# PREVALENCE OF CAESAREAN SECTION NICHE IN WOMEN WITH PREVIOUS CAESAREAN SECTION AND ITS EFFECT ON REPRODUCTIVE HEALTH

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Submitted: 25/6/2023; Accepted: 20/10/2023; Published: 21/12/2023

## ABSTRACT

### *Background*

The Cesarean Section (CS) rate has been increasing in recent practice worldwide as well as in Iraq, and there are many gynecological and obstetric problems related to CS also increasing in parallel to CS, some of them may be related to cesarean scar niche (CSN). There has yet to be a consensus about the gold standard method for diagnosing CSN, its prevalence, and the symptoms it causes.

### *Objective*

This study aims to find the prevalence of CSN in women with previous CS and how common gynaecological symptoms, including abnormal uterine bleeding, are among women who have had cesarean section niches compared to women with no CSN.

### *Patients and Methods*

This is a cross-sectional study conducted in private clinics of gynaecology and ultrasonography in Sulaymaniyah/ Kurdistan/Iraq from December 2020 to May 2023. It involved 259 women with a history of previous Cesarean section for whom transvaginal ultrasound was done to find the presence or absence of CSN. Accordingly, they divided into two groups: the first with CSN and the second with no CSN. Both groups followed prospectively for several parameters: postmenstrual spotting, intermenstrual bleeding, dysmenorrhea, dyspareunia, chronic pelvic pain, and subfertility—the chi-square test used for statistical analysis of the variables.

### *Results*

This study was carried out on 259 women with a history of one or more CS. Diagnosis of CSN done by 2D TVU: 44% of them had CSN, and 66% had no CSN; the prevalence of CSN was higher in women with repeated CS ($P<0.001$). Not all scar niches had symptoms but were frequently symptomatic; in this group, 50.9% were symptomatic, while in those with no CSN, 26.2% were symptomatic ($P<0.001$). Postmenstrual spotting and dysmenorrhea were the most predominant symptoms, which were statistically significant compared to the group of no niche (P $P<0.001$). At the same time, dyspareunia, chronic pelvic pain, and subfertility were not significantly increased. In the group of CSN, 44.73% had large, and 55.26% had small niches. Postmenstrual spotting and dysmenorrhea symptoms were more prevalent in women with large CSN than in small CSN ($P<0.001$).

### *Conclusion*

The prevalence of cesarean scar niche was 44% in women with previous CS, which can cause postmenstrual spotting and dysmenorrhea. More studies need to be addressed regarding intermenstrual bleeding, dyspareunia, chronic pelvic pain, and subfertility. Therefore, the practice of cesarean section on request is not recommended.

**Keywords:** *Caesarean section, Caesarean scar niche, Transvaginal ultrasound, Postmenstrual spotting, dysmenorrhea.*

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https://doi.org/10.17656/jsmc.10439

## INTRODUCTION

Cesarean section is a routine part of modern obstetric practice to reduce maternal and perinatal morbidity and mortality, and there is significant geographic variation in the CS rate worldwide. The 'right' CS rate is still being determined, but in 1985 WHO recommended a CS rate of no higher than 15 percent [1].

Cesarean section CS-related complications have increased in tandem with the rising rate of CS. CS niche, also known as (isthmocele, cesarean scar defect, diverticulum, or pouch) is a uterine wall defect (dimpling 2 mm or more at the CS site) that can occur due to a CS scar. It is mainly a sonographic finding and is mostly defined as a triangular anechoic area at the presumed incision site. It has been linked to poor pregnancy outcomes like scar dehiscence, uterine rupture, placenta previa, placenta accrete spectrum, and cesarean scar pregnancy.

It can also be related to gynecological symptoms like abnormal uterine bleeding (AUB), including prolonged menstruation or postmenstrual spotting, dysmenorrhea, pelvic pain, and secondary infertility [2-5].

The prevalence of CSN in several cross-sectional cohort studies varies between 24-70% using transvaginal ultrasound and between 56-70% using sonohysterography. The prevalence of niche with hysteroscopy has only been evaluated in selected populations with gynecological symptoms and varies between 31% and 100%. Risk factors could be related to closure techniques like single layer closure and locking, lower location of incision and non-development of the lower uterine segment, and other factors like multiple CS uterine, retroflection with factors related to wound healing [6].

