

A Comparative Study of the Risk of Adverse Outcomes in the Second Pregnancy after a First Caesarean Delivery Compared to a First Vaginal Delivery.

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Abstract: Objectives: To estimate the risks that a caesarean first birth, compared with a vaginal first birth, imposes in the second birth regarding maternal and perinatal outcomes.

Methods: It was a retrospective hospital-based cohort study carried out in R. G. Kar Medical College and Hospital, Kolkata, West Bengal between July 2010 to June 2011. Total number of cases studied during that period was 2500.

Results: A total of 2500 consecutive women admitted in the department of Obstetrics and Gynaecology, R. G. Kar Medical College & Hospital were recruited in the study. Among them 1809 women belonged to the previous vaginal delivery cohort and 691 women belonged to the previous caesarean delivery cohort. Prior caesarean delivery increases the incidence of placenta previa (1.45%, OR 2.4, p value 0.046), indeterminate APH (4.34%, OR 2.115, p 0.0026), malpresentations (6.22%, OR 1.473, p 0.047), uterine rupture (0.58%, OR 23.668, p 0.034), placenta accreta (0.87%, OR 34.316, p 0.016) in the subsequent pregnancy. Prior caesarean delivery also increases the risk of preterm birth (6.51%, OR 1.486, p 0.039), very preterm birth (3.03%, OR 1.798, p 0.04) and unexplained stillbirth (2.17%, OR 1.985, p 0.046) in the future pregnancies compared with prior vaginal birth

Conclusion: Caesarean section as a mode of delivery imposes risks of adverse maternal and perinatal outcomes in the subsequent pregnancies.

Keywords: Caesarean section, Second Pregnancy, First Caesarean Delivery, First Vaginal Delivery, Adverse Outcomes.

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I. Introduction

Birth is a normal, natural process and the vast majority of women can have safe, normal vaginal births. There are health conditions where a caesarean birth is necessary for the wellbeing of the mother or her baby. However, in these days, more and more mothers are giving birth by caesarean section for non-medical reasons. The high prevalence of caesarean section (CS) is a global public health issue¹. According to a WHO statement in 1985, regional CS rates should not exceed 10–15%². However, the rate of CS has markedly increased from approximately 6 to 40% in low, medium and high-income countries in the past three decades^{3,4,5,6}. A caesarean delivery poses risks as well as benefits for mother and baby, and should not be undertaken lightly. A growing interest in the long-term effects of caesarean delivery has been fuelled by rising rates of caesarean delivery in many countries⁷ together with the trends towards “informed choice” for pregnant women and clinicians making decisions in partnership with women.⁸

Elective first caesarean at physician’s request may, however, play a significant role⁹ in increasing the caesarean delivery rate and the rise in elective repeat surgeries, which has climbed by more than 40 percent in the last ten years, certainly does.¹⁰ Although 70 percent of women or more who plan a vaginal birth after

caesarean (VBAC) can give birth vaginally and avoid the complications of repeat caesarean surgeries almost all women today have a repeat operation because most doctors and many hospitals refuse to allow VBAC.^{11,12,13} There is no denial of the fact that a caesarean section can be a lifesaving operation and some babies would not be born vaginally under any circumstances; however, it is still a major surgery that has complications potentially life threatening and added to that there are its adverse effects on subsequent pregnancies. Women have a legal right to know the risks associated with their treatment and the right to accept or refuse it.¹⁴ According to recent data up to 2015, the WHO announced that CS rates higher than 10% were not associated with reductions in maternal and new born mortality rates at the population level^{2,15,16} The WHO global survey indicated that caesarean delivery was positively associated with an increased risk of postpartum antibiotic use, maternal morbidity and mortality, and fetal and neonatal morbidity^{3,4}. Furthermore, prior CS was significantly associated with an increased risk of unexplained stillbirth in the subsequent pregnancy^{17,18}.

Caesarean section, being such a common but major surgery that can have many adverse effects on the health of a woman in the present pregnancy and also in the subsequent pregnancies, this study was performed to try to find out to what extent a prior caesarean section affects subsequent pregnancies.

