

## Challenges of Repeat Cesarean Sections: An Analysis of Intraoperative Complications in a Tertiary Care Hospital, Salem

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### ABSTRACT

**Introduction:** In the world, caesarean sections are the most prevalent obstetric surgical procedures. Potential perioperative complications after a repeat caesarean section can include adhesions, higher blood loss, extended surgery, damage to nearby structures, hysterectomy, and more. These rise in tandem with the number of caesarean sections.

**Aim& objectives:** To avert complications, to evaluate the intraoperative surgical challenges in patients with one or more previous caesarean sections and to predict and handle surgical difficulties that may arise during a repeated caesarean section

**Material & methods:** Fifty pregnant patients with a history of prior caesarean sections participated in this hospital-based trial. These patients were from Vinayaka Mission's Kirupananda Variyar Medical College and Hospital in Salem, from October 2022 to March 2024 (18 months) in the obstetrics and gynaecology department. The patient was chosen based on inclusion and exclusion criteria after giving their informed consent in order to evaluate the different intraoperative surgical problems and challenges that arise during recurrent caesarean sections. Every pregnant woman undergoing a repeat caesarean surgery had her complete medical history, clinical results, and intraoperative observations documented. The findings were tallied and examined.

### Results:

The study analyzed 50 women with previous caesarean sections who underwent repeat caesareans. 60% were from the G2 group, with a decrease in the proportion of women with previous caesarean sections as gravidity increases( $p = 0.0059$ ). The most common indications were previous LSCS with pain(61%). Adhesions were present in 36% patients, with severe adhesion scores of 22%. Most deliveries occurred within the first 5 minutes, and the duration of surgery varies by type and Number of previous caesarean sections( $P<0.0007$ ). Common complications included adhesions (36%), scar issues(38%), emergency hysterectomy(6%), placenta issues(8%), blood transfusions(14%) and rupture uterus(2%).

**Conclusion:** Recurring pregnancies after a caesarean scar puts a woman at great danger, especially in a nation like India where prenatal care is frequently disregarded. When it is feasible, lowering the rates of initial and repeat caesarean sections is the best way to minimize the numerous potential consequences of such procedures.

**Keywords:** Cesarean Sections, intraoperative complications, repeat caesarean sections, adhesions, rupture uterus, blood loss

## INTRODUCTION

Vaginal birthing, which is the signature procedure of the obstetrician is not devoid of maternal or fetal complications. Health care providers take up the patient for LSCS keeping the patient as well as the unborn fetus in mind. But this procedure has become a top priority public health issue globally because the CS rate is sky rocketing without a proportionate reduction in maternal and fetal morbidity or mortality. WHO and ACOG's goal of primary CS is 15 to 15.5%. The irony is that 29% of all birth will be by CS in 2030.<sup>1</sup> Main reason for rising CS is high rate of primary

CS.

Multiple cesarean sections are thought to increase the chance of uterine rupture, severe intraperitoneal adhesions, considerable bleeding, placenta praevia, placenta accreta, bladder damage, hysterectomy, and other complications.<sup>2</sup> The incidence of significant complications due to adhesion formation and scarring might range from 4.3% to 12.5%, contingent on the number of prior cesarean procedures.<sup>3</sup> One of the potentially fatal consequences of a repeat cesarean section that could lead to a hysterectomy is uterine scar rupture. In light of the aforementioned information, the current study was conducted to assess the intraoperative challenges a surgeon might face when performing a repeat cesarean section.

This study conducted at a tertiary care hospital in Salem aims to assess the surgical challenges faced by patients undergoing repeat cesarean sections. It has two main objectives. Firstly, it seeks to evaluate the specific difficulties encountered during surgery in women with one or more previous C- sections. Secondly, by identifying these potential issues, the study aims to develop strategies for predicting and effectively managing them during repeat cesarean deliveries, ultimately improving the safety and efficiency of these procedures.

## MATERIALS & METHODS

This hospital based observational study was carried out in the Department of Obstetrics and Gynaecology at Vinayaka Mission's Kirupananda Variyar Medical College and Hospital in Salem from October 2022 to March 2024 (18 months) to assess the intra operative difficulties encountered in a repeat caesarean section and management modalities of the difficulties encountered during repeat caesarean section.

