

Isthmocele; An Overlooked Cause of Abnormal Uterine Bleeding and Other Gynecological Complications

İsthmosel; Anormal Uterus Kanamalarının ve Diğer Jinekolojik Komplikasyonların Gözden Kaçan Nedeni

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ABSTRACT

Objective: Cesarean scar defects (isthmocele); are characterized by insufficient uterine scar formation or scar separation after cesarean section. The diagnosis of isthmocele is often found incidentally in patients presenting with clinical symptoms such as postmenstrual spotting, dysmenorrhea, dyspareunia, and chronic pelvic pain. The aim of this study was to describe the prevalence of various clinical symptoms in patients with cesarean scar defect and to determine the relationship between the size of the cesarean scar defect, uterine position, previous cesarean section number, and clinical complaints. **Material and Methods:** Between March 2019 and May 2022, 97 patients diagnosed with cesarean scar defects were included in the study. Three different parameters were examined: Scar depth (the distance vertically between the defect's base and its peak), scar breadth (the length of the biggest breach in the cervicoistmic canal), and the thickness of the remaining myometrium. The position of the uterus was also noted. **Results:** A statistically significant difference was found in terms of the number of cesarean sections (C/S) and defect width depending on whether the participants had postmenstrual bleeding or not (p:0.039, p:0.000). A statistically significant difference was found in terms of residual myometrial thickness depending on whether the participants had postmenstrual bleeding or not (p:0.001). There was a statistically significant, positive, and moderate relationship between the number of cesarean sections and the width of the defect (p:0.005, r= .454). A statistically significant difference was found in the number of cesarean sections and defect widths depending on whether the participants had dysmenorrhea (p: 0.044, p: 0.000). The number of cesarean sections and the width of the defect show a statistically significant difference according to whether the participants have chronic pelvic pain or not (p: 0.036, p:0.000). **Conclusion:** The incidence and prevalence of isthmocele are higher than most gynecologists realize. Isthmocele can develop after cesarean section in women, and as a result, women may experience long-term complications that morbidly affect the rest of their lives. The most effective way to reduce the prevalence of isthmocele is to reduce the number of cesarean section operations. It is important for physicians to keep the isthmocele in mind when examining the complaints of dysmenorrhea and chronic pelvic pain in women.

Keywords: Cesarean section; scar; isthmocele

ÖZET

Amaç: Sezaryen skar defektleri (isthmosel); sezaryen sonrasında yetersiz uterin skar oluşumu veya skarın ayrılması ile karakterizedir. İsthmosel tanısı sıklıkla adet sonrası lekelenme, dismenore, disparoni, kronik pelvik ağrı gibi klinik semptomlarla başvuran hastalarda tesadüfen saptanır. Bu çalışmanın amacı, sezaryen skar defekti olan hastalarda çeşitli klinik semptomların prevalansını tanımlamak ve sezaryen skar defektinin boyutu, uterus pozisyonu ve önceki sezaryen sayısı ile klinik şikayetler arasındaki ilişkiyi belirlemektir. **Gereç ve Yöntemler:** Mart 2019-Mayıs 2022 tarihleri arasında Sezaryen skar defekti tanısı alan 97 hasta dahil edilmiştir. Üç farklı parametre: Skar derinliği (defektin tabanı ile zirvesi arasındaki dikey mesafe), skar genişliği (servikoistmik kanaldaki en büyük yarığın uzunluğu) ve kalan miyometriyumun kalınlığı incelendi. Uterusun pozisyonu ek olarak değerlendirildi. Dismenore, postmenstrüel lekelenme, disparoni gibi klinik semptomlar, hastaların tıbbi geçmişleri incelendikten sonra veri tabanından kontrol edildi. **Bulgular:** Katılımcıların postmenstrüel kanama geçirip geçirmemesine göre rezidual miyometriyal kalınlık açısından istatistiksel olarak anlamlı farklılık bulundu (p:0.039, p:0.000). Katılımcıların postmenstrüel kanama geçirip geçirmemesine göre rezidual miyometriyal kalınlık açısından istatistiksel olarak anlamlı farklılık bulundu (p:0.001). Sezaryen sayısı ile defektin genişliği arasında istatistiksel olarak anlamlı, pozitif ve orta düzeyde bir ilişki vardı (p:0.005, r= .454). Katılımcıların dismenore olup olmasına göre sezaryen sayısı ve defekt genişlikleri istatistiksel olarak anlamlı bir farklılık saptanmıştır (p: 0.044, p:0.000). Katılımcıların kronik pelvik ağrısı olup olmasına göre sezaryen sayısı ve defekt genişlikleri istatistiksel olarak anlamlı bir farklılık saptanmıştır (p: 0.036, p:0.000). **Sonuç:** İsthmosel insidansı ve prevalansı çoğu jinekoloğun düşündüğünden daha yüksektir. Kadınlarda sezaryen sonrası isthmosel gelişebilir ve bunun sonucunda kadınlar hayatlarının geri kalanını morbid olarak etkileyen uzun vadeli komplikasyonlar yaşayabilirler. İsthmosel prevalansını azaltmanın en etkili yolu sezaryen ameliyatlarının sayısını azaltmaktır. Hekimlerin, dismenore ve kronik pelvik ağrıdan şikayet eden kadınlarda İsthmosel'i akılda tutması önemlidir.

