

INFLUENCE OF THE NUMBER OF PREVIOUS CAESAREAN SECTIONS ON LOWER UTERINE SEGMENT STATE

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Determining the lower uterine segment (LUS) state before vaginal delivery and after Caesarean section, including pregnant women with more than one Caesarean section, may be an important step towards prevention from still high maternal and neonatal morbidity and mortality that follow uterine rupture. In pregnant women with one or more previous Caesarean sections, ultrasonic measuring of thickness and estimating the LUS integrity can objectively show the state of uterine scars. The aim of this study was to determine the influence of several previous Caesarean sections on the LUS state in term pregnant women. The prospective study included 62 pregnant women with one or more previous Caesarean sections – the examined group, and 50 pregnant women without Caesarean section – the control group, that after the 37th week of pregnancy had undergone the transvaginal ultrasonic measuring of the thickness of the LUS muscular tissue. In 57 pregnant women from the examined group delivered with another Caesarean section, we estimated, intraoperatively, the LUS integrity in the scar area. On the same occasion, in the scar area, the presence of defect – partial or complete was detected. The research pointed out that the average LUS thickness in the examined group – $1.92 \pm 0.95 \text{ mm}$ was statistically significantly lower compared to the control group – $2.68 \pm 0.97 \text{ mm}$ ($p < 0.001$). The average LUS thickness in 52 examined women with one Caesarean section was $1.92 \pm 0.97 \text{ mm}$, and in 9 women with two Caesarean sections the average thickness was lower – $1.78 \pm 0.82 \text{ mm}$, which does not represent a statistically significant difference ($p = 0.85$). In one pregnant woman with three Caesarean sections, the LUS thickness was 3.30 mm . We registered the total of 13 pregnant women with a defect in the Caesarean section scar area (12 partial and 1 complete defects), in 12 women after one Caesarean section and in 1 woman after two Caesarean sections. The research results show that women with previous Caesarean section have significantly thinner LUS, compared to the group of pregnant women without scars. With the increasing number of previous Caesarean sections, the LUS thickness decreases, but the difference is not statistically significant. Intraoperatively, the presence of certain LUS classes compared to the number of previous Caesarean sections is not significantly different. Furthermore, the increase in the number of Caesarean sections does not involve a statistically significant increase in the frequency of Caesarean section scar defects, which is in accordance with other authors' results. *Acta Medica Medianae 2010;49(2):29-33.*

Key words: *uterine segment – LUS, Caesarean section, scar, transvaginal ultrasound*

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Introduction

The frequency of Caesarean section (CS) in the world is increasing, and in many regions it exceeds 25% (1). There are many factors contributing to the real CS epidemics (2). According to the recommendations of the World Health Organization, CS rate over 15% is not justified due to the consequences it can have on the female reproductive health. An additional problem is the fact that up to 90% of women after the first Caesarean section have the same kind of delivery

in their next pregnancy, which points out that the number of potential pregnant women with more previous Caesarean sections increases. Pregnancy and delivery after several Caesarean sections are followed by increased risk for both the mother and the baby, which furthermore obliges the obstetricians in making decisions for every surgical completion of delivery.

Determining the state of the lower uterine segment before vaginal delivery after prior Caesarean section, including pregnant women with several CS, may have great significance in the prevention of still high maternal and neonatal morbidity and mortality that follow the uterine rupture at delivery. Ultrasonic measuring of the thickness and estimating the integrity of the LUS in pregnant women with previous Caesarean section is a way to objectively see the state of the uterine scars (3-5).

Selection of the patients with higher risk of uterine rupture at delivery encourages obstetricians to attempt vaginal delivery in pregnant women without or with minimal risk of the uterine rupture. Still, there is no total agreement on clinical application of this otherwise additional method in deciding about the way of delivery after previous Caesarean section, which was another motive of our research.

Aim

The aim of this study was to determine the influence of the number of previous Caesarean sections on the lower uterine segment state.

Examinees and methods

This research was a prospective study that included 112 pregnant women. It was conducted at the Clinic of Gynecology and Obstetrics, Clinical Center Niš, from January, 2006 to December, 2007. The examined group consisted of 62 randomly chosen pregnant women with single term pregnancy, with one or more previous Caesarean sections. The control group consisted of 50 pregnant women without previous Caesarean section or any uterine operation, with single pregnancy in the 37th gestational week or later, delivered vaginally. The research did not include women with multifetal pregnancies, placenta praevia or low-lying placenta, as well as pregnant women in active delivery phase. The control group was heterogeneous, and included nulliparae and multiparae. The mean age of pregnant women in the examined group was 30.68 years, with the youngest one being 22 years old, and the oldest one 40 years old. The mean age in the control group was 25.4 years, with the range 16 - 34 years.

