

Cesarean Scar Niche in Secondary Infertility Patients: Are there any specific criteria by Saline Infusion Sonohysterography and Diagnostic Hysteroscopy

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ABSTRACT

Background: Caesarean section (CS) rate and its relatively new long-term sequela; scar niche have increased in clinical practice. Although niche-related symptoms are not life-threatening consequences after CS, they can cause long-term morbidities including subfertility and infertility. The aim of the present study to assess the better evaluation of cesarean scar niche in patients with secondary infertility and to correlate the appearance of the scar with the associated symptoms. **Patients and methods:** A cross-sectional study involved 100 women with secondary infertility and a history of at least one CS. **Results:** The current study revealed the mean age of cases was 28.12 (± 3.54 SD), mean BMI was 29.2 (± 3.56 SD) and the mean Number of children was 2.1 (± 0.56 SD). There were 45 cases with 1 Previous CS, 30 cases with 2 previous CS, 25 cases with 3 previous CS, 12 cases with previous failed ICSI, 35 cases with Previous miscarriage, 16 with Previous curettage, 10 with Previous preterm labour due to tender scar. There was insignificant correlation between features of niche by diagnostic hysteroscopy with duration of secondary infertility. There was significant correlation between dimensions of niche by Saline Infusion Sonohysterography with niche-related symptom "post-menstrual spotting with the volume being the most predictive parameter. There were insignificant correlation between different shapes of niche by Saline Infusion Sonohysterography and niche-related symptoms. There was insignificant correlation between dimensions of niche by Saline Infusion Sonohysterography and duration of secondary infertility. **Conclusion:** There are no specific anatomical characteristics for Cesarean Section scar niche in secondary infertility patients. Niche volume, depth, and width are good predictor factors for postmenstrual spotting in those patients with scar niche.

Keywords: Cesarean Scar; Sonohysterography ; Hysteroscopy

INTRODUCTION

Caesarean section (CS) is considered to be a safe procedure that can be life saving for both mother and child but the increasing trend draws more attention to adverse outcomes related to CS. Apart from the well-known obstetrical complications, such as uterine rupture, adherent placenta and Caesarian scar pregnancy, the long-term gynecological effects of this widely used procedure have been poorly studied (1).

Uterine niche is an iatrogenic pouch-like defect at the site of previous Caesarean scar due to defective tissue healing. Other terms used are uterine niche, Caesarean scar defect, uterine dehiscence and diverticulum. The niche is defined radiologically as a triangular, hypoechoic or anechoic area at scar site (2). It has been described as indentations at least 2 mm deep in the myometrium. There is recent surge in the literature including reviews addressing various aspects of niche (3). Other symptoms

include dysmenorrhea and chronic pelvic pain. Besides, dysmenorrhea, chronic pelvic pain, the retention of blood, mucus and fluid in the niche, cervix and uterus are hypothesized to be a cause of secondary subfertility, due to unsuccessful sperm cell penetration or embryo implantation (4).

A relatively new long-term sequela is the niche in the uterine caesarean scar. A niche is defined as “an indentation at the site of the uterine caesarean scar with a depth of at least 2 mm on ultrasound” and is present in 56–84% of women after one or more CSs (5).

A 3D-sonohysterography evaluation of the niche should be performed between the 17–25 day of the menstrual cycle because the cervical mucus during the preovulatory phase and blood deposits after menstruation may mix with the infused saline, which will deteriorate the quality of imaging (6). Compared to transvaginal ultrasonography, it detects more niches (7). Additionally, it has increased sensitivity and specificity for the detection of uterine niches by enhancing the niche and allowing its dynamic evaluation (8).

The aim of the present study to assess the better evaluation of cesarean scar niche in patients with secondary infertility and to correlate the appearance of the scar with the associated symptoms.

PATIENTS AND METHODS

A cross-sectional study involved 100 women who conducted at Department of Obstetrics & Gynecology, Faculty of Medicine, Zagazig University.

Inclusion and exclusion criteria:

Women with secondary infertility with at least one CS and seeking for pregnancy. While, women with anatomical uterine abnormalities whether congenital or acquired as adhesions or tumors, previous uterine surgery other than C.S as myomectomy or hysterotomy were excluded.