Anahtar Kelimeler: Sezaryen; skar; isthmosel

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Cesarean scar defects are characterized by insufficient uterine scar formation or scar separation after cesarean section.¹ In these cases, there is no myometrial continuity in the region of the cesarean scar.¹ It has been reported that these anatomical flaws brought on by prior cesarean deliveries are linked to persistent spotting during the menstrual cycle.¹⁻⁴ While the rate of cesarean delivery recommended by the World Health Organization is 10-15 %, this rate is over 50% in our country.⁵ In relation to the high cesarean section rate, we frequently encounter isthmocele in the clinic due to the loss and thinning of the uterine muscle layer in the cesarean section line.⁵

Isthmocele was first reported by Poidevin as a cesarean scar defect in 1961.⁶ In the literature, isthmocele is also terminologically called niche, pouch, uterine dehiscence, and diverticulum.^{4,7,8} Using transvaginal ultrasonography to find these problems is highly helpful and the free use of transvaginal ultrasonography has increased the identification of cesarean scar defects. Patients who present with clinical symptoms such as chronic pelvic pain, dyspareunia, dysmenorrhea, and postmenstrual spotting discomfort are frequently diagnosed with isthmocele by accident.^{4,9,10} Isthmocele, which is frequently detected in routine examinations, may be clinically asymptomatic or may present with many clinical conditions and complications such as menstrual irregularities, infertility, chronic pelvic pain, scar pregnancies, scar separation, uterine rupture.^{11,12} Transvaginal ultrasound usage in the detection of cesarean scar was first reported in 1990. In this publication, 4 key ultrasonographic findings were described. These are wedge-shaped defects, inward protrusion of the scar, outward protrusion of the scar and hematoma, and scar retraction.¹³ Vervoort et al. defined the isthmocele, which they named a niche, as a myometrial defect with a depth of at least 2 mm, and wide niche was defined as ≤ 2.2 mm residual myometrium thickness by transvaginal ultrasonography and ≤ 2.5 mm by sonohysterography.¹⁴ Van der Voet et al. stated that sonohysterography is more sensitive than transvaginal ultrasonography, but the depth and width of the defect are measured larger with this method.¹⁵ In addition to ultrasound, imaging methods such as saline hysterosonography and magnetic resonance (MR) can be used in the diagnosis of

isthmocele.^{11,16} It is difficult to report a clear prevalence for isthmocele, as many patients are asymptomatic.¹⁷ In the literature, it is stated that most of the isthmocele cases are diagnosed while investigating the cause of recurrent miscarriages, ectopic pregnancies in the cesarean section, and abnormal uterine bleeding.¹⁷ In one study, isthmocele was classified as systemic. This classification is based on the shape (triangular, semicircular, water drop), depth, and volume of the isthmocele.¹⁸ Classification can also be made according to ultrasonographic measurements of the isthmocele. An isthmocele measurement of <15 mm was determined as 1st degree, between 16 and 25 mm as 2nd degree, and >25 mm was determined as 3rd degree.¹⁹ The purpose of this research was to characterize the frequency of different clinical symptoms in patients with cesarean scar defects and to ascertain the correlation between clinical complaints and the size of the cesarean scar defect, the position of the uterus, and the number of prior cesarean sections.

