Outcomes of Laparoscopic Treatment in Women with Cesarean Scar Syndrome

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
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Background: The aim of this study was to evaluate the outcomes of laparoscopic treatment of women with severe defect of a Cesarean section (CS) scar and Cesarean scar syndrome.

Material/Methods: A prospective longitudinal study was conducted in 11 women who were treated for Cesarean scar syndrome. Ultrasound examinations were performed transvaginally 1 day before surgery and 6 months after laparoscopy in all women. Clinical data were registered 1 day before laparoscopy and 6 months after laparoscopy.

Results: Of these 11 women, total dehiscence of the CS scar was present in 72.7% (8/11) of the women. Before laparoscopy, all 11 women had severe defect of the CS scar (DRC ≤0.25); however, 6 months after laparoscopy, 81.8% (9/11) of women still had severe defect of the CS scar. Mean thickness of the CS scar, measured 1 day before and 6 months after laparoscopy in all 11 women, was 0.3±0.4 mm and 1.3±1.0 mm, respectively. Accordingly, no significant differences were observed in the mean CS scar thickness (p=0.101). After laparoscopy, 63.6% (7/11) of women were fully asymptomatic, and among the remaining 4, the most common complications were dyspareunia in 36.4% (4/11, p=0.005), pelvic pain in 27.3% (3/11, p=0.014), and dysmenorrhea in 18.2% (2/11, p=0.01), and best results after laparoscopy were achieved for postmenstrual spotting in 18.2% (2/11, p<0.001).

Conclusions: Improvement of women's health after laparoscopy does not necessarily mean improvement of CS scar sonomorphology. Surgery should be offered only to women with symptoms of the Cesarean scar syndrome.

MeSH Keywords: **Cesarean Section • Laparoscopy • Ultrasonography**

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Background

The Cesarean delivery rate is increasing and currently accounts for approximately one-third of all deliveries [1]. Epidemy of Cesarean sections (CS) is a serious problem in gynecology and obstetrics. Subsequent pregnancies are associated with increased risk of abnormal placental implantation (placenta praevia, accreta), ectopic pregnancy in the CS scar, and uterine rupture [2–4]. Women who had undergone a Cesarean section had a 9% lower consecutive pregnancy rate than those who had delivered vaginally [5,6]. In 1995, Morris reported histopathological changes in uterine specimens at the site of the Cesarean section scar in women with hypermenorrhea [7]. Gubbini et al. described severe CS scar defects as "isthmoceles" [8]. Anechoic loss of the myometrium continuity at the presumed site of the Cesarean section scar was first described 2001 by Monteguado et al. [9] as a "niche". Clinical symptoms (pelvic pain, dysmenorrhea, postmenstrual spotting, infertility) of abnormally healed Cesarean section scars are collectively referred to as Cesarean scar syndrome [10]. Morphological changes of the Cesarean section scar have been evaluated for at least 20 years, but few studies have provided information about treatment management in women with Cesarean scar syndrome and severe defect of the CS scar, and none of these studies provided comparative ultrasound and clinical outcomes of the laparoscopy, with the exception of case reports.

The aim of this study was to evaluate the results of the laparoscopic treatment of women with severe defect of the CS scar and Cesarean scar syndrome. Our objective was to describe the effects of laparoscopy on the postoperative clinical status of women, and on the sonomorphology of the Cesarean section scars.

Material and Methods

Study populations

This prospective longitudinal study enrolled 11 women treated for Cesarean scar syndrome from Jan 2012 to Nov 2015. Demographic data and postoperative medical history were obtained 1 day before laparoscopy and 6 months after laparoscopy. The following data were registered 1 day before surgery: age, number of Cesarean sections, and time interval after the last Cesarean section. All women were specifically asked about symptoms before surgery, including chronic pelvic pain, dysmenorrhea, intermenstrual spotting, and dyspareunia. Chronic pelvic pain was defined as pain in the pelvic region that lasts 6 months or longer [11]. Dysmenorrhea was defined as pain during menstruation that interferes with daily activities. Dyspareunia is painful sexual intercourse in which the woman may be distracted from feeling pleasure and excitement [12,13].
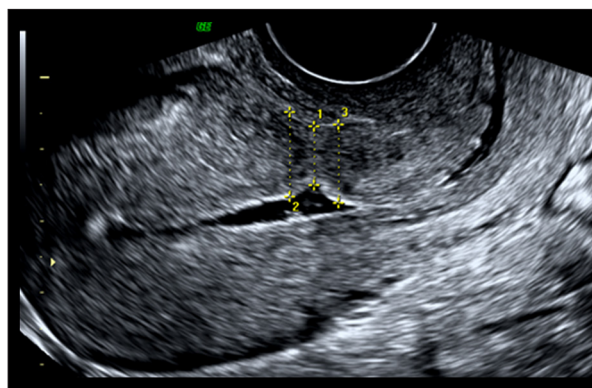