Clinical evaluation:

All cases subjected to full history and complete clinical examination. Assessment of uterine scar niche in selected cases were performed using hysteroscopy and sonohysterography with evaluation of scar depth, width and shape.

Office Hysteroscopy

Hysteroscopic examination was done using a rigid 30-degree hysteroscope with 4 mm diameter diagnostic sheath (Karl Storz Endoskope, Germany). Vaginoscopic approach was performed; complete evaluation of the uterine cavity required visualization of the uterine cavity and close inspection of uterine walls then the right and left tubal ostia. Examination of the CS scar and uterine cavity was done.

Sonohysterography

Using a 2D endocavitary probe RIC5-9W-RS GE voluson P 8 and E8 ultrasound system equipped with a 6–12 MHz 3D for all studied women. The presence of uterine niche was detected in the lower segment at the classic site at low-transverse cesarean section. By transvaginal sonography, the scar was recognized in the sagittal plane of the uterus. A standard transvaginal ultrasound probe is then inserted alongside the

catheter. The amount of fluid instilled was varying depending on distention of the uterus and patient tolerance.

Statistical analysis:

Data analyzed using IBM SPSS software package version 20.0. (Armonk, NY: IBM Corp). Kolmogorov-Smirnov test was used to verify the normality of distribution. Quantitative data were described using range mean, standard deviation, median and interquartile range (IQR). Mann Whitney test, Chi-square test (X^2), Z-test for percentage and Odds ratio (OR). *P* value of > 0.05 indicates non-significant results. *P* value of < 0.05 indicates significant results.

RESULTS

The current study revealed the mean age of cases was 28.12 (± 3.54 SD), mean BMI was 29.2 (± 3.56 SD) and the mean Number of children was 2.1 (± 0.56 SD) (**Table 1**).

There were 45 cases with 1 Previous CS, 30 cases with 2 previous CS, 25 cases with 3 previous CS, 12 cases with previous failed ICSI, 35 cases with Previous miscarriage, 16 with Previous curettage, 10 with Previous preterm labour due to tender scar (**Table 2**).

There was insignificant correlation between features of niche by diagnostic hysteroscopy with duration of secondary infertility (**Figure 1**).

There was significant correlation between dimensions of niche by Saline Infusion Sonohysterography with niche-related symptom “post-menstrual spotting with the volume being the most predictive parameter (**Table 3**).

There were insignificant correlation between different shapes of niche by Saline Infusion Sonohysterography and niche-related symptoms (**Figure 2**).

There was insignificant correlation between dimensions of niche by Saline Infusion Sonohysterography and duration of secondary infertility (**Table 4**).

Table (1): Distribution of studied cases according to demographic data

	(Mean \pm SD)
Age	28.12 \pm 3.54
BMI (Kg/m ²)	29.2 \pm 3.56
Number of children	2.1 \pm 0.56

Table (2): Distribution of studied cases according to obstetric history

	No.	%
Previous (Caesarean section)		
Cases with previous 1 CS	45	45.0
Cases with previous 2 CS	30	30.0
Cases with previous 3 CS	25	25.0
Previous Failed ICSI	12	12.0
Previous miscarriage	35	35.0
Previous curettage	16	16.0
Previous preterm labour due to tender scar	10	10.0