MATERIAL AND METHODS

Between March 2019 and May 2022, 950 females having a cesarean section history who underwent transvaginal ultrasound screening for a variety of gynecological conditions were included in this research. A total of 123 females having cesarean scar defects were found to be eligible for analysis, and 26 of these were excluded because of the presence of other uterine pathologies, and 7 participants were excluded from the research due to the presence of endometrial hyperplasia and polyps, 2 patients due to the presence of uterine malignancy, and 17 patients due to the presence of Myoma Uteri. Therefore, the study population consisted of 97 patients with cesarean scar defects.

Sonographic evaluation of the Caesarean Scar Defect was conducted using a Voluson 730 Expert ultrasound equipment which has a 7-9 MHz transvaginal probe. All participants with suspected isthmocele were also consulted by the radiology department and the diagnosis of isthmocele was confirmed with the same device. The development of a hypoechoic region (filling defect) in the lower uterine segment's myometrium at the location of the prior cesarean section incision led to the diagnosis of a cesarean scar defect.

After the definition of the cesarean scar defect was made, the myometrial defect was measured and evaluated according to the following parameters. Three different parameters were examined: Scar depth (the distance vertically between the defect's base and its peak), scar breadth (the length of the biggest breach in the cervicoistmic canal), and the thickness of the remaining myometrium.²⁰

The position of the uterus was also noted. In contrast to uterine retroflexion, which is the posterior deviation of the axis, uterine antelexion is described as the anterior deviation of the long axis of the uterus endometrial cavity toward the cervical axis.

Clinical symptoms included dysmenorrhea, postmenstrual spotting, dyspareunia, and persistent pelvic pain checked from the database after reviewing the medical histories of the patients. Only the dimensions of the biggest measurement were recorded when a patient underwent several ultrasound tests throughout the research period. This was done by reviewing the patient's medical records and photos. The study was written in accordance with the Principles of the Declaration of Helsinki. Within the scope of the research, first of all, general information about the participants was summarized with descriptive statistics.

Afterward, the skewness and kurtosis values of the continuous data were investigated, and it was discovered that the values were in the range of +1.5 to -1.5. Therefore, it was concluded that distributions of continuous variables were normal. Then, a t-test was employed for pairwise comparisons, Pearson correlation was employed in the investigation of the relations between continuous variables and chi-square was used in the analysis of the relations between the categorical variables. Ethics committee approval numbered 2486-GOA was obtained from the ethics committee. In our study, an Informed Consent form was obtained from the patients and the rules regarding animal rights were followed. The research data were statistically analyzed using SPSS version 20 (IBM SPSS Statistics, IBM Corporation, Armonk, NY, USA).

RESULTS

The mean age of the participants was 30.78 ± 4.63 , the mean cesarean section number was 2.09 ± 0.91 , the mean defect width was 6.56 ± 1.59 mm, the mean de-

fect depth was 7.09 ± 0.71 mm and the mean residual myometrial thickness was 4.55 ± 0.56 mm. 52.6% of the participants had postmenstrual bleeding, 38.1% had dysmenorrhea, 32% had chronic pelvic pain, and 26.8% had dyspareunia. It was determined that the uterus position was antelexion in 79.4% of the participants. A statistically significant difference was found between patients with and without postmenstrual bleeding in terms of the number of cesarean sections and defect width ($p:0.039$, $p:0.000$). A statistically significant difference was found in terms of residual myometrial thickness between patients with and without postmenstrual bleeding ($p:0.001$). There was no statistically significant difference with regard to defect depth ($p:0.833$). There was a statistically significant difference in the number of cesarean sections and defect widths between patients with and without dysmenorrhea ($p:0.044$, $p:0.000$). No statistically significant difference was found between women with and without dysmenorrhea in terms of defect depths and residual myometrium thickness ($p:0.902$, $p:0.439$). A statistical difference was found between patients with and without chronic pelvic pain in terms of the number of cesarean sections and defect widths ($p:0.036$, $p:0.000$). There was no statistically significant difference between patients with and without chronic pelvic pain in terms of defect depths and residual myometrial thicknesses ($p:0.760$, $p:0.100$) (Table 1).

