The Risk of Subsequent Preterm Birth After Second Stage Cesarean Section

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ABSTRACT

Objective: Preterm birth is defined as delivery before 37 weeks of gestation, it has multiple risk factors on the mother and the baby. The aim of this study is to evaluate the risk of subsequent preterm birth (sPTB) after the second stage and compare it with caesarean section (CS) in the first stage and with normal vaginal delivery.

Method: A retrospective cohort study included 276 women with two consecutive deliveries in the period between January 2014 to December 2018, data collection was held in the department of Obstetrics and Gynecology in Salmaniya medical center.

Results: In this study, the mean age of the patients was 29.80±5.44 years; the mean interval between the index and subsequent pregnancy was 2.48±1.09 years. Subsequent 'preterm' births were found in 25 (9.06%) patients in total. Out of which, 8 had sPTB in women who had undergone first stage cesarean section while 10 had sPTB in women who underwent 2nd stage C-section. However, among 'normal' vaginal delivery group 7 females were observed to have sPTB (4.5%) RR=1.74, the subsequent preterm birth was found in 25 (9.06%) patients.

Conclusion: This study concluded that there is an increased risk of subsequent preterm birth (i.e. 1.74 times) among women who underwent second stage cesarean section.

Keywords: Labour, Subsequent Preterm Birth, Caesarean Section

INTRODUCTION

Preterm birth is defined as babies born before 37 weeks of gestation. According to the World health organization (WHO) they can be subcategorized into the following: Extremely preterm which is when babies are born in less than 28 weeks, very preterm which is between 28 to 32 weeks and moderate to late preterm which between 32 and 37 weeks[1].

It is estimated that 15 million babies are born preterm every year, and this number has been steadily increasing since 2005. In addition to the concern of the potential rise in death and disability in these preterm babies, there is the concern of the economic costs of caring for premature infants[2].

Preterm birth complications are one of the leading causes of death among children under five years of age. These complications were responsible for approximately 1 million deaths in the year 2015[1].

In addition to the high risk of death during the first year of life in premature babies, they also have an increased risk of developing major health problems like cerebral palsy, intellectual disability, chronic lung infection, and blindness or hearing loss[1].

Although several possible factors exist for premature births, almost half of preterm births have little known causes. If conditions allow, doctors can prevent early labour while pregnancy can continue to be full-term, thus improving the health and survival chances of the baby. However, there are no effective means to prevent premature labour. Several examples of possible contributing factors to premature birth are listed below[2]:

- Previous premature birth history.
- Multiple pregnancies (triplets', twins).
- Uterine or cervical abnormalities.
- Cervical, Uterine or urinary tract infection including Sexually transmitted diseases.
- Substance abuse including tobacco, alcohol and other recreational drugs.

Women below the age of 18 and above the age of 35 are at a higher risk of preterm[2].

Worldwide there is an increasing trend in the rates of caesarean section. The Arab world is not an exception as the studies show that there are significant differences in their CS rates, with some countries having shown high CS rates while others have meagre rates. This can be mainly due to each country's developmental level. This upward trend has implications on maternal and neonatal morbidity as well as on future pregnancies. Various studies done worldwide have found a high rate of spontaneous PTB after caesarean section, especially in caesarean sections done late in labour (at Full dilatation)[2].

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According to a recent study, CS rates are increasing in Bahrain; more than 30% of deliveries in Bahrain are by CS, exceeding the WHO threshold, which is 15%[3].

There was no previous study done in Bahrain regarding implications of second stage caesarean section which leads to preterm birth in an immediate next pregnancy and provide better maternal care and intervention if required in the antenatal period[3].

METHODOLOGY

We conducted a retrospective cohort study of women with two consecutive deliveries between January 2014 to December 2018, the study was held in the department of Obstetrics and Gynecology in Salmaniya medical complex, Kingdom of Bahrain.

Oral informed consent was obtained. Demographic information (name, age, gestational age, parity) was also collected using electronic databases as well and antenatal records. Two hundred seventy-six (276) females fulfilling selection criteria including all term, cephalic, live singleton birth without fetal malformation in patients reaching the second stage of labor.

Women with a single fetus at term (>37 weeks) in their index pregnancy and not less than 24 weeks' in their succeeding pregnancy were included. Also, women going for the trial of vaginal delivery after C-Section were included.

Females with preterm birth in their index pregnancy or with a history of preterm birth were excluded from the study, whereas those women with planned or undergoing elective caesarean section were excluded from the study.

Data was analyzed using SPSS version 21. Comparative analyses between women with singleton term pregnancies who had a caesarean section in the second stage of labour and those who had a first stage caesarean section and a normal vaginal delivery were completed using standard statistical methods. A subgroup analysis, according to indication for caesarean section, was also performed. Quantitative variables such as age, gestational age etc. were presented as an average ± SD. Parity was presented as frequency. Chi-square test 'was applied' to compare the groups. P-value < 0.05 was taken as 'significant.

