

Birth after a previous cesarean section – what is most important in making a decision?

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Abstract

OBJECTIVE: A retrospective analysis of the course of labour in patients after one caesarean section (CS) and of factors influencing successful attempt of vaginal birth after caesarean (VBAC).

DESIGN: A group of 296 patients after one CS was divided into: group G1 (206 patients) – elective CS, group G2 (90) – VBAC attempt, and G2 to: G2a (35) – VBAC and G2b (55) – CS after an unsuccessful VB attempt. A comparative analysis between the groups and logistic regression analysis of factors influencing a successful VBAC was made.

RESULTS: There were no differences regarding age, BMI, weight gain during pregnancy or gestational age between groups G1 and G2, as well as G2a and G2b. G2a patients had more often already given VB previously (28.6% vs 10.9%; $p=0.03$). The most frequent indication for a repeat elective CS was the lack of informed consent for VBAC (29.13% of all indications). The mean neonatal birthweight was highest in G1 (3410 g), and in G2b higher than in G2a (3275 g vs 3098 g; $p=0.009$). There were no differences in newborns' general condition between the group. There were no cases of uterine rupture and 4 cases of uterine scar dehiscence in G1 and 1 in G2. Of all the analysed factors only spontaneous delivery onset (OR 7.78) and previous vaginal birth after the caesarean (OR 1.99) or before the caesarean (OR 2.03) had significant influence on successful VBAC trial.

CONCLUSION: The right classification of patients is a significant factor having effect on the success of a VB attempt after CS.

Abbreviations:

ACOG - to American College of Obstetricians and Gynecologists
CS - caesarean section
PGS - Polish Gynecological Society
VB - vaginal birth
VBAC - vaginal birth after caesarean section
WHO - World Health Organisation

INTRODUCTION

'Once a caesarean, always a caesarean' – in those well-known words Edwin B. Cragin described the then established rule in obstetrics in his 1916 article *Conservatism in obstetrics* (Cragin, 1916). The necessity of a surgical birth in the following pregnancy after one caesarean section (CS) in the past was a consequence of the operating technique at the time. The classic caesarean section, based on a midline longitudinal uterus incision, involved leaving an easily torn scar and, in order to minimise the risk of a ruptured muscle, resulted in inevitable further caesarean sections upon next pregnancies. Once the lower uterine transverse cut was introduced, the number of complications appearing during the next pregnancy was significantly reduced. Thus formed scar was typically more resilient, which made vaginal birth possible despite undergoing a surgical one in the past. 81 years after Cragin, Bruce Flamm rephrased his words to a catchphrase still actual today: 'once a caesarean, always a controversy' (Flamm, 1997). Later according to American College of Obstetricians and Gynecologists (ACOG) guidelines, natural birth was approved as a safe choice for pregnant after a caesarean section (ACOG, 2010). Although, the decision is still difficult.

As reported by World Health Organisation (WHO), the proportion of caesarean sections should not exceed 15% of all births (WHO, 1985). Nevertheless, in many countries this percentage is alarmingly higher, and what is more, it has considerably increased in the course of the last decade; e.g. in Poland in 2010 it amounted to 32% (Troszynski, 2011). The proportion of CS carried out around the world is diversified: the highest was noted in Brazil (47.4%), the lowest in Holland (14.3%) (OECD, 2011). An upward tendency, however, seems to be observable in terms of the percentage of surgical births everywhere. Principally, it is the result of the liberal indications of patients after a prior surgical birth to a subsequent CS.

Which way is the best to deliver after a prior CS? In each case the decision should be made upon a deep considerations of all obstetrical issues by the doctor and taking into account patient's opinion. Now the question is – which obstetrical factors should play a deciding role in choosing between vaginal delivery and subsequent caesarean section?

The aim of this paper is a retrospective analysis of the course of the labour in patients after one caesarean section, and a comparative analysis of factors influencing successful trial of the vaginal birth after caesarean (VBAC).