Figure 1. Sagittal plane of the uterus obtained transvaginally 6 weeks after CS. The thickness of the CS scar (1), the thickness of the myometrium proximally (2) and distally (3) to the CS scar.

Our study protocol was approved by the hospital Ethics Committee and the women provided written informed consent.

Ultrasound examination

Ultrasound examinations were performed in all 11 women transvaginally 1 day before surgery and 6 months after laparoscopy. All scans were performed with the Voluson E6 BT13 (GE Healthcare, Zipf, Austria) and 5–9 MHz transvaginal (RIC 5–9) transducer. Women were examined after emptying the bladder. The thickness of the myometrium proximal and distal to the CS scar and the thickness of the scar were measured in the midsagittal plane. To quantitate the severity of the scar defect, we defined "a dehiscence risk coefficient" (DRC), which is calculated as a ratio between the thickness of the scar(s) and the thickness of the myometrium adjacent to the defect (mean thickness of the myometrium proximal (pm) and distal (dm) the scar): DRC=s/((pm +dm)×0.5) (Figure 1). DRC less than 0.25 was considered as a severe scar defect. These calculations were based on the results of our previous studies [2].

Laparoscopy

Standard antibiotic prophylaxis consisting of 2 grams of cefazoline was administered to each woman intravenously 30 min before surgery. The surgery was performed under general anaesthesia in lithotomy position. We used 3 trocars: an 11-mm trocar at the umbilicus for visualization, a 5-mm trocar 2 cm medial and superior to the anterior superior iliac spine, and a 5-mm trocar 3 cm above the symphysis pubis. We performed closed entry laparoscopy. After creating CO_2 pneumoperitoneum (pressure of 12 mm Hg), visualization of the peritoneal cavity was performed. The uterine CS scar site was visualized by inserting a uterine probe through the cervical canal into the uterine isthmus. The CS scar defect was visualized as a prominence of the perimetrium. After this, we opened the
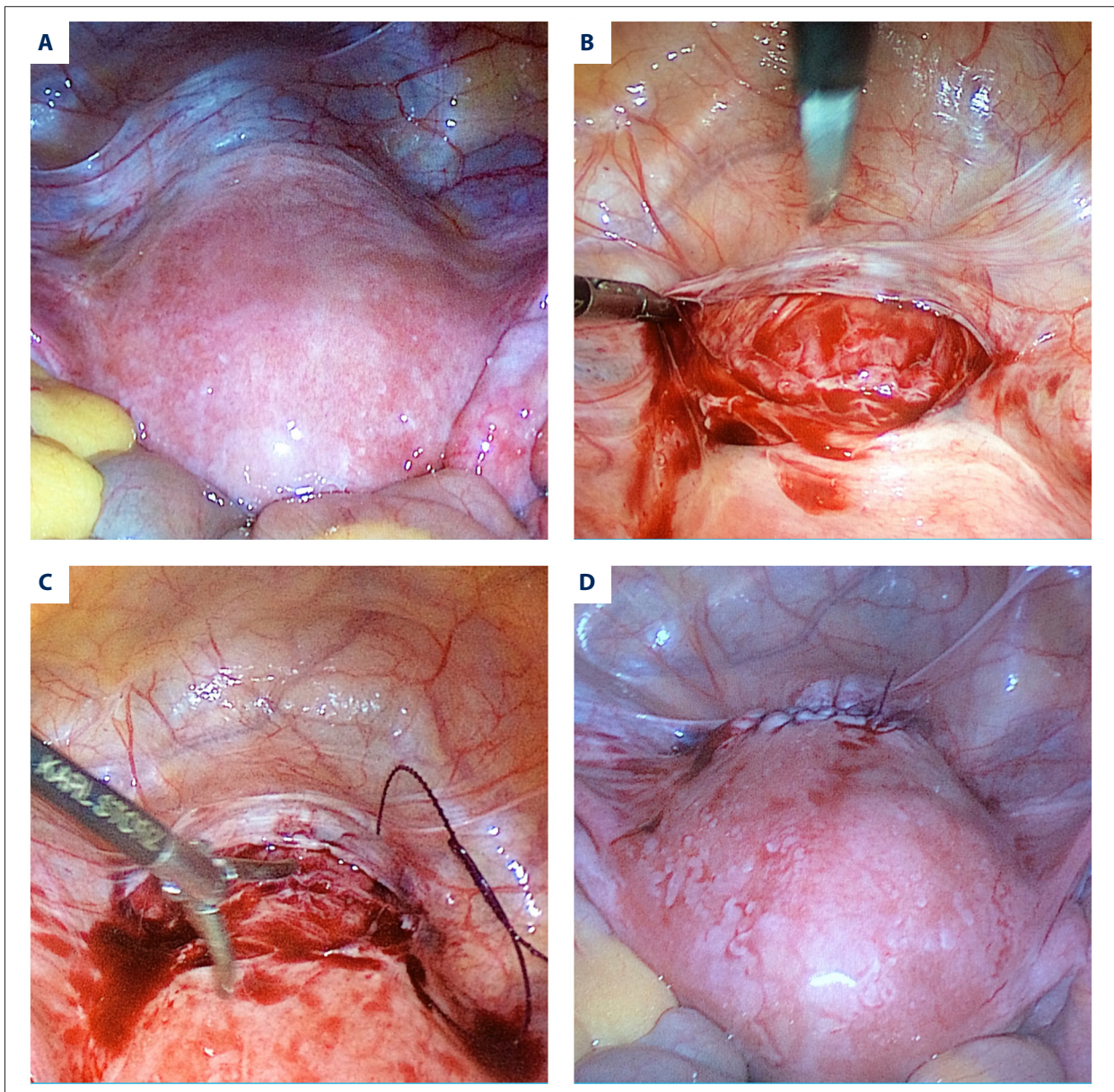
Figure 2. (**A**) Intact perimetrium above the isthmocele. (**B**) Opened perimetrium and prepared CS scar region. (**C**) The uterine incision was closed with a single layer of running absorbable barbed sutures. (**D**) Final image of the sutured uterine isthmus.

