The Egyptian Journal of Hospital Medicine (April 2025) Vol. 99, Page 1853-1857

Hysteroscopic Resection Versus Laparoscopic Repair for Women with Caesarean Scar Defect Suffering from Postmenstrual Spotting, A Randomized Trial

Reda A Ahmad [1], Ashraf Nasr Refaie [1], Ahmed Mahmoud Abdou[1], Ahmed Salama Iraki[1], Mahmoud Ismaeel Kotb [1], Reham Abdelhamed Elsayed[1]

[1]Department of Obstetrics and Gynaecology, Faculty of Medicine – Zagazig University, Egypt

***Corresponding author: Reham Abdelhamed Elsaid, Mobile: (+20)** 01061424034**,**

Email: rehamabdelhamid2019@outlook.com

ABSTRACT

Background: The prevalence of scar deformities following Cesarean sections (CSD) has risen significantly due to the global increase in Cesarean deliveries. Infertility, dysmenorrhea, dyspareunia, persistent pelvic pain, and postmenstrual uterine hemorrhage are some of the symptoms of these abnormalities. Various management strategies have been proposed for addressing these defects.

Objective: The current study aimed at assessing how well laparoscopic repair and hysteroscopic resection work to alleviate CSD symptoms, particularly postmenstrual spotting, against expectant management, in a randomized trial.

Methods: The study has been carried out from December 2019 to December 2023. This study included 45 women diagnosed with CSD using transvaginal sonohysterography. All participants had undergone at least six months of medical treatment (Using combined oral contraception and/or tranexamic acid) before being included. The women were randomly divided into three groups: One continuing medical treatment without additional intervention, and the other two undergoing surgical repair using either laparoscopic or hysteroscopic techniques. All participants were assessed three months post-surgery for symptom improvement and underwent ultrasonographic evaluation.

Results: Both laparoscopic repair and hysteroscopic resection of CSD significantly reduced three months after surgery, the number of days with postmenstrual spotting. Improvement in bleeding symptoms was observed in 93.3% of cases in both surgical groups. Additionally, the residual myometrial thickness (RMT) significantly increased preoperatively from 3.97 ± 0.97 mm to three months post-laparoscopic repair at 7.3 ± 1.45 mm.

Conclusions: Both laparoscopic repair and hysteroscopic resection effectively alleviated symptoms associated with CSD, particularly postmenstrual bleeding or spotting. Laparoscopic repair is favored for anatomical correction and improved ultrasonographic measurements of the scar defect.

Keywords: Laparoscopy, Hysteroscopy, Postmenstrual spotting, CSDs.

INTRODUCTION

The growing rate of Cesareans in the world over the past 25 years has stimulated interest in morbidity frequently observed as Cesarean scar defect (CSD) [(1)].

CSD is commonly detected in transvaginal ultrasound (TVS) as an anechoic wedge-shaped region in the myometrium near the site of the prior Cesarean section (CS) [(2)].

The scar defect of the Cesarean section (CSD) may be asymptomatic. However, one of the most common symptoms associated with the CSD was abnormal bleeding (mostly postmenstrual spotting) brought on by the loss in contractility of the muscle fibers surrounding the defect and the buildup of blood in a reservoir-like niche. Other women who had CSD report persistent pelvic pain, vaginal discharge, and dysmenorrhea and dyspareunia. Additionally, there was a link between women who have secondary infertility and scar abnormalities from Cesarean sections. This connection was attributed to the ongoing presence of blood causing chronic inflammation, which may alter cervical mucus, hinder sperm transport, and disrupt embryo implantation. It can also lead to obstetrical complications such as abnormal placentation, scar dehiscence, and uterine rupture [(3)].

Several techniques exist for detecting and measuring Cesarean section scar defects (CSD), including two- and three-dimensional transvaginal ultrasound, magnetic resonance imaging, hysterosalpingography, hysteroscopy, and two- and three-dimensional sonohysterography. None of these diagnostic techniques, though, are regarded as the "gold standard" [(4)].

In women who are not infertile, symptomatic Cesarean scar abnormalities can be corrected medically with combination of oral contraceptive tablets or with less invasive procedures such as laparoscopic repair or hysteroscopic excision. The benefits of hysteroscopic CSD: One advantage of resection is its ease of use, short recovery period, and efficient symptom alleviation. But, potential complications include possible bladder injury and incomplete closure of the defect, which may lead to persistent symptoms [(5)].

