Discussion

In our study, pregnant women who underwent a caesarean section at or after 39 week gestation are of lower age and parity than those who had a caesarean section before 39 week gestation, our results agree with the study of Shamel M et al. [18] and Emily D, et al. [21]. The explanation is that the commonest indication for caesarean section in our study was previous caesarean section (s), so women of low parity, who usually also would be of younger age tend to have one or no previous caesarean section so the timing of elective caesarean section tend to be later (>39 week gestation) than those with previous two or more caesarean section (who tend to be older and of higher parity). Neonates delivered at or after 39 week gestation had higher body weight than those who delivered before 39 week gestation, as fetal growth continue in the range of 24-26 g/day increment in the late third trimester [22]. Malpresentation as an indication for elective caesarean section was more common in the group of women who underwent caesarean section at or after 39 week gestation compared to those who had their caesarean section before 39 week gestation, this result is in line with the result of Shamel M, et al. [18].

The commonest indication for caesarean section in both groups was previous caesarean section (s), 87.2% of women with previous >3 caesarean section (34 cases out of 39) had their caesarean section performed before 39 week gestation while only 12.8% (5 cases) of them had their caesarean section performed at or after 39 week gestation, 82.1% (69 out of 84 cases) of women with history of previous two or more caesarean section had their elective procedure performed before 39 week gestation this is agree with the results of the study of Emily D, et al. [21] and Glavind J, et al. [23]. This earlier caesarean section among women with multiple caesarean sections could be due to fear of spontaneous labour if the procedure is performed later on with possibility of uterine rupture [24, 25], also there is an increased risk of unexplained stillbirth [9, 26]. 17.1% of cases of elective caesarean section (36 out of 210) was due to previous one caesarean section because of trend toward elective caesarean section rather than trial of vaginal birth after caesarean section in the developing countries which could be due to limited training or fear of litigation [27].

In our study, 66.6% of elective caesarean section were performed before 39 weeks of gestation (group A) and 33.3% of elective caesarean section were performed at or after 39 weeks (group B) ( $P < 0.0001$ ), this is in agreement with the studies of Wilmink FA et al. [9] and Yeung K, et al. [24]. It was surprising that 7.1% of caesarean section was performed at 36 weeks gestation and 30.5% at 37 weeks gestation, in both gestational age the commonest cause was previous scar (s) as we mention previously. In our study, 23.6% of the neonate who were delivered before 39 weeks gestation had been admitted to the NCU compared to 10% of the neonates who were delivered at or after 39 weeks gestation. TTN and RDS were the commonest causes for admission to the NCU, these were more frequent in group A than in group B, but the difference doesn't reach statistical significance, our results agree with the study of Tita et al. [11].

Hypoglycemia was more common in group B, this result disagrees with the study of Emily D et al. [21]. All cases of neonatal death occurred among the neonates who were delivered before 39 weeks gestation, 4 out of 5 of these death occurred among neonates who were delivered before 38 weeks gestation, the result of our study disagree with that of Ghazala A, et al. [28] and Wilmink F [9].

## 5. Conclusion

There is high proportion of elective caesarean sections performed at earlier gestation than recommended by guideline. This was associated with increased neonatal mortality and morbidity.

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## Conflict of Interest

There was no conflict of interest.

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