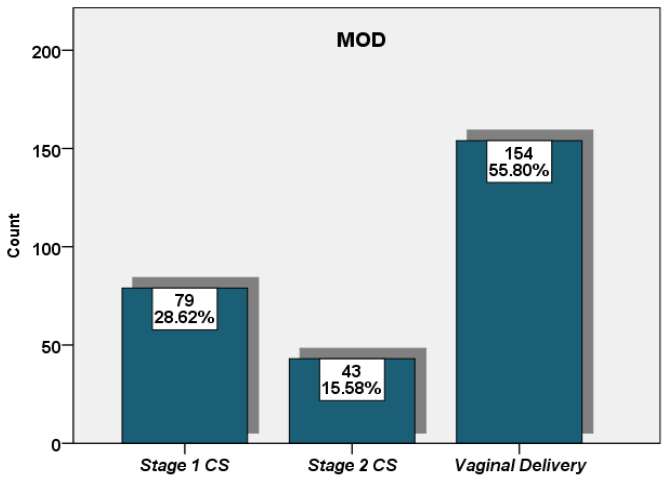

Figure 1: Frequency of mode of delivery

Table 1: Presentation of age (years)

'Age'	N	276
	Average	29.80
	'SD'	5.44
	Lowest	'19'
	Largest	42

Table 2: Presentation of gestational age at delivery

Gestational Age (weeks)	N	276
	Average	38.71
	SD	1.43
	Minimum	37
	Maximum	42

Table 3: Frequency distribution of parity

		Frequency	Per cent
Parity	Nulliparous	80	29.0
	One	123	44.6
	Two	48	17.4
	Three	9	3.3
	Four	8	2.9
	Five	5	1.8
	Six	3	1.1
	Total	276	100

Table 4: Comparison of preterm birth between mode of delivery

		MOD				
		CS stage 1	CS stage 2	Vaginal delivery	Total	p-value
Preterm Birth	Yes	8	10	7	25	<0.001
		10.1%	23.3%	4.5%	9.1%	
	No	71	33	147	251	
		89.9%	76.7%	95.5%	90.9%	
Total		79	43	154	276	
		100%	100%	100%	100%	

Table 5: Comparison of preterm birth between mode of delivery

		MOD			
		CS	Vaginal delivery	Total	RR
Preterm Birth	Yes	18	7	25	1.74 [1.306, 2.311]
		14.75%	4.5%	9.1%	
	No	104	147	251	
		85.24%	95.45%	90.9%	
Total		122	154	276	
		100%	100%	100%	

RESULTS

Firstly, the average age of females was 29.80 ±5.4 years, with age ranging from 19 years to 42 years.

The patient average gestational age in this study was 38.71± 1.43 weeks with lowest gestational age at 37 weeks and maximum up to 42 gestational weeks (Table 2).

Out of 276 patients ,80 (29%) patients were primigravida, 123 (44.6%) were para 1, 48 (17.4%) were para 2, 9 (3.3%) were para 3 and 8 (2.9%) were para 4, 5 (1.8%) were para 5 and 3 (1.1%) were para 6 (Table 3).

The study results showed that among 276 patients, stage 1 CS deliveries were done in 79 (28.62%) patients, stage 2 CS deliveries were done in 43 (15.58%) patients. while normal vaginal delivery is done in 154 (55.80%) patients (Figure 1).

The results showed that the mean interval between the index and subsequent pregnancy was 2.48±1.09 years with a minimum interval of 1 year and a maximum interval of 4 years.

In this study, gestational diabetes and gestational hypertension were found in 57 (20.7%) patients.

According to this study, the subsequent preterm birth was found in 25 (9.06%) patients.

The comparison of 2nd stage C-section with 1st stage C-section and vaginal delivery of the patients showed that among 43 patients having 2nd stage C-section the sPTB was found in 10 (23.3%) patients, among 79 patients with 1st stage C-section the sPTB found in 18 (14.8%) patients and among 154 patients undergone a vaginal delivery, the sPTB was found in 7 (4.5%) patients. Statistically, the significant difference found between the mode of delivery and preterm birth (p-value=<0.001) (Table 4).

The study results showed that among 122 patients having C-section the subsequent preterm birth was found in 18 (14.8%) patients, whereas in 154 patients who had vaginal delivery the subsequent preterm birth was seen in 7 (4.5%) patients.

There is 1.74 times higher risk of having subsequent preterm birth among patients having the caesarean section at full dilatation compared to patients having a vaginal delivery. i.e. RR=1.74 [1.306, 2.311] (Table 5).

DISCUSSION

Premature childbirth (as mentioned previously is the delivery 'before' 37 gestational weeks) is still a significant problem in conventional obstetrics & remains an important public health issue. It impacts 7.2 & 9.6%, respectively, in the US & China, around 15 million worldwide pregnancies each year. It is associated with an increased risk of neonatal morbidity[4-7]. Likewise, in this study subsequent preterm births were found in 25 (9.06%) patients.

