International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Madhangi VB et al. Int J Reprod Contracept Obstet Gynecol. 2020 Oct;9(10):4091-4096
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: http://dx.doi.org/10.18203/2320-1770.ijrcog20204293

Original Research Article

Cesarean scar defect and its association with clinical symptoms, uterine position and the number of cesarean sections

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Received: 19 July 2020
Accepted: 04 September 2020

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ABSTRACT

Background: Caesarean scar defect (CSD), also called isthmocele or niche is a long-term complication, which can be asymptomatic or can give rise to chronic pelvic pain, dyspareunia and postmenstrual spotting. The objective of this study was to assess the association of CSD with clinical symptoms, position of the uterus and the number of caesarean sections.
Methods: This was a prospective observational study done at a tertiary care teaching hospital from January 2019 to December 2019. The study included women with history of previous one or more caesarean sections with demonstrable CSD on transvaginal ultrasound. Various scar dimensions noted were width and depth of the scar. A deficiency ratio was calculated as a ratio of residual myometrium at the scar to the adjacent myometrium.
Univariate analysis was done to assess the relationship of clinical symptoms with the defect parameters and number of previous caesarean sections. Multiple logistic regression analysis was done to find out the association between symptoms and number of previous caesarean sections with the scar defect dimensions.
Results: The width, depth and deficiency ratio of the CSD were significantly higher in study subjects with a greater number of caesarean sections. Retroflexed uteri had larger CSD. There was no association of clinical features with the defect dimensions and the position of the uterus.
Conclusions: CSD dimensions and deficiency ratio correlate with the number of previous caesarean sections and the position of the uterus. There was no association of clinical symptoms with the defect parameters.

Keywords: CSD, Isthmocele, Niche, Transvaginal ultrasonography

INTRODUCTION

Caesarean section is on the rising trend globally for various indications. In India, the overall rate of caesarean section delivery in 2015-16 is around 17.2% in the public sector and 27.7% in the private sector.[1] With this increasing trend, various long-term complications are being recognized. CSD, also called isthmocele or niche is one such complication, which can be asymptomatic or can give rise to many gynaecological complaints and conditions like chronic pelvic pain, dyspareunia, postmenstrual spotting, secondary infertility, abnormal placentation and, caesarean scar pregnancy.[2] The prevalence of CSD varies widely from 6.9 to 69%, owing to variations in indications, time and number of caesarean sections, adequacy of healing, and nutrition status of the patients and the diagnostic criteria applied.[3,4]

The symptoms, if present can be varied. Postmenstrual spotting can continue for up to 12 days post menstruation owing to collection of menstrual blood in the niche. Dysmenorrhoea can be attributed to adenomyotic changes at the myometrium adjacent to the scar site. Most often the symptoms can be vague with a dull aching pain post

menstruation or can be present as chronic pelvic pain. A larger defect is said to be associated with a retroflexed uterus and it can be symptomatic. [5]

Poor nutritional status, retroflexed uteri, more than one prior caesarean section, type of surgical closure and wound infections are some of the factors determining the adequacy of healing of the caesarean scar.[6]

According to a study by Dicle O et al, where evaluation of the caesarean scar was done by magnetic resonance imaging, a minimum of 6 months is necessary for the diagnosis of CSD post-partum.[7]

In 2018, a consensus was arrived regarding the ultrasound evaluation of the CSD. Transvaginal ultrasound is a well-accepted modality of investigation for CSD.[8,9] The statement details about the definition, visualization, and the method of measurement specifics. A CSD was defined as an indentation of at least 2 mm depth at the caesarean scar site in the uterus.

Studies done by J Glavind et al and Ofili et al showed that the ratio of residual myometrial thickness at the maximum depth of the scar site to the adjacent myometrial thickness can provide an estimate of the deficient myometrium. This can be correlated with the magnitude of the symptoms and the adverse clinical outcomes in patients.[10,11]

There are only few studies on the prevalence and clinical features of CSD in India due to heterogeneity of the population and vague symptomatology. Numerous case reports have been published based on CSD and its implications namely the caesarean scar pregnancy and its management.[12-14]

This study was done to assess the association between the number of previous caesarean sections, clinical features and position of the uterus among patients with CSD.