MATERIALS AND METHODS

In order to gather data required for this research, a retrospective analysis of medical records was conducted. The records of 296 patients after one CS, hospitalized between January 2010 and May 2011 at the 1st Depart-

ment of Obstetrics and Gynecology at the Medical University of Warsaw, were examined. Patients after more than one CS and multiple pregnancies were excluded from the study. The study group was divided into two subgroups: group 1 (G1), including 206 patients qualified for an elective CS, and group 2 (G2), encompassing 90 patients – who attempted natural birth. Group G2 was further divided into two groups depending the actual type of birth: group G2a consisting of 35 women who delivered vaginally and group G2b, comprising of 55 patients whose VBAC attempt was unsuccessful and, as a result, who had a CS.

With the aim of investigating the factors having the greatest influence on the successful attempt at VBAC, the groups analysed were assessed and compared according to age, parity, Body Mass Index (BMI), weight gain during pregnancy, the duration of pregnancy, the spontaneity of vaginal delivery onset and the anaesthetization used during birth. Furthermore, the newborns' birth weight and their health according to the Apgar scale examined in the first and fifth minute of life were also analysed. During the statistical analysis the following tests were used: a Mann-Whitney *U* test, Pearson's chi-squared test and Fisher's exact test, assuming that $p \leq 0.05$ is the level of statistical significance. The influence of factors having impact on the success of the VBAC was considered according to logistic regression model.

RESULTS

The group of patients analysed comprised 12.71% of all births given in the Department during this research. In group G2 67.8% of labours started spontaneously. Among them in 28%, however, an intravenous oxytocin injection was necessary in order to stimulate uterine contractions during the first and second stage of labour. A preinduction of labour was used among the 32.2% of G2 patients, meaning an intracervical application of a Foley catheter for 24 hours and inflating a 60 ml balloon with 0.9% NaCl. 4 of those patients (4.45%) developed a spontaneous contractions while preinduction, and the rest underwent labour induction (via an intravenous infusion of oxytocin and amniotomy). Division of the study group into subgroups is illustrated in Figure 1.

Both groups G1 and G2 were similar in terms of age, BMI, weight gain during pregnancy, and the gestation week. The time interval between the first CS and another birth also turned out to be much the same for both groups. Those parameters and the results were recapitulated in Table 1.

In comparison to G1, group G2 consisted of over triplicate as high number of patients who, after a caesarean section in the past, had already had one or more successful attempts at vaginal birth. The difference was statistically significant ($p < 0.001$). 28.6% of the group G2a had already underwent a vaginal birth in the past, which constituted a statistically significant difference in comparison to group G2b (10.9%; $p = 0.033$; Table 2).

Among the most frequent indications for previous CS in the included patients' medical history were: cervix dystocia (26.7%), imminent fetal asphyxia (18.24%), fetal malpresentation or malposition (17.23%) or cephalopelvic disproportion (8.45%).

Within group G1 the patients were most often qualified for another, elective CS because of the lack of consent for a vaginal birth, which constituted as much as 29.13% of all indications in this group. Other were cephalopelvic disproportion (16.02%) and an elective CS due to extra-obstetric factors (12.14%), in which 6.31% were ophthalmologic recommendations and 2.43% – orthopedic. 4.1% of sections were performed

due to fetal malpresentation or malposition. The indications for the first and a subsequent CS were the same among 22.7% of patients. The most recurring indications were extra-obstetric factors (ophthalmologic and orthopedic) and the cephalo-pelvic disproportion.

Group G2a and G2b did not substantially differ in age, BMI, weight gain during pregnancy and the gestation week at the delivery (Table 2). However, over a half (55.6%) of women with BMI over 30, who attempted VB, were qualified for an emergency CS. These patients consisted 10% of the G2b group.

Within group G2 in 61% of patients' indications for surgical birth appeared during a vaginal labour attempt.