Ultrasonic measuring of the lower uterine segment thickness was done on Diagnostic ultrasound system Shimadzu SDU-2200, Japan, with 7 MHz vaginal probe, with previous informing the patients about the aim of examination and acquiring their individual consent. Transvaginal ultrasonic examination of all the pregnant women was done from the 37th week of pregnancy and later, in the absence of uterine contractions on CTG or before the active delivery phase, that is in the latent phase without contractions. We measured only the thickness of myometrium LUS layer in its thinnest part.

In the examined pregnant women delivered with repeated Caesarean section, intraoperatively, after cutting plice vesicouterine, LUS was classified as follows:

1. Well developed – class I
2. Thin but without visible uterine contents (conception product) – class II
3. Partial scar defect – dehiscence – class III
4. Complete scar dehiscence – incomplete rupture – class IV.

Classes III and IV with scar defect were considered positive findings.

For statistic analysis we used Mann-Whitney U test, Hi square test or Fischer test of exact probability, and Spirman's rang correlation coefficient. Statistical difference (P 0.05) was significant.

Results

Within the examined group we registered 52 pregnant women with one, nine women with two and one pregnant woman with three previous Caesarean sections. Fifty-seven pregnant women were delivered with repeated Caesarean section, and five of them had vaginal delivery.

Table 1. Lower uterine segment thickness (mm) in pregnant women with previous Caesarean section in the control group

Parameter	Experimental group (n=62)	Control group		
		Nullipara (n=35)	Multipara (n=15)	Total (n=50)
Xsr	1.92	2.44	3.25	2.68
SD	0.95	0.88	0.97	0.97
Median	1.75	2.40	3.10	2.65
Minimum	0.30	1.30	1.90	1.30
Maximum	4.70	4.20	5.50	5.50

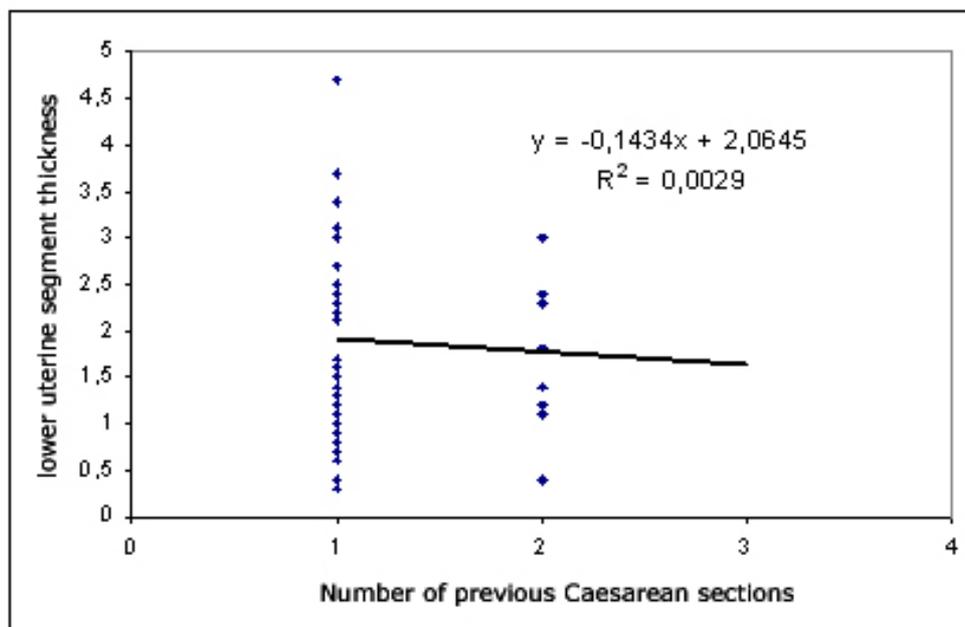
Average low uterine thickness in women with previous Caesarean section was 1.92 ± 0.95 mm, and it was statistically significantly lower than in the examined women, compared to nulliparae (2.44 ± 0.88 ; Mann-Whitney U test: $Z=2.12$ and $p=0.025$), multiparae (3.25 ± 0.97 ; Mann-Whitney U test : $Z=5.39$ and $p<0.001$), as well as to the control group in general (2.68 ± 0.97 mm; Mann-Whitney U test: $Z=4.04$ and $p<0.001$). In the control nulliparae, the average lower uterine segment thickness was statistically significantly lower than in the control multiparae (Mann-Whitney U test: $Z=2.51$ and $p=0.012$).