perimetrium at the site of the prominence, minimally dissected the urinary bladder, and shaved (bloodily prepared) the scar tissue using Metzenbaum scissors to reduce the fibrotic scar tissue. The uterine cavity was not opened. The uterine incision was sutured with a single layer of running absorbable 2-0 polyglactin barbed suture (V-Loc 0, Covidien, Mansfield, MA) (Figure 2). The stitches were pulled tight enough to approximate the borders of the scar, but without excessive tension. After laparoscopy, women were advised to avoid pregnancy for at least 6 months, due to the fact that histologic healing of the CS scar takes at least that long [14].

Statistical analysis

Statistical analysis was performed using PASW Statistics 18 (SPSS, Chicago, IL). Descriptive statistics are presented as mean values with standard deviation (SD). Categorical data are presented as total numbers with percentages. Non-parametric Mann-Whitney tests were used to determine the statistical differences of particular clinical outcomes. Since the clinical preoperative and postoperative data are meaningfully paired (in that they are assessed in the same patients), the McNemar chi-squared test paired proportions was used. $P < 0.05$ was considered statistically significant.

Table 1. Differences in ultrasound measurements of the Cesarean section scars in women before and after laparoscopy.

Parameter	Before laparoscopy (n=11)	After laparoscopy (6 months) (n=11)	p*
Scar thickness (mm)	0.3±0.4	1.3±1.0	0.101
DRC	0.03±0.04	0.13±0.09	0.088

Data are presented as mean ±SD; DRC (dehiscence risk coefficient). *Mann-Whitney U test

Table 2. Outcomes of laparoscopic treatment in women with Cesarean scar syndrome.