All expectant mothers who visited our department during their current pregnancy and had previously undergone a caesarean section were eligible for the study. A sample size of fifty was determined using the results of the Somani et al.<sup>4</sup> study, taking into account the 95% confidence interval and a 5% margin of error correction.

Every woman had a thorough medical check up and history taken. An obstetric and pelvic examination was performed, and the results recorded. In accordance with hospital procedure, pertinent laboratory investigations were sent. All women underwent USG to evaluate growth, parameters, gestation age, placental location, and liquor.

Women were divided into two groups based on how many caesarean sections they had undergone (1 and 2). The intra-operative problems were recorded and subsequently compared in terms of adhesions, bleeding, uterine rupture, bladder damage, scar dehiscence, hysterectomy requirement, etc. Every intraoperative issue was handled quickly. When all other attempts to save the uterus appeared to have failed, such as in cases of placenta accreta or uterine rupture, a caesarean hysterectomy was performed.

Additionally, the study recorded operating time, delivery time, and length of hospital stay. To gain a more comprehensive understanding of these cases, the study also collected detailed case histories of each repeat caesarean delivery.

The time taken to deliver the baby from the time of skin incision (delivery time), and the operating time (defined as skin incision to skin closure) were noted.

The statistical software for social sciences (SPSS for Windows, version 20.0. Chicago, SPSS Inc.) and Microsoft Excel 2010 were used to tabulate the data and conduct a statistical analysis. The student test is used to compare results on continuous measures, which are expressed as mean + standard deviation. Using the Chi square test, discrete data are evaluated and expressed as numbers (%). It was determined that a probability value (p value) of less than 0.05 was statistically significant.

Ethical approval for the study was given by the Vinayaka Mission's Kirupananda Variyar Medical College and Hospital, Salem, Institutional Ethical Committee vide Reference number: VMKVMC&

H/ IEC/22/109 Dated: 24.09.2022. Written consent was obtained from study participants prior to the study. The risks and benefits involved in the study and the voluntary nature of participation were explained to the participants before obtaining consent. The confidentiality of the study participants was maintained.

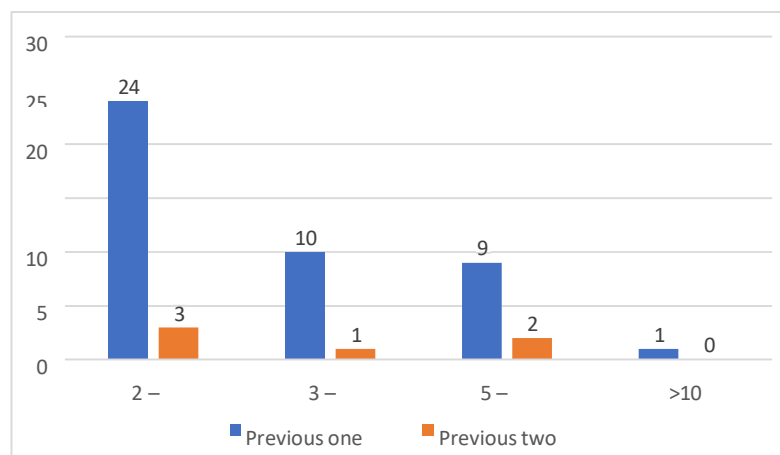
## RESULTS

The majority of our patients were from the age group of 31 to 35 years, especially the previous 1 CS group of patients. Quiet striking was that we did not have any patients less than 20 years of age despite being a low socioeconomic group. 60% of our total patients were falling into G2 group and the minimum (14%) was from G4 group (Table 1).

**Table 1: Maternal characteristics.**

Parameter	Previous 1 CS	Previous 2 CS	Total
Age < 20	-	-	-
Age 21 – 25	10 (20%)	3 (6%)	13 (26%)
Age 26 – 30	14 (28%)	1 (2%)	15 (30%)
Age 31 – 35	17 (34%)	1 (2%)	18 (36%)
Age 36 – 40	3 (6%)	1 (2%)	4 (8%)
Age Total	44 (88%)	6 (12%)	50 (100%)
Gravida G2	30 (60%)	-	30 (60%)
Gravida G3	9 (18%)	4 (8%)	13 (26%)
Gravida G4	5 (10%)	2 (4%)	7 (14%)

Figure 1 shows the time intervals between previous lower segment cesarean sections (LSCS) within a cohort. It shows that among those with LSCS 2-3 years ago, 48% had it as their first, while 6% had it as their second. Similar trends are observed for longer intervals, with fewer individuals undergoing subsequent LSCS.



