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## Post caesarean section niche and female subfertility

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### Abstract

**Background:** Caesarean delivery is one of the most common surgical procedures in females. "CS niche" refers to a hypoechoic region with myometrial disruption at the site of prior CS within the isthmus (lower uterine segment) myometrium (defect). A myometrial depression of at least 2 millimetres is considered a niche. A scar defect forms on the anterior wall of the uterine isthmus after hysterotomy or Caesarean delivery. Several pregnancy- and patient-related hypotheses explain why a niche develops. Caesarean scar defect patients had many symptoms. Delayed cervix menstruation causes abnormal uterine bleeding, pelvic pain, vaginal discharge, dysmenorrhea, dyspareunia, and infertility. A niche may cause future obstetric problems.

**Aim:** To assess the relationship between post Caesarean section niche and female subfertility.

**Subject and Methods:** This study was an observational prospective cohort study. The study was carried out at the Department of Obstetrics and Gynecology, Tanta University Hospitals.

**Results:** Intermenstrual bleeding, dysmenorrhea, dyspareunia, pelvic pain were statistically significant higher in niche group than no niche group. There is statistically significant lower pregnancy rate in CS with Niche group than CS without niche group. As regard the relation between intramenstrual spotting and ultrasound findings in CS with niche patients; there is statistically significant higher IU fluid collection, niche depth, endometrial thickness and lower RMT in patients with AUB.

**Conclusion:** With increasing cesarean section rates worldwide, it is inevitable that sequelae associated with such surgery is also increasing. It is clear that cesarean scar niche formation is a common complication, the formation of which appears to be multifactorial in nature but associated with poor wound healing, cesarean section technique, and possibly retroflexion of the uterus.

**Keywords:** Caesarean section (CS), subfertility, post-caesarean niche

### Introduction

Caesarean delivery is very common surgical procedure in females, with rates of 30% or more. In a random group of women who have had at least one Caesarean delivery, the incidence of Caesarean scar defect, or the presence of a niche at the site of the Caesarean delivery scar, is still rising. The terms niche, isthmocele, uteroperitoneal fistula, and diverticulum are also used to describe Caesarean scar defects<sup>[1, 2]</sup>.

"CS niche" refers to a hypoechoic region with myometrial disruption at the site of prior CS within the isthmus (lower uterine segment) myometrium (defect). A myometrial depression of at least 2 millimetres is considered a niche<sup>[3]</sup>.

Caesarean scar defect develops after Caesarean delivery, at the site of hysterotomy or Caesarean delivery, on the anterior wall of the uterine isthmus, while this is the usual site, the defect presents at the endocervical canal and mid-uterine body. Caesarean scar site develops an indentation and a fluid-filled pouch as a result of improper Caesarean wound healing, which thins the anterior uterine wall<sup>[4]</sup>.

There are several theories, divided into pregnancy-related and patient-related factors, but the exact reason why a niche forms is still unknown. Low (cervical) hysterotomies, single-layer uterine wall closure, the use of locking sutures, hysterotomy closure using an endometrial-sparing technique, and numerous Caesarean births are surgical procedures that may increase the likelihood of niche development. Patients who have medical conditions (such as diabetes, smoking, immune-compromised diseases, chemotherapy, and radiotherapy) that may affect wound healing may be more susceptible to niche development<sup>[2]</sup>.

Some symptoms were found in patients with Caesarean scar defects. These signs and symptoms include irregular bleeding due to delayed menstruation through the cervix, pelvic discomfort,

vaginal discharge, dysmenorrhea, dyspareunia, and infertility<sup>[5]</sup>. Aside from the gynaecological complaints, niches could theoretically harm future fertility. Mucus and blood accumulation in the cervix in association with a niche or intrauterine fluid during ovulation may hinder sperm cell entry or hinder embryo implantation. According to a recent meta-analysis involving 85 728 women, CS, when compared to vaginal deliveries, on average decreased the likelihood of a subsequent pregnancy by 10% [relative risk (RR) 0.91, 95% confidence interval (CI) (0.87-0.95)]<sup>[6]</sup>.

The presence of a niche may be linked with obstetric complications in future pregnancies. A pregnancy with a Caesarean scar is one that is entirely surrounded by the myometrium, or fibrous tissue of the scar, and is situated in a niche outside of the uterine cavity. Although this is a very uncommon occurrence, it is important to identify this type of ectopic pregnancy. Especially if a suction curettage is performed in case it is misdiagnosed as ongoing abortion<sup>(6)</sup>. Different approaches, such as ultrasonography and invasive procedures like hysteroscopy and laparoscopy, can be used for diagnosis<sup>[7]</sup>.

