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A PROSPECTIVE ANALYSIS OF INTRA-OPERATIVE FINDINGS AND COMPLICATIONS IN CASE OF REPEAT CAESAREAN SECTION.

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ABSTRACT

Caesarean section (CS), performed to save life of pregnant patient as well as foetus, has a continuously increasing incidence for the last two decades giving the women, an obstetrical status of "previous caesarean section." However, CS is associated with an increased risk of maternal and perinatal morbidity and mortality. A prospective observational was study carried out at GMERS Medical College, Sola, Ahmedabad, Gujarat, India from October 2020 to October 2021 with a sample size of 200. The observed intra-operative findings were analysed in relation to the number of previous caesarean sections and intraoperative complications encountered in repeat caesarean section in comparison to primary LSCS. Suitable statistical tests of comparison were done. Statistical significance was taken as $P< 0.05$. The data was analysed using epi info 7.2.5.0. Comparison was done between 74 primary LSCS and 126 previous $\geq$ 1 LSCS. The occurrence of intra-op complications like bladder injury, uterine dehiscence, extension of uterine incision and morbidly adherent placenta were statistically significant ($p<0.05$) in the previous $\geq$ 2 LSCS group as compared to previous 1 LSCS and primary LSCS. Most of the patients in both the study groups had a good maternal outcome (97.30% in primary LSCS and 92.06% in previous $\geq$ 1 LSCS). It was concluded that repeat caesarean sections are associated with increased intra-operative complications & maternal morbidity. The perinatal morbidity associated with repeat caesarean section can be reduced by educating public regarding the importance of antenatal care, detection of high-risk cases, making timely referrals and limiting the number of primary LSCS.

INTRODUCTION

Caesarean delivery defines the birth of a foetus via laparotomy and then hysterotomy.[1] Caesarean section (CS) is the most common obstetric surgery performed worldwide to save life of pregnant patient as well as foetus with a continuously increasing incidence for the last two decades giving the women, an obstetrical status of "previous caesarean section." However, CS is associated with increased risk of maternal and perinatal morbidity and mortality. It is associated with PPH, sepsis, peripartum hysterectomy in present pregnancy and adherent placenta, uterine rupture, and death in future pregnancies.[2]

According to World Health Organization's (WHO) guidelines, modified in 1994, the caesarean birth rate in any population group should range between 5% to 15% (WHO 1994).[2] It is suggested that no additional benefit occurs to the fetus or to the mothers when the rates exceed this level. However, currently the Caesarean birth rates in many developed and developing countries far exceed the tolerable limit specified by the WHO.

The raising CS rates and potential complications especially during the repeat caesarean section in many countries[3], according to the latest data from 150 countries currently 18.6% of all births occur by CS, ranging from 6% to 27.2% in the least and most developing regions respectively.

India is also experiencing an increasing trend of caesarean delivery along with an increase in the number of institutional deliveries and growing access to gynaecological and obstetric care. The trend of increase in c-section delivery can be studied from the data available from National Family Health Survey (NFHS) from the years 1992-1993 to 2015-2016, which shows an upward trend in caesarean delivery.

At an all-India level the rate has increased from 2.9% of the child birth in 1992-1993 to 7.1% in 1999-1999 and 10.6 in 2005 to 2006 and further to 17.2% in 2015 to 2016. [4]

After any laparotomy, it is common to develop scar tissue, adhesions and bladder extensions, c-section holds no exception to this. Multiple emergency caesarean deliveries are associated with more intra-operative complications as compared to planned caesarean deliveries. The risk of major complications increases with the number of caesarean sections. Scarring & adhesion formation is known to cause increase in major complication rates from 4.3 to 12.5% depending upon the number of previous caesarean section.[5] Intra-peritoneal adhesions have an incidence varying from 5.5% to 42.5%.[6]

This study assessed the type and frequency of intra-operative complications in case of repeat caesarean section and immediate fetal outcome.

METHOD

Outcomes measured:

- To document any abnormal intra-op finding in case of repeat caesarean section, if any.
- To document the incidence of intra-op findings in relation to the number of previous caesarean section.

Data Analysis:

Descriptive analysis.

Study Duration:

October 2020 to October 2021

Type of Study:

Prospective observational Study.

Sample Size:

Sample size has been calculated by the following formula:

$$n = \frac{Z^2pq}{d^2}$$

where:

n = sample size

Z = standard error associated with chosen level of confidence (1.96)

p = prevalence of caesarean section in the population (25% as per HMIS Bulletin 2021)
q = 1- p
d = absolute allowable error (6%)

$$n = \frac{(1.96)^2 (0.25) (1-0.25)}{(0.06)^2}$$

n = 200
The sample size for this study is 200.

