

# Does the number of previous caesarean deliveries affect maternal outcome and complication rates?

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هل يؤثر عدد الولادات القيصرية السابقة في حصة الولادة وفي معدل المضاعفات؟

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**الخلاصة:** قام الباحثون بتقييم مضاعفات الولادة بالنظر إلى عدد الولادات القيصرية السابقة، وذلك في مستشفى الأميرة بديعة التعليمي، في إربد، بالأردن. وأجري تحليل للسجلات الطبية للسيدات اللاتي وُلدن قيصرية وعددهن 1739 امرأة. وكشف التحليل عن زيادة نسبتها 14 ضعفاً في احتمال التعرض لاستئصال الرحم القيصري لدى من يعانين من المشيمة المنزاحة ممن تعرّضن لولادة قيصرية سابقة، بالمقارنة مع من يعانين من المشيمة المنزاحة دون التعرض لولادة قيصرية سابقة. ولوحظ ازدياد مخاطر استئصال الرحم القيصري كلما ازداد عدد الولادات القيصرية السابقة. وكانت السيدات اللاتي وُلدن بالجراحة القيصرية 3 مرات أو تزيد، أكثر تعرضاً لمخاطر نقل الدم. كما لوحظ أن معدل الإصابة بالحمى التالية للجراحة أكثر شيوعاً لدى السيدات اللاتي وُلدن بالجراحة القيصرية ثلاث مرات أو أكثر، بالمقارنة مع السيدات اللاتي وُلدن بالجراحة القيصرية لأول مرة.

**ABSTRACT** We evaluated maternal complications in relation to number of previous caesarean sections in Princess Badea Teaching Hospital, Irbid, Jordan. Analysis of the medical records of 1739 patients delivered by caesarean section was conducted. It revealed a 14-fold increase in the risk of caesarean hysterectomy in patients with placenta praevia and previous caesarean section compared to patients with placenta praevia and no previous caesarean section. The risk of caesarean hysterectomy increased with increasing number of previous caesarean sections. Those with 3 or more previous caesarean sections were at significantly higher risk of blood transfusion. Post-operative pyrexia was commoner in women with 3 or more previous caesarean sections compared to those undergoing their first one.

## Le nombre d'antécédents d'accouchements par césarienne a-t-il un impact sur l'état de la mère et/ou sur le taux de complications post-partum ?

**RÉSUMÉ** Nous avons évalué les complications maternelles en fonction du nombre d'antécédents d'accouchements par césarienne au centre hospitalo-universitaire Princesse Badea à Irbid en Jordanie. Les dossiers médicaux de 1739 parturientes césarisées ont été analysés. Cette analyse a révélé une multiplication par un facteur 14 du risque d'hystérectomie d'hémostase chez les parturientes présentant un placenta praevia et ayant accouché par césarienne par rapport aux parturientes avec placenta praevia non césarisées. Le risque d'hystérectomie d'hémostase augmente parallèlement au nombre d'antécédents d'accouchements par césarienne. Les femmes ayant déjà subi au moins 3 césariennes s'avèrent significativement plus susceptibles de nécessiter une transfusion sanguine. On a constaté une plus grande fréquence de la pyrexie post-opératoire chez les parturientes ayant subi au moins 3 césariennes par rapport aux primocésarisées.

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## Introduction

Caesarean section is considered a safe surgical procedure. Better anaesthesia, improved surgical techniques, more efficacious preventive and therapeutic measures against infections and thromboprophylaxis have contributed to the advancement of safety. Despite this, caesarean section remains associated with higher maternal morbidity and mortality than vaginal delivery [1,2]. Although anaesthesia and surgery carry their inherent risks, maternal morbidity and mortality at caesarean section is more a consequence of either a disease predating pregnancy or induced by pregnancy [3].

About one-third of performed caesarean sections are repeat procedures [4]. Repeat caesarean sections are associated with an increased incidence of placenta praevia and placenta praevia accreta [5–7], scar dehiscence and rupture [3,8,9]. Health workers in developing countries in general, and Middle Eastern countries in particular, may face different problems. Large families are the desired norm and sterilization is not readily acceptable so the prevalence of women with multiple previous caesarean sections is high.