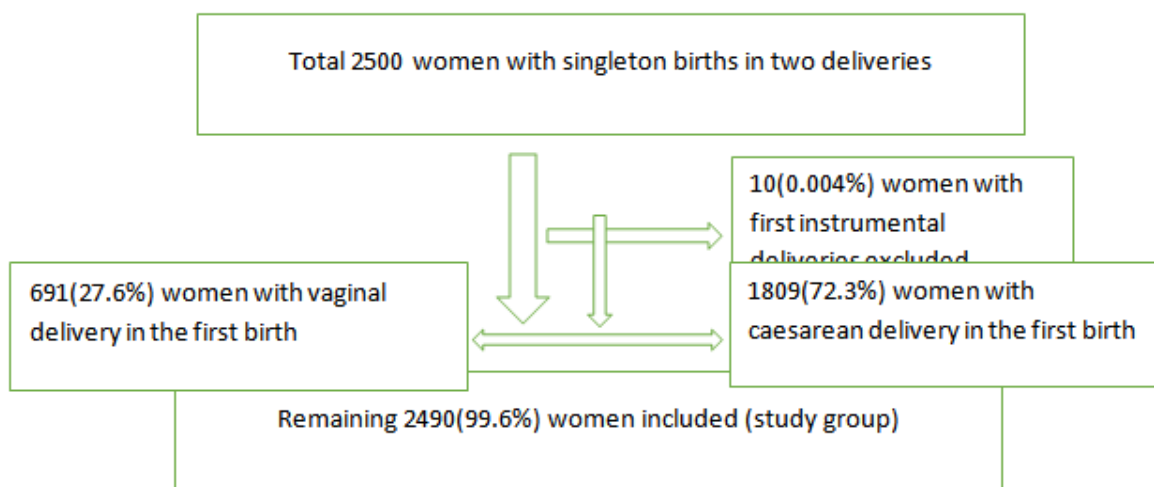
II. Materials & methods:

This present hospital based retrospective cohort study, performed in the department of Obstetrics and Gynaecology, R. G. Kar Medical College & Hospital (RGKMC), Kolkata, West Bengal between July 2010 to June 2011. A total of 2500 women admitted consecutively, either with a vaginal first birth or a caesarean first birth was recruited in the study. The required information was gathered from history of the patients, Labour Room log book, Operation Theatre record book and Bed Head Tickets of the patients. Ultrasonography was used to diagnose cases of placenta previa, abruptio placentae and placenta accreta. All second gravida mother having single-ton pregnancy and certain of their LMP admitted in the labour room of RGKMC were considered for this study. Pregnancies terminated before 20 completed weeks were excluded in this study (Fig1).

The maternal outcomes which were taken into consideration were placenta previa, placental abruption, APH of indeterminate cause, caesarean section, rupture uterus, malpresentations, hysterectomy and maternal death. The fetal outcomes studied were preterm birth (less than 37 completed weeks), very preterm birth (less than 32 completed weeks), low birth weight, stillbirth, unexplained stillbirth, admission in NICU and neonatal death.

The statistical analysis was done by the MedCalc software version 9.3.0 (2007). After collecting the data, it was formulated in MS Excel Spreadsheet and summarized by routine descriptive statistics, namely mean and standard deviation for numerical variables and percentages for categorical variables. The odds ratios were calculated along with 95% confidence interval and p values. Relative risk was calculated where deemed relevant. Frequencies were compared between groups by Fischer's exact test or chi-square test as appropriate, while numerical variables were compared by Student's independent samples t test. Two-sided p values of less than 0.05 were considered to indicate statistical significance.

Fig. 1. Flow chart showing study population in cohorts



III. Results

The women were divided in two cohorts. The baseline characteristics were analysed based on age distribution, residential area, antenatal care, pregnancy interval and body mass index (BMI) and the two cohorts were found to be comparable (Table I).

Table 1. Base line characteristics

Variable	FIRS CD n=691 (%)	FIRST VD n=1809(%)	Total	p value	95%CI
Maternal Age	23.42±4.154	23.82±3.84		0.462	-0.234 to 0.514
≤25	427(61.79)	1119(61.86)	1546(61.84)		
25-29	210(30.39)	523(28.91)	733(29.32)		
≥30	54(7.82)	167(9.23)	221(8.84)		
Residence				0.462	-2.5to 5.58
Rural	495(71.6)	1265(70)	1760(70.4)		
Urban	196(28.4)	544(30)	740(29.6)		
Gestational Age	24.38±6.461	24.09±6.091		0.295	-0.833 to 0.253
≤24 Months	373(54%)	1048(57.92%)	1421(56.84)		
>24 Months	318(46%)	761(42.08%)	1079(43.16)		
BMI				0.078	0.507-0.027
a. <18.5	151(21.85%)	401(22.17%)	552(22.08)		
b. 18.5-24.9	498(72.07%)	1296(71.64%)	1794(71.76%)		
c. 25-29.9	18(2.61%)	42(2.32%)	60(2.4%)		
d. 30-34.9	24(3.47%)	70(3.87%)	94(3.76%)		
Booked	361(52.24%)	917(50.69%)	1278(51.12%)	0.487	0.892-1.268
Unbooked	150(21.71%)	422(23.33%)	572(22.88%)	0.388	0.737-1.125
Referred	180(26.05%)	470(25.98%)	650(26%)	0.972	0.821-1.225