**Fig1: Time interval from previous LSCS**

**Table2: Placental location**

Placenta	Frequency	Percentage
Anterior	25	50
Fundal	10	20
Posterior	13	26
Low(Within2cmfromOS)	2	4

Table 2 presents data on the frequency and distribution of placental locations within a sample. The table categorizes placental location into four main types: anterior, fundal, posterior, and low (within 2 cm from the os). Among the observed placental locations, anterior placement is the most common, accounting for 50% of cases, followed by posterior placement at 26%. Fundal placement represents 20% of cases, while low placement is the least frequent at 4%. This data provides insights into the distribution of placental locations within the studied population, indicating a predominance of anterior and posterior placements.

**Table3: Period of gestation and number of CS**

POG	Previous 1 CS		Previous 2 CS		Total		P value
	No	%	No	%	No	%	
< 34	1	2%	-	-	1	2%	0.0474
34 <sup>+</sup> to 35	-	-	1	2%	1	2%	
35 <sup>+</sup> to 36	3	6%	2	4%	5	10%	
36 <sup>+</sup> to 37	10	20%	1	2%	11	22%	
37 <sup>+</sup> to 38	21	42%	2	4%	23	46%	
38 <sup>+</sup> to 39	8	16%	-	-	8	16%	
39 <sup>+</sup> to 40	1	2%	-	-	1	2%	
Total	44	88%	6	12%	50	100%	

Table 3 summarizes the association between the period of gestation (POG) and the number of previous cesarean sections (CS). It indicates that individuals with a POG of 37<sup>+</sup> to 38 weeks had the highest proportion of previous CS (46%), while those with a POG of <34 weeks had the lowest (2%). The P- value of 0.0474 suggests a significant relationship between POG and the number of previous CS.

Our study also found that indications such as previous LSCS with pain and previous LSCS combined with cephalopelvic disproportion (CPD) are prominent, with respective frequencies of 11 and 22. Notably, intrauterine growth restriction (IUGR) stands out with a frequency of 2, indicating significant association with previous CS history (P-value = 0.0008).

**Table 4: Severity of adhesions and number of previous LSCS**

Severity of adhesions	Total no. of patients	Previous one LSCS	Previous two LSCS	P value
Mild to moderate (Score of<10)	4	3	1	0.9901
Severe (Score>=10)	14	10	4	
Total	18	13	5	

Table 4 revealed out of 50 patients, 18 (36%) had adhesions, while 32 did not. Among the 6 patients with two previous lower segment cesarean sections (LSCS), 5 had adhesions - 1 with mild to moderate and 4 with severe adhesions. Among the 44 patients with one previous LSCS, 13 had adhesions - all mild to moderate and 10 severe. This suggests a higher prevalence of adhesions in patients with multiple previous LSCS, particularly severe adhesions.

**Table 5: Nature of the scar in relation to number of previous LSCS and gap between caesarean sections**

Nature of scar(N)	Previous One LSCS	Previous Two LSCS	Previous LSCS (years ago)			P value
			<=3	3 – 5	> 5	
Thin (12)	10	2	5	5	2	0.827
Dehiscence (7)	4	3	4	2	1	
Rupture (1)	0	1	1	0	0	
Total(20)						

Table 5 presents data on the nature of the scar in relation to the number of previous lower segment cesarean sections (LSCS) and the gap between cesarean sections. The table categorizes scars into three types: thin, dehiscence, and rupture. Twelve (24%) of our patients had thin scar of which 10 were from 1 CS group and two from 2 CS group. Seven (14%) had scar dehiscence. Four from one CS group and three from 2 CS group. There was one rupture uterus from previous 2CS group. Overall, no significant differences were observed in the distribution of scar types concerning the number of previous LSCS or the gap between cesarean sections, as indicated by the P-value of 0.827. This suggests that neither the number of previous LSCS nor the gap between cesarean sections significantly influences the nature of the scar.