Most studies compare patients delivered by caesarean section with those delivered vaginally. The aim of our study, however, was to evaluate maternal complications during the peripartum period in relation to the number of previous caesarean sections and the risks of maternal morbidity and mortality. The ultimate goal being the provision of evidence-based information that can be used in planning antenatal care and admission for elective or emergency deliveries to units that are well equipped to deal with potential complications. Such evidence would have added benefit in counselling couples regarding the advisability of performing tubal ligation in cases of multiple previous caesarean sections.

## Methods

Out of 2209 patients delivered by caesarean section at Princess Badea Teaching Hospital between January 2000 and June 2001, the complete medical records of 1739 patients (80%) were reviewed. The review of this large number of files to retrieve the necessary data after the patients were discharged was done manually and was time consuming. During the period since the data were collected no change in policies or practice occurred in the management of patients delivered by caesarean and so the situation in the hospital is believed to be the same now.

The rate of caesarean section was 18% of all deliveries. The surgical procedure involved a “standard” transverse lower segment caesarean section under general anaesthesia. These operations were performed by fourth-year obstetric residents or specialists and tubal ligation only performed if the patient and her husband gave their consent. Cephalosporins were routinely prescribed and anticoagulant prophylaxis was administered to patients with high thromboembolic risk profiles. Patients were divided into those with no previous caesarean section and those with 1, 2, and 3 or more previous caesarean sections (groups 0, 1, 2 and 3 respectively).

In addition to demographic data, parity and gestational age, details of any maternal intra-operative, postoperative and puerperal morbidity and mortality were extracted. Placenta praevia accreta was diagnosed intraoperatively. The following information was extracted from the records: peripartum hysterectomy including hysterectomy for placenta praevia accreta, bowel and bladder injury and any intra- or postoperative blood transfusion due to excessive blood loss during the operation. Puerperal complications in each of the designated groups were

also recorded, such as fever ( $> 38^{\circ}\text{C}$  on 2 consecutive measurements, 6 hours apart other than in the first 24 hours) and wound infection presenting as induration, erythema and or purulent discharge. Wound seromas were not included.

Descriptive statistics were generated and significance of statistical comparison was determined by the chi-squared test. The Fisher exact test was used for smaller groups. Odds ratios (OR) and 95 confidence intervals (CI) were calculated to identify the association between number of caesarean sections and certain complications.  $P < 0.05$  was considered statistically significant.

## Results

Of the 1739 patient records reviewed, 1060 (61%) had no previous caesarean section and were undergoing the procedure for the first time, 351 (20%) had 1 previous caesarean section, 204 (12%) had 2 and 124 (7%) had 3 or more previous (the highest was 6 caesarean sections).

As expected, maternal age and parity were higher in patients with more previous caesarean sections, but this was not the case for gestational age. Tubal ligation was performed in 64 (3.7%) patients (Table 1). Of these, 49 (76.6%) were in high parity patients (36 patients had no previous cae-

sarean section, 6 with 1 previous caesarean section, 6 with 2 previous caesarean sections and 1 with 3 previous caesarean sections). Only 15 (23.4%) patients had tubal ligation because of high number caesarean sections (3–6 previous caesarean sections).

Table 2 shows the maternal complications recorded according to the presence or absence of previous caesarean sections. Twelve (12) patients required caesarean hysterectomy. Of these, 7 were because of placenta praevia accreta, all of which were anterior. One patient had a hysterectomy with a normally sited placenta that was adherent. Two patients had bowel injury; 1 with history of 2 previous caesarean sections, the other with history of 4. Bladder injury was recorded in 3 women, the first in combination with uterine rupture and no previous caesarean section, the second had 1 previous caesarean section and was delivered in the second stage, the third patient had had 6 previous caesarean sections and was delivered at 37 weeks of gestation and found to have incomplete rupture and extensive adhesions. There was 1 death who was a mother with 3 previous caesarean sections and placenta praevia accreta. She died a few hours after undergoing caesarean hysterectomy because of prolonged shock and multiple organ failure.