Parameter	Before laparoscopy (n=11)		After laparoscopy (3 months) (n=11)		p*
Postmenstrual spotting % (n)	100	(11/11)	18.2	(2/11)	<0.001
Pelvic pain, % (n)	81.8	(9/11)	27.3	(3/11)	0.014
Dysmenorrhoe, % (n)	72.7	(8/11)	18.2	(2/11)	0.01
Dyspareunia, % (n)	81.8	(9/11)	36.4	(4/11)	0.03

Statistical significance of differences between preoperative and postoperative clinical health status (*McNemar's test). Results are presented as total number (percentage).

Results

Statistical analysis of demographic and clinical data revealed the following results: the median age of patients was 34 years (range 26–39), the interval from the last CS was 4 years (range 1–8), and the median number of CSs was 1 (1–3). All 11 women underwent 2 transvaginal ultrasound examinations at predefined time-points (1 day before and 6 months after laparoscopy) to assess the CS scar, myometrium thickness proximal and distal to the CS scar, and mathematical explanation of the DRC (Table 1). Total dehiscence of the CS scar was present in 72.7% (8/11) of women. Before laparoscopy, all 11 women had severe defect of the CS scar (DRC ≤0.25), but 6 month after laparoscopy, 81.8% (9/11) of women still had severe scar defect of the CS scar. Mean thickness of the CS scar measured 1 day before and 6 months after laparoscopy in all 11 women was 0.3±0.4 mm and 1.3±1.0 mm, respectively. Mean DRC calculated from ultrasound measurements 1 day before and 6 months after laparoscopy in all 11 women was 0.03±0.04 and 0.13±0.09 mm, respectively. Accordingly, no significant differences were observed in the mean CS scar thickness (p=0.101) or in the dehiscence risk coefficient (DRC) (p=0.088).

The clinical data and outcomes evaluated 1 day before and 6 months after laparoscopy are shown in Table 2. After laparoscopy, 63.6% (7/11) of women were fully asymptomatic, and among the remaining 4 the most common complications were dyspareunia in 36.4% (4/11, p=0.005), pelvic pain in 27.3% (3/11, p=0.014), and dysmenorrhea in 18.2% (2/11, p=0.01), and the best results after laparoscopy were achieved in postmenstrual spotting in 18.2% (2/11, p<0.001).

The statistical analyses were affected by the small number of patients in our study.

Discussion

In this prospective study, we show the outcomes of laparoscopy in 11 women with severe CS scar defect and Cesarean scar syndrome. All women were treated laparoscopically because they had severe CS scar defects (CS scar thickness less than 2.0 mm). Hysteroscopy is not recommended in women with CS scar thickness <2.0 mm due to the reported higher risk of uterine rupture and urinary bladder injury [15].

An interesting finding during laparoscopy was that, in women with ultrasonographically-diagnosed total dehiscence of the CS scar, we could not visualize a hole-like defect of the uterine isthmus or a prominent isthmocele (Figure 3). Similar surprising intraoperative findings were reported by Masuda et al. [16], who found the isthmic perimetrium was mostly intact, but dense adhesions of the vesicouterine pouch were visualized in 37.5% (3/8) of women with total dehiscence of the CS scar (Figure 4). The course of laparoscopy in all 11 women was without serious complications; the most common problems were the adhesions of the vesicouterine pouch. Blunt and sharp adhesiolysis was performed carefully to avoid urinary bladder injury. The CS scar region was bloodily prepared and scar margins approximated close to each other, but without excessive tension, because ischemic wound tissue with impaired perfusion and oxygenation could lead to abnormal scar healing with insufficient CS scar and adhesions formation [17]. Presence of
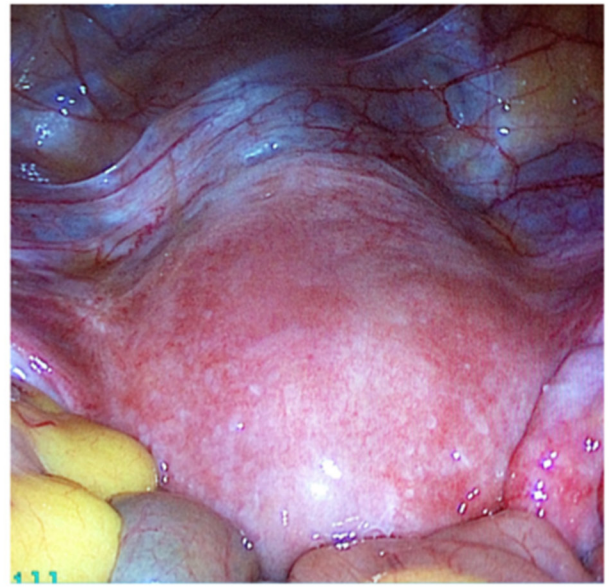
Figure 3. Laparoscopic image of the intact perimetrium above the ultrasonographically identified isthmocele.
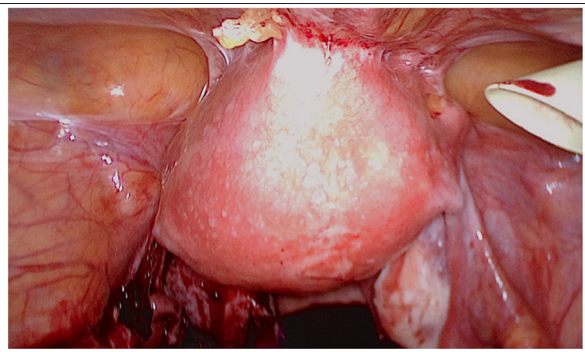