(CD-Caesarean Delivery, VD- Vaginal Delivery, BMI: Body Mass Index)

Table 2 showed that the different maternal outcomes between the two cohorts of women enrolled in the study. There were 10 cases (1.45%) of placenta previa in the cohort of first caesarean delivery whereas there were 11 (0.61%) cases in the first vaginal delivery cohort which was statistically significant (p 0.046). As far as placental abruption was concerned there was no statistically significant difference between the two cohorts (p 0.622). APH of indeterminate cause was more common in the women with a prior caesarean delivery cohort than first vaginal delivery cohort (4.34% vs. 2.1%) with a p value of 0.0026.

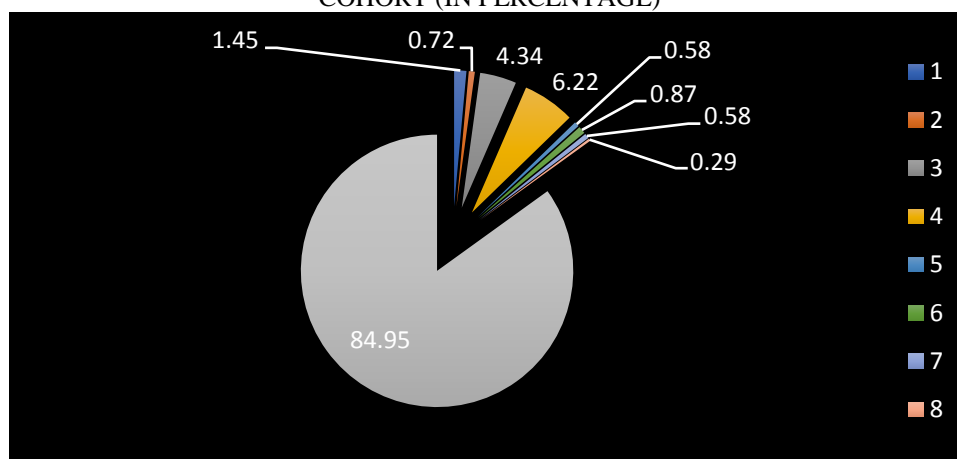
Malpresentations were more common in the prior caesarean delivery group (6.22% vs. 4.31%). There was statistically increased Incidence of caesarean delivery in the cohort of first caesarean delivery group than in first vaginal delivery cohort group (p <0.0001). The incidence of placenta accreta, rupture uterus, hysterectomy was all more common in the prior caesarean delivery cohort compared to first vaginal group.

Table 2. Maternal Outcomes

OUTCOMES	FIRST CD (n=691)	%	FIRST VD (n=1809)	%	OR	95% CI	P
Placenta Praevia	10	1.45	11	0.61	2.4	1.015-5.677	0.046
Placental Abruption	5	0.72	10	0.55	1.311	0.447-3.850	0.622
APH (Indeterminant Cause)	30	4.34	38	2.1	2.115	1.299-3.442	0.0026
Malpresentation	43	6.22	78	4.31	1.473	1.004-2.16	0.047
Caesarean Delivery	677	97.97	248	13.71	304.377	176.329-525.413	<0.0001
Rupture Uterus	4	0.58	0	0	23.688	1.274-440.576	0.034
Placenta Accreta	6	0.87	0	0	34.316	1.931-609.990	0.016
Hysterectomy	4	0.58	0	0	23.688	1.274-440.576	0.034
Maternal Death	2	0.29	1	0.06	5.248	0.475-57.974	0.176