The AUB is usually due to the collection of menstrual blood within the pouch, which is periodically expelled after the end of menstruation, as well as the poor contractility of myometrium around the scar, bringing on postmenstrual spotting. In addition, the fibrotic tissue below the niche may hinder the flow of menstrual passage through the cervix. When the bloody fluid from the cesarean scar passes in the opposite direction toward the uterine cavity, it may result in implantation failure. Blood retention in the uterine cavity may result in infertility via a mechanism resembling hydrosalpinx. However, some women may be asymptomatic, especially with small niches [2].

A uterine niche can be examined using two or three-dimensional TVU and two- and three-dimensional Sono-hysterography, hysterosalpingography, hysteroscopy, or magnetic resonance imaging. However, TVU is the initial and least invasive diagnostic method used to evaluate the integrity of the uterine wall. The CS scar may take the form of an isolated niche, a niche with fibrosis, and isolated fibrosis; in TVU, a small niche may not be visible, or their parameters may be underestimated. There are no unambiguous guidelines regarding the time after the CS in which the uterine scar should be assessed and the phase of the menstrual cycle in which the assessment was done. In some studies, assessment is done 6-12 weeks after CS. However, other studies recommend assessment for cesarean niche at least six months after CS as remanent myometrial tissue (RMT) over the niche decreases with time, and most authors recommend assessment of niche in the follicular phase of the menstrual cycle, especially a few days after menstruation [7].

The literature lacks a uniform classification of CSN; however, some studies classified niches as large and small. The large niche is when it penetrates to a depth of at least 50% or 80% of uterine muscles or when RMT is ≤2.2 mm in TVU and ≤2.5 mm in sonohysterography. In the situation when there is no remaining tissue (RMT) over the defect (CSN), it is a total defect [5].

The justification for this study is the increasing number of non-medically indicated CS and the increasing gynecological problems in women with a previous history of delivery by CS.

The objective of this study is to find the prevalence of CSN in women with previous CS and to find out how common gynaecological symptoms like postmenstrual spotting, intermenstrual bleeding, dysmenorrhea, and subfertility in women with CSN in comparison to women with no CSN, and to find the role of TVU in such cases.

## PATIENTS AND METHODS

The cross-sectional study was conducted in private clinics in Sulaymaniyah City/Kurdistan/Iraq between December 2020 and May 2023. It involved 259 women with CS and was divided into two groups according to the presence and absence of CSN. The diagnosis of CSN was made by TVU, which was done by two experienced ultrasonologists in their private clinics. They assessed the presence of CSN, and when present, they assessed the niche depth on sagittal plane TVU and the RMT over the niche.

Accordingly, they classified the CSN into large (> 50% of myometrial defects) and minor (<50% of myometrial defects). These women were examined at least six months after their last CS in the follicular phase of their menstrual cycle (in the first few days after menstruation). Both groups were followed prospectively for 2-3 years for symptoms of postmenstrual spotting, prolonged menstruation, intermenstrual bleeding, dysmenorrhea, dyspareunia, chronic pelvic pain, and subfertility.

The constructed questionnaire was used for data collection; it was composed of general characteristic features for the studied women, including age, residency, level of education, gravidity, parity, and miscarriage. It also included the necessary parameters like gynecological symptoms as mentioned above, and other parameters like number of CSs, type of CS (emergency or elective), history of scar ectopic, any history of post-partum complications (post-partum endometritis, and primary or secondary post-partum hemorrhage), any history of pregnancy complications like pregnancy-induced hypertension (PIH), and gestational diabetes mellitus (GDM). Any previous history (before CS) of abnormal uterine bleeding, dysmenorrhea, dyspareunia, chronic pelvic pain, and subfertility was also taken.

Inclusion criteria included previous CS, with at least six months between the last CS and examination. Exclusion criteria included a positive pregnancy test, using hormonal contraception or intrauterine contraceptive device, having any coagulation problems or using anti-coagulant drugs, any benign or malignant tumours of the uterine body, cervix, and ovaries, any uterine or cervical polyp, as seen by cervical examination or smear, TVU or taken from the history of the patient, and any history of gynaecological symptoms and subfertility before the CS.

Exclusion criteria also included patient's refusal to participate in the study and missed follow-up cases.