Figure 4. Laparoscopic image. Solid large adhesions of the vesicouterine pouch in a woman with severe CS scar defect.

adhesions in the vesicouterine pouch is a risk factor for bladder injury in consecutive CS.

In our study, all assessed gynecologic symptoms were significantly different after laparoscopic reconstruction of the CS scar. Best results were achieved in patients with postmenstrual spotting, and only 2 patients experienced visible spotting after laparoscopy. On the other hand, Schepker et al. reported that all of their patients stopped bleeding after reconstructive surgery [18]. Interestingly, we found that laparoscopy resolved all assessed gynecologic problems in 63.6% of women (7/11), but after laparoscopy 81.8% (9/11) of women still had severe scar defect of the CS scar. Case reports by Drouin et al. [19] and Yalcinkaya et al. [20] had similar results, despite the fact we did not perform excision of the CS scar defect. The CS scar was not removed, because in our opinion it could increase tension between the margins of the newly molded uterine scar.

Li et al. [21] reported resolution of symptoms after laparoscopy in 70.6% (12/17) of patients and no significant difference in the CS scar thickness before and after laparoscopy (<2.5 mm vs. >3.0 mm, respectively). Marotta et al. [22] reported a statistically significant increase in residual myometrial thickness covering defect before and after laparoscopy (1.6 mm vs. 9.8 mm) and resolution of the gynecologic symptoms in 60% (6/10) of patients. Because the relationship between CS scar defects and gynecologic problems is still not recognized, we can only speculate on the cause of these interesting findings. However, we can hypothesize that the isthmocele is a weak anatomic point, where the menstrual blood and/or mucus is accumulated, and that pathologic neovascularization and micropolyps at the site of the isthmocele may be the cause of Cesarean scar syndrome [22,23]. Different suturing methods have been reported for CS scar defects, but when mono-layer closure (Li et al. [21]) was compared with double-layer closure (Marota et al. [22]) with regard to median differences of CS scar thickness, no significant difference was found [24]. Therefore, the healing mechanism of the laparoscopy is not well defined [25]. We assume that laparoscopic reconstruction of the uterine scar defect could mechanically strengthen the scar area. Recent studies report that no matter what method is used for treatment of Cesarean scar syndrome (laparotomic, vaginal, laparoscopic, hysteroscopic) [26–28], results are almost the same. An interesting conservative treatment method was described by Ida et al. [29], who treated CS scar defect with a physiological saline solution. After serial wound lavaging, healing of the scar defect was maintained and the patient was satisfied and refused further treatment.

Conclusions

In conclusion, we documented outcomes of laparoscopic treatment in women with Cesarean scar syndrome. Interestingly, improvement of the women's health after laparoscopy does not necessarily mean improvement of CS scar sonomorphology. Nevertheless, laparoscopy is the method of choice in Cesarean scar syndrome because, besides the CS scar reconstruction, adhesiolysis of the vesicouterine pouch can be performed. We suggest that surgery should be offered only to women with symptoms of Cesarean scar syndrome.

Further studies on this issue are needed to confirm the ideal management of women with Cesarean scar syndrome.

Conflict of Interests

None.

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