**Table6:Time taken for delivery**

Time taken for Delivery for fetus	Total number of patients	Previous one LSCS	Previous two LSCS	P value
Up to 5min	23	22	1	
6 to 10min	15	15	-	

11 to 15min	11	7	4	0.0007
16 to 45min	1	-	1(45minutes)	

Table 6 provides data on the time taken for delivery of the fetus, categorized into four intervals: up to 5 minutes, 6 to 10 minutes, 11 to 15 minutes, and 16 to 45 minutes. Notably, the P-value of 0.0007 indicates a significant association between the time taken for delivery and the number of previous LSCS. Specifically, there's a substantial difference in the distribution of delivery times between patients with one previous LSCS and those with two previous LSCS. The findings of present study shows statistically significant association (p-value = 0.0027) between the severity of adhesions and delivery time. Deliveries with severe adhesions were more likely to have longer delivery times (11 minutes or more) compared to those with mild to moderate adhesions (less than 10 minutes).

**Table7: Totalduration of surgery**

Time taken	Total no of patients	Elective LSCS	Emergency LSCS	Previous One LSCS	Previous Two LSCS	P value
<=1 hour	32	21	11	30	0	0.0006
1to1½ hour	15	10	5	13	4	
> 1 to ½3 hour	3	1(2 ½hrs)	2	1(2 ½hrs)	2(3, 4hrs)	

The findings of Table 7 suggest a statistically significant association (p-value < 0.001) between total duration of surgery and the type of cesarean section (elective, emergency, previous one LSCS, previous two LSCS).

**Table8: Consistency of adhesion and time taken for delivery and duration of surgery**

Consistency of adhesions and no. of patients	Time taken for delivery		Total duration of surgery			P value
	Number	Time mints	in45minto hr	1>1hr To1½h r	>1 ½hr	
No(32)	24	5min	27	5	1	<0.0001
	7	7min				
	1	12min				
Mild to moderate(4)	2	5min	4	0	0	
	1	7min				
	1	10min				
Severe(14)	6	10min	1	10	3	
	4	12min				
	3	15min				
	1	45min				

The findings of Table 8 are statistically significant for both delivery time (chi-square = 6.15, df = 2, p-value < 0.0001) and total duration of surgery (chi-square = 11.98, df = 2, p-value < 0.0001), indicating a strong association between the consistency of adhesions and these outcomes. Delivery Time: Patients with severe adhesions generally had longer delivery times leading leading...