The direct interview method was used for collecting data from the participants. Data entry was performed using an Excel spreadsheet; then, the statistical analysis was performed by SPSS program version 24 (IBM SPSS Statistical Package for Social Science).

The data is presented in tabular forms among both groups, showing different variables' frequency and relative frequency distribution. The chi-square test was used to compare the categorical data between these two groups of women concerning different variables. P values of 0.05 were used as a cut-off point for the significance of statistical tests.

Ethical consent was taken from women involved in the study, and all information related to the participants was kept confidential.

## RESULTS

This study was carried out on women with a history of previous CS. It included 259 women with a history of one or more CS. After examination by 2D TVU, they were divided into niche and non-niche groups. Of 259 women, 114 (44%) had a niche, and 145 (66%) had no niche. In the niche group, 51 (44.74%) had a large niche, and 63 (55.26%) had a small niche.

The two groups were comparable regarding age, residency, and educational level, with P values of 0.19, 0.76, and 0.77, respectively, which are non-significant, as shown in Table 1.

The increasing number of CS significantly affected the presence of niche with a P value of <0.001, which is significant. Eighty-eight cases had one CS, 25 cases had a niche, and 63 had no niche. Seventy-seven cases had two CS; of those, 33 had a niche, and 44 had no niche. Fifty-seven cases had 3 CS; of those, 30 had a niche, and 27 had no niche. Thirty-seven cases had four CS, 26 had a niche, and 11 had no niche, as shown in Table 2.

Type of CS (emergency or elective) and history of normal vaginal delivery (NVD) had no significant effect on the niche presence with P values of 0.34 and 0.15, respectively, as shown in Table 2.

Gravidity and miscarriage had no significant effect on the presence of niche with P values of 0.38 and 0.14, respectively, as shown in Table 2.

Parity significantly affected the presence of niche with a P value of 0.02, as shown in Table 2.

The presence of many gynaecological symptoms and complications was observed in both groups. 4.4% of niche cases had scar ectopic, and 95.6% of them had no scar ectopic, while 2.8% of no niche group had scar ectopic and 97.2% of them had no scar ectopic, with a P value of 0.48, which is not significant, as shown in Table 3.

Regarding symptomatic cases as a general, 58 cases

(50.9%) of the niche group were symptomatic, and 38 cases (26.2%) of no niche group were symptomatic with a P value of < 0.001, which is significant, as shown in Table 3.

Newly developed postmenstrual spotting and dysmenorrhea were significantly affected by the presence of niche with a P value of <0.001 in both symptoms, which is significant. In contrast, intermenstrual bleeding, Dyspareunia, Chronic pelvic pain, and subfertility were not significantly affected by the presence of niche with a P value of 0.41, 0.87, 0.26, 0.40, respectively, as shown in Table 3.

Table 4 clarifies that there was no significant association between the presence of niche and the following parameters:

History of gestational diabetes mellitus (P 0.56), hypertension during pregnancy (P 0.17), infection after delivery (endometritis) (P 0.43), primary and secondary PPH (P 0.73), and retroverted uterus (P 0.36) did not affect the development of the niche.

Table 5 clarifies the association between the size of the uterine niche and many symptoms and complications:

Only 17 women (27%) with small niches were symptomatic, while 42 women (82.4%) with large niches were symptomatic with a P value of < 0.001, which is significant.

Postmenstrual spotting and intermenstrual bleeding were significantly affected by the size of the niche, and they are more in large niches with a P value of <0.001. In comparison, dysmenorrhea (P 0.13), dyspareunia (P 0.48), chronic pelvic pain (P 0.83), and subfertility (P 0.96) were not significantly affected by the size of the niche.

Table 6 clarifies that no significant association was seen between the size of niche and gravidity, parity, miscarriage, no. of CSs, type of CS, GDM, PIH, post-partum endometritis, and position of the uterus (retroverted or anteverted).

Scar ectopic was more in large niches (4 cases) and (1 case) in small niches, but the difference was statistically non-significant with a P value of 0.11, as shown in Table 5.

