

Perfect cesarean section — the Holy Grail of obstetricians

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Caesarean section (CS), as the most frequently performed major surgical procedure worldwide (21.1% women give birth by CS — almost 30 million CSs annually), has several advantages [1]. The obvious one is it's a safe option for delivery when due to maternal or fetal indications the vaginal delivery is contraindicated. Moreover, there are long-term advantages like decreased rates of pelvic floor dysfunction (especially stress urinary incontinence and pelvic organ prolapse) when compared to women who deliver vaginally [2, 3].

Major progress has been achieved in the reduction of early CS complications, such as wound infection (*i.e.*, antibiotic prophylaxis), postpartum haemorrhage (*i.e.*, carbocin infusion), pain control (*i.e.*, transversus abdominis plane block) and thromboembolic complications (*i.e.*, low molecular weight heparin, early mobilization) [4, 5].

However, there are no roses without thorns. Above all, there are ongoing concerns about increased maternal mortality related to CS [6]. Also, an urgent problem is maternal morbidity expressed in skyrocketing frequency of long-term CS complications. These complications are mostly related to the incomplete healing of the uterine CS scar. In pregnant women they include potentially life-threatening complications like cesarean scar dehiscence or rupture, CS scar pregnancy and its direct consequence — placenta previa accreta [7]. In nonpregnant women the long-term CS complications include abnormal uterine bleeding, subfertility and pelvic pain syndrome [8–10]. Also, CS related intra-abdominal adhesions, mainly between the uterus and abdominal wall, negatively affect the safety of subsequent surgical procedures and increase the risk of incomplete healing of the uterine CS scar [11].

As the incompletely healed uterine CS scar seems to play crucial role in the etiology of long-term CS complications the current research should be focused on the improvement of surgical techniques that allow better healing of the uterine CS scar and decrease adhesion formation.

Making a long story short — the cornerstone on the way to modern CS was change from vertical uterine incision to low transverse incision introduced by John Martin Munro Kerr in 1926, which was then combined with transverse "Pfannenstiel" abdominal entry [12]. The next step was the introduction of blunt dissection techniques for abdominal entry by Joel-Cohen and uterine entry – the Misgav-Ladach method. These novel techniques allowed decreased blood loss, shortening of the operation time and recovery period [12]. However, after millions of CSs and dozens of studies the uterine closure technique that allows complete healing of the CS scar is still missing [13, 14]. There are also no general guidelines on CS technique from skin incision to skin closure. The American College of Obstetricians and Gynecologists advises autonomy of obstetricians in choosing their preferred CS technique, considering their safety regarding short-term complications [12]. However, the impact of this techniques on the above listed long-term CS complications is still under evaluation, with no final conclusions [12, 15].

One of the steps forward on the way to the „perfect“ CS might be the “novel technique uterine suturing” (NTUS) described by Ugur Erkayiran and Tufan Arslanca in the current issue of *Ginekologia Polska* in a study entitled: “Comparative analysis of classical primary continuous and novel technique uterine suturing methods on uterine scar formation after caesarian section: a prospective clinical study” [16]. In this study the CS scar niche incidence did not differ between the group with NUTS closure and the group with classical primary continuous suturing, however the residual myometrial thickness (RMT) was significantly thicker in the NUTS group.

According to the current knowledge the RMT has crucial value in terms of risk for scar related complications in subsequent pregnancies. Randomized studies revealed that low RMT values measured in the non-pregnant uterus using transvaginal ultrasound (TVUS) predict the occurrence of CS scar dehiscence and rupture in the next pregnancy [17, 18].

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Moreover, in women with cesarean scar pregnancy (CSP) the RMT value of ≤ 2 mm measured at the first prenatal ultrasound predicts in all cases the development of placenta previa accreta when the pregnancy is continued [19].

In our opinion the key to success in improvement of CS technique is the evaluation of own results. In our centre — the 2nd Department of Gynecology and Obstetrics, Medical University Wroclaw, Poland (Head: Prof. Mariusz Zimmer) in 2005 we introduced the first standardized ultrasonographic assessment of the CS scar in the non-pregnant uterus. The scar was assessed six weeks after CS. The results published in *Ginekologia Polska* in 2007 revealed that in 94.5% of women the scar niche was detected [20]. After analysis of the results a mandatory full thickness single layer uterine closure without the inclusion of decidua was implemented. Further studies on women after CS performed in our department revealed significant decrease in niche detection [18]. Among 204 women included in the latest publication from our center only five patients (2.4%) had a RMT < 2.2 mm [21].

The last word in the topic on the improvement of the CS technique is not said. We should be aware that even small progress in the most common major surgery worldwide may have positive impact on wellbeing of millions of women and thus on public health. The key to the success is the evaluation of own surgical results both in the settings of big clinical trials and in the micro scale — by the surgeons themselves. The tool for CS scar assessment – TVUS is widely available and uterine CS scar assessment techniques are easy to implement and use [22]. Dear Readers, we encourage all of you to assess the CS scars after the cesareans you have performed — maybe your technique will turn out to be a milestone on the way to a perfect CS.

Conflict of interest

The authors have no conflicts of interest to declare.

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