The subsequent preterm of 122 patients who had C-section was found in 18 (14.8%) patients compared to 135 normal vaginal delivery patients in which the subsequent preterm birth was observed in 7 (4.5%) patients (p-value=0.003). Similarly, an American research showed that CS in the second stage of labor was associated with a two-fold increase risk of spontaneous preterm birth at less than 32 weeks of gestation in a subsequent birth, Relative Risk 1.57 95% CI (1.43, 1.73) and Relative Risk 2.12 95% CI (1.67, 2.68)[8].

Hence, there is 1.74 times more risk of subsequent preterm birth among patients having CS at full dilatation as compared to NVD patients i. e. RR=1.74 [95% CI; 1.31-2.31].

Over the previous two years, several cohort studies have examined the association among previous delivery methods & premature birth in successive births. The positive relationship of cesarean section during the 1st pregnancy with subsequent premature birth was well documented[9-11].

Dana Vitner conducted a study on the difference in outcomes between cesarean section in the second versus the first stages of labour. The author concluded that the second-stage CS is associated with higher rates of adverse maternal outcomes, mainly unintentional uterine incision extension, uterine atony, and suspected endometritis[12].

Rafael et al[13] demonstrated that in women with a previous spontaneous twin PTB at <34 weeks' gestation, there is found to be increased risk of subsequent singleton PTB. A twin birth at ≥34 weeks' gestation is not likely to cause an increased risk for a subsequent singleton PTB.

One study documented that there seems to be a significantly increased rate of premature birth in females who had C section at complete expansion compared to women that had a caesarean in the first labour stage[14].

According to recent evidence, the cervix comprises a specialized sphincter at the internal os composed of 50–60% smooth-muscle cells organized circumferentially around the endocervical canal, and persists down to the mid cervix and then the number of smooth-muscle cells gradually decreases towards the external os, which is composed of approximately 10–15% smooth muscle[15]. The authors proposed that the cervical smooth-muscle cells play a role in cervical remodelling as well as initiating and/or disseminating uterine contractility[15]. This novel sphincter morphology may be a key to investigating the mechanisms of premature and term cervical remodelling. It is thought that cervical effacement causes the internal-sphincter smooth muscle to migrate into the lower uterine segment, which can be disrupted during FDCS[15].

There have been reports of anterior cervical defects visualized on a transvaginal ultrasound in women with previous FDCS. This is not looked for routinely in antenatal ultrasound scans, and their relationship to preterm birth risk is unclear[16].

On the other hand, Levine et al[17] conducted a cohort study and found a statistically insignificant increase in subsequent prematurity rate after cesarean delivery done at a prolonged second stage of labour ≥3hours[17]. However, Levine et al. found that extension of the uterine incision into the cervix during FDCS increases the risk of subsequent spontaneous preterm birth[17]. Thus, resulting in incomplete recovery of cervical muscular function. Furthermore, closure of the uterine defect if it is located too low, or if an extension to the cervix is required due to difficulty delivering an impacted fetal head, could equally injure the internal os[17]. The limitations that were faced during this research were firstly in the small sample size which reduces the accuracy of the study and the lack of previous researches in this topic which led to less comparisons with previous research findings, we encourage further future researches regarding the complications mentioned in this research and how unnecessary caesarean sections can be avoided.

Why is it Important: Women who undergo second stage caesarean section might experience preterm birth with subsequent pregnancies? The goal of this research is to evaluate this risk and compare it with first stage cesarean section and normal vaginal delivery. Establishing a correlation between a second stage caesarean section and subsequent preterm birth would lead to avoiding the former when unnecessary to prevent its impact on the baby, mother, and the economy.

What Question Does Our Research Answer: What is the risk of subsequent preterm labor in women who have had caesarean section in the first stage, second stage and normal vaginal delivery?

Major Important Results or Overall Findings: The risk of subsequent preterm birth increased by 1.74 folds in women who have had a second stage caesarean section.

CONCLUSION

To summarize, our results indicate that women who had a second stage caesarean section were more likely to experience a future preterm birth compared to other two groups.

In the present study, rates of preterm births after caesarean deliveries at the first and second stages of labour were compared with those after a vaginal delivery. Rates of future preterm births varied significantly between groups: 4.5% for vaginal delivery, 10.1% for first stage caesarean and 23.3% for second stage caesarean.

Females with a history of single successful delivery are at a higher risk for future preterm birth composing 44.6% of the study group.

Author Contribution:

Arjumand Bano Qamaruddin: Conceptualized the study, collected data, analysed data, drafted the manuscript, reviewed the manuscript for intellectual content and reviewed the manuscript for final submission.

Dr. Amal Hassani: Conceptualized the study, reviewed the manuscript for intellectual content and reviewed the manuscript for final submission.

Dr. Mohammed Jamal Ibrahim: Analyzed data, drafted the manuscript, reviewed the manuscript for intellectual content.

Dr. Safinaz Abdulrahim: Collected data and reviewed the manuscript for final submission.

Dr. Sara Khudair: Collected data and reviewed the manuscript for final submission.

Ethical Approval: Approved by the Department of Obstetrics and Gynecology, and Ethical committee, Salmaniya Medical Complex, Bahrain.

Potential Conflict of Interest: None

Competing Interest: None

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