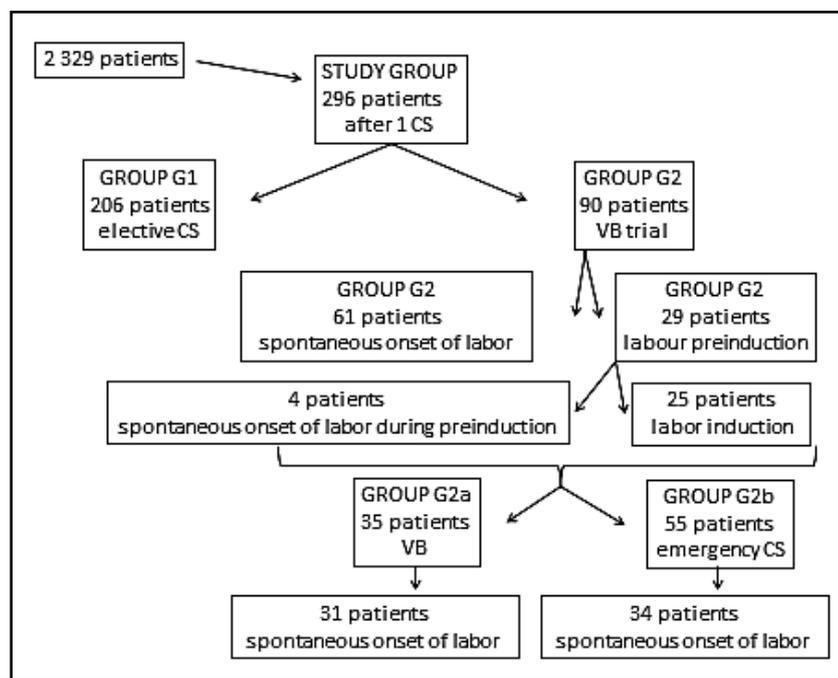


Fig. 1. Division of the study group.

Tab. 1. A comparative profile of groups G1 and G2.

	G1 n=206		G2 n=90		p-value
	average / %	SD	average / %	SD	
age	33.24	4.23	33.67	3.78	ns
BMI	23.73	4.26	23.82	4.41	ns
gestation week	38	2.57	38.24	2.18	ns
weight gain during pregnancy [kg]	13.54	5.9	13.94	5.1	ns
number of months	61.39	35.28	55.69	36.18	ns
previous VB (%)	4.85		17.78		<0.001
VB before previous CS (%)	2.43		10		0.005
VB after previous CS (%)	2.43		7.78		0.032
newborns birthweight (g)	3410	567	3207	602	0.008
blood loss (mL)	601	262	538	186	0.003

SD – standard deviation; BMI – body mass index; number of months – the number of months between the previous CS and the next birth; VB – vaginal birth; CS – caesarean section

Tab. 2. A comparative profile of groups G2a and G2b.

	G2a n=35		G2b n=55		p-value
	average / %	SD	average / %	SD	
age	32.34	4.19	33.82	4.19	ns
BMI	23.51	4.04	23.87	4.42	ns
gestation week	37.53	2.68	38.23	2.50	ns
weight gain during pregnancy [kg]	14.10	5.49	12.65	6.52	ns
number of months	52.11	23.81	67.29	40.05	ns
previous VB (%)	28.57		10.9		0.033
VB before previous CS (%)	11.43		5.45		ns
VB after previous CS (%)	17.14		5.45		ns
spontaneous labour onset (%)	88.57		61.82		0.005
newborns birthweight (g)	3098	489	3276	612	0.009
blood loss (mL)	335	138	672	237	<0.001

SD – standard deviation; BMI – body mass index; number of months – the number of months between the previous CS and the next birth; VB – vaginal birth; CS – caesarean section

condition according to Apgar score. 93.7% of babies in group G1 and 93.3% in G2 were born in a good general condition (according to Apgar score in the first minute of life; $p=ns$). In the fifth minute the condition of over 96% of neonates were estimated as good in both groups.