Surgeons generally recommend ensuring a residual myometrial thickness of at least 3 mm before considering this method to minimize complications. On the other hand, laparoscopic repair of CSD includes accurate myometrial approximation and total removal of the scar tissue. Despite this, the invasiveness of the procedure and associated risks, such as bladder injury during dissection and the possibility of defect and symptom persistence, are concerns [(6, 7)].

Comparing the results of laparoscopic and hysteroscopic treatment for symptomatic Cesarean scar abnormalities was the goal of this study.

Received: 24/11/2014
Accepted: 23/01/2015

PATIENTS AND METHODS

This study was carried out at the hospitals of Zagazig University starting in December 2019 to December 2023 to assess hysteroscopic resection compared to laparoscopic repair for women experiencing postmenstrual spotting due to Cesarean scar defect. This was a randomized controlled clinical trial, with an estimated sample size of 45 participants who were divided into three groups of 15 each.

Sample size: 80% power (1-beta, percentage likelihood of detection) with a two-sided significance threshold (1-alpha) of 95%. Sample size unexposed/exposed ratio (1), percentage of unexposed individuals with an outcome of 37, and percentage of exposed individuals with an outcome of 91. The estimated sample were 15 patients in each group.

Randomization: A computer-generated randomization scheme. A statistician who was not involved in patient recruitment created the randomization list. Sequentially numbered, opaque, black, sealed envelopes were used to conceal allocation.

Inclusion criteria: Women with history of Cesarean section. Postmenstrual spotting/bleeding. The existence of residual myometrial thickness (RMT) in a Cesarean scar niche more than 3 mm diagnosed by sonohysterography. Failed medical treatment (combined oral contraceptive pills and/or tranexamic acid) for at least 6 months.

Exclusion criteria: If the time between the study and the Cesarean section was less than six months. Cesarean scar niche with residual myometrial thickness less than 3 mm diagnosed by sonohysterography. Irregular cycle. Pregnancy. Uterine anomalies. Hysterotomy (less than 28 weeks). History of placenta previa and morbidly adherent placenta. Uterine incision other than the lower transverse incision. Other potential causes of abnormal uterine bleeding include cervical dysplasia, adenomyosis, submucosal fibroids, and a history of abnormal endometrial cells, among other conditions. Other causes of pelvic pain (cervical or pelvic infection, hydrosalpinx). Any contraindication to general anaesthesia and laparoscopy

All included women were subjected to complete history taking especially their menstrual pattern and associated pain (dysmenorrhea, dyspareunia and chronic pelvic pain). Moreover TVS and sonohysterography in the follicular phase to assess the measurement of CSD (length, width, depth, and thickness of the anterior and residual myometrium). Three groups were randomly selected from among the included women:

Group A: Control group (receiving combined oral contraceptive pills and/or tranexamic acid.

Group B: During laparoscopic repair, in addition to the primary port near the umbilicus or palmar entry and two more side ports, one on the left and one on the right, were placed in the lower abdomen. Additionally, we positioned a port close to the umbilicus. The patient was then positioned in the Trendelenburg position. The bladder was mobilized from the lower uterine segment downwards, starting laterally on both sides, to 1 cm below the level of the internal OS. The edges of the niche were trimmed using cold scissors to expose healthy myometrium. Using multifilament absorbable sutures (2/0 vicryl) and the intracorporeal suture technique, the well-vascularized myometrium was sutured in one or two non-locking layers that approximated the entire thickness, including the mucosa. After irrigating and suctioning the abdomen, a tube drain was inserted. The patient was released within 24 hours after a 6-hour urinary catheterization to prevent urine retention.

Group C: The patients underwent hysteroscopic resection, scheduled during the early proliferative phase and performed under spinal anesthesia, except for two cases, which required general anesthesia. The procedures were carried out by the same operator under strict aseptic conditions. The cervix was dilated up to size 10 using Hegar's dilators. The uterine cavity was filled with a 24F working element with its sheath and a 4 mm 30-degree telescope (Karl Storz, Germany) that had a hysteroscopic monopolar loop. The distension medium was glycine (1.5%), and the inflow and outflow volumes were tracked to make sure that the differential didn't exceed one liter. Participants were subsequently monitored for the number of days they experienced postmenstrual spotting or bleeding during their menstrual cycle three months post-operation. Additionally, successful anatomical restoration was evaluated by an increase in residual myometrial thickness observed in a sonographic image three months after the procedure.

Ethical approval: The Institutional Review Board (IRB) granted approval for the research under reference number (5611/16-10-2019), alongside The Hospital's Ethical Committee. Written informed permission was acquired by each subject. The study complied with the ethical guidelines for human research set forth in The World Medical Association's Declaration of Helsinki.