Generally women with no previous caesarean section and those with previous

Table 1 Characteristics of patients in the study groups

Characteristic	Number of previous caesarean sections			
	0 (n = 1060)	1 (n = 351)	2 (n = 204)	3 (n = 124)
Maternal age <sup>a</sup> (years)	29.3 (6.5)	30.2 (5.2)	31.5 (5.3)	33.4 (4.8)
Parity <sup>a</sup>	2.4 (2.8)	2.4 (2.2)	3.2 (1.7)	4.2 (1.7)
Gestational age <sup>a</sup> (weeks)	38.8 (2.3)	38.4 (2.2)	37.5 (1.9)	37.1 (2.0)
Tubal ligation [No. (%)]	36 (3.4)	6 (1.7)	6 (2.9)	16 (12.9)

<sup>a</sup>Values are means (standard deviations) except where otherwise stated.

**Table 2 Maternal complications in patients with and without history of previous caesarean section**

Maternal complication	No previous caesarean section (n = 1060)		Previous caesarean section (n = 679)		P-value
	No.	%	No.	%	
Blood transfusion	80	7.6	56	8.2	0.6608
Hysterectomy	5	0.5	7	1.0	0.2709
Placenta praevia/ hysterectomy	1	0.1	6	0.9	0.0307*
Bladder injury	1	0.1	2	0.3	0.6941
Bowel injury	0	0.0	2	0.3	0.3060
Fever	31	2.9	15	2.1	0.3642
Wound infection	35	3.3	14	2.1	0.1687
Maternal death	0	0.0	1	0.2	0.8060

\*Significant at  $P < 0.05$ .

caesarean sections had a similar rate of complications apart from hysterectomy for placenta praevia accreta, which was significantly higher in patients with previous caesarean section ( $P = 0.03$ ) (Table 2).

The rates of maternal complications were compared between the 4 groups according to the number of previous caesarean sections (Table 3). The risk for blood transfusion as a result of intra-operative blood loss was similar in patients with no previous caesarean section and those with 1 previous caesarean section. Women with 2 previous caesarean sections were at lower risk of transfusion (OR = 0.31, 95% CI: 0.12–0.77,  $P = 0.01$ ), while women with 3 previous caesarean sections were at a higher risk of blood transfusion (OR = 1.96, 95% CI: 1.12–3.44,  $P = 0.02$ ).

There was an increased risk of placenta praevia accreta in relation to previous caesarean scar. In patients with placenta praevia, 6 out of 20 (30%) women with previous caesarean section needed a hysterectomy

compared to 1 out of 33 (3%) of those with no previous caesarean section (OR = 14.14, 95% CI: 1.65–128.56,  $P = 0.02$ ). When the study groups were analysed separately, the risk of hysterectomy increased with increasing number of previous caesarean sections (OR = 1.50, 33.00, 132.00 for groups 1, 2 and 3 respectively) (Table 3). The risk of scar rupture was not significantly affected by the number of previous caesarean sections. Women with 1 or 2 previous caesarean sections had the same risk of developing post-operative fever as women without previous caesarean section, but the risk of fever in women with 3 or more previous caesarean sections was higher (OR = 2.31, 95% CI: 1.04–5.14,  $P = 0.04$ ) (Table 3). No significant correlation was found between having had any number of previous caesarean sections and the risk of developing wound infection. There were no cases of anaesthetic complications or thromboembolic events in the records reviewed.

**Table 3 Complications in patients delivered by caesarean section in relation to number of previous caesarean sections**