**Fig2: Complications encountered**

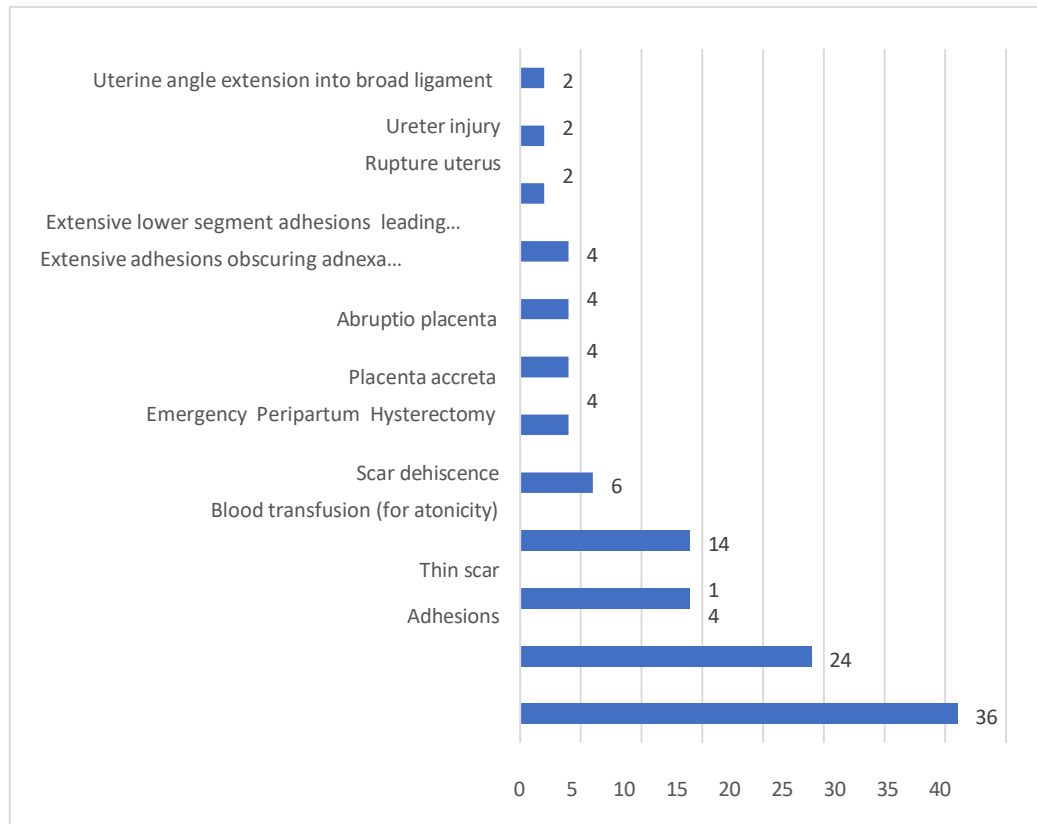


Figure 2 shows details of the various complications encountered during the repeat cesarean section procedures. Adhesions were the most frequent complication, occurring in 36% of cases. This was followed by a thin scar (24%), scar dehiscence (14%), and blood transfusion due to uterine atony (14%). The highlights are severe complications, though less frequent. These include emergency subtotal hysterectomy (6%), uterine rupture (2%), ureter injury (2%), placenta accreta (4%), and abruptio placenta (4%). Overall, the table emphasizes the presence of adhesions as a major complication in repeat cesarean sections, along with potential risks for significant blood loss and scar-related issues.

**Table 9: Blood loss in study group**

Previous CS	<=1000ml	>1000to1500ml	>1500to2000ml
1 CS	39	3	2
2 CS	4	-	2

The table 9 displays total 43 patients (86%) had a blood loss of <=1000 ml. Three patients (6%) of our study group (all from previous 1 CS) had a blood loss of >1000 to 1500 ml. Four (8%) of our patients had a blood loss of > 1500 to 2000 ml. Also our study revealed Seven of our patients had blood transfusion. Two had abruptio placenta, two had placenta accreta spectrum disorder, two had atonicity and one was a case of rupture uterus. Five out of these seven were from previous one CS and only two were from previous two CS.

One of the patients who underwent EPH had extensive adhesions. Adnexa could not be visualised. Ureter was injured while clamps were applied for hysterectomy. Urologist called in and DJ stenting with repair was done. PO period uneventful

**Table 10: Hospital days:**

Days	Previous 1 LSCS	Previous 2 LSCS	P value
< 7 days	39	3	0.0034
8 to 10 days	4	-	
11 to 15 days	1	2	
16 to 20 days	-	-	

The table 10 summarizes hospital stays based on patients' prior cesarean sections. Patients with one previous cesarean section mostly stayed less than 7 days (39 cases), while those with two prior sections had longer stays, with 3 cases staying less than 7 days and 2 cases between 11 to 15 days. There were no cases of patients with two prior cesarean sections staying 8 to 10 days or 16 to 20 days. The P value of 0.0034 indicates a significant difference in hospital stays between the two groups. The study found a link between some complications and longer hospital stays. Patients with abruptio placenta, placenta accreta, or who underwent an emergency hysterectomy (EPH) stayed in the hospital for 8-15 days. The longest stay (20 days) was for a patient with a ureteric injury.

## DISCUSSION

50 pregnant women at or near term who had previously had a caesarean section at Vinayaka Missions, Kirupananda Variyar Medical College and Hospital, participated in our observational study over a period of one year. The study examined the presence of any intra-operative surgical difficulties that the surgeon may have encountered during the repeat caesarean section.