Inclusion Criteria:
1. Those who give Consent.
2. Patients with one or more previous caesarean section.

Exclusion Criteria:
1. Those who do not give consent.
2. Those with history of abdominal surgeries.
3. Patient with history of myomectomy or hysterotomy.

Methodology:
This was a prospective observational study carried out at GMERS Medical College and Hospital, Sola, Ahmedabad, Gujarat, India from October 2020 to October 2021. An informed consent was obtained from the subject prior to participation in the study. Before posting the patients for repeat caesarean sections either elective or emergency, patient's history was taken, clinical examination, ultrasound examination and laboratory investigations were done. The observed intra-operative findings were analysed and categorized in relation to the number of previous caesarean sections and intraoperative complications encountered in repeat caesarean section in comparison to primary LSCS.

Descriptive statistics were done for all data and reported in terms of mean values and percentages. Suitable statistical tests of comparison were done. Continuous variables were analysed with the unpaired t test. Categorical variables were analysed with the Chi-Square Test and Fisher Exact Test. Statistical significance was taken as $P < 0.05$. The data was analysed using epi info 7.2.5.0.

RESULT
In this study, out of the total sample size of 200 LSCS, 74 (37%) were primary LSCS and 126 (63%) were previous one or more LSCS.

Type of Caesarean Section	Number	Percentage
Primary LSCS	74	37.00
Previous 1 LSCS	91	45.50
Previous ≥ 2 LSCS	35	17.50
Total	200	100.00

Table I: Patient group based on the type of caesarean section.

When analyzing the age distribution between the study groups, it was found that:
- Amongst the primary LSCS, majority belonged to 21-25 years age group (43.24%) followed by 26-30 years age group (21.62%).
- Amongst the previous ≥ 1 LSCS group, majority belonged to 26-30 years age group (41.27%) followed by 31-35 years age group (25.40%).
- Overall, majority of the women belonged to 26-30 years age group (34%) followed by 21-25 years age group (29%).

Age	Primary LSCS (no.)	Percentage	Previous≥ 1 LSCS (no.)	Percentage	Total	Percentage
≤ 20 years	13	17.56	7	5.55	20	10.00
21 – 25 years	32	43.24	26	20.63	58	29.00
26 – 30 years	16	21.62	52	41.27	68	34.00
31 – 35 years	8	10.81	32	25.40	40	20.00
≥ 36 years	5	6.76	9	7.14	14	7.00
Total	74	100.00	126	100.00	200	100.00

Table II: Age distribution of the patients

While analyzing the months of amenorrhea at which the patients were taken for LSCS in this study, it was observed that:

- Amongst both the groups majority of LSCS were done at 9 months of amenorrhea (95.95% primary LSCS and 92.86% previous ≥ 1 LSCS).
- Primary LSCS carried out at 7 months of amenorrhea was for placenta previa grade 3 in labour and at 8 months of amenorrhea were for abruptio placenta.
- Previous ≥ 1 LSCS carried out at 7 and 8 months of amenorrhea were for placenta previa, abruptio placenta and placenta accreta spectrum.
- However, the number of LSCS carried out at 7 months and 8 months of amenorrhea was higher in the previous ≥ 1 LSCS (2.38% and 4.76% respectively) than the primary LSCS (1.35% and 2.71% respectively).

While statistically comparing the estimated difference in amenorrhea status amongst the groups, it was found to be statistically non-significant (p>0.05).

Amenorrhea	Primary LSCS	Percentage	Previous≥1 LSCS	Percentage	Total	Percentage
7 months	1	1.35	3	2.38	4	2.00
8 months	2	2.71	6	4.76	8	4.00
9 months	71	95.95	117	92.86	188	94.00
Total	74	100.00	126	100.00	200	100.00
P Value Fischer Exact Test			.79 *statistically non-significant* (p>0.05)			

Table III: Months of Amenorrhea when c-section was done.

The indications for LSCS amongst the study group were as mentioned below:

- Amongst the primary LSCS, majority of the LSCS were done for MSL (33.38%) followed by foetal distress (20.27%) followed by abnormal presentation/lie and NPOL (both 13.51%).
- Amongst the previous ≥ 1 LSCS, majority of the LSCS were done for NPOL (17.46%) followed by MSL (13.49%) followed by Scar Tenderness (11.11%).
- Overall, majority of the LSCS were done for MSL (21.00%) followed by NPOL (16.00%) followed by fetal distress (13.50%).

