



Maternal Outcomes and Complications after Repeated Cesarean Sections among Zagazig University Hospital Patients

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Abstract

Background: Cesarean section (CS) is among the most common obstetric operations globally, and recent research shows a rise in the prevalence of CS. Maternal morbidity and mortality related to CS is a major public health concern across the world. This necessitates a study of the impact of recurrent CSs on mother morbidity. **Patients and Methods:** This Cross-sectional study was carried out on 165 women in the Department of Obstetrics and Gynecology, Zagazig University Hospitals by analyzing the data and records of all women who underwent multiple repeated CSs. The women were allocated according to the number of CSs into 3 groups, the maternal outcomes and complications as adhesions, hysterectomy, or blood transfusion requirements of all groups were examined retrospectively. **Results:** The current study included a total of 165 participants. Our results revealed that the most frequent complication was adhesion ~59.39%, followed by intraoperative hemorrhage and need for blood transfusion (19.4%), and the less frequent complication was endometritis and no maternal death. There was a significant difference between the groups regarding maternal age, BMI, hospital stay, and operative time, while no significance was found in pre/postoperative hemoglobin. **Conclusions:** Our results endorse our assumption that the risk of maternal complications increases as the number of CSs increases. There is no clear absolute threshold for the number of CSs, but a total of 4 or more cesarean deliveries was identified as the critical level for most of the major complications. Adhesions were the most prevalent complication in our research group, followed by intraoperative hemorrhage. To reduce related problems, the number of CSs must be reduced. The patient should be advised that vaginal birth after CS is an option.

Key words: Multiple cesarean sections; Maternal complication; morbidity; Intraabdominal dense adhesion.

INTRODUCTION

Cesarean section (CS) is a medical operation that, in many instances, can save both the mother and the baby's lives. Cesarean delivery rates have risen year after year, and this has become a public health issue in terms of the strain on the country's economy as well as potential problems [1]. The CS rate has risen significantly in recent years in both undeveloped and developing countries as a result of older maternal age, defensive obstetric

practice, maternal request for a CS, and medico-legal concerns [2]. The CS rate in the Middle East is lower than 15% in the majority of the countries, except Qatar (19.6), Bahrain (16%) and Lebanon (18%), although higher rates have been reported in Egypt (57.3%) and Tunisia (43%) [3]. The rate of multiple repeated CS is persistently on the rise because of social and cultural demands for large families [4]. Additionally, main reasons for this increase were rapidly decreasing rate of vaginal

birth after cesarean section (VBAC) and increasing primary cesarean rate on maternal request. Although, the fact that operations are now safer than in the past because to advances in anaesthetic, antibiotics, and blood transfusion services, they nevertheless pose a considerable danger to the mother when compared to vaginal birth [5]. Increasing rate and number of cesarean deliveries are known to be associated with maternal risks. External physical abnormalities, such as skin malformations and scar development, may occur as a result of a CS. Several studies have found that recurrent CSs have higher incidence of placenta previa, placenta accreta, and CS hysterectomy [6, 7]. The frequency of surgical injuries, the rate of blood transfusions, and the creation of adhesions all rose as the number of CSs increased. Furthermore, adhesions can occur among abdominal organs when the abdomen is re-opened for an operation, and they can vary depending on the operator, operating style, operative method, operative type, operative time, complications, and the individual's body's reactions during recovery [8]. However, the fact that the time of the delivery, the surgeon's expertise, the center's competency, surgical technique, and anesthesia risk all play key roles in the appearance of complications, little is known about the factors that contribute to management outcomes despite the complications ratcheting up [9]. The significance and goal of the present research were to assess the effect of repeated cesarean delivery on maternal mortality and morbidity in women with a history of 2 or more CSs, using as precise metrics as feasible and a higher number of morbidity parameters..

PATIENT AND METHODS

This Cross-sectional study was carried out in Obstetrics and Gynecology department of Zagazig University Hospitals, Zagazig City, Sharika Governorate, Egypt, for a period of six months from March 2019 to September 2019. This study included 165 pregnant women who gave birth by caesarean delivery. We made sure at least 6 weeks had passed after the delivery of the registered pregnant women. Before the beginning of the study, the suggested protocols were declared to all women, who accepted to participate and met the inclusion criteria that mentioned below. Detailed history taking include demographic data (age, weight, parity, gravidity), comorbidities and history of previous surgery. Full general examination: involve pulse, blood pressure examination, body mass index (BMI, kg/m²), abdominal and pelvic examination.

