ABSTRACT

Purpose: Caesarean section (C.S.) is the most commonly performed operative procedure of the uterus in women of reproductive age. Each of these women increases their likelihood of complications in subsequent pregnancies. There is an obsolete law in obstetrics: once a cesarean, always a cesarean, due to the danger of failure of the uterine scar tissue and the greatly increased possibility of uterine rupture. This necessitates the application of various methods of assessing the sufficiency of the scar tissue before planning further deliveries. The most accurate methods for determining the structure of a tissue are histological, which by their nature cannot be used during the pregnancy but they can correlate to clinical ones.

Materials/Methods: Prospective study of 40 pregnant women with previous C.S., divided into groups according to the interval between the operations. Another subsequent division of subgroups to the number of Caesarean sections was made. The morphological indicators were compared to a control group of dermal scar from the same patients. The results of the clinical methods were to be compared with the results of the same patients from the morphological studies. We used clinical methods such as the history of the previous pregnancies and puerperal period, history of previous operations and the recovery after them, ultrasound examination and evaluation of the anterior uterine wall preoperatively. The morphological methods used are: Hematoxylin & eosin staining (H&E), followed by Masson Trichrome for collagen; Weigert-Van Gieson staining for elasticity; staining of immunohistochemistry MIB-1 (Ki-67) for cell proliferation.

Results: The study group was presented by patients with one or more previous C.S. that were divided in subgroups. The shortest inter-delivery interval was 14 months, the longest – 19 years. The shorter the period between the C.S.s was, the thinner the myometrium. Cases of abnormal healing have been observed, including: myometrial hyperplasia, adenomyosis, myofiber disarray, elastosis, inflammation, fibroids, keloids. These results can be compared to clinical data from patients but mainly with the number of previous C.S. or those with a brief period between them.

Conclusions: The results from our research proved that multiple C.S. is risk factors for larger defects of the uterine scar but not mandatory. The likelihood of prolonged healing time was higher in cases of more than one C.S. The dimensions of the surgical incision are associated with clinical symptoms such as postmenstrual smears, dysmenorrhea and chronic pelvic pain.

Keywords: uterine rupture, caesarean section scar tissue, vaginal birth after previous caesarean section, uterine dehiscence

INTRODUCTION

Caesarean section (C.S.) is the most commonly performed operative procedure of the uterus in women of reproductive age. Each of these women increases their likelihood of complications in subsequent pregnancies. There is a continuous discussion about the optimal caesarean delivery rate and what is the most appropriate one for both maternal and fetal outcome. The increased range of C.S. in the last decades is widening new perspectives for complications, and further steps are needed to reach the optimal percentages. However, in 1916, Edwin Cragin placed an obsolete law in obstetrics that has been executed for a long time: “Once a caesarean, always a caesarean”, due to the danger of failure of the uterine scar tissue and the greatly increased possibility of uterine rupture. In the literature is reported that the chance of uterine rupture in nulliparas during the delivery is 2 per 10 000 while it can highly increase with the multiparity and it can reach up to 20-50 per 10 000 in vaginal deliveries after previous caesarean section [1, 2, 3]. This necessitates the application of various methods of assessing the sufficiency of the scar tissue before planning further deliveries. The most accurate methods for determining the structure of tissue are histological, which by their nature cannot be used during the pregnancy. These methods correlate with some clinical ones that we tried to prove.

Several big obstetrical organizations agreed on vaginal birth after prior caesarean section to be first choice option as clinically safe for women with one previous C.S.
– not only for the clinical benefits and the decreased possible complications but also for the economic and social factors caused by the earlier recovery [4, 5, 6, 7, 8, 9].

It is known and confirmed by many researchers that factors such as short interval less than 12 months between the deliveries, macrosomia of the baby, oligohydramnion, post-term pregnancies, low pelvic score and thin myometrial thickness on ultrasound examination are increasing the rate of uterine rupture during VBAC [10, 11, 12, 13, 14, 15, 16]. Another retrospective study [17] examined specifically patients with short inter-delivery interval and concluded that it is not increasing significantly the incidence of uterine rupture.

Lower uterine segment (LUS) thickness measurement in prenatal women with a history of past caesarian sections could be used as a tool to predict the occurrence of a uterine defect (dehiscence or rupture of the uterine scar) in women undergoing VBAC. This was suggested in a meta-analytical study [18], and it further added, that the minimum thickness lying above the amniotic cavity at the level of the uterine dehiscence cut-off range of between 2.1-4.0 mm gives a strong negative predictive value for a uterine defect to occur during VBAC, whereas a myometrial thickness cut-off range of between 06-2.0 mm provides a positive predictive value for uterine defects to occur. However, according to the study, it wasn’t possible to define a realistic cut-off thickness which could be implemented in clinical practice.

**MATERIAL/METHODS**

Cross sectional study was designed to examine women with prior Caesarean sections. For eight months, samples of 40 women hospitalized in Clinic of Obstetrics and Gynecology at the University Hospital – Pleven, Bulgaria were examined. Patients’ demographic data were collected by a questionnaire after informed consent. The study was a part of a scientific project funded by the Medical University – Pleven, Bulgaria. The study protocol was approved by the Ethics Committee of Medical University – Pleven. The data were statistically analyzed using the X² test and P < 0.05 was accepted as the level of significance.