Table 2. Lower uterine segment thickness (mm) vs. the number of previous Caesarean sections (n=62)

Parameter	Number of previous Caesarean sections		
	1 (n=52)	2 (n=9)	3 (n=1)
Xsr	1.92	1.78	3.30
SD	0.97	0.82	-
Mediana	1.65	1.80	3.30
Minimum	0.30	0.40	3.30
Maximum	4.70	3.00	3.30

In 52 pregnant women with one previous Caesarean section, average lower uterine segment thickness was 1.92 ± 0.97 mm, and in nine pregnant women with two Caesarean sections the thickness was lower – 1.78 ± 0.82 mm, but the difference was not statistically significant (Mann-Whitney U test: $Z=0.19$ and $p=0.85$). One pregnant woman with three Caesarean sections had 3.30mm thick lower uterine segment.

Correlation analysis of the examined women with one or two Caesarean sections showed that the increased number of previous Caesarean sections was associated with the decrease of the lower uterine segment thickness, but the value of Spirman's correlation rang coefficient ($r=-0.05$ i $p=0.79$) did not support a statistically significant association in the examined sample. The analysis did not include the woman with three previous Caesarean sections, since there was only one such patient and the thickness was 3.30mm.



Graph 1. Number of previous Caesarean sections vs. lower uterine segment thickness

Table 3. Intraoperative finding of the scar position vs. the number of previous Caesarean sections

Broj prethodnih carskih rezova	Klasa			
	I	II	III	IV
1	19 (40.4%)	16 (34.0%)	11 (23.4%)	1 (2.1%)
2	4 (44.4%)	4 (44.4%)	1 (11.1%)	-
3	1 (100.0%)	-	-	-

Well-developed lower uterine segment was determined in 40.4% of women with one previous Caesarean section, and in 44.4% of women with two previous Caesarean sections. The woman with three previous Caesarean sections had the same finding. Thinner lower uterine segment with invisible uterine content (class II) was determined in 34.0% of women with one previous Caesarean section, and 44.4% of women with two previous Caesarean sections. Lower uterine segment with partial scar defect (class III) was determined in 23.4% of women with one previous Caesarean section, and in 11.1% of women with two previous Caesarean sections. Complete scar defect (class IV) was found in one woman with one previous Caesarean section. The presence of certain classes of intraoperative finding compared to the number of previous Caesarean sections was not significantly different (Chi square or Fischer test: $p > 0.05$).

We registered the total of 13 defects in the Caesarean section scar area (12 partial and one complete defect), in 12 pregnant women after one CS and one pregnant woman after two CSs.

Discussion

Lower uterine segment in term pregnancy is an anatomically great area. Uterine incisions done closer to the inner cervix axis encompass mostly cervical tissue, while those made closer to

the uterine body involve the smooth-muscle tissue. With the advanced cervical dilatation there is a danger to incise the cervical tissue itself. Not rarely, with repeated CS, a new incision is done at the same place as the previous one. All this influences the healing process and the quality of the scar (6). LUS thickness depends on the formed scar quality (7). Bad scar interrupts the regeneration of the isthmic part of the uterus, which makes it thinner. In the following pregnancy additional thinning of the lower uterine segment can be followed by a defect (3).

Table 1. It was found that the LUS thickness in pregnant women with previous Caesarean section was significantly lower than in pregnant women without scars, which is supported by the results from the published studies (4,7,8).

Table 2. The research did not confirm that the increased number of CS influences a statistically significant lower uterine segment thinning, which corresponds to the literary data. Sambaziotis et al. (2004) did not find statistically significant difference in the lower segment thickness compared to the number of previous Caesarean sections, not even during the second trimester of pregnancy (9). Qureshi et al. (1997) did not confirm a statistically significant difference in 35 pregnant women with one and 8 pregnant women with two previous Caesarean sections, in term pregnancies (7).

Our knowledge suggests that not all but only bad scars can impair the isthmus regeneration and will influence the abnormal lower uterine segment thinning in the following pregnancy. The lower segments, in which that process passed undisturbed, were well-developed during surgery. In some cases, the scar place could not be identified (7).

Table 3. Relić et al. (2009) revealed the fact that the increased number of previous CS does not influence a statistically significant increase in the frequency of incomplete and complete Caesarean section scar ruptures (1-3%), especially

after three CSs compared to the examined women after the fourth Caesarean section. Furthermore, there was no statistically significant difference in pathohistological scar quality (number of collagen fibers – level of desmoplasia) after the first and the second, that is, after three previous Caesarean sections, compared to the scar after four CSs (10).

In our research, the presence of certain LUS classes, intraoperatively, compared to the number of previous Caesarean sections was not statistically significantly different ($p > 0.05$). The increased number of previous CSs does not influence the statistically significant increase in the frequency of Caesarean section scar defects, which is in accordance with the results obtained by other authors. We registered 13 pregnant women with the Caesarean section scar defect (12 partial and 1 complete defects), in 12 pregnant women after one CS and in 1 pregnant woman after two CSs.