Statistical Analysis

SPSS version 26 (IBM Inc., Armonk, NY, USA) was used for the statistical analysis. Histograms and the Shapiro-Wilks test were used to evaluate the data distribution's normality. ANOVA (F) with a post hoc Tukey test for more than two groups, or the unpaired Student's t-test for two groups, were used to examine quantitative parametric data, which were expressed as mean and standard deviation (SD). The Mann-Whitney test for two groups or the Kruskal-Wallis test with additional Mann-Whitney tests for comparisons among

more than two groups were used to examine quantitative non-parametric data, which were presented as median and interquartile range (IQR). The Chi-square test or Fisher's exact test, if appropriate, was used to examine the qualitative variables, which were displayed as frequency and percentage (%). Statistical significance was established at a two-tailed P value ≤ 0.05.

RESULTS

Although 62 patients were offered the opportunity to take part in the experiment, 6 participants declined to do so, and 11 patients did not fit our inclusion criteria. So, this randomized controlled study was conducted on 45 cases randomly allocated into 3 groups: Group A (Control group): 15 patients received combined oral contraceptive pills and tranexamic acid, group B: 15 patients underwent laparoscopic repair and group C: 15 patients underwent hysteroscopy resection. There were insignificant differences between the studied groups regarding the number of CS, indications of last CS, complications of last CS, and the duration from last CS.

There were insignificant different between the studied groups regarding pattern and cause of bleeding and number of days with spotting. Length, depth, width, RMT, and AMT of the Cesarean scar defect were not statistically different between the groups under study in terms of the preoperative ultrasonographic assessment of CSD, as indicated in the table (1).

Table (1): Preoperative Cesarean scar niche characteristics of the studied groups

		Group A (n=15)	Group B (n=15)	Group C (n=15)	P value
Length (mm)	Mean ± SD	11.34±3.32	11.53±2.66	11.53±2.66	0.978
	Range	6 – 17	8 - 16	8 - 16	
Depth (mm)	Mean ± SD	6.19 ± 2.02	6.73 ± 1.8	6.73 ± 1.8	0.664
	Range	4 – 10	4.4 - 11	4.4 - 11	
Width (mm)	Mean ± SD	12.16±3.92	15.13±4.98	15.13±4.98	0.143
	Range	8 – 20	11 - 28	11 – 28	
RMT (mm)	Mean ± SD	4.25 ± 1.25	3.97 ± 0.97	3.97 ± 0.97	0.768
	Range	3 - 5.5	3 - 5.8	3 - 5.8	
AMT (mm)	Mean ± SD	12.33±1.95	12.53 ± 3	12.53 ± 3	0.973
	Range	10 – 17	10 - 19	10 – 19	

RMT: residual myometrium thickness, AMT: adjacent myometrial thickness.

The average number of spotting days following surgery was significantly lower in groups B and C than in group A. Additionally, the post-surgery bleeding pattern in groups B and C demonstrated a significant difference compared to group A, as illustrated in table (2).

Table (2): Bleeding pattern in the studied groups after 3 months of follow-up

		Group A n=15	Group B n=15	Group C n=15	P-value [b]
Number of days of spotting		4.63 ± 1.37	0.26±0.70	0.26±0.70	<0.0001
Pattern of Bleeding	Postmenstrual	12 (80%)	1 (6.67%)	1 (6.67%)	<0.001
	Intermenstrual	3(20%)	0 (0.0%)	0 (0.0%)	

Data are given as mean± SD or n (%).

Dyspareunia was notably more prevalent in group B compared to group C (P value =0.035), whereas pelvic pain and dysmenorrhea did not show significant differences between these two groups, as indicated in table (3).

Table (3): Symptomatic assessment of the studied groups post intervention

	Group B (n=15)	Group C (n=15)	P value
Spotting	1 (6.67%)	1 (6.67%)	0.483
Pelvic pain	2 (13.33%)	0 (0%)	0.483
Dyspareunia	7 (46.67%)	1 (6.67%)	0.035*
Dysmenorrhea	4 (26.67%)	2 (13.33%)	0.651

*: statistically significant as P value <0.05.

In comparison with group C, group B's Cesarean scar niche was shorter and narrower (P value <0.001). Additionally, group B's Cesarean scar niche was shallower than group C's (P value = 0.004). Group B had a higher RMT than group C (P value <0.001). The table showed that there was no discernible difference in AMT between groups B and C (Table 4).

