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Transvaginal Ultrasound evaluation of the Cesarean scar: relation between a niche and abnormal uterine bleeding

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Abstract

Introduction: Cesarean section (CS) is a critical lifesaving operation for both mother and child, and its use has increased dramatically over the last decade. Mirroring global trends, CS rates in Egypt have steadily increased, reaching 52% of all deliveries according to the most recent 2014 Egypt Demographic and Health Survey (EDHS) and representing more than a 100% increase in the CS rate since 2005.

Aim of the study: To evaluate the relationship between the presence of a niche and abnormal uterine bleeding in women with a history of Cesarean section.

Subjects and Methods: The current observational cross-sectional study was performed between October 2020 and May 2021. All women who had a Cesarean section performed in our hospital were asked to participate. 225 women were included and examined with transvaginal sonography (TVS) 6–12 months after the Cesarean section. The depth, volume, and residual myometrium were measured in the case of a niche. The shape was assessed according to a specified classification.

Results: The prevalence of a niche on evaluation with TVS was 24.0%. Postmenstrual spotting was reported by 33.6% of women with a niche and 15.2% of women without a niche ($P=0.002$). The niche volume significantly differed between women with and without postmenstrual spotting ($P=0.02$). Most niches had a semicircular (50.4%) or triangular shape (31.6%). No significant relationship was identified between the body of the niche and postmenstrual spotting ($P=0.19$).

Conclusions: Our results demonstrate that 24% of women with a history of Cesarean section have a niche when examined by TVS and that a niche is associated with postmenstrual spotting.

Keywords: Uterine niche; Cesarean section niche; Diagnostic methods; Ultrasonography; Sonohysterography.

1. Introduction

Cesarean section (CS) is a critical lifesaving operation for both mother and child, and its use has increased dramatically over the last decade [1]. Mirroring global trends, CS rates in Egypt have steadily

increased, reaching 52% of all deliveries according to the most recent 2014 Egypt Demographic and Health Survey (EDHS) and representing more than a 100% increase in the CS rate since 2005 [2]. The proportion

of institutional-based CS (67.3%) is more than double the percentages in Jordan and Saudi Arabia, Egypt's regional neighbors [3]. Currently, Egypt has the third highest rate of CS globally, following the Dominican Republic (56.4%) and Brazil (55.6%) [1].

The consequence of each cesarean section is uterine scar formation. In some patients, the uterine scar after cesarean section heals incompletely, and as a result, the uterine niche is formed. Most of the small niches are asymptomatic, but the large cesarean scar niches in nonpregnant women may cause a cesarean scar syndrome, which manifests itself as abnormal uterine bleeding, dysmenorrhea, and secondary infertility [4]. Among pregnant women, the presence of large niches may be associated with potentially life-threatening consequences, such as cesarean scar dehiscence and uterine rupture, placenta accreta spectrum disorders, placenta previa, and cesarean scar pregnancy. Due to the possibility of dangerous consequences related to the occurrence of a uterine niche, in recent years many studies have focused

on the term cesarean scar niche, its risk factors, diagnostic methods, and treatment options [5]. The uterine niche can be examined using two- or three-dimensional transvaginal ultrasonography, as well as two- and three-dimensional sonohysterography, hysterosalpingography, hysteroscopy, or magnetic resonance imaging [6].

Because of the high Cesarean section rate, it is important to learn more about the clinical consequences of a niche [5]. Several small studies have demonstrated that a niche may be responsible for abnormal uterine bleeding in women with a previous Cesarean section. However, most studies included women with gynecological complaints [7]. No large prospective studies have yet been performed that focus on the relationship between the niche and abnormal uterine bleeding, and in which women with a history of Cesarean section were consecutively asked to participate. The current study aimed to evaluate the relationship between the presence of a niche and abnormal uterine bleeding in women with a history of Cesarean section.

2. Subjects and methods

2.1. Subjects

An observational cross-sectional study was performed between October 2020 and May 2021 at the Department of Obstetrics and Gynecology, Fayoum University Hospital, Fayoum, Egypt. The study was approved by the local research ethics committee.

2.2. Inclusion criteria

All women who had a Cesarean section performed in our hospital were consecutively asked to participate.

2.3. Exclusion criteria

That included the risk of pelvic inflammatory disease, cervical cancer, and pregnancy.

2.4. Methodology

All women underwent TVS to study the presumed site of the uterine scar, performed by one experienced operator in a standardized way.

Women were asked for the regularity and duration of their menstrual cycle, the number of days of blood loss (including the number of days of brownish discharge just before and after the cycle), and the number

3. Results

The current study included 225 women with a history of CS. The mean age of the included women was 34.9 years (range, 22–44 years). All women underwent TVS in which the niche was demonstrated by TVS in 54 cases (24.0%). The baseline characteristics of the study group are demonstrated in **Table 1** for women with and without a niche. A significant difference

of days of intermenstrual bleeding. Postmenstrual spotting was defined as more than two days of brownish discharge at the end of menstruation with a total length of menstruation (including spotting) of more than seven days, or intermenstrual bleeding, which starts within five days after the end of menstruation.