METHODS

This was a prospective observational study that was done in the department of Obstetrics and Gynaecology at a tertiary care teaching hospital from January 2019 to December 2019 after approval by the institutional research committee and ethics committee (IRC No. AV/IRC/IEC/2019/001).

Sample size for this study was estimated to be 196 with Open Epi software considering a prevalence rate of 15%[3]. All non-pregnant women from different age groups visiting the gynaecology department for various complaints with history of one or more previous caesarean sections were recruited for the study.

Detailed history regarding menstrual complaints, dyspareunia, dysmenorrhea, chronic pelvic pain was obtained from the study subjects. Transvaginal ultrasound was done on an outpatient basis, using a Mindray M7 ultrasound machine with a 7 to 9 MHz transvaginal probe by a single operator. Patients with comorbid gynaecological conditions, antenatal, postmenopausal, and premalignant or malignant lesions of the genital tract were excluded from the study. Patients with a hypoechoic defect in the myometrium near the site of the previous caesarean section, measuring more than or equal to 2 mm were recruited in the study.

Defect was measured along its maximum depth and width in the longitudinal plane, as shown in the figure 1. Adjacent myometrial thickness was measured superior to the defect. Residual myometrial thickness was measured at the site of the defect. Position of the uterus was also ascertained by the relationship of long axis of the uterus with respect to the axis of the cervix. All the patients underwent endometrial biopsy and cervical cytology at secretory phase. Patients with endometrial pathology and premalignant lesions of the cervix were then excluded. Patients with secondary infertility were also excluded since secondary infertility as a presenting symptom would need ruling out other causes of infertility.

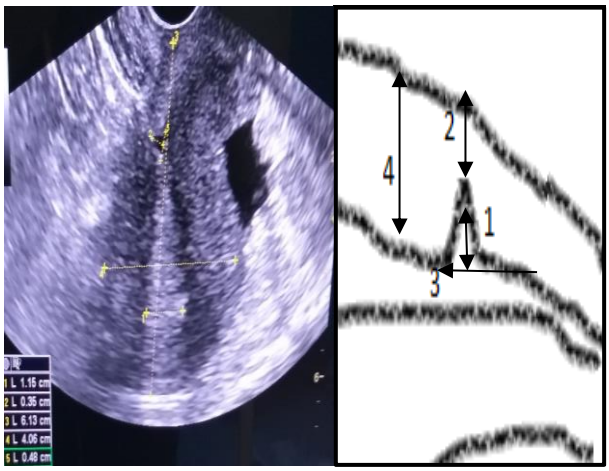

Figure 1: CSD (1, 2, 3, and 4 the depth, residual myometrial thickness, width and adjacent myometrial thickness respectively).

Data entry was done in excel sheet. Variables that were studied were various clinical symptoms, number of previous caesarean sections, and size of the defect in terms of maximum width, depth of the defect, residual myometrial thickness at the scar site, and adjacent myometrial thickness in millimetres. The deficiency ratio, which is the ratio of the residual myometrium to the adjacent myometrium was also calculated.

Data were analysed using the SPSS version 24.0. Continuous variables were depth, width of the scar defect and the deficiency ratio. Categorical variables were number of caesarean sections and the position of the uterus. Univariate analysis was done for assessing the relationship of various clinical symptoms with the defect parameters and number of previous caesarean sections

and also the relationship of the position of the uterus with respect to the defect parameters. Multiple logistic regression was done to analyse the association between various symptoms and number of previous caesarean sections with scar defect dimensions namely the width, depth of the defect and the deficiency ratio. A $p<0.05$ was considered to be statistically significant.

