Effect Of Hysteroscopic Correction of Symptomatic Caesarian Scar Defect in Women with An Explained Secondary Infertility: Randomized Controlled Trial

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Abstract

Background: One of the complications of Cesarean section, cesarean scar defect, has been shown to be associated with various gynecological and obstetric problems. Additionally, cesarean scar defect may increase the risk for complications in gynecological procedures such as intrauterine device placement, evacuation, and embryo transfer.

Objective: to investigate the effect of hysteroscopic correction of symptomatic caesarian scar defect in women with an explained secondary infertility.

Patients and methods: A prospective, randomized study was conducted on women suffered from secondary delayed pregnancy after caesarean section with a scar at the site of the caesarean wound, who attended at the Obstetrics and Gynecology department, Menoufia University Hospitals, during the period between January 2021 and April 2022.

Results: most patients in group A had positive pregnancy rate (53.33%) than patients in group B (23.33%) with a significant difference (P=0.017).

Conclusion: In women with secondary infertility and a residual myometrial thickness of less than 3 mm, hysteroscopic correction of a caesarean scar defect offers a minimally invasive method with a high success rate and no risks.

Key words: Hysteroscopic correction, cesarean scar defect, Secondary Infertility, clinical pregnancy.

INTRODUCTION

A caesarean scar defect (CSD) is a triangular, anechoic region at the caesarean scar's location. **[1]** Transvaginal sonography (TVS) can be used to identify it, although saline infusion sonohysterography (SIS) may provide a sharper picture **[2]**. Niche, isthmocele, caesarean scar defect, or pouch are all terms used to characterise uterine scarring after a caesarean operation. **[3]**

It is a reality that 20% of pregnant women have CS, and that CS rates are rising in most parts of the world. **[4]** Between 1990 and 2014, CS rates in Latin America and the Caribbean rose from 22.8 percent to 42.2 percent, in Oceania from 18.5 percent to 32.6 percent, in North America from 22.3 percent to 32.3 percent, in Europe from 11.2 percent to 25 percent, in Asia from 4.4 percent to 19.5 percent, and in Africa from 2.9 percent to 7.4 percent. **[5]** But why are the rates of CS skyrocketing? China has experienced the most rapid growth in recent decades, rising from 3% in 1988 to 39% in 2008, with an average of 34.9 percent in 2014. Egypt came in third place among international countries, with a CS rate of 51.8 percent. **[4]** The 2015 World Health Organization guidelines that CS rates > 10% are not connected with reduced maternal or newborn mortality appear to have had little effect on these high rates. **[6]** Laparoscopy, vaginal surgery, or operational hysteroscopy can all be used to resect inflammatory tissues at the location of a caesarean scar defect. **[7]** Despite the fact that caesarean scar defects are widespread, no research has looked at which cases should be considered for infertility therapy. Cesarean scar syndrome is being treated using two different surgical approaches: hysteroscopic and laparoscopic. There is, however, no evidence-based guidance for selecting the most appropriate approach. **[8]** The later in labour CS is performed, the greater the risk of developing larger CSDs, with the risks increasing considerably if labour lasts R5 hours or cervical dilation is R5 cm. The presence of intrauterine fluid at the time of ovulation may theoretically impact subsequent fertility. In addition, mucus and blood collection in the cervix, as well as a caesarean scar deformity, can impede sperm penetration and embryo implantation **[9]**.

Hysterosalpingography transvaginal sonography (TVS), saline infusion sonohysterography (SIS), hysteroscopy, and magnetic resonance imaging can all be used to detect abnormalities in the anterior uterine isthmus after CS (MRI). Hysterosalpingography, which is used to evaluate tubal factor, is sometimes used by gynecologists to detect CSDs. **[4]** The thickness of the surviving myometrium is the most useful distinguishing feature, and it can only be determined by TVS or pelvic MRI. **Junaid et al. [11]** employed hysteroscopic removal of scar tissue from the area of the caesarean scar defect and coagulation of any hypovascularized tissues in 22 patients with postmenstrual bleeding; 14 of the patients' symptoms vanished, and the other patients' symptoms significantly improved. **Vitale et al. [13]** looked explored the use of hysteroscopic roller-ball coagulation of scar tissue in 26 women who had abnormal uterine bleeding. Nine of the women suffered secondary infertility. All of their abnormal uterine bleeding stopped, and seven of the infertile ladies became pregnant. **[14]** So, the aim of the work is to investigate the effect of hysteroscopic correction of symptomatic caesarian scar defect in women with an explained secondary infertility.