**Table 1.Demographic characteristics of study participants.**

| | Presence of niche | | | | Total (%) | | *P* value |
|---|---|---|---|---|---|---|---|
| | Yes (%) | | No (%) | | | | |
| **Age (Years)** | | | | | | | |
| 18 - 28 | 16 | (32.65) | 33 | (67.35) | 49 | (100) | 0.19 |
| 29 – 38 | 66 | (47.48) | 73 | (52.52) | 139 | (100) | |
| 39 - 50 | 32 | (45.07) | 39 | (54.93) | 71 | (100) | |
| **Residency** | | | | | | | |
| Urban | 69 | (44.81) | 85 | (55.19) | 154 | (100) | 0.76 |
| Rural | 45 | (42.86) | 60 | (57.14) | 105 | (100) | |
| **Level of education** | | | | | | | |
| Illiterate or read and write | 15 | (51.72) | 14 | (48.28) | 29 | (100) | 0.77 |
| Primary | 21 | (41.18) | 30 | (58.82) | 51 | (100) | |
| Secondary | 30 | (41.10) | 43 | (58.90) | 73 | (100) | |
| Higher education | 48 | (45.28) | 58 | (54.72) | 106 | (100) | |
| **Total** | 114 | (44.02) | 145 | (55.98) | 259 | (100) | |

**Table 2. Obstetric history of study participants in relation to CS niche.**

| | Presence of niche | | | | Total (%) | | P value |
|---|---|---|---|---|---|---|---|
| | Yes (%) | | No (%) | | | | |
| **Number of Caesarian sections** | | | | | | | |
| One | 25 | (28.41) | 63 | (71.59) | 88 | (100) | < 0.001 |
| Two | 33 | (42.86) | 44 | (57.14) | 77 | (100) | |
| Three | 30 | (52.63) | 27 | (47.37) | 57 | (100) | |
| Four or more | 26 | (70.27) | 11 | (29.73) | 37 | (100) | |
| **Type of last CS** | | | | | | | |
| Emergency | 27 | (39.13) | 42 | (60.87) | 69 | (100) | 0.34 |
| Elective | 87 | (45.79) | 103 | (54.21) | 190 | (100) | |
| **History of NVD** | | | | | | | |
| Yes | 24 | (36.36) | 42 | (63.64) | 66 | (100) | 0.15 |
| No | 90 | (46.63) | 103 | (53.37) | 193 | (100) | |
| **Gravida** | | | | | | | |
| One | 11 | (32.35) | 23 | (67.65) | 34 | (100) | 0.38 |
| Two | 26 | (41.27) | 37 | (58.73) | 63 | (100) | |
| Three | 23 | (41.82) | 32 | (58.18) | 55 | (100) | |
| Four | 25 | (48.08) | 27 | (51,92) | 52 | (100) | |
| Five or more | 29 | (52.73) | 26 | (47.27) | 55 | (100) | |
| **Para** | | | | | | | |
| One | 14 | (26.92) | 38 | (73.08) | 52 | (100) | 0.02 |
| Two | 26 | (41.27) | 37 | (58.73) | 63 | (100) | |
| Three | 23 | (41.82) | 32 | (58.18) | 55 | (100) | |
| Four | 25 | (48.08) | 27 | (51.92) | 52 | (100) | |
| Five or more | 29 | (52.73) | 26 | (47.27) | 55 | (100) | |
| **Abortion** | | | | | | | |
| None | 78 | (47.89) | 85 | (52.15) | 163 | (100) | 0.14 |
| One | 19 | (32.76) | 39 | (67.24) | 58 | (100) | |
| Two or more | 17 | (44.74) | 21 | (55.26) | 38 | (100) | |
| **Total** | 114 | (44.02) | 145 | (55.98) | 259 | (100) | |