2.5. Statistical analysis

Data were analyzed using Statistical Packages for the Social Sciences (SPSS, Inc., Chicago, IL, USA). Two-sided tests were used, and $P < 0.05$ was considered statistically significant.

was found in parity ($P = 0.01$) and the mean number of previous Cesarean sections ($P = 0.001$). The mean length of the uterus was slightly greater in women with a niche (7.3 cm) than in women without a niche (6.9 cm) ($P = 0.04$), while the width of the uterus was the same for both groups (3.8 cm). The mean depth of the niche was 4.9 mm, and the mean volume of the niche was 0.14.

Table 1: Baseline characteristics with details of the Cesarean section preceding entry to the study.

	Niche on GIS (n = 117)	No niche on GIS (n = 92)	P
Age (years)	35.2 ± 4.0	34.5 ± 4.4	0.260
Parity	1.8 ± 0.9	1.5 ± 0.9	0.010*
Number of Cesarean sections	1.5 ± 0.7	1.2 ± 0.5	0.001*
Gestational age at the time of Cesarean section (weeks)	38.2 ± 3.3	37.5 ± 3.9	0.390
Time after last Cesarean section at the time of inclusion (weeks)	49.4 ± 4.7	50.1 ± 4.5	0.250

n: number. Values are presented as mean ± SD, * statistically significant.

The relationship between the presence of a niche and abnormal uterine bleeding is demonstrated in **Table 2**. Postmenstrual spotting was present in 39 women with a niche (33.6%) and 14 women without a niche (15.2%). Information about intermenstrual bleeding was obtained from

197 women. 33 cases with a niche (30.0%) and another nine without a niche (10.3%) significantly reported this symptom ($P=0.001$). The mean number of days of intermenstrual bleeding was 0.8 for the group with a niche and 0.3 for the group without a niche ($P= 0.001$).

Table 2: Uterine bleeding pattern and urological symptoms of women in the study group.

Characteristic	Niche on GIS (n = 117)	No niche on GIS (n = 92)	P
Postmenstrual spotting (n = 208)	39/116 (33.6)	14/92 (15.2)	0.002
Days of blood loss during menstruation (n = 194)	5.7 ± 2.8	5.8 ± 1.9	0.23
Intermenstrual bleeding (n = 197)	33/110 (30.0)	9/87 (10.3)	0.001
Days of intermenstrual bleeding (n = 197)	0.8 ± 1.7	0.3 ± 1.1	0.001

4. Discussion

The prevalence of a niche as detected by TVS in the current study was (24.0%), which is comparable with that of (19.4%) in a previous study using the same method [7]. Other authors reported a much lower prevalence of 6.9% [8]. This difference may have been caused by variations in definitions, level of awareness, and methods used.

We have demonstrated a significant relationship between the presence of a niche as seen using TVS and postmenstrual spotting in women with a previous Cesarean section.

Several hypotheses have been postulated to explain the etiology of bleeding disorders in relation to the niche. It

has been assumed that abnormal uterine bleeding may be due to the retention of menstrual blood in the niche, which is intermittently expelled after the majority of the menstruation has ceased, causing postmenstrual spotting [8].

Thurmond *et al.* (1999) reported that this condition might depend on poor contractility of the uterine muscle around the scar [9]. In addition, the presence of fibrotic tissue below the niche may impair the drainage of menstrual flow through the cervix. It cannot be ruled out that the accumulated blood is produced in situ, as suggested by Morris, [10] based on the presence of free blood cells in the

endometrial stroma, suggesting recent hemorrhage.

The positive relationship between niche volume and postmenstrual spotting indicates an increased capacity to collect blood and underlies the theories mentioned above [6]. Our hypotheses that the depth and shape of the niche may be related to abnormal uterine bleeding could not be confirmed, which may be explained by the group size being insufficient to test these secondary outcome parameters.

We propose that the presence of a niche, especially one with a large volume, may be associated with intracavitary fluid, which affects postmenstrual spotting. It has been suggested that subfertility after a Cesarean section might be caused by the presence of a niche. More research should be undertaken to study the relationship between the niche, intracavitary fluid, and infertility.

5. Conclusion

In conclusion, we have performed a cross-sectional study in which the prevalence of the niche and its relationship

to abnormal uterine bleeding were evaluated. Our results demonstrate that 24% of women with a history of Cesarean section have a niche when examined by TVS and that a niche is associated with postmenstrual spotting. Therefore, we encourage gynecologists to include the niche as a differential diagnosis in patients with postmenstrual spotting and a previous Cesarean section. Future research should increase our knowledge about the etiology of a niche.

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Ethical approval:

The study was approved by the Institutional Ethics Committee

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