Although there may be a connection between niche prevalence and subfertility following Caesarean section, there are other causes as well. It's essential to recognize that not all uterine scar niches manifest symptoms, and that more research is necessary to conclusively link subfertility to uterine scar niches<sup>[8]</sup>.

### Aim of the work

The study is to assess the relationship between post Caesarean section niche and female subfertility.

### Patients and Methods

This study was an observational prospective cohort study. The study was carried out at the Department of Obstetrics and Gynecology. Tanta University Hospitals from July 2021 till July 2022.

### Ethical considerations

- We put code number to every participant with the name and address kept in a special file.

- We hid the patient name when we use the research.
- We used the results of the study only in a scientific manner and not to use it in any other aims.

### All participants were divided into two equally groups each group was 30 cases

**Group A):** included females having history of previous CS with CS scar niche.

**Group B):** included females having history of previous CS without CS scar niche.

All patients with secondary infertility for maximum 2 years who attended to our outpatient clinic underwent to the following:

- Focused history taking.
- Examination.
  - General examination.
  - Regional examinations.
  - Local clinical examination.
- Vulvar Examination.
- Vaginal Examination.
- Bimanual Examination.

### Statistical analysis design

Data collected throughout history, basic clinical examination, laboratory investigations and outcome measures coded, entered and analyzed using Microsoft Excel software. Data were then imported into Statistical Package for the Social Sciences (SPSS version 22) (Statistical Package for the Social Sciences) software for analysis. According to the type of data qualitative represent as number and percentage, quantitative continues group represent by mean  $\pm$  SD, the following tests were used to test differences for significance;., correlation by Pearson's correlation or Spearman's. P value was set at <0.05 for significant results & <0.001 for high significant result.

### Results

As regard the clinical presentation of the studied 2 groups (CS with niche and without niche); intermenstrual bleeding, dysmenorrhea, dyspareunia, pelvic pain were statistically significant higher in niche group than no niche group (Table 1).

**Table 1:** Comparison of the clinical presentation of the studied population

		CS with Niche group	CS without niche group	x <sup>2</sup>	P-value	Sig.
		N=30	N=30			
Intermenstrual bleeding	No	14 (46.7%)	28 (93.3%)	15.556	<0.0001	HS
	Yes	16 (53.3%)	2 (6.7%)			
Dysmenorrhea	No	18 (60%)	25 (83.3%)	4.022	0.045	S
	Yes	12 (40%)	5 (16.7%)			
Dyspareunia	No	22 (77.3%)	29 (96.7%)	6.405	0.011	HS
	Yes	8 (22.7%)	1 (3.3%)			
Pelvic pain	No	20 (66.7%)	28 (93.3%)	6.667	0.010	HS
	Yes	10 (33.3%)	2 (6.7%)			

As regard the obstetric outcome of the studied 2 groups (CS with niche and without niche) and the effect on fecund ability; there is statistically significant lower pregnancy rate in CS with Niche

group than CS without niche group. However there is no statistically significant difference between Niche group and no niche group as regard the abortion and CSP (Table 2).

**Table 2:** Comparison of the obstetric outcome of the studied population and the effect on fecund ability

		CS with Niche group	CS without niche group	x <sup>2</sup>	P-value	Sig.
		N=30	N=30			
Pregnancy	No	16 (53.3%)	5 (16.7%)	8.864	0.003	HS
	yes	14 (46.7%)	25 (83.3%)			
Abortion	No	25 (83.3%)	27 (90%)	0.576	0.447	NS
	yes	5 (16.7%)	3 (10%)			

CSP	No	27 (90%)	30 (100%)	3.158	0.076	NS
	yes	3 (10%)	0 (0%)			
Subfertility	No	14 (46.7%)	25 (83.3%)	8.864	0.003	HS
	yes	16 (53.3%)	5 (16.7%)			

As regard the relation between pregnancy and ultrasound findings in CS with niche patients; there is statistically significant higher IU fluid collection and RVF uterine position,

depth and lower RMT and endometrial thickness in non-pregnant group (Table 3).

**Table 3:** Relation between pregnancy and ultrasound findings in CS with niche patients

		No pregnancy		Pregnancy		Test	
		N=16		N=14		X2	P-value
		N	%	N	%		
IU fluid collection	No	2	12.5%	12	85.7%	16.081	<0.0001
	Yes	14	87.5%	2	14.3%		
Position of the uterus	AVF	4	25%	12	85.7%	11.059	0.0008
	RVF	12	75%	2	14.3%		
		Mean	SD	Mean	SD	z	P-value
	RMT (mm)	3.97	0.95	4.90	1.26	-2.319	0.028
	Width (mm)	11.26	1.24	10.74	0.68	1.416	0.173
	Depth (mm)	4.75	1.18	3.87	1.00	2.183	0.038
	Endometrial thickening (mm)	8.49	1.15	10.06	1.13	-3.767	0.001

## Discussion

The present study showed that as regard the clinical presentation of the studied 2 groups (CS with niche and without niche); intermenstrual bleeding, dysmenorrhea, dyspareunia, pelvic pain was statistically significant higher in niche group than no niche group.