Of the fifty women, forty-four (88%) had undergone one previous cesarean section, and six (12%) had undergone two. Studies by Singh et al., which found that 85% and 13% of prior 1 and 2 cesarean procedures, respectively, and Sinha et al., which found that 81.25% and 17.5% of prior 1

and 2 cesarean sections, respectively, are equivalent to this.<sup>4,5</sup>

A review of the patients' ages revealed that the majority of those who had recurrent cesarean sections (56%) belonged to the 21–30 age range. The youngest, who was 21 years old, had had a cesarean section performed a year prior for cephalopelvic disproportion (CPD). The fact that we did not have any patients under the age of twenty, even though our socioeconomic category is low, was quite surprising. The oldest, who was 36 years old, had had two cesarean sections before. The current study is consistent with research by Poovathi et al. and Sheela et al., which found that, respectively, 80% and 68.9% of cases occur in the age range of 21 to 30 years.<sup>6,7</sup>

Normally during the first 7 months of pregnancy, the upper part of uterus grows more faster, whereas the lower part grows faster in the last months. This differentiation of growth is impaired when the lower uterine segment is scarred, thus CS is contributing as the major culprit to placenta praevia. One CS can cause 2.5-fold increase in CS and this rate multiplies with increase in CS rate.<sup>8</sup> Only two (4%) patients had low lying placenta. One of them was from previous 1 CS group and the other from previous 2 CS group.

The main reasons for emergency cesarean sections in this study were fetal distress (3 cases) and previous C-section with pain (11 cases). There were also a few instances of uterine rupture (1 case), abruptio placenta (2 cases), and prolonged rupture of membranes (PROM, 1 case). The most common indication for performing an elective (repeat) caesarean section was previous LSCS with cephalopelvic disproportion (69%), in contrast, emergency C-sections were most often for pain associated with a previous C-section and signs of fetal distress (29%). This was similar to a research by Poovathi et al. in which fetal discomfort (20%) and cephalopelvic disproportion (50%) were the main reasons why most patients required repeat cesarean sections.<sup>6</sup>

It has been observed that a repeat cesarean section increases the risk of intraoperative problems. Compared to women who had only had one cesarean section previously, those who had had two had a higher rate of complications. Similar findings were seen in a research by Lakshmi et al, where a range of intra-operative



problems were seen in 81.8% and 37.8% of women who had previously had two and one repeat cesarean sections, respectively.<sup>9</sup>

In the present study, adhesions accounted for 36%. Studies on the prevalence of adhesions in patients with previous cesarean sections have shown varying rates of adhesion formation. Alpay et al. (2008) conducted a study involving 63 patients who were reoperated for evaluation of adhesions in their second cesarean sections.<sup>10</sup> Conversely, Nuamah et al. (2017) found that 38% of women had adhesions after cesarean sections in their study in Ghana. These findings indicate that adhesion formation is a common occurrence in patients with previous cesarean sections.<sup>11</sup>

The severity of adhesions in patients with multiple repeat cesarean sections was also explored by (Biler et al., 2017), who noted a longer hospital stay in patients with multiple repeat cesarean sections compared to the control group. This suggests that the number of cesarean sections may impact the severity of adhesions and subsequent clinical outcomes.<sup>12</sup>

Present study reveals that thin scars were more common in patients with one previous LSCS, while dehiscence and rupture were rarer. Most deliveries occurred within 5 minutes and the majority of surgeries were completed in less than 1 hour.

When comparing our study results with previous research Huque et al pointed out that the increasing prevalence of Caesarean sections has led to a growing population of women with scarred uteruses, which is associated with a higher risk of Emergency Peripartum Hysterectomy (EPH) due to abnormal placentation.<sup>13</sup>

Rawashdeh et al., studies support that the incidence of abnormal placentation, such as placenta previa and placenta accreta, has been on the rise in recent years due to the increasing rates of Caesarean deliveries.<sup>14</sup> Additionally, Boujida et al., shown the association between a history of both Caesarean section and placenta previa significantly increases the risk of morbidly adherent placenta in subsequent pregnancies.<sup>15</sup>

Jahnavi & Gomathy studies shown that the incidence of placenta accreta spectrum, which includes conditions like placenta previa and placenta accreta, is increasing due to the rise in Caesarean section rates.<sup>16</sup> Furthermore, Doreswamy et al studies shown the most common indication for emergency and planned peripartum hysterectomy is abnormal placentation associated with previous Caesarean sections.<sup>17</sup>

Anubha Vidyarthi et al. found that a significant proportion (59.7%) of uterine ruptures were attributed to previous CS, aligning with the notion that prior CS can increase the risk of uterine rupture.<sup>18</sup>

Greenberg et al reported mean interval of incision to delivery as 15.6 min with mild to moderate adhesions and 19.8 min with severe adhesions. In very bad adhesions it has extended beyond 30 min.<sup>19</sup> In one of our cases, it was 45 minutes. It was due to extensive adhesions at all levels and also because lower segment was not accessible.