There was a statistically significant, positive, and moderate relationship between the number of cesarean sections and the width of the defect ($p:0.005$, $r=0.454$), and a statistically significant, positive, and weak relationship between the number of cesarean sections and the defect depth ($p:0.022$, $r=0.253$). A statistically significant, negative, and weak correlation was observed between the residual myometrial thickness and the number of cesarean sections ($p:0.018$, $r=0.219$) (Table 2).

No statistically significant difference was found between the mean number of cesarean sections according to whether the participants had dyspareunia or not ($p:0.252$). No statistically significant difference was found between defect width, and defect depth according to whether the participants had dyspareunia or not ($p:0.661$, $p:0.466$). No statistically significant difference was found between residual myometrial thickness according to whether the participants had

TABLE 1: The relationship between ultrasonographic data and symptoms.

Variables		N	Number of C/S		Defect Width		Defect Depth		Residual Myometrial Thickness	
			Mean±SD	p	Mean±SD	p	Mean±SD	p	Mean±SD	p
Postmenstrual Bleeding	yes	51	2.27±1.00	0.039	7.58±1.38	0.000	7.11±0.78	0.833	4.38±0.52	0.001
	no	46	1.89±0.76		5.44±0.93		7.08±0.63		4.74±0.55	
Dysmenorrhea	yes	37	2.35±1.08	0.044	7.21±1.52	0.001	7.11±0.72	0.902	4.49±0.46	0.439
	no	60	1.93±0.75		6.17±1.52		7.09±0.71		4.58±0.62	
Chronic Pelvic Pain	yes	31	2.41±1.11	0.036	7.47±1.38	0.000	7.13±0.67	0.760	4.41±0.49	0.100
	no	66	1.93±0.76		6.14±1.52		7.08±0.73		4.61±0.59	

TABLE 2: The relationship between the number of cesarean sections and ultrasonographic data.

	1	2	3	4
1. Number of cesarean section	1			
2. Defect width	.454**	1		
3. Defect depth	.253*	.598**	1	
4. Residual myometrial thickness	.219*	.397**	.109	1

*r: Correlation coefficient.

dyspareunia or not (p:0.608). No statistically significant relationship was observed between the participants' uterine positions and dysmenorrhea(p:0.061). No statistically significant relationship was observed between the participants' uterine positions and dyspareunia (p:0.838). No statistically significant relationship was observed between the participants' uterine positions and chronic pelvic pain (p:0.833).

DISCUSSION

This research conducted on patients with cesarean scar defects revealed a correlation between clinical symptoms and the extent of defects. A statistically significant difference was found between patients with and without postmenstrual bleeding in terms of the number of cesarean sections and defect width (p:0.039, p:0.000). A statistically significant difference was found in terms of residual myometrial thickness between patients with and without postmenstrual bleeding (p: 0.001). The mean cesarean section number and mean defect width were found to be higher in patients with postmenstrual bleeding. The mean residual myometrial thickness was found to be lower in patients with postmenstrual bleeding. In our research was a statistically significant, positive, and

moderate relationship between the number of cesarean sections and the width of the defect (p:0.005, r=.454), and a statistically significant, positive, and weak relation between the number of cesarean sections and the defect depth (p<0.022, r=.253). Similarly, in two different studies, it was found that there was no relation between the depth of the cesarean scar defect and the history of multiple cesarean sections.^{21,22} In these studies, saline contrast sonohysterography was employed to measure the cesarean scar defect and it is thought that there may be an increase in the size of the measured cesarean scar defect due to the problems of this technique.^{21,22} In another study, a relationship was found, similar to our study, between the width of the cesarean scar defect and postmenstrual bleeding.²³ A statistically significant difference was found between the patients with and without dysmenorrhea in terms of defect widths and the number of cesarean sections. (p:0.001, p:0.044). It is thought that residual blood accumulated in the cesarean scar line triggers this process. The average number of cesarean sections and defect widths were higher in those with dysmenorrhea.