RESULTS

200 patients met the inclusion criteria with CSD after ruling out other gynaecological comorbidities by transvaginal ultrasonography and endometrial biopsy. The baseline characteristics of the study participants are shown in Table 1.

The commonest symptom was dysmenorrhea, which was present in 35% of the patients, followed by postmenstrual spotting in 29% of the patients. Majority of the patients had anteflexed uteri (82.5%). 79 patients with demonstrable scar defect on ultrasound, did not have any symptoms and among them 12 had retroflexed uteri.

The relationship of clinical symptoms with the depth and width of the scar defect, and the deficiency ratio is shown in Table 2. The mean defect width, depth of the defect and the deficiency ratio were almost similar in patients with and without symptoms. The measured defect measurements were compared with various gynaecological symptoms using univariate analysis. None of the symptoms were significantly associated with the depth and width of the defect or the deficiency ratio.

Table 3 shows the relationship of number of previous caesarean sections and the position of uterus with the scar defect parameters and the deficiency ratio. The mean width and depth of the defect in patients with two or more caesarean sections were higher than in patients with previous one caesarean section. Similarly, the defects were larger in retroflexed uteri. The association of number of previous caesarean sections with the width and depth of the defect and the deficiency ratio was found to be statistically significant ($p<0.05$). Significant difference in the defect dimensions and deficiency ratio were noted among patients with retroflexed uteri as compared to patients with anteflexed uteri ($p=0.000$).

Univariate analysis showed a significant correlation of the number of previous caesarean sections and retroflexed position of uterus with the width and depth of the defect as shown in Table 4.

Table 1: Baseline characteristics of the study subjects.

Variables		N=200 (%)
Age (years)		38.58±6.8
Socio economic class	2	5 (2.5)
	3	108 (54.0)
	4	87 (43.5)
Previous caesarean section	1	40 (20.0)
	2	134 (67.0)
	3	26 (13.0)
Postmenstrual bleeding	Present	58 (29.0)
	Absent	142 (71.0)
Dysmenorrhoea	Present	70 (35.0)
	Absent	130 (65.0)
Dyspareunia	Present	35 (17.5)
	Absent	165 (82.5)
Chronic pelvic pain	Present	28 (14.0)
	Absent	172 (86.0)
Uterus position	Retro-flexed	35 (17.5)
	Ante-flexed	165 (82.5)

Table 2: The relationship of clinical symptoms with the depth and width of the scar defect, and the deficiency ratio.

Clinical symptoms		Width (mm)	Depth (mm)	Residual myometrial thickness (mm)	Ratio
		Mean±SD	Mean±SD	Mean±SD	Mean±SD
Postmenstrual bleeding	Present (n=58)	3.51±1.13	6.10±1.24	5.66±1.09	0.45±.091
	Absent (n=142)	3.26±1.77	5.93±1.19	5.88±1.23	0.46±0.096
	p value	0.324	0.378	0.240	0.233
Dysmenorrhoea	Present (n=70)	3.33±1.11	6.12±1.26	5.71±1.14	0.45±0.092
	Absent (n=130)	3.34±1.83	5.90±1.17	5.88±1.21	0.46±0.096
	p value	0.949	0.227	0.321	0.385
Dyspareunia	Present (n=35)	3.20±1.12	5.83±1.17	5.78±1.23	0.46±0.097
	Absent (n=165)	3.36±1.70	6.01±1.21	5.83±1.18	0.46±0.094
	p value	0.590	0.427	0.845	0.727
Chronic pelvic pain	Present (n=28)	3.28±1.12	5.91±1.25	5.96±1.14	0.47±0.09
	Absent (n=172)	3.34±1.68	5.99±1.20	5.80±1.20	0.46±0.095
	p value	0.849	0.750	0.506	0.515

Table 3: The relationship of number of previous caesarean sections and the position of uterus with the scar defect parameters and the deficiency ratio.