In our study 44 patients with previous 1 CS, 30 (60%) delivered in < 1 hr, 13 patients (26%) took 1 to 1 ½ hour and just one patient (2%) took > 1 ½ hr. Of the total 6 patients with previous 2 CS, 4 patients (8%) took 1 to 1 ½ hr and two patient (4%) took > 1 ½ hr. similar finding was by Tulandi the operating time at repeat emergency and elective LSCS (Previous one and two), there was small but significant correlation between adhesion score and incision to operating time. ( $r=0.26$ ,  $p<0.0001$ ). The operating time (min) was  $40.7 \pm 1.4$  in previous 1 CS. (p value NS) and

$46.2 \pm 2.9$  ( $p < 0.05$ ). On the other hand for elective CS, operating time for previous one CS was  $39.55 \pm 0.8$  (p - NS) and  $45.0 \pm 1.6$  ( $p=0.005$ ).<sup>20</sup>

In our study total 43 patients (86%) had a blood loss of  $\leq 1000$  ml. Three patients (6%) of our study group (all from previous 1 CS) had a blood loss of >1000 to 1500 ml. Four (8%) of our patients had a blood loss of > 1500 to 2000 ml. Similar to our study finding Silver et al studies showing significant blood loss with high order CS<sup>21</sup> and Juntunen et al all studies do not agree with such

results.<sup>22</sup> Blood transfusions were necessary in 14% of cases, reflecting the substantial blood loss associated with uterine atonicity. Scar dehiscence (14%) and thin scars (24%) were also noted, emphasizing the importance of evaluating uterine scar integrity in patients with prior LSCS surgeries.

In summary, our study's findings corroborate and expand upon previous research, emphasizing the complex and sometimes severe maternal health challenges associated with LSCS procedures, particularly in cases with a history of previous caesarean sections. These findings underscore the importance of careful preoperative assessment, surgical expertise, and vigilant monitoring to optimize maternal and fetal outcomes during LSCS procedures.

## CONCLUSION

Decision to do CS must weigh the pros and cons, keeping her obstetric career in mind. Aim to reduce primary CS. Regular auditing by governing bodies definitely brings down CS rate. Documentation of the details of lower segment, number of layers of uterine closure and suture material in the discharge summary is vital in considering about TOLAC. All obstetricians should undergo training to do internal iliac artery ligation, peripartum

hysterectomy, repair bowel and bladder injury. Need of the hour is to put a check to the epidemic of rising CS without compromising on maternal and fetal morbidity or mortality.

#### **Limitations**

As this was a single center study with a comparatively short sample size. Also the use of convenience sampling for participant selection might limit the generalizability of our findings of this study cannot be generalized. Generalization requires the support of results from similar large studies

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**Conflicts of interest:** There are no conflicts of interest.

#### **Ethical statement:**

Institutional ethical committee accepted and approved this study. Ethical approval for the study was given by the Vinayaka Mission's Kirupananda Variyar Medical College and Hospital, Salem, Institutional Ethical Committee vide Reference number: VMKVMC& H/ IEC/22/109 Dated: 24.09.2022. Written consent was obtained from study participants prior to the study. The risks and benefits involved in the study and the voluntary nature of participation were explained to the participants before obtaining consent. The confidentiality of the study participants was maintained. Informed written consent was obtained from all the study participants and only those participants willing to sign the informed consent were included in the study.

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#### **Authors' contributions:**

**Dr Divya. M-** conceptualization, data curation, investigation, methodology, project administration, visualization, writing—original draft, writing—review and editing; **Dr B. Jeyamani** writing— original draft, writing—review and editing. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work. All authors have read and agreed to the published version of the manuscript.

#### **DATA AVAILABILITY**

All datasets generated or analysed during this study are included in the manuscript.

#### **INFORMED CONSENT**

Written informed consent was obtained from the participants before enrolling in the study **Use of Artificial Intelligence:** No, authors have not used Artificial Intelligence in this research.

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