PATIENTS AND METHODS

A prospective, randomized study was conducted on women suffered from secondary delayed pregnancy after caesarean section with a scar at the site of the caesarean wound, who attended at the Obstetrics and Gynecology department, Menoufia University Hospitals, during the period between January 2021 and April 2022.

Ethical consideration

Following permission from the local ethics committee, all patients who decided to participate signed an informed consent form after being told of the trial's advantages and risks. The study was approved by the Menoufia University faculty of Medicine's ethical committee.

Inclusion criteria: women ages before 35 years, who suffered from secondary delayed pregnancy after caesarean section with a scar at the site of the caesarean wound.

Exclusion criteria: women ages above 35 years, residual myometrium less than 3 mm at sonohysterography, any factor impairing fertility other than cesarean scar defect.

Patients included in this study were subjected to:

Full history taking included Personal history: Name, age, occupation and address. **Present history:** Duration of infertility, possible etiology, previous investigations and treatment if any. **Past history** of diseases or operations, blood transfusion and **family history** of a general disease. Also, **detailed obstetric history** as number of previous pregnancies and the outcome of each, and mode of delivery.

Through full examination included vital signs, weight, body mass index (BMI), pallor, cardiac examination, and presence of scars of previous operations, inspection of external genitalia, and speculum examination.

Routine infertility work up for detection of any factor of infertility if present, Saline infusion sonography was used to assess the caesarean scar defect in the sagittal plane, which revealed the widest niche and the thinnest remaining myometrium. The niche depth and residual myometrial thickness were measured.

Women included in this study were divided into two groups:

Group A (n=30): included 30 women whose scar is corrected using hysteroscopy.

Group B (n=30): included 30 women whose scars are not corrected but were given conservative treatment only.

Clinical pregnancy rates are monitored one year after hysteroscopy or not.

Surgery was planned for participants in group A during the early proliferative phase. The same operator conducted hysteroscopic niche resection on all patients under general anaesthesia. After placing the patient in a modified lithotomy position, a bladder catheter was inserted and the bladder was filled with 200 mL of normal saline, all while under the supervision of abdominal ultrasonography.

In the uterine cavity, a 24F working element with its sheath and a 4 mm 30 telescope with a hysteroscopic monopolar loop were placed.

WIEST HYSTEROMAT 3700 used glycine (1.5%) as the distending medium at an inflow pressure of 70–100 mmHg.

The distal margin of the scar defect was removed until the muscle tissue beneath was visualised, as described by **Gubbini et al., [15]**, utilising a cutting monopolar loop and a pure cutting current (40 W). To promote the pouch's retraction, the bottom of the pouch was cauterised using a 3-mm rollerball and a current of 30 W. The patients were followed for a total of 12 months. Patients were contacted on a regular basis and followed up with every month.

Outcomes of the study

The primary outcome included the clinical pregnancy rate.

Secondary outcomes included duration of the procedure, amount of fluid deficit, and occurrence of any complications in group A.

Sample size calculation: Taking into account the number of pregnancies the sample size was calculated based on the previous study by **Gubbini et al. [15]** who reported pregnancy rate was 77.7%, with confidence level 95%.

The Sample plus 10% (for refusal rate and drop out) was calculated and 30 patients' women in each group needed to give 80% power of the study.

Statistical Analysis: MICROSOFT EXCEL 2019 and SPSS v. 25 (SPSS Inc., Chicago, IL, USA) were used to tabulate and statistically analyse the data on a personal computer. The following software was used for statistical analysis: Descriptive terms include percentages (%), mean, and standard deviation. Chi-Squared (X^2), and student t tests were used to compared the studied groups. $P \leq 0.05$ considered a significant level.

RESULTS

A CONSORT flow chart of the study population is shown in Figure 1. Of the 83 women admitted at the Obstetrics and Gynecology department, Menoufia University Hospitals, 6 declined consent and 9 did not meet the inclusion criteria, 68 patients were willing to participate in the study and consented for participation. But, eight patients were dropped from follow up (4 from each group). Thus, 60 women patients were analyzed, 30 in each group.