**Table 3. Gynecological symptoms and complications about CS niche.**

| | Presence of niche | | | | Total (%) | | *P* value |
|---|---|---|---|---|---|---|---|
| | Yes (%) | | No (%) | | | | |
| **Scar ectopic** | | | | | | | |
| Yes | 5 | (4.4) | 4 | (2.8) | 9 | (3.5) | 0.48 |
| No | 109 | (95.6) | 141 | (97.2) | 250 | 96.5 | |
| **Symptomatic** | | | | | | | |
| Yes | 58 | (50.9) | 38 | (26.2) | 96 | (37.1) | < 0.001 |
| No | 56 | (49.1) | 107 | (73.80) | 163 | (62.9) | |
| **Postmenstrual spotting** | | | | | | | |
| Yes | 43 | (37.7) | 19 | (13.1) | 62 | (23.9) | < 0.001 |
| No | 71 | (62.3) | 126 | (86.9) | 197 | (76.1) | |
| **Intermenstrual bleeding** | | | | | | | |
| Yes | 12 | (10.5) | 11 | (7.6) | 23 | (8.9) | 0.41 |
| No | 102 | (89.5) | 134 | (92.4) | 236 | (91.1) | |
| **Dysmenorrhea** | | | | | | | |
| Yes | 24 | (21.1) | 9 | (6.2) | 33 | (12.7) | < 0.001 |
| No | 90 | (78.9) | 136 | (93.8) | 226 | (87.3) | |
| **Dyspareunia** | | | | | | | |
| Yes | 5 | (4.4) | 7 | (4.8) | 12 | (4.6) | 0.87 |
| No | 109 | (95.6) | 138 | (95.2) | 247 | (95.4) | |
| **Subfertility** | | | | | | | |
| Yes | 32 | (28.1) | 34 | (23.4) | 66 | (25.5) | 0.40 |
| No | 82 | (71.9) | 111 | (76.6) | 193 | (74.5) | |
| **Chronic pelvic pain** | | | | | | | |
| Yes | 4 | (3.5) | 2 | (1.4) | 6 | (2.3) | 0.26 |
| No | 110 | (96.5) | 143 | (98.6) | 253 | (97.7) | |
| **Total** | 114 | (100.0) | 145 | (100.0) | 259 | (100.0) | |

**Table 4: Characteristics of study participants in relation to CS niche.**

| | Presence of niche | | | | Total(%) | | P value |
|---|---|---|---|---|---|---|---|
| | Yes (%) | | No(%) | | | | |
| **History of GDM** | | | | | | | |
| Yes | 17 | (48.57) | 18 | (51.43) | 35 | (100) | 0.56 |
| No | 97 | (23.30) | 127 | (56.70) | 224 | (100) | |
| **History of HT in Pregnancy** | | | | | | | |
| Yes | 14 | (34.15) | 27 | (65.85) | 41 | (100) | 0.17 |
| No | 100 | (45.87) | 118 | (54.13) | 218 | (100) | |
| **History of infection after delivery (Endometritis)** | | | | | | | |
| Yes | 2 | (66.67) | 1 | (33.33) | 3 | (100) | 0.43 |
| No | 112 | (43.75) | 144 | (56.25) | 256 | (100) | |
| **PPH** | | | | | | | |
| Yes | 4 | (50.0) | 4 | (50.0) | 8 | (100) | 0.73 |
| No | 110 | (43.82) | 141 | (56.18) | 251 | (100) | |
| **Retroverted uterus** | | | | | | | |
| Yes | 16 | (51.61) | 15 | (48.39) | 31 | (100) | 0.36 |
| No | 98 | (42.98) | 130 | (57.02) | 228 | (100) | |
| **Total** | **114** | **(44.02)** | **145** | **(55.98)** | **259** | **(100)** | |

**Table 5: Gynecological symptoms and Complications regarding the size of CS niche.**

| | Size of niche | | | | Total (%) | | *P* value |
|---|---|---|---|---|---|---|---|
| | Small (%) | | Large (%) | | | | |
| **Scar ectopic** | | | | | | | |
| Yes | 1 | (1.59) | 4 | (7.84) | 5 | (4.39) | 0.11 |
| No | 62 | (98.41) | 47 | (92.16) | 109 | (95.61) | |
| **Symptomatic** | | | | | | | |
| Yes | 17 | (27.0) | 42 | (82.4) | 59 | (51.8) | < 0.001 |
| No | 46 | (73.0) | 9 | (17.6) | 55 | (48.2) | |
| **Postmenstrual spotting** | | | | | | | |
| Yes | 10 | (15.9) | 34 | (66.7) | 44 | (38.6) | < 0.001 |
| No | 53 | (84.1) | 17 | (33.3) | 70 | (61.4) | |
| **Intermenstrual bleeding** | | | | | | | |
| Yes | 1 | (1.6) | 12 | (23.5) | 13 | (11.4) | < 0.001 |
| No | 62 | (98.4) | 39 | (76.5) | 101 | (88.6) | |
| **Dysmenorrhea** | | | | | | | |
| Yes | 10 | (15.9) | 14 | (27.5) | 24 | (21.1) | 0.13 |
| No | 53 | (84.1) | 37 | (72.5) | 90 | (78.9) | |
| **Dysparonia** | | | | | | | |
| Yes | 2 | (3.2) | 3 | (5.9) | 5 | (4.4) | 0.48 |
| No | 61 | (96.8) | 48 | (94.1) | 109 | (95.6) | |
| **Subfertility** | | | | | | | |
| Yes | 17 | (27.0) | 14 | (27.5) | 31 | (27.2) | 0.96 |
| No | 46 | (73.0) | 37 | (72.5) | 83 | (72.8) | |
| **Chronic pelvic pain** | | | | | | | |
| Yes | 2 | (3.2) | 2 | (3.9) | 4 | (3.5) | 0.83 |
| No | 61 | (96.8) | 49 | (96.1) | 110 | (96.5) | |
| **Total** | 63 | (100) | 51 | (100) | 114 | (100) | |