Laboratory investigations that included: pre and postoperative hemoglobin levels that measured by automated blood counter on Sysmex® XS 500 Japan that performed according to Clinical Pathology Department Protocol in Zagazig University Hospital.

Inclusion criteria were pregnant women who were 20- 45 years old, had undergone at least 1 CS, and births at 36 - 40 weeks of gestation.

Exclusion criteria: women who were not included in the study were pregnant women undergone non-cesarean abdominal surgery, women who did not come for postnatal follow-up, who had inadequate data in their hospital records, and women had other comorbidity as chronic hypertension, diabetes, renal problem.

Approval for performing the study was obtained from Obstetrics and Gynecology Department, Zagazig University Hospitals after approval taking by the Institutional Review Board (IRB) unit and the Research Ethical Committee in the Faculty of Medicine, Zagazig University (IRB Number: ZU-IRB#5037#03-12-2018). The study was performed according to the code of ethics of the world medical association (Declaration of Helsinki) for studies involving humans.

The suggested study protocols were conveyed to all participants, a verbal and an informed written consent document was signed by those who agreed to participate.

METHODOLOGY

After exclusion of non-respondents or women with the above-mentioned exclusion criteria, we review the charts and hospital records of all patients who had at least one caesarean section for pregnant women in the adolescent age group who gave birth in our clinic between March and September 2019.

Description of the variables

Maternal Complications and outcomes identification:

Intraabdominal dense adhesion: it was characterized as the existence of adhesions identified intraoperatively, stretching from the abdominal wall to the bladder or front wall of the uterus, not readily separating, and being left alone during surgery as much as possible due to the worry that it might cause significant morbidity.

Endometritis: this was defined as a clinical description where puerperal period fever, bad-smelling vaginal discharge and pelvic tenderness were present and no other focus was found after the birth.

Placenta previa: it was the placenta closing the cervix internal so partially or completely on ultrasonographic evaluation performed during the 3rd trimester. It was defined as the placenta closing the uterus lower segment cervix partially or completely during intraoperative observation in patients whose third trimester ultrasonography was not performed.

Placenta adhesion abnormalities (placenta accretta): this diagnosis was made with histopathological verification if there was hysterectomy material present and based on intraoperative findings if there was no need for hysterectomy. It was described as significant bleeding from the adhesion site following separation in situations when it could not be removed from the adhesion site or was difficult to separate due to a variety of factors with intraoperative moderate traction.

Bladder injury: It was defined as unintended harm caused by the incision or intraoperative tissue dissection. Intestinal injury was defined as either intestinal entrance during intraoperative tissue dissection or seromuscular damage that needed to be repaired.

Need for Blood transfusion: this was performed when the preoperative Hb level was less than 10 g/dl, the intraoperative estimated blood loss was greater than 20% of the total blood volume, or the postoperative Hb level was less than 8.5 g/dl.

Incision site infection: This complication was considered in patients with secretion from the incision site or growth in incision site culture after

the 3rd postoperative day. The operation time was calculated as the time between skin incision and skin closure.

STATISTICAL ANALYSIS

Collected data during the history, laboratory examinations, basic clinical investigation, and result evaluations were coded, tabulated and statistically analyzed using SPSS version 20.0 for windows (Statistics Package Social Science, SPSS Inc, Chicago, ILM, USA). Data were tested for normal distribution using the Shapiro Walk test, whereas Chi square test (χ^2) and Fisher exact were used to calculate difference between qualitative variables as indicated. One way ANOVA or Kruskal Wallis were used to compare between more than two dependent groups of parametric and non-parametric variables respectively. Paired nonparametric t-test was used to calculate P value in each group (It was thought that P-value ≤ 0.05 indicates significant; $p < 0.001$ indicates highly significant while; $P > 0.05$ indicates non-significant difference).

RESULTS

Demographic characteristics of 165 women who completed the study protocol are presented in Table (1). The average age of all patients involved in our current study was 30.25 ± 5.081 (20 - 44) years, with average BMI of 28.92 ± 3.65 (22- 39) kg/m^2 . Table (1) presents the preoperative routine laboratory investigations; the mean Hb value was 11.15 g/dl, mean TLC $9.46 \times 10^3/\text{uL}$., and INR of 1.14

Table (1): Demographic characteristics, Parity, Gravidity distributions and Preoperative laboratory data of the studied patients.