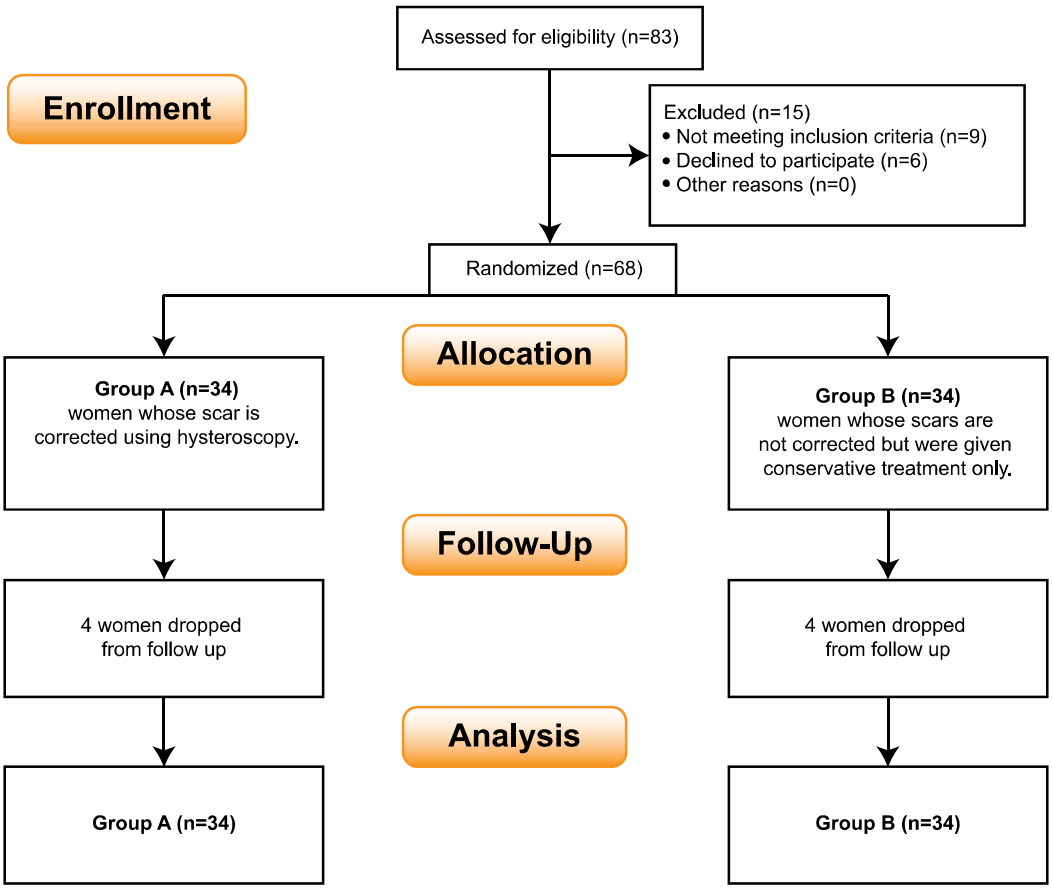

Figure 1. Flowchart of the studied participants.

Results indicated that, there were no significant differences among the studied groups regarding age, BMI, and duration of infertility ($P>0.05$). While, parity was significantly increased among group B than group A ($P=0.031$), (Table 1).

Table 1. Demographic data of the studied groups.

Variable	Group A N=30	Group B N=30	t	P-value
Age/years Mean ±SD	30.57±3.05	30.33±3.30	0.284	0.777
BMI (kg/m2) Mean ±SD	30.77±3.67	30.13±2.13	0.817	0.417
Duration of infertility/year Mean ±SD	3.10±0.995	2.80±0.76	1.312	0.195
Parity Mean ±SD	2.13±0.82	2.63±0.93	2.212	**0.031***

Group A: women whose scar is corrected using hysteroscopy.

Group B: women whose scars are not corrected but were given conservative treatment only.

In the present study, there were no significant differences among the studied groups regarding cesarean section, vaginal delivery, previous miscarriage, and branching (P>0.05). Regarding the previous obstetric history, most patients had one or two previous cesarean sections, (Table 2).

Table 2. Previous obstetric history among the studied groups.