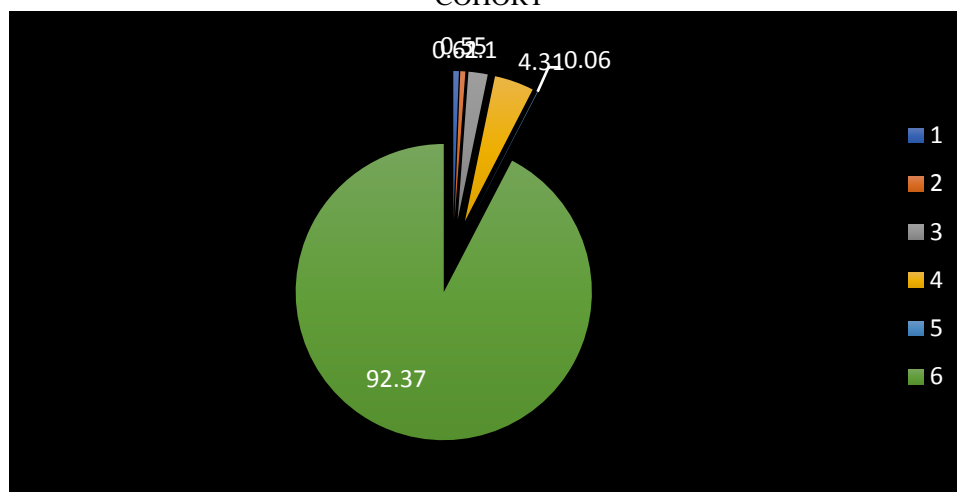
(CD-Caesarean Delivery, VD- Vaginal Delivery)

FIG 2: PIE CHART SHOWING MATERNAL OUTCOMES IN THE FIRST CAESAREAN DELIVERY COHORT (IN PERCENTAGE)



1. Placenta Praevia, 2. Placental Abruption, 3. APH due to Indeterminate causes, 4. Malpresentation, 5. Rupture uterus, 6. Placenta Accreta, 7. Hysterectomy, 8. Maternal Death, 9. No such Complication

FIG 3: PIE CHART SHOWING MATERNAL OUTCOMES IN THE FIRST VAGINAL DELIVERY COHORT



1. Placenta Praevia (0.61%), 2. Placental Abruption (0.55%), 3. APH due to Indeterminate causes (2.1%), 4. Malpresentation (4.31%), 5. Rupture uterus, 6. Placenta Accreta, 7. Hysterectomy, 8. Maternal Death (0.06%), 9. No such Complication

Neonatal outcomes were shown in Table 3. Both pre-term (6.51% vs. 4.48%) and very pre-term birth (3.03% vs. 1.71%) were more common in the prior caesarean delivery group compared with first vaginal delivery (p values 0.039 and 0.040, respectively). There was no demonstrable significant association between low birth weight and prior mode of delivery. Neither was there any relation between stillbirth and prior route of delivery. On the contrary, unexplained stillbirth rate was statistically significantly more common in the prior caesarean delivery cohort compared with first vaginal delivery cohort (2.17% vs. 1.1%) with a p value of 0.046. Whereas, neonatal death was not associated favourably with either of the two cohorts.

Table 3: Neonatal Outcomes

OUTCOMES	FIRST CD (n=691)	%	FIRST VD (n=1809)	%	OR	95% CI	P
Preterm Birth	45	6.51	81	4.48	1.486	1.021-2.163	0.039
Very Preterm Birth	21	3.03	31	1.71	1.798	1.026-3.150	0.040
Low Birth Weight	76	10.99	164	9.06	1.239	0.93-1.652	0.143
Stillborn	20	2.89	42	0.33	1.254	0.731-2.151	0.411
Unexplained Stillborn	15	2.17	20	1.1	1.985	1.010-3.899	0.046
Neonatal Death	5	0.72	26	1.44	0.497	0.190-1.299	0.154

(CD-Caesarean Delivery, VD- Vaginal Delivery)

IV. Discussion

Caesarean section as a mode of delivery has become one of the most commonly performed major operations around the world.^{1, 3-6} In our study, among the 2500 recruited women, 691 women (27.64%) underwent a caesarean section as mode of delivery in the first pregnancy. Now caesarean section as a mode of delivery may be necessary to save the life of mother or the baby, but it imposes risks to the subsequent pregnancies. In our study, women in the two cohorts were comparable in respect to their basic demographic profile, such as, age, residence, gestational age, BMI and antenatal care.