Maternal age (years)			
Mean \pm SD		30.25 ± 5.081	
Range		20 – 44	
BMI (kg/m^2)			
Mean \pm SD		28.92 ± 3.65	
Range		22 – 39	
Sample size		Patients (n=165)	
		N	%
Parity	1	2	1.2
	2	85	51.5
	3	51	30.9
	4	18	10.9
	5	8	4.8

	6	1	0.6
Gravidity	3	67	40.6
	4	50	30.3
	5	22	13.3
	6	19	11.5
	7	3	1.8
	8	3	1.8
	10	1	0.6
Preoperative laboratory data of the studied patients			
Hemoglobin (g/dl) Mean ± SD		11.15 ± 0.91	
TLC (10³ /μL) Mean ± SD		9.46 ± 2.33	
PT (sec) Mean ± SD		12.19 ± 0.589	
INR Mean ± SD		1.14 ± 1.01	
Rh	<i>Positive</i>	157 (95.2%)	
	<i>Negative</i>	8 (4.8%)	

TLC = Total leukocyte count; **PT**= Prothrombin Time; **INR** = International Normalized Ratio

The results of our study revealed that adhesion was the most frequent complication among the studied patients by 59.39%, followed by blood transfusion of 19.4% and the less frequent complication was endometritis of 1.8 %, without maternal death. The major cause of maternal ICU admission was extensive hemorrhage of > 1500 ml (11 patients controlled by hysterectomy and transfusion blood, plasma), one patient was due to sepsis (post CS hematoma and resistant endometritis did not respond to antibiotic), Table (2).

Table (2): Maternal complication among the studied patients.

Complications	Patients (n=165)	
	N	%
Placenta accreta	12	7.3
Hysterectomy	11	6.7
Blood transfusion	32	19.4
Adhesion	98	59.4
Bladder injury (at dome of bladder)	3	1.8
Endometritis	3	1.8
Wound infection	8	4.84
Uterine Rapture (incomplete)	5	3.03
Scar tenderness	30	18.2
Admitted to ICU	12	7.3
Maternal death	0	0

ICU = Intensive Care Unit

A total of 3 patient groups were created according to the number of CSs (2nd, 3rd and 4th/5th). Table (3) displays demographics as well as clinical data of each patient. One hundred and eleven patients had their first CS procedure, 44 had their 2nd, 9 had their 4th and one had her 5th. Referring to Table (3), there

was a highly significant difference within the 3 groups regarding maternal age, BMI, hospital stay, and operative time (p < 0.05), while there was no significant found concerning pre/postoperative hemoglobin (P = 0.124 and 0.485, respectively). The 2nd CS group had the lowest maternal age

(28.56 ± 4.31 years), whereas the group with 4th/ or 5th CSs had the highest (35.1 ± 4.12 years) (p= 0.001). The 2nd and 3rd CS groups had similar rates

of hospitalization duration (~1.16 days), while patients of the 4th/ or 5th CSs groups had the longest hospitalization duration of 2.5 ± 3.24.

Table (3): Maternal characteristics and clinical data in relation to cesarean section number.

	2 nd CS (n=111)	3 rd CS (n=44)	4 th /5 th CS (n=10)	F	P
Age (years) Mean ± SD	28.56 ± 4.31	33.7 ± 4.91	35.1 ± 4.12	26.64	0.0001
BMI (kg/m²) Mean ± SD	28.29 ± 3.69	30.12 ± 3.39	31.60 ± 1.84	7.09	0.001
Preop. Hb (g/dl) Mean ± SD	11.05 ± 0.88	11.34 ± 0.91	11.44 ± 1.03	2.11	0.124
Postop. Hb (g/dl) Mean ± SD	10.16 ± 0.81	10.29 ± 0.71	10.39 ± 0.46	0.726	0.485
Hospital stays (days) Mean ± SD Range	1.16 ± 0.436 1 - 3	1.66 ± 1.72 1 - 7	2.5 ± 3.24 1 - 10	7.074	0.001
Operative time (min) Mean ± SD	45.25 ± 6.41	46.77 ± 9.13	57.1 ± 10.85	11.18	0.0001

Preop. Hb = preoperative hemoglobin; **Postop. Hb** = postoperative hemoglobin

Maternal complications in relation to cesarean section number are presented in Table (4). There is a significant difference among the studied groups in term of hysterectomy, Placenta accreta, blood transfusion, and ICU admission (p < 0.05). In terms of the existence of thick adhesions, there was a non-statistically significant difference between the groups (P = 0.271). The rate of adhesion present was comparable between the 3rd CS (54.5 %) and

4th/ or 5th CS (40 %) groups, but substantially greater in the 2nd CS (63.1 %). The crucial threshold for the majority of the main complications was determined to be fur or more CSs. We observed that groups with 4th/ or 5th CSs had considerably greater incidence of damage to surrounding organs (as the bladder), caesarean hysterectomy, blood transfusion need, and infectious complications.