Indication for LSCS	Primary LSCS	Percentage	Previous≥ 1 LSCS	Percentage	Total	Percentage
CPD	6	8.10	10	7.93	16	8.00
Abnormal presentation / lie	10	13.51	13	10.31	23	11.5
MSL	25	33.78	17	13.49	42	21.00
Fetal Distress	15	20.27	12	9.52	27	13.50
NPOL	10	13.51	22	17.46	32	16.00
Obstruction	5	6.76	7	5.55	12	6.00
Placenta Previa	1	1.35	3	2.38	4	2.00
Abruptio Placenta	2	2.70	5	3.97	7	3.50
Severe Oligo	0	0.00	10	7.93	10	5.00
Placenta Accreta Spectrum	0	0.00	4	3.17	4	2.00
Postdate	0	0.00	9	7.14	9	4.50
Scar Tenderness	0	0.00	14	11.11	14	7.00
Total	74	100.00	126	100.00	200	100.00

Table IV: Indication of LSCS

While analyzing the intra-op complications in this study, it was observed that:

- Amongst the primary LSCS group, most common intra-op complication was extension of uterine incision (6.76%) followed by excess blood loss (4.05%). Most patients who underwent primary LSCS (86.40%) had no intra-op complications.
- Excess blood loss in primary LSCS group was encountered in patients operated for placenta previa, preterm LSCS and abruptio placenta while thinned out lower uterine segment was seen in patients with obstructed labour.
- Amongst the previous 1 LSCS group, the most common intra-op complication encountered was adhesions (85.71%) followed by thin lower uterine segment (41.76%) followed by advanced bladder (24.18%). Amongst the previous $\geq$ 2 LSCS group, most common intra-op complication was adhesions (88.57%) followed by thin lower uterine segment (48.57%) followed by advance bladder (25.71%).
- Excess blood loss in previous 1 LSCS and previous $\geq$ 2 LSCS was seen more in patients operated for placenta previa, abruptio placenta, placenta accreta spectrum and those LSCS which were done before term gestation.
- However, the incidence of all if the intra-op complications was higher in the previous $\geq$ 2 LSCS group than previous 1 LSCS followed by primary LSCS.
- The occurrence of intra-op complications like bladder injury, uterine dehiscence, extension of uterine incision and morbidly adherent placenta was statistically significant ($p<0.05$) in the previous $\geq$ 2 LSCS group as compared to previous 1 LSCS and primary LSCS.

Intra-operative Complications	Primary LSCS (n=74)	Percentage	Previous 1 LSCS (n=91)	Percent-age	Previous $\geq$ 2 LSCS (n=35)	Percent-age	Total (n=200)	Percent - age	Chi Square Test P-Value
Nil	64	86.40	4	4.40	1	2.86	69	34.50	.80
Thin Lower Uterine Segment	5	6.76	38	41.76	17	48.57	60	30.00	.58
Excess Blood Loss	3	4.05	8	8.79	6	17.14	17	8.50	.14
Extension of Uterine Incision	2	2.70	8	8.79	7	20.00	17	8.50	.05
Adhesions	0	0.00	78	85.71	31	88.57	109	54.50	.31
Advanced Bladder	0	0.00	22	24.18	9	25.71	31	15.50	.95
Bladder Injury	0	0.00	0	0.00	1	2.86	1	0.50	.03
Bowel Injury	0	0.00	0	0.00	0	0.00	0	0.00	NA
Uterine dehiscence	0	0.00	1	1.20	3	8.57	4	2.00	.01
Uterine rupture	0	0.00	0	0.00	0	0.00	0	0.00	NA
Morbidly Adherent Placenta	0	0.00	2	2.20	3	8.57	5	2.50	.04

Table V: Intra-operative complications during LSCS.

When statistically estimating the difference in the amount of blood transfusion amongst the study groups it was found to be statistically significant ($p<0.05$).

Type of LSCS	Total number of LSCS in which Blood & Components were transfused	Percentage
Primary	3	4.05
Previous 1 LSCS	11	12.09
Previous $\geq$2 LSCS	9	25.71
P Value Fisher Exact Test		**.04 *statistically significant*(p<0.05)**

Table VI: Type of LSCS and Blood & its components transfused.

The maternal outcome was found to be good amongst both the study groups (97.30% in primary LSCS and 92.06% in previous $\geq$ 1 LSCS). Poor maternal outcome group included patients who had a longer stay due to more amount of blood transfused, wound infection, bladder injury and longer ambulation time. While analysing the number of NICU admissions amongst the study groups in this

study it was found to be higher in babies born of previous ≥ 1 LSCS (19.05%) than in primary LSCS group (10.81%).
When statistically estimating the difference in the admission to NICU rate amongst the study groups it was found to be statistically non-significant (p>0.05).