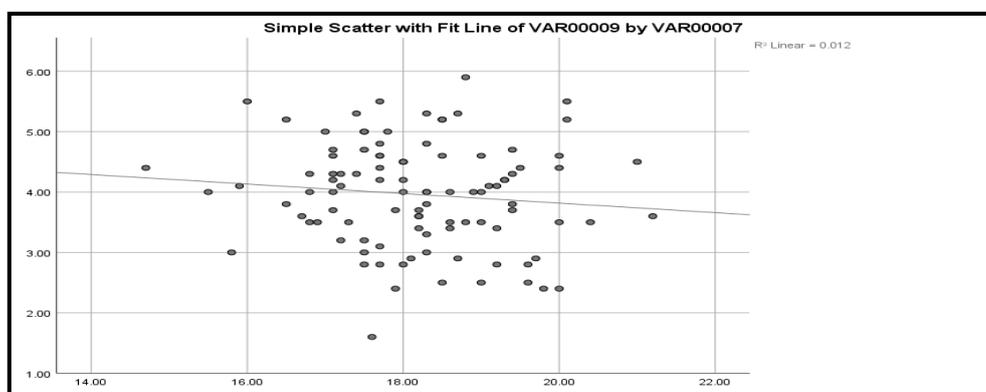


Figure 1: insignificant correlation between “abnormal vascular pattern” appearances of niche by diagnostic hysteroscopy with duration of secondary infertility

Table (3): Correlation between dimensions of niche by Saline Infusion Sonohysterography with niche-related symptoms in studied cases

Niche-related symptoms	Niche dimensions by SIS							
	Volume (cm ³)		Width (mm)		Depth (mm)		RMT (mm)	
	R	P	R	P	R	P	R	P
Post-menstrual spotting	0.44	0.037	0.55	0.049	0.40	0.3	0.48	0.40
Dyspareunia	0.22	0.55	0.21	0.52	0.25	0.60	0.2	0.56
Chronic pelvic pain	0.06	0.90	0.052	0.98	0.7	0.45	0.052	0.98

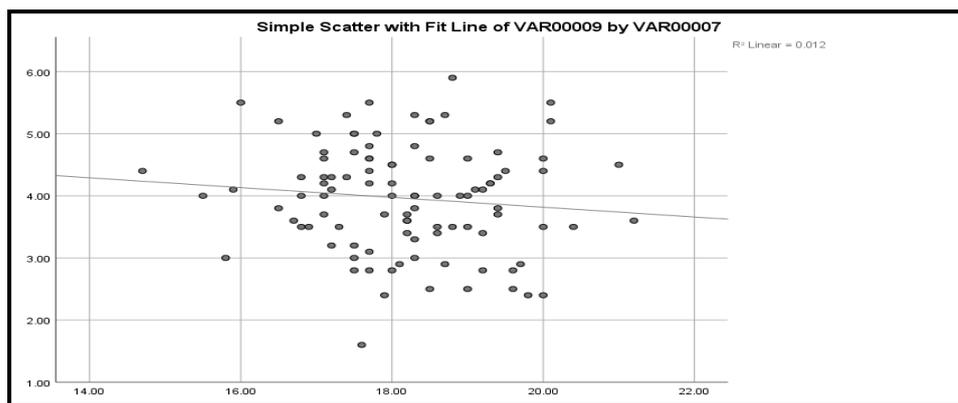


Figure (2): Insignificant correlation between “Triangular shape” of niche by SIS with postmenstrual spotting

Table (4): Correlation between dimensions of niche by Saline Infusion Sonohysterography with duration of secondary infertility in studied cases (n=100)

Duration of secondary infertility	Niche dimensions by SIS							
	Volume (cm ³)		Width (mm)		Depth (mm)		RMT (mm)	
	R	P	R	P	R	P	R	P
≥ 1 year	0.45	0.40	0.9	0.8	0.40	0.3	0.8	0.22
≥ 2 years	0.32	0.86	0.20	0.50	0.25	0.60	0.55	0.30
≥ 3 years	0.08	0.79	0.022	0.66	0.7	0.45	0.044	0.11

DISCUSSION

Cesarean section (CS) is one of the most commonly performed surgical procedures in obstetric practice worldwide. As a large number of women are undergoing this vital operation each year, it has become increasingly important to study the sequels of this procedure on the future reproductive capacity (9).

Nevertheless, the presence of an anatomic uterine defect in patients with a history of cesarean section is a common, expected finding: the thickness of the myometrium at the level of isthmus uteri decreases and the prevalence of scar defects and large scar defects increases with increase in the number of cesarean sections. The surgical technique used may also contribute to occurrence of scar niche (3). In a randomized prospective study of 78 patients, **Yazicioglu et al. (10)** analyzed two different techniques (full thickness, including the endometrial layer, and split-thickness, excluding the endometrial layer) and found that by selecting a full-thickness suturing technique, one may significantly lower the incidence of incomplete healing of the uterine incision after cesarean section.