Table (4): Postoperative cesarean scar niche characteristics of the studied groups

		Group B (n=15)	Group C (n=15)	P value
Length (mm)	Mean ± SD	6.73 ± 2.43	13.53 ± 2.85	<0.001*
	Range	3 - 11	10 – 18	
Depth (mm)	Mean ± SD	3.79 ± 1.75	2.33 ± 0.49	0.004*
	Range	1.5 - 8	2 – 3	
Width (mm)	Mean ± SD	9.67 ± 3.92	15.73 ± 4.33	<0.001*
	Range	6 - 18	10 – 28	
RMT (mm)	Mean ± SD	7.3 ± 1.45	4 ± 0.98	<0.001*
	Range	5 - 9	3 – 6	
AMT (mm)	Mean ± SD	12.53 ± 3	12.07 ± 3.71	0.708
	Range	10 - 19	4 – 19	

RMT: residual myometrium thickness, AMT: adjacent myometrial thickness, *: significant as P value ≤ 0.05.

DISCUSSION

The rise in Cesarean deliveries worldwide has led to an increase in Cesarean section scar defects, which can manifest through various symptoms such as infertility, dyspareunia, dysmenorrhea, persistent pelvic pain, and/or postmenstrual uterine hemorrhage. In order to manage this illness, both medicinal and surgical treatments have been suggested, with the most definitive approach being surgical. This involves the excision and repair of the uterine defect, which can be performed through laparotomy, laparoscopy, or hysteroscopy.

This randomized controlled trial aimed at evaluation of the laparoscopic repair versus hysteroscopic resection of Cesarean scar defect in terms of the resolution of symptoms related to the niche especially post-menstrual spotting as compared to expectant management.

Beginning in December 2019, this study was conducted at Zagazig University Hospitals' Department of Obstetrics & Gynecology to December 2023. The study included 45 women with Cesarean scar defect (CSD) diagnosed by transvaginal sonohysterography. All patients completed at least 6 months of medical treatment (Combined oral contraception and/or tranexamic acid) before enrollment in the study. The included participants were randomly allocated to receive no additional therapy and to be encouraged to continue on medical treatment (Combined oral contraceptive pills and/or tranexamic acid) or to undergo laparoscopic repair of CSD or hysteroscopic resection of CSD.

There were no significant difference regarding the number of Cesarean sections performed by the groups under study, indications of last cesarean section, complications of last cesarean section, the duration from last cesarean section, the pattern of bleeding, and number of days with post-menstrual spotting. Regarding the preoperative ultrasonographic assessment of CSD, measurements of length, width, depth, anterior myometrial thickness (AMT), and residual myometrial thickness (RMT) of Cesarean scar defect were insignificantly different between the studied groups.

Three months postoperatively, both laparoscopic repair and hysteroscopic resection of Cesarean scar defect were associated with a significant decrease in the number of days with postmenstrual spotting. The days with postmenstrual bleeding/spotting were 0.21 ± 0.79 days in the laparoscopic group, 0.21 ± 0.79 days in the hysteroscopic group versus 4.63 ± 1.37 days in the control group (P-value:>0.0001). Bleeding symptoms improved in most cases (93.3%) of laparoscopic repair (14/15) and hysteroscopic resection (14/15) groups. These data are inconsistent with **Vervoot and his group** [6] in their prospective study of 101 patients who underwent laparoscopic repair of niche, found that 78% of patients had improved postmenstrual bleeding. However, **Wu *et al.*** [8] in their study comparing laparoscopy and hormonal treatment (98 vs. 47 cases). Their results are different from our results. They found only 24% of the laparoscopic repair group had showed a duration of menstruation < 7 days vs. 4.3% in the hormonal group.

Our data revealed that the improvement in bleeding pattern was also associated with the laparoscopic group showing a considerable improvement in sonographic residual myometrium thickness (7.3±1.45 mm) compared to the hysteroscopic group's 4 ± 0.98 mm and the control group's 4.25 ± 1.52 mm. (P-value 0.003). RMT had significantly increased from 3.97 ± 0.97 mm pre-operatively to 7.3 ± 1.45 mm, 3 months following laparoscopic repair. However, there was no significant increase in RMT in the hysteroscopic resection or control groups. The mean increase in RMT following laparoscopic repair was 3.33 ± 0.48 mm as compared to preoperative thickness. It seems that total elimination of niche sonographically appears to be a difficult task when using conventional laparoscopy, despite the relief of symptoms [9]. In agreement with our data, **Vervoot and his group** [6] who found an increase in RMT from 1.2 to 5.3mm. Additionally, **Karamplas *et al.*** [10] had found that three to six months following the laparoscopic repair, the mean RMT increased dramatically from 1.77 ± 0.86 mm pre-operatively to 6.67 ± 1.8 mm.