Clinical methods were used such as the history of the previous pregnancies and puerperal period, history of previous operations and the recovery after them, ultrasound examination and evaluation of the anterior uterine wall preoperatively. All the patients had been examined with ultrasound antenatally to measure the thickness of the lower uterine segment (scar dehiscence or scar rupture). During the operation for delivering the baby, a biopsy material from the uterine scar was collected to be evaluated histopathologically. The morphological methods used are: Hematoxylin & eosin staining (H&E); Masson Trichrome for evaluating the amount of collagen; Weigert-Van Gieson staining for elasticity; staining of immunohistochemistry MIB-1 (Ki-67) for cell proliferation. The morphological indicators were compared to a control group of dermal scars from the same patients.

### RESULTS

The study group was presented by patients with one or more previous C.S. They were divided as following: Group A – 23 (57.5 %) patients with one C.S. and subgroup A1 – less than 2 years ago (6 patients – 15 %), subgroup A2 – more than 2 years (17 patients – 42.5 %); Group B – with more than one C.S. (17 patients – 42.5 %). The women were at the age between 16 and 40 years, mean age 28.04±sd 10.958. Twenty-three (57.5%) of the women live in villages, and the other seventeen (42.5%) live in cities. According to ethnic group, the study population included: Bulgarians – 19 (47.5%) and minority – 21 (45%). Marital status showed that only 5 (12.50%) were married. There was no statistically significant difference between ethnicity and the healing processes in the examined group. Also, there is no statistically significant difference between marital status, living location and the uterine scar recovery.

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
</tr>
</thead>
<tbody>
<tr>
<td>One previous C.S.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bulgarians</td>
<td>13</td>
<td>6</td>
</tr>
<tr>
<td>Minority</td>
<td>4</td>
<td>17</td>
</tr>
<tr>
<td>Married</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

The shortest inter-delivery interval was 14 months, the longest – 19 years. The ultrasound measurement results of the front uterine wall were between 1,73 mm and 3,79 mm. The shorter the period between the C.S.s was, the thinner the myometrium.

Cases of abnormal healing have been observed, including: myometrial hyperplasia, myometrial hypertrophy (fig. 1), adenomyosis (fig. 2), myofiber disarray (fig. 3), fibrosis (fig. 4), inflammation (fig. 5), fibroids, keloids. These results can be compared to clinical data from patients but mainly with the number of previous C.S. or those with less than 2 years between them.

**Fig. 1.** Scar with myometrial hypertrophy and fibrosis
DISCUSSION

Our results indicate that there is a high frequency (60%) of low healing in patients with prior C.S. less than two years from women who experienced longer interval. Routine screening of pregnant women for the dimension of the uterine scar is currently not practiced in our region. However, the dimensions of the surgical incision are associated with clinical symptoms such as postmenstrual smears, dysmenorrhoea and chronic pelvic pain. The incidence of tearing in the evaluated group was higher in patients with a short interval between births (below 24 months), a caesarean infection, two or more caesarean sections.

In our study women from group, A1 was associated to be more commonly with insufficiency of the uterine scar with histologically “young” cells proliferation (fig. 6). Infections were found regardless the ethnicity, but significantly predominantly observed in the group of low social status patients.

Fig. 2. Adenomyosis with haemorrhages

Fig. 3. Myofiber disarray with Masson Trichrome staining

Fig. 4. Weigert-Van Gieson staining for elasticity

Fig. 5. Scar tissue with signs of inflammation

Fig. 6. Uterine scar with histologically “young” cells proliferation
Patients who experienced a smooth puerperal period with the prior deliveries and had long (two years at least) inter-delivery interval, were evaluated as clinically qualitative scar tissues (fig. 7). Their results of the ultrasound measurements were between 2.3 and 3.79 mm. Those patients are concluded to be safe for VBAC.

**Fig. 7.** Qualitative scar tissues with Weigert-Van Gieson staining

There were two cases of patients with a history of fever during the puerperal period after the previous C.S. – the scars of these patients were found to be with myofiber disarray and inflammation signs.

Women with haemoglobin levels less than 110 g/l during the re-elective C.S. were diagnosed with pregnancy-related anaemia. The ultrasound measurements of the patients with anaemia showed thickness of the uterine scar less than 2.5 mm. Histologically the tissue material from these patients showed low cells proliferation.

**CONCLUSION**

The results from our research proved that multiple C.S. is risk factors for larger defects of the uterine scar but not mandatory. The likelihood of prolonged healing time was higher in cases of more than one C.S. Ultrasound measurement of prior uterine scar is a useful method for investigating the possible complications of spontaneous vaginal birth and for detecting the patients for Re-C.S., but we recommend its wider use at the time a pregnancy is in the third trimester to enable individual risk assessment and prevention. Not only the clinical history but also the live quality standards such as well-balanced diet, clean home and regular daily activities are decreasing the rate of unwanted complications and healing abnormalities. However, further researches are needed to recognize all the risk factors and the precise incidence of complications.

**ACKNOWLEDGEMENTS**

This research was funded by Medical University – Pleven through research project No.6/2017.

**REFERENCES:**


14. Weimar CH, Lim AC, Bots ML, Bruinse HW, Kwee A. Risk factors for...


Received: 27/10/2018; Published online: 21/03/2019

Address for correspondence:
Elitsa Gyokova
Department of Obstetrics and Gynecology, Faculty of Medicine, Medical University - Pleven
1, Kliment Ohridski Str., 5800 Pleven, Bulgaria.
E-mail: egyokova@yahoo.com