Bij de Vaate *et al* research's [9] which found that postmenstrual spotting was present in 39 women with a niche (33.6%) and 14 women without a niche (15.2%) with a statistically significant difference between them provided support for our findings.

Additionally, Osser *et al.* [10] and Vervoort *et al.* [11] found that dysmenorrhea (40–50%), persistent pelvic pain (35%), dyspareunia (18%), or suprapubic pain may be present in women with niche. An abnormal myocontraction to clear the contents of a niche may be the cause of pain.

Additionally, according to Van der Voet *et al.* [12], women with a niche as determined by GIS (gel instillation sonohysterography, GIS) reported more postmenstrual spotting than women without a niche (OR 5.48, 95% CI 1.14-26.48).

In addition, Murji *et al* meta-analysis's [13] of nine papers found that patients with confirmed caesarean scar defects were more likely to experience abnormal uterine bleeding (AUB) (CSD). In comparison to patients without CSD, those with CSD were more prone to experience AUB (relative risk, 3.47; 95% confidence interval [CI], 2.02-5.97; 6 studies, 1,385 patients; I2 = 67%). The prevalence of AUB in patients with CSD was 25.5% (95% CI, 14.7-40.5; 6 studies, 667 patients, I2 = 93%) in a group of patients who had undergone at least one caesarean delivery. However, symptom prevalence was much higher in patients presenting for imaging for a gynecologic indication where the prevalence of AUB in the presence of a CSD was 76.4% (95% CI, 67.8-83.3; 5 studies, 505 patients; I2 = 71%). In symptomatic CSD patients, the mean intermenstrual bleeding lasted 6.8 days (9 studies, 759 patients; I2 = 93%) and the mean menstrual length was 13.4 days (95% CI, 12.6-14.2; 2,095 patients; 19 studies; I2 = 96%). "Brown fluid" was the most frequently used description of CSD-associated AUB. Patients with larger CSD had more signs of bleeding.

The current study showed that as regard the obstetric outcome of the studied 2 groups (CS with niche and without niche) and the effect on fecund ability; there is statistically significant lower

pregnancy rate in CS with Niche group than CS without niche group. However, there is no statistically significant difference between Niche group and no niche group as regard the abortion and CSP.

Our findings were supported by a study by Wang *et al.* [14] who found that women who had previously undergone a Caesarean section had a lower clinical pregnancy rate (40.3%), particularly if a post-Caesarean scar defect (niche) combined with endometrial fluid (12.5%) was present, compared to women who had previously given birth vaginally (54.8%) (P 0.05).

In a cohort study performed by Vissers *et al.* [15] of 159 women with large niches and who underwent a laparoscopic niche repair because of symptoms, intrauterine fluid was initially observed in 40% of subjects but this number dropped to 7.5% 6 months after the intervention. This suggests that the niche is the cause of fluid accumulation. In that research, where 40.2% of the subjects had previously undergone unsuccessful IVF treatment, the pregnancy rates were also very encouraging; at the 2-year mark, 52.0% had naturally conceived children, with a median gestation period of 3.0 months following the cessation of contraception.

After more than a year of follow-up, the majority of patients in two other cohort trials on laparoscopic niche repair in 22 and 38 subfertile patients conducted by Tanimura *et al.* [16] and Donnez *et al.* [17] experienced high pregnancy rates (55.6% and 44.0%, respectively). These findings suggest that the intrauterine niche and associated fluid may play a significant intermediate role in post-Caesarean subfertility. RCTs are required to demonstrate the positive impact of laparoscopic niche resection on reproductive outcomes.

## Conclusion

Up to 80% of individuals with symptoms who undergo surgical repair experience an improvement in symptoms. If the RMT is greater than 3 millimetres, hysteroscopic resection should be taken into account. A laparoscopic or vaginal approach should be considered if the RMT is less than 3 mm. The future fertility and obstetric outcomes in patients with a scar niche and those who have had their niche repaired are presently unknown. It is important to inform patients of the dangers of CSP, PAS, and endometrial dehiscence. Additionally, a number of variables are probably involved. There could be a number of reasons for the

observed lower fertility rates following C-section. With the scant information that is currently available, we have proposed a number of theories regarding the underlying mechanisms and indicate that a niche in the uterine scar may play a significant role. Future research is required to confirm or refute our ideas. The development of targeted therapies and the identification of patients who might profit from extra therapies depend critically on more knowledge of the underlying mechanisms.

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#### Author's Contribution

Not available

#### Conflict of Interest

Not available

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