Parameters		Width (mm)	Depth (mm)	Residual myometrial thickness (mm)	Ratio
		Mean±SD	Mean±SD	Mean±SD	Mean±SD
Previous LSCS	1 (n=40)	2.88±1.01	5.23±0.74	6.14±0.86	0.49±0.063
	>2 (n=160)	3.24±1.72	6.16±1.22	5.74±1.25	0.45±0.099
	p value	0.008	0.000	0.021	0.001
Uterine position	Anteflexed (n=165)	3.08±1.61	5.64±0.94	6.08±0.99	0.487±0.076
	Retroflexed (n=35)	4.54±0.98	7.56±1.03	4.61±1.32	0.351±0.093
	p value	0.000	0.000	0.000	0.000

Table 4: Univariate analysis of position of the uterus and the number of previous caesarean sections with the defect parameters.

Parameter	Defect parameters (mm)	B (S.E.)	Significant	(OR) 95% CI
Retroflexed position of the uterus	Width	-0.182 (0.135)	0.178	(0.834) 0.640-1.086
	Depth	-1.400 (0.525)	0.008	(0.247) 0.088-0.690
Number of previous LSCS	Width	0.001 (0.117)	0.995	(1.001) 0.7961-0.259
	Depth	-1.924(0.476)	0.000	(0.146) 0.057-0.371

Table 5: Multiple logistic regression analysis of clinical symptoms, number of previous caesarean sections with defect parameters.

Clinical symptoms		Width (mm)	Depth (mm)	Ratio of residual myometrium to the adjacent myometrium
		Mean ± SD	Mean ± SD	Mean ± SD
Postmenstrual bleeding	Present (n=13)	4.59±0.70	7.57±0.84	0.3623±0.07
	Absent (n=22)	4.51±1.12	7.56±1.15	0.3445±0.10
	p value	0.823	0.971	0.594
Dysmenorrhoea	Present (n=15)	4.52±0.90	7.713±1.00	0.3485±0.07
	Absent (n=20)	4.56±1.05	7.460±1.07	0.3531±0.10
	p value	0.907	0.481	0.890
Dyspareunia	Present (n=5)	4.44±1.29	7.760±0.43	0.3073±0.034
	Absent (n=30)	4.56±0.94	7.537±1.10	0.3584±0.098
	p value	0.804	0.661	0.264
Chronic pelvic pain	Present (n=6)	4.55±0.50	7.700±0.90	0.3647±0.094
	Absent (n=29)	4.54±1.05	7.541±1.07	0.3483±0.094
	p value	0.985	0.738	0.703
Previous LSCS	1 (n=3)	3.50±1.32	5.66±0.57	0.506±0.02
	>2 (n=32)	4.64±0.90	7.74±0.87	0.336±0.08
	p value	0.053	0.000	0.000

Multivariate analysis was done for assessing the association of clinical symptoms, number of previous caesarean sections with the defect parameters namely the depth, width and the deficiency ratio. None of the clinical symptoms had any association with the defect parameters. However, patients with two or more caesarean sections had significantly higher depth and deficiency ratio as shown in Table 5.

Among the 35 patients with retroflexed uteri, no statistically significant association was found with their clinical symptoms.

Summary of this is the width, depth and deficiency ratio of the caesarean scar defect were found to be significantly higher as the number of caesarean sections increased in patients. Patients with retroflexed uteri were found to have larger caesarean scar defects. There was no association of clinical features in patients with the defect dimensions and position of the uterus.

DISCUSSION

In a study done by Wang et al, patients were recruited based on ultrasonographic findings and then their clinical histories were reviewed. The missing history from

patients were obtained through telephonic contact. Since this study was done to find out the association of clinical symptoms with the scar defect, history from patients were obtained at the first outpatient visit. The study patients underwent transvaginal ultrasonography on the first day of their hospital visit. Transvaginal ultrasonography is an accepted modality for diagnosing scar defect in the presence of fluid in the endometrial cavity. Endometrial biopsy and cervical cytology were done on the outpatient basis to rule out endometrial causes and premalignant lesions of the cervix.