Variable	Group A N=30		Group B N=30		Total N=60		x^2	p-value
Cesarean section:								
Once	17	56.67	11	36.67	23	46.67	4.100	0.128
Twice	11	36.67	12	40.00	23	38.33		
Thrice	2	6.67	7	23.33	9	15.00		
Vaginal Delivery:								
No	14	46.67	14	46.67	28	46.67		
Once	13	43.33	12	40.00	25	41.67	2.24	0.52
Twice	3	10.00	2	6.67	5	8.33		
Thrice	0	0.00	2	6.67	2	3.33		
Previous miscarriage:								
No	15	50.00	11	36.67	26	43.33		
Once	11	36.67	12	40.00	23	38.33	2.05	0.56
Twice	4	13.33	6	20.00	10	16.67		
Thrice	0	0.00	1	3.33	1	1.67		
Branching:								
Once	14	46.67	14	46.67	28	46.67		
Twice	11	36.67	11	36.67	22	36.67	1.11	0.774
Thrice	5	16.67	4	13.33	9	15.00		
Four times	0	0.00	1	3.33	1	1.67		

Group A: women whose scar is corrected using hysteroscopy.

Group B: women whose scars are not corrected but were given conservative treatment only.

Additionally, width and residual myometrial thickness were significantly decreased among group B than group A (P<0.05). While, depth was significantly increased among group B than group A (P<0.05), (Table 3).

Table 3. Saline infusion sonography criteria of cesarean scar defect.

Variable	Group A N=30	Group B N=30	t	P-value
Width/mm Mean ±SD	5.80±0.895	5.14±0.95	2.775	**0.007***
Depth/mm Mean ±SD	5.02±1.11	5.88±0.65	3.63	**0.001***
Residual Myometrial thickness Mean ±SD	5.83±0.77	4.82±0.78	5.051	**0.000***

Group A: women whose scar is corrected using hysteroscopy.

Group B: women whose scars are not corrected but were given conservative treatment only.

Regarding clinical pregnancy, most patients in group A had positive pregnancy rate (53.33%) than patients in group B (23.33%) with a significant difference (P=0.017).

Table 4. Clinical pregnancy between the studied groups:

Variable	Group A N=30		Group B N=30		Total N=60		x^2	p-value
Pregnancy rate								
Positive	16	53.33	7	23.33	23	38.33	5.71	0.017*
Negative	14	46.67	23	76.67	37	61.67		

Group A: women whose scar is corrected using hysteroscopy.

Group B: women whose scars are not corrected but were given conservative treatment only.

DISCUSSION

The most common obstetric surgery is a caesarean section. In developing countries, it has increased in prevalence over the last few decades, reaching 25.7%. In wealthy countries, it ranges from 16.3% to 38.2%. **[16]** Cesarean scar defect, one of the consequences of caesarean section, has been linked to a variety of gynecological and obstetric issues. Uterine rupture and ectopic caesarean scar pregnancy are relatively uncommon complications of surgical scar defects, although they can be fatal. **[17]** Postmenstrual spotting, dysmenorrhea, dyspareunia, and chronic pelvic pain are all common symptoms associated with a caesarean scar defect. **[18]** Furthermore, a caesarean scar defect can raise the risk of difficulties after gynecological treatments like IUD placement, evacuation, and embryo transfer. **[19]** So, the aim of the work is to study the effect of hysteroscopic correction of symptomatic caesarian scar defect in women with an explained secondary infertility randomized controlled trial.

The present study showed that, most patients in group A had positive pregnancy rate (53.33%) than patients in group B (23.33%) with a significant difference (P=0.017).

In the case of caesarean scar syndrome, hysteroscopic surgery is used. CSS is most commonly used to treat abnormal uterine bleeding **[20, 21]**, however numerous recent studies have shown that it can also be used to restore fertility [22,23]. Infertility can occur in women with CSS because to aberrant uterine bleeding caused by a minor haemorrhage in the CSD that prevents implantation **[24, 25]**. Gubbini et al. **[26]** examined the effect of resectoscope repair of isthmocele on 9 patients with secondary infertility and niche, and came to the same conclusion. Seven out of nine patients with secondary infertility were able to conceive. Gubbini et al., on the other hand, looked at the reproductive outcomes of 41 patients who had a cesarean-

induced isthmocele and secondary infertility. The caesarean scar defect was corrected with operative hysteroscopy. They discovered that between 12- and 24-months following arthroplasty, all patients fell pregnant on their own. Thirty-seven of the 41 patients (90.2%) had a caesarean delivery, while four patients (9.8%) suffered a spontaneous abortion in the first trimester. There were no occurrences of scar rupture reported by the authors during pregnancy.