**Table 6: Characteristics of study participants in relation to the size of the CS niche**

| | Size of niche | | | | Total (%) | | *P* value |
|---|---|---|---|---|---|---|---|
| | Small (%) | | Large (%) | | | | |
| **History of GDM** | | | | | | | |
| Yes | 8 | (50.0) | 8 | (50.0) | 16 | (100) | 0.65 |
| No | 55 | (56.12) | 43 | (43.82) | 98 | (100) | |
| **History of HT in Pregnancy** | | | | | | | |
| Yes | 7 | (50.0) | 7 | (50.0) | 14 | (100) | 0.67 |
| No | 56 | (56.0) | 44 | (44.0) | 100 | (100) | |
| **History of infection after pregnancy (endometritis)** | | | | | | | |
| Yes | 1 | (50.0) | 1 | (50.0) | 2 | (100) | 0.88 |
| No | 62 | (55.36) | 50 | (44.64) | 112 | (100) | |
| **PPH1** | | | | | | | |
| Yes | 2 | (50.0) | 2 | (50.0) | 4 | (100) | 0.83 |
| No | 61 | (55.45) | 49 | (44.55) | 110 | (100) | |
| **Retroverted uterus** | | | | | | | |
| Yes | 10 | (58.82) | 7 | (41.18) | 17 | (100) | 0.75 |
| No | 53 | (54.64) | 44 | (45.36) | 97 | (100) | |
| **Type of last CS** | | | | | | | |
| Emergency | 14 | (51.85) | 13 | (48.15) | 27 | (100) | 0.68 |
| Elective | 49 | (56.32) | 38 | (43.68) | 87 | (100) | |
| **History of NVD** | | | | | | | |
| Yes | 15 | (62.50) | 9 | (37.50) | 24 | (100) | 0.42 |
| No | 48 | (53.33) | 42 | (46.67) | 90 | (100) | |
| **Number of Caesarian section** | | | | | | | |
| One | 13 | (54.17) | 11 | (45.83) | 24 | (100) | 0.82 |
| Two | 19 | (57.58) | 14 | (42.42) | 33 | (100) | |
| Three | 18 | (60.0) | 12 | (40.0) | 30 | (100) | |
| Four or more | 13 | (48.15) | 14 | (51.85) | 27 | (100) | |
| **Type of last CS** | | | | | | | |
| Emergency | 14 | (51.85) | 13 | (48.15) | 27 | (100) | 0.68 |
| Elective | 49 | (56.32) | 38 | (43.68) | 87 | (100) | |
| **History of NVD** | | | | | | | |
| Yes | 15 | (62.5) | 9 | (37.5) | 24 | (100) | 0.42 |
| No | 48 | (55.33) | 42 | (44.67) | 90 | (100) | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Gravida** | | | | | | | |
| One | 4 | (36.36) | 7 | (63.64) | 11 | (100) | 0.47 |
| Two | 14 | (56.0) | 11 | (44.0) | 25 | (100) | |
| Three | 14 | (60.87) | 9 | (39.13) | 23 | (100) | |
| Four | 17 | (65.38) | 9 | (34.62) | 26 | (100) | |
| Five or more | 14 | (48.28) | 15 | (51.72) | 29 | (100) | |
| **Para** | | | | | | | |
| One | 5 | (38.46) | 8 | (61.54) | 13 | (100) | 0.67 |
| Two | 19 | (61.29) | 12 | (38.71) | 31 | (100) | |
| Three | 18 | (60.0) | 12 | (40.0) | 30 | (100) | |
| Four | 15 | (57.69) | 11 | (42.31) | 26 | (100) | |
| Five or more | 6 | (50.0) | 6 | (50.0) | 12 | (100) | |
| **Abortion** | | | | | | | |
| None | 43 | (54.43) | 36 | (45.57) | 79 | (100) | 0.49 |
| One | 12 | (66.67) | 6 | (33.33) | 18 | (100) | |
| Two or more | 8 | (47.06) | 9 | (52.94) | 17 | (100) | |
| **Total** | 63 | (55.26) | 51 | (44.74) | 114 | (100) | |