Complication	Previous caesarean sections	Complications		OR (95% CI)	P-value
		Present	Absent		
Blood transfusion	0 <sup>a</sup>	80	980	1	
	1	34	317	1.31 (0.86–2.0)	0.209
	2	5	199	0.31 (0.12–0.77)	0.012*
	≥ 3	17	106	1.96 (1.12–3.44)	0.018*
Placenta praevia/ hysterectomy	0 <sup>a</sup>	1	33	1	
	1	0	11	1.50 (0.05–47.84)	0.819
	2	2	2	33.00 (2.02–538.64)	0.014*
	≥ 3	4	1	132.00 (6.84–2546.02)	0.001*
	All <sup>b</sup>	6	14	14.14 (1.65–128.56)	0.019*
Dehiscence/rupture	1 <sup>a</sup>	1	3348	1	
	2	3	201	1.74 (0.35–8.68)	0.502
	≥ 3	4	119	3.91 (0.86–17.71)	0.077
Fever	0 <sup>a</sup>	31	1029	1	
	1	7	344	0.67 (0.26–1.35)	0.216
	2	0	204	0.08 (0.005–1.33)	0.079
	≥ 3	8	115	2.31 (1.04–5.14)	0.041*
Wound infection	0 <sup>a</sup>	35	1025	1	
	1	7	344	0.59 (0.26–1.35)	0.216
	2	2	202	0.29 (0.07–1.33)	0.090
	≥ 3	5	118	1.24 (0.48–3.23)	0.658

\*Significant at  $P < 0.05$ .

<sup>a</sup>Reference group.

<sup>b</sup>Total number of patients with previous caesarean sections.

Due to the small numbers in some categories and the wide confidence intervals, the statistical values are not strong.

OR = odds ratio, CI = confidence interval.

## Discussion

When undergoing an abdominal delivery, patients with previous 1 or more caesarean sections are exposed to specific problems that are directly related to this mode of delivery [2]. Despite the improvement in technical skills and preventive measures of various potential complications, maternal morbidity and mortality at caesarean

section are still encountered [1,2]. When counselling patients with previous caesarean sections regarding future pregnancies, evidence-based advice is advantageous, which is why we conducted the study.

Analysis revealed that blood transfusion was required for 7.6% of patients with no previous caesarean section and for 8.2% of those with previous caesarean section. This

is higher than the 1.9% reported by Loverro [5]. The group with 2 previous caesarean sections needed fewer blood transfusions, which is mostly due to the fact that these patients had elective deliveries while those with no or 1 previous caesarean section were mostly emergency deliveries. The significantly higher frequency of blood transfusion in patients with 3 or more previous caesarean sections ( $P = 0.018$ ) cannot be clearly explained but may be related to associated problems in this group, such as placenta praevia, uterine atony due to twin pregnancy and atony due to grand multiparity.

Placenta praevia accreta is a serious problem that is strongly associated with the presence of previous caesarean section scar [8–11]. Our study revealed a 14-fold increase in the risk of peripartum hysterectomy for this indication in patients with previous caesarean section compared to those with placenta praevia and no previous caesarean section. This risk of hysterectomy increased with increasing number of previous caesarean section. This corroborates data from other surveys which showed a linear correlation between the risk of caesarean hysterectomy in cases of placenta praevia accreta and the number of previous caesarean sections [7,12].

Peripartum hysterectomy is an operation that is almost always performed as an emergency and is associated with significant blood loss as suggested by Castaneda et al. [13]. This makes it essential that patients with previous caesarean section and placenta praevia should be properly counselled and operated on by senior staff members.

Enough blood products must be readily available. Prenatal diagnosis of placenta praevia accreta by transabdominal colour Doppler ultrasound may have an impact on the peripartum clinical management [14,15]

Regarding postoperative pyrexia, there was a lower overall incidence of fever in patients undergoing their first caesarean section and those with previous caesarean sections compared with the report of Chazotte and Cohen (2.9% and 2.1% respectively versus 5.1%) [8]. Women with 3 or more previous caesarean sections had a significantly higher risk of postoperative fever than those with no history of previous caesarean section. Variable degrees of adhesions, extensive tissue handling and longer operative time are possible contributors to this discrepancy. These variables should be the subject of further investigation. Analysis of the difference in wound infection between the subgroups did not reveal any significant differences.

The number of women with multiple previous cesarean sections who had opted for tubal ligation was very small which perhaps reflects the desire for large families in the community.

Given the risk of complications associated with repeat caesarean delivery, women likely to face this situation should be counselled about these risks and encouraged to consider avoiding large families. To minimize maternal risk, women with placenta praevia and previous caesarean section should be delivered by the most senior members of staff in adequately equipped hospitals.

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