In another study, similar to our study, a relation was observed between the width of the Caesarean scar defect and dysmenorrhea.²³ A statistically significant difference was found between patients with and without chronic pelvic pain in terms of the number of cesarean sections and defect widths. (p:0.036, p:0.000). Menometrorrhagia, which is thought to develop due to isthmocele, is thought to cause this. The average number of cesarean sections and defect widths are higher in those with chronic pelvic pain. Similar to our study, another study found a relation-

ship between the width of the cesarean scar defect and chronic pelvic pain.²³ Similarly, in another study, besides the negative effect of isthmocele on the menstrual cycle, its relationship with chronic pelvic pain was revealed.²⁴ In our study, there is a statistically significant, negative, and weak correlation between the number of cesarean sections and residual myometrial thickness ($p:0.018$, $r=-.219$). Failure to repair the myometrium layer properly is thought to be the reason for this. No statistically significant relationship was observed between the participants' uterine positions and dysmenorrhea ($p:0.061$). No statistically significant relationship was observed between the participants' uterine positions and dyspareunia ($p:0.838$). No statistically significant relationship was observed between the participants' uterine positions and chronic pelvic pain ($p:0.833$). In another study, contrary to our study, a significant correlation was found between the width of the cesarean scar defect and the retroflex uterus.²³ In this study, the history of more than one cesarean section was found to be correlated with dysmenorrhea independent of the width of the cesarean scar defect but unrelated to postmenstrual bleeding or chronic pelvic pain.²³ The literature reports a variety of Caesarean scar defect rates.^{10,23,25} The prevalence of cesarean scar defect in our screened female population was found to be significantly higher (123/950 12.9%) compared to other studies.^{23,25} However, there is another study reporting a higher prevalence of 19.4%.¹⁰ In this study, the source and criteria for the selection of the participants were not mentioned.¹⁰ It is necessary to do a cohort study with a bigger group of women who have undergone cesarean sections to accurately determine the prevalence of cesarean scar defect. In some studies, it has been shown that the depth of the Caesarean scar defect is larger in individuals with retroflex uterus than in patients with anteflex uterus.^{10,23} This is thought to be caused by the retroflex uterus reducing vascular perfusion and putting excessive pressure on the lower part of the uterus, compromising the healing capacity of the cesarean scar. Moreover, it is thought that a history of more than one cesarean section may affect tissue perfusion. First, in a study, abnormalities in cesarean section scars were evaluated by transabdominal sonography.²⁶ There are studies reporting that saline contrast sonohysterography using a hystero in-

jector to inject saline into the cervical cavity is useful for evaluating scar integrity.^{22,27} Despite its low cost-effectiveness, this approach is not without danger and has limited use.¹⁰ Prolonged delivery time before cesarean section, cervical dilatation over 5 cm, induction of labor with oxytocin, and the existence of a retroverted uterus are warning signs for the isthmocele development.²⁸⁻²⁹ In our study, the obstetric results of the patients regarding these parameters could not be obtained. In some studies, it has been stated that the isthmocele development is linked with body mass index, preeclampsia, postoperative anemia, and membranes premature rupture.³⁰ In our study, the obstetric results of the patients regarding these parameters could not be obtained. The diagnosis of abnormalities in cesarean scars can be done using three-dimensional ultrasonography, which may have certain advantages over traditional sonography.³¹ Transvaginal sonography is still the method of choice for assessing Caesarean scar abnormalities because of its ease of use, non-invasiveness, and affordability.³²

The lack of detailed information on how cesarean deliveries are performed is considered one of the potential limitations of this retrospective analysis. The most important reason for this is that the cesarean section operations of these patients are performed by different doctors. Additionally, there was a lack of knowledge of suture procedures, cesarean indications, and hospital circumstances following a cesarean section. Therefore, it was unclear how these variables might affect the development of cesarean scar abnormalities. The scheduling of ultrasound scans was not consistent, which was another drawback.

CONCLUSION

The incidence and prevalence of isthmocele are higher than most gynecologists realize. Isthmocele can develop after cesarean section in women, and as a result, women may experience long-term complications that morbidly affect the rest of their lives. The most effective way to reduce the prevalence of isthmocele is to reduce the number of cesarean section operations. It is important for physicians to keep the isthmocele in mind when complaining of dysmenorrhea and chronic pelvic pain in women.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the

potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: Ufuk Atlhan; **Design:** Ümit Derundere; **Control/Supervision:** Ufuk Atlhan; **Data Collection and/or Processing:** Ufuk Atlhan; **Analysis and/or Interpretation:** Ümit Derundere; **Literature Review:** Ufuk Atlhan; **Writing the Article:** Ufuk Atlhan; **Critical Review:** Ümit Derundere; **References and Fundings:** Ufuk Atlhan; **Materials:** Ufuk Atlhan.

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