Table (4): Maternal complications in relation to cesarean section number.

	2 nd CS (n=111)	3 rd CS (n=44)	4 th /5 th CS (n=10)	χ ²	P
Hysterectomy	3 (2.7%)	5 (11.4%)	3 (30%)	7.11	0.032
Placenta accreta	6(5.6%)	3(6.8%)	3(30%)	8.25	0.016
Blood transfusion	16 (14.4%)	8 (18.2%)	5 (50%)	8.034	0.018
Adhesion	70 (63.1%)	24 (54.5%)	4 (40%)	2.61	0.271
Bladder injury	1 (0.9%)	1 (2.3%)	1 (10%)	4.43	0.108
Endometritis	1 (0.9%)	2 (4.5%)	0	2.54	0.281
Wound infection	5 (4.5%)	2 (4.5%)	1 (10%)	.612	0.736
Uterine Rapture	3 (2.7%)	1 (2.3%)	1 (10%)	1.78	0.411
Scar tenderness	16 (14.4%)	10 (22.7%)	4 (40%)	4.87	0.088
Admitted to ICU	6 (5.4%)	3 (6.8%)	3 (30%)	8.25	0.016

DISCUSSIONS

Generally, CS is regarded as a safe technique. However, the potential of complications should not be disregarded, and must be evaluated with caution, especially for individuals who underwent multiple

CSs [10]. Despite differences in patient age, location of residence, and cultural circumstances, the global CS rate has increased significantly. This rise is notably noticeable among women in cities and those over the age of 35. When compared to

normal delivery and the first caesarean, repeated caesarean birth is associated with serious maternal complications. However, medico-legal reasons, greater cesarean birth reliability, and lower rates of vaginal delivery after CS all play key roles in the recent increase in CS rates. Another major issue is the increased expense of CS, particularly in developed nations [11]. Cultural expectations for bigger families, which are prevalent in many areas of the world, particularly in the Arab world, have resulted in a rise in the prevalence of CSs, as a result, many repeat CSs with accompanying complications. Several studies have been performed to determine the implications of multiple repeated CSs on future pregnancies in order to correctly counsel women on the safety of higher-order CSs, with conflicting findings [3].

The goal of this cross-sectional study was to determine the risk of maternal complications associated with repeated CSs. Regarding caesarean section numbers, most of our studied patients were in their second CS (67.3%), the 3rd CS was 26.7%, the 4th was 5.5% and only one woman was in her 5th CS. We found a highly significant difference between the study groups concerning the demographic data (maternal age and BMI) hospital stay, and operative time, which was agreed with the finding of Alshehri et al. [12] and Kaplanoglu et al. [13]. While there was no significant found concerning pre/postoperative hemoglobin that is in accordance with the finding of Kaplanoglu et al. [11].

In our study, we found that the major maternal complications were adhesion of 59.4% followed by blood transfusion needed (19.4%), scar tenderness (18.2%), and placenta accrete (7.3) while cesarean hysterectomy documented in 6.7% patients and 7.3% admitted to ICU. whereas the minor maternal complications were endometritis of 1.8%, uterine rupture (3.03%), bladder injury (1.8%), and wound infection of 4.8%. This is in accordance with the findings of Alshehri et al. [12], who reported comparable results, in which they found adhesion formation in 80% of cases, ~ 61 % experiencing blood loss during surgery and blood transfusion was need, cesarean hysterectomy in (3.3%) and bladder injury in (1.3%), uterine rupture (0.8%), wound infection (0.5%) and ICU admission (2.5%) [12].

Adhesions are fibrous, band-like formations that develop intra-abdominally and are a common surgical complication. After obstetrical and gynaecological surgery, it was predicted that 51% of patients are developed adhesions. Adhesions are

a reason of acute morbidity, such as bleeding and prolonged surgery, as well as chronic morbidity, such as persistent pelvic discomfort and digestive issues. The adhesion rate and intensity increase as the number of CSs increase. Furthermore, adhesions can cause extra morbidity either directly or indirectly through peripheral organ damage. The surgical approach has an impact on adhesions that occur during caesarean delivery [14].