Moreover, it was noted that large and total scar defects are more common in uteri in retroflexion than in anteflexion and that scars with defects are located lower in the uterus than intact Scars. The reason by which this occurs may rely in the evidence that the flexion point of the uterus is at the level of the internal os, and therefore the lower segment of the uterus in a retroflexed uterus is under a degree of tension, which may

compromise healing of a cesarean section scar. This anatomical traction to the scar and the associated reduced vascular perfusion caused by stretching of the lower uterine segment may cause impaired tissue perfusion and reduced wound oxygen tension, which has been reported to delay wound healing by slowing the production of collagen (11).

Our study involved 100 women who complaining of unexplained secondary infertility with history of at least one CS. The study aimed to assess cesarean scar niche by diagnostic hysteroscopy and sonohysterography in women with unexplained secondary infertility and to correlate the appearance of the scar with its related symptoms.

Our finding are in agreement with several studies (**Yao et al.,(12)**; **Fahad et al.,(13)**; **Tang et al.,(14)**) who revealed that there is an association between CS scar niche and multiple gynecological symptoms.

The slightly increased percentage of niche-related symptoms in cases of our study group “patients with secondary infertility” in comparison to previous studies in literature concerned with correlation between CS scar niche and its related symptoms raises - but yet not confirming - the possibility of scar niche as a cause of their secondary infertility.

Regarding the correlation of niche dimensions measured by SIS with niche related symptoms, our study cleared that there was significant correlation between dimensions of niche (volume, width & depth) by Saline Infusion Sonohysterography with niche-related symptom “post-menstrual spotting” with the Volume having the highest positive predictive value followed by niche width.

This finding in agreement with **Tang et al.,(14)** and **Van Der Voet et al.,(15)** suggested a relation between scar niche volume, residual adjacent myometrial thickness, and development of postmenstrual spotting.

Visser et al. (16) concluded that the lower fertility reported after Caesarean section may have various causes and suggested that a niche in the uterine scar may play an intermediate role, and with the limited available evidence, they have postulated several hypotheses on the underlying mechanisms. Future research is needed to confirm or refute their ideas. A combination of factors may also likely contribute. More information on the underlying mechanisms is pivotal to the development of selective therapies and the identification of patients who may benefit from additional therapies.

Our findings demonstrated that SIS was comparable to Office Hysteroscopy (standard diagnosis of intrauterine lesions) as shown by sensitivity, specificity, +ve predictive value, -ve predictive value and Overall accuracy of 87%, 100%, 100%, 95% and 96% respectively, in the diagnosis of scar defect (niche). In agreement with our results, **Fabres et al. (17)** showed 100% correlation of transvaginal sonohysterography with Office Hysteroscopy for the detection of scar defect. Other Study of **Cepni et al., (18)** also demonstrated that SIS is a valuable technique for the assessment of uterine cavity pathologies.

As regard Office Hysteroscopy findings not detected with Saline Infusion Sonohysterography, our study demonstrated that there were 45 cases with unhealthy (fibrotic) scar, 41 cases with presence of collected blood in scar niche, 24 cases with

presence of infection in scar niche, 5 with endometritis, 4 with small submucosal polyp, 1 with small uterine septum. So, Office Hysteroscopy is considered by many as the golden standard tool for diagnosis of intrauterine lesions (19,20).

Although the study has reached its aim, there was some unavoidable limitations. First, because of the time limit, this study was conducted on a relatively small size of the population whom attended our outpatient clinic, therefore to generalize the results for larger groups further large-scale studies are recommended. Second, follow up of the participants didn't involve different treatment options they received and their effect on improvement of niche related symptoms and infertility.

CONCLUSION

There are no specific anatomical characteristics for Cesarean Section scar niche in secondary infertility patients. Niche volume, depth, and width are good predictor factors for postmenstrual spotting in those patients with scar niche.

No Conflict of interest.

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