## DISCUSSION

Cesarean scar niche is one of the long-term complications of CS, especially in repeated CS. Its detection rate depends on the population and the diagnostic method used, which can be 2D TVU or 3D TVU, sonohysterography, or MRI. Although not all niches are symptomatic, they may cause many gynaecological and obstetric complications. Many studies have been done on CSN, addressing its prevalence, way of diagnosis, gynaecological and obstetric complications, and management. They agreed on many topics, but still, there are many controversies about other topics.

In this study, niche was present in 44% of cases, which goes with the study done by Gozzi *et al*., who detected a prevalence of niche of 44.4% [8]. It is near to a systematic review done by Bij de Vaat *et al*., who found a prevalence of 24-70% when detected by TVU and between 56% and 84% when detected by SHG from twenty-one paper[s] [4], and studies done by Abd Elsamie *et al.,* Tulandi *et al.,* Tower *et al*., Hsu *et al* show 24%, 24-88%, 19.4-88%, and 60.4% niche detection by TVU respectively[,9,10,13,14], but does not agree with Osser *et al*. which showed 70% detection by TVU and 84% detection by SHG[11], and a study done by Abdelfattah *et al*. which shows niche in 14.7% of cases detected by TVU, these may be related to the different procedure of CS, different study population, different criteria, and detection of niche by different personnel[7].

The demographic features had no significant effect on the presence of niche; it goes with studies done by Gozzi *et al*. Karli *et al*. [8,15] but do not agree with a study by Salah *et al*., who reveal a significant association between CSN and maternal age [2]; sample size may cause this difference.

In this study, gravidity, parity, and miscarriage had no significant effect on CSN, which agrees with the study done by Gozzi *et al*. [8].

This study shows a significant association between CSN and the number of CS. This finding goes with studies done by most authors, and all of them agree with the concept of increasing risk of CSN with repeated CS; for example, studies were done by Salah *et al*., Van der Voet *et al.,* Tulandi *et al*., Nitayaphan *et al*., Tower *et al*., Karli *et al*. [2,6,10,12,13,15].

In this study, there was no significant difference between emergency and elective CS on the prevalence of CSN, which goes with the study done by Antila-langsjo *et al*. [16]. On the other hand, a study done by Karli *et al*.

demonstrated increased CSN in emergency CS [15]. Nitayaphan *et al.* show that CSN is more common in women's emergency CS, especially after a 6 cm dilated cervix [12]; this difference may be related to sample size and different procedures of CS in these studies.

Gestational diabetes mellitus, pregnancy-induced hypertension, post-partum endometritis, primary and secondary PPH, and retroverted uterus had no significant effect on the development of CSN. Studies are addressing these factors; Van der Voet *et al.* and Vervoort *et al.* show that factors that increase adhesion formation, impair wound healing, and increase inflammation are associated with the development of CSN [6,17], Antila-Langsjo *et al.* showed that GDM is an independent risk factor for CSN [16]. Salah SM *et al.* showed a significant association between CSN and hypertension [2]. Bij de Vaate *et al.*, Nitayaphan *et al.*, and Wang *et al.* said that uterine retroflection is associated with an increased risk of CSN [4,12,18]; these different results with my study may be related to differences in population and sample size.

Regarding gynaecological symptoms, this study shows that more than half of women with CSN were symptomatic, which was also reported by Abdelfattah *et al.* and the other studies mentioned below [7].