The adhesion incidence in our study was similar to the general consensus, the frequency of adhesion ranges between 46 and 65 %, depending on the number of caesarean sections performed. In a Canadian study reported by Tulandi et al., adhesions were not observed in women with a 1st CS but were found in the 2nd (24.4%), 3rd (42.8%), and 4th (47.9%) CS [14]. Moreover, Rashid and Rashid, 2004 also mentioned a similar increasing trend of the dense adhesions (15% for 3-4 CSs and 54% for 5-9 CSs) when compared to our study [15].

In terms of hospital stay and surgery duration, we reported a significant difference between the groups, with the 4th/ or 5th CS group having the longest hospitalization and operation time compared to the 3rd and 2nd groups. These results are consistence with early finding reported by Kaplanoglu et al. [13] who found that the duration of hospitalization was increased in correlation with the increasing number of CS [13]. Interestingly, Zwergel and Kaisenberg [16] revealed that adhesions have been also associated with increased operative time, increased blood loss, and increased risk of visceral injury. Also, Choudhary et al., demonstrated that thick adhesions not only complicate the surgeon's job, but also represent an elevated risk to the women by extending surgical time and increasing the chance of damage to nearby organs [3].

Another important complication is hysterectomy. We found a significant difference among the studied groups in terms of hysterectomy after CS, and the need for blood transfusion with higher rate in the 4th /or 5th CS group (30%, 50% respectively). The incidence of these conditions was found to increase in correlation with the increasing number of CSs and this was consistent with the early reported finding of Silver et al. [17]. Khong [18] stated that hysterectomy is most commonly linked with placenta accreta, previa, uterine atony, and uterine rupture. Each uterine scar increases the likelihood of hysterectomy, regardless of the existence of placenta previa. This is generally due to increased

placenta accreta frequency along with insufficient decidualization [18].

In consistence with our finding, Choudhary et al. [3] and Kaplanoglu et al. [11] reported no maternal death. The low ratio of maternal mortality related to the surgical technique and improvements in surgical techniques and operating room equipment. However, O'Dwyer et al. [19] reported that there were 2 maternal deaths following cesarean. This could probably be attributed to the smaller size of the study and the relatively small number of higher orders CSs (four and more).

Our results are consistent with early studies [11, 13], and Mengesha et al. [8] who documented sever maternal complications and outcomes in women who underwent multiple repeated cesareans.

Kaplanoglu et al. [13] were assessed maternal complication in 2460 patients who underwent delivery by CS at a center in southeast Turkey between January 2012 and January. They reported that dense adhesions (13.9%) were the major maternal complications, followed by need for blood transfusion (11.1%), while the minor complications were need for intensive care (2.8%) and incision site infection (5.6%), but they no need for hysterectomy during the study [13]. Also, in agreement with the findings of investigation reported by Mengesha et al., who noted that the most severe adverse maternal management outcomes were adhesion (8.3%), significant blood loss (5.6%), caesarean hysterectomy (3%), wound infection, and dehiscence. Despite complete antibiotic treatment, surgical site infection was frequent, which may be attributed to patient, surgeon, and environmental factors [8].

Other earlier studies that showed contrary findings, Choudhary et al. [3] stated the absence of any major morbidity such as uterine rupture, placenta accreta, or caesarean hysterectomy in their study. This can be attributed to such the relatively small number of higher orders CSs (four and more), the retrospective nature of their study since it is likely that some data on complications may not have been completely documented, lack of uniformity in subjective descriptions of the surgeons regarding adhesions, blood loss and conditions of the lower uterine segment

CONCLUSIONS

In summary, the evaluation of the present study reveals a substantial rise in maternal morbidity as the number of CSs increases. There is no clear

absolute threshold for the number of cesarean sections, however, the fourth CS operation appears to be the crucial threshold for the majority of morbidity. Adhesions appear to be a central role in all the risks. Damage to peripheral organs, haemorrhage, the requirement for urgent care, extended operation times, and a higher likelihood of hysterectomy are all correlated. In view of this background, this study will assist us in providing information on the likely consequences of dense adhesions and Blood transfusion in particular, advising women away from elective CS and toward vaginal birth following CS.

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