Higher number of neonates were admitted to NICU in case of previous ≥ 1 LSCS (19.05%) as compared to primary LSCS (10.81%) as there were increased number of LSCS which were taken before full term gestation i.e., at 7 and 8 months of amenorrhea for the indication of placenta previa, abruptio placenta and placenta accreta spectrum (PAS). Neonates born of primary LSCS which were admitted to NICU for respiratory distress and birth asphyxia were mostly of those operated for MSL and foetal distress.

DISCUSSION

The age group distribution of the patients in this study was comparable to the age groups in previous studies.

Study	Most Common Age Group (years)
J Vasantha Lakshmi et al[10]	20-29 years (93.5%)
Ganiga P et al[11]	25-29 year (56%)
Pooja Gupta et al[9]	26-30 years (43.30%)
Shekhar Amale et al[8]	23-28 years (64%)
Kalaiarasi s et al[7]	26-30 years (52.44%)
Present Study	26-30 years (34%)

Table VII: Comparison of most common age distribution group with previous studies

Maximum number of patients who underwent LSCS in this study were full term, which is comparable to previous studies.

Study	Gestational Age
Ganiga P et al[11]	9 months (94%)
Kalaiarasi s et al[7]	9 months (52.89%)
Present Study	**9 months (94%)**

Table VIII: Comparison of months of amenorrhea at the time of LSCS with previous studies.

The most common indication for LSCS in primary LSCS and previous ≥ 1 LSCS in our study were similar to the indications of previous studies (Pooja Gupta et al[9] and Shekhar Amale et al[8]). The most common indication of LSCS in the study by Kalaiarasi s et al[7] was CPD/ previous CS because all the subjects in their study were previous ≥ 1 LSCS. Hence the difference in common indication for LSCS is justified.

In the studies conducted by Kalaiarasi s et al[7], J Vasantha Lakshmi et al[10], Ganiga P et al[11] and Pooja Gupta et al[9], their study group including only women with history of previous one or more LSCS. Hence when we compare our findings of intra- op complications in case of previous ≥ 1 LSCS with their studies it is similar.

In the study conducted by Shekhar Amale et al[8], they compared the findings of primary LSCS with repeat LSCS which were observed to be like our study. Moreover, as observed in both studies, it is seen that as the number of previous LSCS increases there is a significant increase in the number of – intra-op complications.

Intra-op Complication	Study							
	J Vasantha Lakshmi et al[10]	Ganiga P et al[11]	Pooja Gupta et al[9]	Kalaiarasi s et al[7]	Shekhar Amale et al[8]		Present Study	
					Primary CS	Previous CS	Primary CS	Previous CS
Adhesion	41.1%	-	-	57.33%	-	68.57 %	-	86.5%
Thinned Out Lower Uterine Segment	17.11%	-	-	32.89%	-		-	43.65%
Haemorrhage	4.81%	11%	21.65%	13.64%	6.17%	20 %	4.05%	11.11%
Extension of uterine incision	2.67%	-	32.99%	15.11%	8.64%	21.43 %	6.76%	-
Advanced Bladder	-	18%	-	-	-	15.71 %	-	24.6%
Scar Dehiscence	-	-	14.43%	32.89%	-		-	-

Table IX: Comparison of Intra-operative complications with other studies.

CONCLUSION

In modern obstetrics, the aim is safe motherhood and healthy baby by proper timely management. It can be concluded that repeat caesarean sections are associated with increased intra-operative complications and maternal morbidity. There is statistically significant increase in incidence of adhesions, thinned out lower uterine segment, extension of uterine incision, excess blood loss, morbidly adherent placenta and scar dehiscence and rupture in case of previous 2 or more LSCS as compared to previous 1 LSCS and primary LSCS. There is significant increase in the incidence of placenta previa and placenta accreta spectrum (PAS) in previous $\geq$ 2 LSCS as compared to previous 1 LSCS. Previous $\geq$ 1 LSCS patients need a longer hospital stay compared to primary LSCS but there is no significant difference in perinatal outcome. Therefore, as maternal risks are increased in repeat caesarean sections, it is important to inform about the related risks to the mother and her relatives prior to caesarean section. Pre-operative assessment of patient's history, previous records, laboratory investigation and ultrasonography (especially for placental implantation site and invasion) with intra-operative preparedness should help to reduce maternal morbidity associated with repeat caesarean section. The perinatal morbidity associated with repeat caesarean section can be reduced by educating public regarding the importance of antenatal care, detection of high-risk cases, making timely referrals and limiting the number of primary LSCS.

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ABBREVIATIONS:

PAS: Placenta Accreta Spectrum
CS: Caesarean Section
NFHS: National Family Health Survey
WHO: World Health Organization
LSCS: Lower Segment Caesarean Section
MSL: Meconium-Stained Liquor
NICU: Neonatal Intensive Care Unit