In addition, in a study by **[28]**, the non-adjusted overall improvement was 78.83 percent among 698 patients with post-cesarean complications such as bleeding, discomfort, and secondary infertility who underwent hysteroscopy. The computed heterogeneity amongst the included trials was noted to be significant, despite the high improvement rate. However, the heterogeneity reported by **Shi et al. [29]** and **Calzolari et al. [30]** alone accounted for half of the total estimated variability. Because of the short follow-up duration, the type of data selection, and the limited sample size of patients included in that research, this is the case.

Although **de Albornoz et al. [31]** reported a 97.37 percent improvement rate, the leave-one-out sensitivity analysis revealed that the rate was not entirely driven by the high findings. The risk of bias was likewise statistically significant (p=0.001). As a result, the asymmetry in the funnel plot depicting all experiments was adjusted, and the overall improvement rate was determined to be 92.82%. **Feng et al. [32]**, on the other hand, observed an 87% reduction in AUB after hysteroscopy, but a higher rate of 100% with laparoscopy and 93% with vaginal repair. Furthermore, the same author documented a 97% pain alleviation rate with hysteroscopy and a 100% pain relief rate with laparoscopy, as well as a decrease in secondary infertility in more individuals following hysteroscopy. **[32]**.

Tanimura et al. [23] observed that endoscopic correction of a caesarean scar defect improved fertility in 22 women with secondary infertility. In four patients with residual myometrial thickness less than 2.5 mm, hysteroscopic repair was performed, whereas in the remaining 18 patients with residual myometrial thickness less than 2.5 mm, laparoscopic repair was performed. The hysteroscopic group had a 100% pregnancy rate, while the laparoscopic group had only 55.56%. Three of the four patients who received hysteroscopic surgery had full-term babies. Five of the patients who underwent laparoscopic surgery gave birth to healthy babies. There were no occurrences of uterine scar rupture documented, and all patients were delivered via caesarean section. **[23]**

Many studies have been conducted to assess the function of laparoscopic caesarean scar healing in women with secondary infertility and have indicated a significant increase in pregnancy rates. Isthmocele was detected by Hysterosalpingo Contrast Sonography (HyCoSy) and hysteroscopy in 15 patients who presented with secondary infertility following one or more caesarean sections, according to **Istvan et al., [33].** Except for one patient, who had the hysteroscopy procedure alone, all patients had hysteroscopy-guided laparoscopic arthroplasty. Within 24 months, 80% of women (n=12/15) were pregnant. Meanwhile, 11 patients (73.33%) became pregnant during the first 12 months, and one (6.67%) became pregnant within the first 24 months, out of the 15 who underwent this surgical procedure. Surprisingly, 58.33% (n=7/15) got pregnant using IVF-ET, while 41.66 percent (n=5/15) got pregnant naturally. **[33]**.

In addition, **Donnez et al. [34]** investigated the effect of laparoscopic caesarean scar healing on 18 women with infertility and residual myometrial thickness. In a cohort of 146 patients, **Zhang et al. [35]** described laparoscopic correction of a prior lower uterine section caesarean scar defect (PCSD). 32 of them wanted to start a family. In the 13–32 months following surgery, 12 of them became pregnant [35]. Furthermore, according to **Nezhat et al., [36]**, 75%

of patients who underwent laparoscopic niche correction for infertility were able to conceive. They only executed hysteroscopic repairs in women who were in discomfort or bleeding. They claimed that the laparoscopic approach is preferable for women who want to have children in the future, while the hysteroscopic approach is ideal for those who have already had children. Although, it is to be noted that they did not study the effect of hysteroscopic repair of cesarean scar defect in patients with secondary infertility, and they made their own recommendation based on the theoretical risk of rupture **[36]**.

CONCLUSION

In women with secondary infertility and a residual myometrial thickness of less than 3 mm, hysteroscopic correction of a caesarean scar defect offers a minimally invasive method with a high success rate and no risks.

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