There were significant differences between the groups examined as far as the average blood loss during labour was concerned. The greatest blood loss was recorded in group 2Gb, while the smallest in group 2Ga. The average blood loss was smaller in case of an elective CS compared to an emergency one, but the difference was not statistically significant ($p=0.07$). There were no cases of uterine rupture in the scar after the CS in any of analysed groups. There were, however, 4 cases of uterine scar dehiscence in group G1 and 1 in group G2 (1.9% vs. 1.1%; $p=ns$).

The conducted logistic regression analysis was aimed at isolating the factors which have influence on the success of the attempt at VBAC. The issues analysed were: age, parity, BMI, weight gain during pregnancy, gestational week at delivery, neonatal birth weight, previous VB in medical history, time period since the last CS, the spontaneity of regular labour contractions onset. It turned out that the most influential factor were the spontaneous delivery onset (OR 7.78). The other noteworthy aspects were previous vaginal birth after the caesarean in the past (OR 1.99) or a VG before the CS (OR 2.03). The remainder of the factors analysed had not demonstrated any statistically significant impact.

DISCUSSION

The constant increase in the number and percentage of the caesarean sections performed is being observed for years. Having a previous CS is not the unconditional

indication for another surgical birth in the future. Literature, however, provides data among which there can be observed a downward trend among the number of patients qualified for a VB. According to Asakura *et al.* in 1995 about 77% of women after previous CS was qualified for VB trial in USA (Asakura *et al.* 1995). In 2005 this percentage dropped to 24.1%, and the number of women who gave a VB after a CS was only 10% (Yeh *et al.* 2006; Caughey *et al.* 2009). In 2006 no more than 8.5% of pregnant women after a CS and in 2007 – 9.2% give birth naturally in the USA (Gregory *et al.* 2010). According to the Centers for Disease Control and Prevention in 2012 only 10.2% gave birth vaginally after a previous CS (CDC, 2012). In the presented material, 30.4% of all women were qualified to such an attempt and only 11.8% of all patients after CS delivered vaginally. Such a result must be undoubtedly due to lack of consent on the part of the pregnant for an attempt at VB, even though there were no medical contraindications for a natural birth. In almost one third of all cases the lack of consent was the only indications for another CS. Polish Gynecological Society (PGS) recommends obtaining a written consent for an attempt at VB (PGS, 2012). It seems exceedingly important to correctly instruct the pregnant and their doctors, as well as the employees of antenatal clinics, so that the decision made by the patient is fully informed and based on factual premises.

Most international publications inform that percentage of successful attempts at VBAC, with appropriate qualification, is at 60–80% (Rosen *et al.* 1991; Pridjian *et al.* 1992; Flamm, 1995; Gregory *et al.* 1999; Naiden & Deshpande, 2001). Similar proportions were published in reference to European statistics. Between 2007 and 2010 80.8% of Czech attempts at VB were successful

(Hruban *et al.* 2012). In Israel between 2006 and 2009 the percentage of successful VBAC was 88% (Kogan *et al.* 2011), in UK in 2010 – 76.5% (Tahseen & Griffiths, 2010), and in Holland in 2011 – 77% (Bais 2001). In the presented material only 30.4% of the pregnant were qualified for a vaginal birth and 38.9% of them were successful. This result is even lower than another Polish data: in Poland between 1966 and 1975 the percentage of VBAC amounted 47.4% (Kostrzewa *et al.* 2010). As it was noted in the material from the Medical University of Lodz, 48.3% of the pregnant women after a previous CS delivered vaginally between 2007 and 2010 (Kus *et al.* 2012). It seems most probably that the numbers result from inadequate patients information about the advantages and disadvantages of VBAC trial and the lack of women's consent for such a procedure.