In 2019, **Diaa *et al.*** [11] reported that 23 out of 33 patients (69.7%) experienced complete relief from chronic pelvic pain. They determined that a minimally invasive, successful method for repairing bothersome Cesarean scar niches is hysteroscopic, and safe procedure for managing this condition.

In 2020, **Amelie Zeller and her team** [12] found that women in the severe defect group, had a 73.5% success rate with a residual myometrial thickness (RMT) of less than 3 mm, while the control group, which had RMT of more than 3 mm, had a 63.6% success rate. Nevertheless, there was no statistically significant change. (p = .40). Overall, both laparoscopic repair and hysteroscopic resection of symptomatic Cesarean section scar defects (CSD) provided relief from symptoms, particularly postmenstrual bleeding and spotting. Nonetheless, the small sample size was a limitation, and further trials with larger sample sizes are recommended.

CONCLUSION

Laparoscopic repair and Hysteroscopic resection of symptomatic Cesarean section scar defect (CSD) offered relief of symptoms related to the niche, especially postmenstrual bleeding/spotting. Laparoscopic repair was preferable concerning anatomical correction and improvement in ultrasonographic measurement of Cesarean section scar defect (CSD).

Conflict of interest: None.
Funding: None.

REFERENCES

1. **Wang C, Chiu W, Lee C *et al.* (2009):** Cesarean scar defect: correlation between Cesarean section number, defect size, clinical symptoms and uterine position. Ultrasound Obstet Gynecol., 34: 85–89. doi: 10.1002/uog.6405.
2. **Tulandi T, Cohen A (2016):** Emerging manifestations of cesarean scar defect in reproductive-aged women. J Minim Invasive Gynecol., 23 (6): 893–902. doi: 10.1016/j.jmig.2016.06.020.
3. **Bhagavath B, Lindheim S (2018) :** Optimal management of symptomatic cesarean scar defects, Fertil Steril., 110 (3): 417-418. doi: 10.1016/j.fertnstert.2018.06.035.
4. **Setubal A, Alves J, Osorio F *et al.* (2018)**: Treatment for uterine isthmocele, a pouchlike defect at the site of a cesarean section scar. J Minim Invasive Gynecol., 25 (1): 38-46. https://doi.org/10.1016/j.jmig.2017.09.022
5. **Budny-Winska J, Pomorski M (2021):** Uterine niche after cesarean section: A review of diagnostic methods . Ginekologia Polska, 92 (10): 726-730. doi: 10.5603/GP.a2021.0195.
6. **Vervoort A, Vissers J, Hehenkamp W *et al.* (2018):** The effect of laparoscopic resection of large niches in the uterine caesarean scar on symptoms, ultrasound findings and quality of life: A prospective cohort study . BJOG: An International Journal of Obstetrics and Gynaecology, 125 (3): 317-325. https://doi.org/10.1111/1471-0528.14822
7. **Ma Y, Huang F, Zhou T *et al.* (2017):** Laparoscopic Single-Site Repair of Cesarean Scar Defects. Journal of Minimally Invasive Gynecology, 24 (7): S122. DOI: 10.1016/j.jmig.2017.08.276
8. **Wu X, Lin R, Yuan Y *et al.* (2017):** A comparison of the effects of two different treatment methods on cesarean section scar diverticulum: the surgical repair of cesarean scars via combined laparoscopy and hysteroscopy vs. cyclic estrogen / progesterone therapy. Int J Clin ExpMed ., 10 (4): 7144-7150.
9. **Dosedla E, Calda P (2017):** Outcomes of laparoscopic treatment in women with cesarean scar syndrome. Med Sci Monit., 23: 4061–4066. doi: 10.12659/MSM.902720
10. **Karampelas S, Salem Wehbe G, de Landsheere L *et al.* (2021):** Laparoscopic Isthmocele Repair: Efficacy and Benefits before and after Subsequent Cesarean Section. J Clin Med., 10 (24): 5785. doi: 10.3390/jcm10245785
11. **Diaa M, Aglan M, Hesham A *et al.* (2019):** MBBCH. Outcome Of Hysteroscopic Repair of Symptomatic Cesarean Scar Defect, Pp: 783. DOI:10.1016\j. fertnstert. 2019.07.1179
12. **Amelie Z, Claire V, Herve F *et al.* (2020):** Is Hysteroscopy a Good Option to Manage Sever Cesarean Scar Defect? Journal of Minimally Invasive Gynecology, doi: 10.1016/j.jmig.2020.11.005.