Prevalence of the cesarean scar defect varies widely according to populations. RM Antila-Langsjo et al conducted a prospective study on prevalence and risk factors in post-operative women in Finland.[4]The prevalence was as high as 45.6%. The exact prevalence of cesarean scar defect in India is yet to be studied. An attempt to find the prevalence was not sought owing to the heterogeneity of the population.

Morris et al in their series of 51 cases of hysterectomy suggested that patients with CSD have pathologic abnormalities in the scar site like lymphocytic infiltration, fibrosis, and, iatrogenic adenomyosis contributing to clinical symptoms such as chronic pelvic pain and dysmenorrhea.[15] Such defects are said to retain menstrual blood and give rise to postmenstrual spotting. This was said to the most common symptom according to Wang et al.[5] In this study, dysmenorrhea was the commonest symptom among patients, followed by postmenstrual spotting. About 39.5% of the sample population did not have any clinical symptom despite the presence of a demonstrable scar defect.

In contrast to the study by Wang et al statistical analysis failed to establish a significant association of symptoms with the defect. The presence of a demonstrable cesarean scar defect did not entail a significant clinical symptom. This can possible mean that the defects were not large enough to retain menstrual blood or the absence of any denovo angiogenic factors and, inflammation. Further studies are needed to evaluate and grade such defects, which would help in further management.

The deficiency ratio or the healing ratio, according to Ofili et al, is said to represent the myometrial loss at the scar site.[11] Technically, lesser the ratio, more is the myometrial loss and that should correlate with symptoms of the patient. In this study, the mean deficiency ratio was 0.49 in patients with previous one cesarean sections when compared to 0.45 in patient with two or more cesarean sections. Similarly, the deficiency ratio showed a significant correlation with retroflexed uteri. Though the deficiency ratio showed a significant correlation with the number of previous cesarean sections and the retroflexed position of the uterus (P= 0.001, P= 0.000, table 3), there was no correlation with the clinical symptoms.

According to Regnard et al, the depth of the scar defect is said to increase as the number of caesarean sections increase.[16] A scar dehiscence was also described in their study where there was more than 80% loss of myometrium at the scar site. According to study, a deeper defect was noted in patients with two or more caesarean sections. This suggests that with repeated injury to the uterus, healing at the scar site is impaired and the uterine wall is rendered thin. Retroflexed uteri were found to be associated with larger defects. The stretch on the lower segment scar due to the retroflexed position of the uterus is said to impair healing and this can lead to larger defects. In the study, in addition to the depth and width of the scar, the deficiency ratio was also found to be significant in patients with retroflexed uteri that supports the above-mentioned theory.

This study established that with rising number of cesarean sections and retroflexed uterine position, the dimensions of the cesarean scar defect increases. But no clinical correlation could be established. The deficiency ratio also shows a similar correlation.

The diagnostic modality of choice, the recognition of the entity, and various potential complications like cesarean scar ectopic, secondary infertility are widely studied. Further studies are needed for population-based prevalence estimation, evaluation of risk factors and treatment modalities.

Limitations of the study

The patients who turn up at the hospital for various gynecological disorders or screening purposes may not be truly representative of the population with clinical symptoms. Also, in low socio-economic groups, patients with chronic pelvic pain and dyspareunia do not commonly report to the hospital for clinical evaluation. All of the above-mentioned reasons could have resulted in under-reporting of symptoms by patients that may under-estimate the prevalence of this condition.

Patients with secondary infertility were not included in this study since even after excluding other causes of infertility, establishing cesarean scar defect as an etiology needs further investigations.

CONCLUSION

CSD dimensions and the deficiency ratio correlates with the number of previous caesarean sections and the position of the uterus in patients. There was no association of clinical symptoms of patients with the defect parameters.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Madhangi VB, Ramany C. Cesarean scar defect and its association with clinical symptoms, uterine position and the number of cesarean sections. Int J Reprod Contracept Obstet Gynecol 2020;9:4091-6.