Postmenstrual spotting and dysmenorrhea were significantly increased in the group with niche, while intermenstrual bleeding, dyspareunia, and chronic pelvic pain were not significantly increased in this study; this goes with the study done by Bandry *et al.*, Bij de Vaate *et al.*, Abd Elsamie *et al.*, Tulandi *et al.,* Karli *et al.*, Antila-Langsjo *et al.,* who showed increased incidence of postmenstrual spotting in cases with CSN [3,4,9,10,15,16]. Salah *et al.* showed a significant incidence of postmenstrual spotting in cases with CSN but no significant increase in dysmenorrhea and chronic pelvic pain. Population and weather differences may be one of the causes of this difference in my study [2].

Wang *et al.* showed that dysmenorrhea and postmenstrual spotting increased in CSN along with chronic pelvic pain; the last symptom does not agree with this study which may be because of population difference [18]. Gozzi *et al.* and Gowan *et al.* showed an increased incidence of postmenstrual spotting and dyspareunia, which does not agree with my study on dyspareunia as it did not significantly increase in my study, which may be related to population difference [8,19].

Vervoort *et al.* reported increased postmenstrual spotting, dysmenorrhea, chronic pelvic pain, and dyspareunia [17].

In addition to this study, almost all the studies done by different authors from different countries agreed on a strong association between CSN and postmenstrual spotting. Most of them did not mention that intermenstrual bleeding increases with CSN. Some agreed about dysmenorrhea, dyspareunia, and chronic pelvic pain, and others did not agree.

Subfertility was not significantly increased with CSN in this study, but most studies reported a contrary result; this may be related to the study's small sample size and the different study populations. Gozzi *et al.*, Tulandi *et al.,* Gowa *et al.*, and Mohr-Sasson *et al.* reported increased subfertility in cases of CSN [8,10,19,20]. However, this relation needs to be fully evaluated and proved as many other factors affect fertility, and there may be misinterpretation in diagnosing the cause. Vissers *et al.* also concluded that CSN is related to subfertility but also said that it must be fully proven and can be caused by other factors [21].

Regarding scar ectopic, there was no significant increase in cases of CSN compared to cases without CSN, but it was more in a large niche with no statistically significant association. Baldini *et al.* also showed that CSN did not increase the incidence of scar ectopic [22].

In this study, the prevalence of large niches was 44.73%, which does not agree with a study done by Nitayaphan *et al.*, who reported a prevalence of 22%, which may relate to population and procedure differences [12]. The size of the niche was significantly affected by repeated CS in this study; Nitayaphan *et al.* and Wang *et al.* also showed the same result [12,18].

There is a significant association between gynaecological symptoms and a large niche in this study; this is also described by Wang *et al.*, who show an increased incidence of postmenstrual spotting, dysmenorrhea, and chronic pelvic pain in a large niche [18]. However, in this study, postmenstrual spotting and intermenstrual bleeding were significantly affected by the size of the niche, and the other symptoms were not affected significantly. Bandry *et al.* also agree with the study, which showed an increased incidence of postmenstrual spotting in women with large niches [3].

The uterine position did not increase the incidence of large niches in this study; it does not agree with a study done by Wang *et al.*, who showed that women with

retroflexed uteri tended to have more significant defects than those with anteflexed uteri [18]. This difference may be related to population, procedure, and sample size differences.

In conclusion, Cesarean scar niche is a common long-term consequence of delivery by CS; its prevalence varies depending on the detection method, different study populations, different CS techniques, and criteria used for detection. The prevalence of CSN in this study was 44% in women with previous CS, and it was more in women with repeated CS. It can be a cause of many gynecological symptoms like postmenstrual spotting and dysmenorrhea. Regarding intermenstrual bleeding, dyspareunia, and subfertility, more studies need to be addressed. The large niche is more in repeated CS, and the gynecological symptoms are more in this group.

The practice of non-medically indicated CS (CS on request) should be decreased by educating pregnant women about the complications of CS, including CSN and obstetric complications.

The practice of painless labour is advisable and should be offered to pregnant women in the late months of pregnancy to decrease the number of CS on request.

TVS is the simple and dependable rule for CSN assessment; it involves the measurement of depth, the width of the niche, and RMT in the sagittal and coronal planes. It is a cheap and easily accessible machine but needs a trained sonographer; it should not be used routinely for diagnosis of CSN in all cases of previous CS without symptoms or complaints.

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