According to the data from the greatest study conducted in 1994, the test-vaginal delivery in women with more than one previous Caesarean section was associated with relatively high probability for success, but with slightly higher risk of uterine rupture as well (1.7% to 0.6% in elective another Caesarean section)

During the last decade, numerous studies investigated the Caesarean section scar state in non-pregnant women, its possible behavior in the following pregnancy and its influence on the appearance of other clinical difficulties (prolonged postmenstrual dotted bleeding, as well as chronic pelvic pain) (11).

Previous manifold CS, with the existing uterine retroflexion in non-pregnant women, is, very frequently, associated with greater scar

defects (12). It can be expected that this will reflect on the lower uterine segment in the following pregnancy, in the way that it will be thinner with the present defects.

The term „CS once, scar always“ refers to caution that possible uterine scar defects should always be looked for during pregnancy and before delivery as well as in non-pregnant women, and potential pregnant ones.

Edward Cragin's catchword from the beginning of the XX century, "CS once, CS always", seems to become more and more present in modern obstetrics, that is, it represents the return to the old principles, despite the progress in the field of mother and child's safety during vaginal delivery after the Caesarean section.

Conclusion

The research results indicate that pregnant women with previous Caesarean section have significantly thinner lower uterine segment compared to the group of pregnant women without scars. The higher the number of previous Caesarean sections, the smaller the lower uterine segment thickness, however, without statistically significant difference. Furthermore, the increase in the frequency of scarring defects with the increase in the number of previous Caesarean sections was not recorded. This and relatively high rate of vaginal delivery after two or more CSs, with somewhat higher risk of uterine rupture in certain studies (13), may indicate that uninterrupted healing process of uterine incision has the crucial influence on the Caesarean section scar quality. Further researches may bring us closer to the answer.

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UTICAJ BROJA PRETHODNIH CARSKIH REZOVA NA STANJE DONJEG SEGMENTA MATERICE

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Utvrđivanje stanja donjeg segmenta materice (LUS-lower uterine segment), pre vaginalnog porođaja, posle carskog reza, kao i kod trudnica sa više od jednog CR, može biti važan korak u prevenciji još uvek visokog maternalnog i neonatalnog morbiditeta i mortaliteta koji prate rupturu materice. Kod trudnica sa jednim ili više prethodnih carskih rezova (CR), merenjem debljine i procenom integriteta LUS-a pomoću ultrazvuka, može se objektivizirati stanje ožiljka na materici. Ovaj rad je imao za cilj da utvrdi uticaj broja prethodnih carskih rezova na stanje LUS-a kod terminskih trudnica. Prospektivna studija je obuhvatila 112 trudnica sa i bez prethodnog CR, kod kojih je od 37. nedelje trudnoće transvaginalnim ultrazvukom merena debljina mišićnog dela LUS-a, u najtanjem delu. Kod 57 trudnica koje su porođene ponovnim CR, intraoperativno na mestu ožiljka registrovano je prisustvo defekta-parcijalnog ili kompletnog. Istraživanje je pokazalo da prosečna debljina LUS-a u ispitivanoj grupi od 1.92 ± 0.95 mm je statistički značajno manja u poređenju sa kontrolnom grupom 2.68 ± 0.97 mm ($p < 0.001$). Prosečna LUS-a kod 52 ispitanice sa 1 CR bila je 1.92 ± 0.97 mm, a kod 9 žena sa po dva CR debljina je manja i iznosila je 1.78 ± 0.82 mm, što ne predstavlja statistički značajnu razliku ($p = 0.85$). Ukupno je registrovano 13 trudnica sa defektom u predelu ožiljka od CR i to, kod 12 trudnica posle jednog CR i 1 trudnice posle dva CR. Rezultati sprovedenog ispitivanja ukazuju da kod trudnica sa prethodnim CR dolazi do značajnijeg istanjenja LUS-a, u odnosu na grupu trudnica bez ožiljka. Sa povećanjem broja prethodnih CR debljina LUS-a se smanjuje, ali je ta razlika bez statističke značajnosti. Zastupljenost pojedinih klasa intraoperativnog nalaza LUS-a (dobro razvijen, istanjen, parcijalni defekt, kompletan defekt) u odnosu na broj prethodnih CR nije značajno različita i da sa povećanjem broja prethodnih CR ne dolazi do statistički značajnog porasta učestalosti defekata ožiljka od CR, što je saglasno rezultatima drugih autora. *Acta Medica Medianae 2010;49(2):29-33.*

Ključne reči: donji segment materice (lower uterine segment-LUS), carski rez, ožiljak, transvaginalni ultrazvuk