Placenta previa, APH due to indeterminate cause, placenta accreta, rupture uterus and malpresentations were associated with prior caesarean delivery in a statistically significant way. Some previous studies^{18,19,20,21} also corroborate with the findings of our study. Placenta previa is significantly associated with the number prior caesarean sections as has been shown several studies. Study¹⁹ showed that the incidence of placenta previa increased from 10 per1000 deliveries with one prior caesarean to 28 per 1000 with three or more prior caesareans. Compared to women with placenta previa and no prior caesarean, women with placenta previa and three or more prior caesareans had a statistically significant increased risk of placenta accreta (3.3-4% versus 50-67%), hysterectomy (0.7-4% versus 50-67%), and composite maternal morbidity (15% versus 83%, odds ratio 33.6, 95% CI 14.6-77.4). Our study showed that there was statistically significantly increased Incidence of placenta previa with prior caesarean delivery cohort group than first vaginal delivery cohort (p 0.046). Although, one study²⁰ showed significant association between placental abruption and prior caesarean delivery, our study did not show any such association. The reason behind this might have been under-diagnosis of the cases of placental abruption.

The incidence of malpresentations was found to be increased significantly in the cohort of women with a previous caesarean delivery with p value 0.047. Kennare et al²¹ showed similar results as they found that the caesarean delivery cohort had increased risks for malpresentations (odds ratio [OR] 1.84, 95% confidence interval [CI] 1.65-2.06). Possible explanation of increased incidence of malpresentation was due to the increased incidence of placenta previa in the women with prior caesarean delivery.

In our study, Rupture uterus was significantly more with previous caesarean delivery as compared with first vaginal delivery cohort (p 0.034). All four cases of rupture uterus were in the cohort of women with previous caesarean delivery. Other studies^{21,22} also found similar results. One study²¹ found uterine rupture to be associated with prior caesarean delivery with OR 84.42, 95% CI 14.64-infinity. We found that there was more incidence of placenta accreta with prior caesarean delivery cohort (p 0.016) and so was the risk of hysterectomy (p 0.34) than with first vaginal delivery cohort. All six cases of placenta accreta and four cases of hysterectomy belonged to the previous caesarean delivery cohort. Our findings were similar with other studies.²⁰ They found that, compared to women with placenta previa and no prior caesarean, women with placenta previa and three or more prior caesareans had a statistically significant increased risk of placenta accreta (3.3-4% versus 50-67%), hysterectomy (0.7-4% versus 50-67%), and composite maternal morbidity (15% versus 83%, odds ratio 33.6, 95% CI 14.6-77.4). The authors concluded that serious maternal morbidity progressively increases as the number of prior caesarean deliveries increases.

The risk of pre-term birth and very pre-term birth was significantly associated with prior caesarean delivery with p values 0.039 and 0.040, respectively. Similar results were obtained from some other studies^{3,21}. The incidence of both small for gestational age (SGA) babies and low birth weight babies did not show any association with previous mode of delivery, caesarean or vaginal. In our study we found that unexplained stillbirth was increased significantly in a woman with a prior caesarean delivery cohort group (p 0.046, OR 1.985, 95% CI 1.010-3.899). In one landmark study³, it was found that prior caesarean delivery increased the risk of unexplained stillbirth in subsequent pregnancy (OR 2.23, 95% CI 1.48-3.36, p value 0.046). Our study did not find any increased risk of neonatal death in any of the two cohorts.

The Strength of our study was that we restricted our analyses to women with a second singleton birth, which eliminated potential confounding effects of parity and multiple gestations. Furthermore, the data analysed were taken from geographically stable population and as the data of the two groups were recorded during the same period, changes in clinical practice are unlikely to influence the findings,

The limitations of our study were being a hospital-based study and not a population based one, may have not reflected the exact picture of risks that are imposed on a woman by a prior caesarean section. Moreover, it was not possible to know the exact indication of primary caesarean in all the cases or the type of incision performed for the primary caesarean delivery; therefore, the increased risk cannot be exactly interpreted. In our hospital we rarely perform vaginal birth after caesarean (VBAC), so the risk uterine rupture in women with a prior caesarean delivery undergoing trial of labour could not be assessed. Some increased risk may be due to confounding factors related to the indication for the first caesarean delivery. While first information available to us may be accurate, we cannot be sure whether outcomes in the second birth are caused

by confounding factors in the first birth, due to our inability to link births longitudinally to the same woman. Although there was no significant difference between the two cohorts of our study in respect to general characteristics, an observational study such as this is unable to assess other important ways the women might have been different, such as values, beliefs and attitude towards birthing. These limitations might be overcome by performing a population-based study, by obtaining the exact information regarding the complications in the first birth, indications of the first caesarean section, detecting any comorbid condition that may complicate the present pregnancy independently.

So, it can be concluded that caesarean delivery is associated with increased risks for adverse obstetric and perinatal outcomes in subsequent birth. However, some risks may be due to confounding factors related to the indication for the first caesarean.

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Conflict of interest:

The authors have no conflicts of interest.

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