As the correct qualification of patients after a previous CS for a VB is crucial, the possibility of identifying the factors increasing and decreasing the chances of success of VB becomes of the greatest significance. In presented data the greatest impact on successful VBAC trial had the spontaneous onset of regular uterine contractions. The spontaneity of labour onset together with a minimum one successful attempt at a VBAC in the past, both before and after a CS, constitute positive predictive factors, which are widely described in the literature. According to Elkousy, 65% of patients who did not give birth naturally before, is able to deliver vaginally after a CS anyway. However, if the pregnant had already had at least one vaginal birth in the past, the chances of a VBAC raise up to 83–94% (Elkousy *et al.* 2003). This was also observed by Macones, who stated that those patients who had not yet given birth vaginally had 70% of chances for a successful VB, and having had a physiological birth in the past increased those chances up to 89% (Macones *et al.* 2005). In addition, it also seemed significant if the former physiological birth had taken place before the CS or after it. Those patients who had already had a vaginal birth after a CS in the past, have better chances of giving birth naturally again in the event of a next pregnancy (DiMaio *et al.* 2002). Similar results were obtained previously by Caughey (Caughey *et al.* 1998). In this paper both the vaginal birth after and before the caesarean section exerted influence on the success of an attempt at VB, and demonstrated comparable OR characteristics (1.99 and 2.03).

DiMaio in 2002 conducted a detailed comparative analysis of patients after a CS who, when being pregnant once more, gave birth naturally or via another CS. According to his data, those of them who bore naturally had a considerably lower body mass index (DiMaio *et al.* 2002). Patients, whose BMI exceeded 40, were twice as many in the elective CS group in comparison to the group who gave birth vaginally. In the material presented there were no differences between the analysed groups observed as far as BMI is concerned, but for over a half of the pregnant whose BMI was over 30, the attempt at VB was unsuccessful.

Excessive BMI in pregnant women is also one of the strongest factors promoting fetal macrosomy (Ahmed *et al.* 2012). In presented data about one in ten cases of women, who did not deliver vaginally, gave birth to a baby weighting over 4000 g. Neonatal birthweight is another mentioned in the literature positive predictive factor for successful VBAC. According to DiMaio *et al.* women who deliver vaginally give birth to babies with lower birthweight (DiMaio *et al.* 2002). Analogous differences were noticed between analysed groups in the presented results.

Taking into consideration all of the factors asserting influence on an attempt at VBAC is a very important element of assessment if such an attempt would be beneficial or not – and especially if there is a possibility of developing complications. An excessive loss of blood during labour is one of the major risks to the wellbeing of the mother during a birth. A CS involves more blood loss than a natural birth, and emergency operation more than elective CS, which was confirmed in the presented material. Still, the most severe complication connected to an attempt at VBAC is uterine rupture and internal haemorrhage, or even the death of the pregnant and the foetus.

ACOG stated that if there is a transverse scar left after a lower segment caesarean incision, the risk of uterine rupture amounts to 0.2–1.5% (ACOG, 2010). Much the same results were obtained by Flamm in 1994. Within a group of 7229 pregnant women after a previous CS, 0.8% of them suffered from uterine rupture (Flamm *et al.* 1994). The risk of cervical rupture after a previous CS is also estimated at 1% in Gregory's paper (Gregory *et al.* 2010). In the data presented in this article, there were no cases of a uterine muscle rupture noted. Asymptomatic uterine scar dehiscence was observed in about 1% of patients, which is similar to mentioned in the literature (0.5%) (Hruban *et al.* 2012) and much lower than it was expected basing on symptoms.

The correct classification of pregnant patients after a previous caesarean sections is a complex issue. The identification of factors affecting the success rate of a vaginal birth allows to differentiate a group of patients, to whom such an attempt might be proposed. Once those factors are isolated, the occurrence of perinatal complications might be minimised. One of the most crucial elements of the proper obstetric situation evaluation remains awareness and assessment of those factors, which lead to the right choice of birth method after a caesarean section in the past.

CONCLUSIONS

One of the conditions of the vaginal birth being successful after a previous caesarean section is the right classification of patients. Special attention should be paid especially to the indications, contraindications, factors which might have significant influence on the

success of the attempt, and patients' instruction on the proposed delivery method, which should be begin as soon as the beginning of pregnancy.

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