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Outcomes and Complications of Cesarean Scar Pregnancy: A Retrospective Study

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ABSTRACT

Background & Objective: Cesarean scar pregnancy (CSP) is a rare form of ectopic pregnancy characterized by the implantation of the gestational sac in the uterine scar from a previous cesarean section. The incidence of CSP is rising, attributed to increased cesarean deliveries. This study was performed with aim to evaluate the outcomes and complications associated with CSP treatment at Imam Khomeini Hospital in Ahvaz.

Materials & Methods: This retrospective study was conducted on 261 patients diagnosed with CSP. Data were collected regarding demographic characteristics, treatment modalities, and subsequent pregnancy outcomes through patient records and follow-up calls. Treatment options included curettage, conservative management, medical therapy, resection, and hysterectomy. Chi square and one-way ANOVA tests were used to compare the outcomes and complications between the treatment modalities.

Results: The mean age of participants was 34.81 ± 9.2 years, with a mean gestational age at diagnosis of 48.74 ± 10.33 days. Following treatment, 96 (36.78%) of patients became pregnant again. The reported complications included infertility 34 (13.03%), recurrent CSP 14 (5.36%), and placenta accreta 15 (5.75%). Additionally, 63 (24.14%) experienced abnormal uterine bleeding, and 25 (9.58%) had abortions in subsequent pregnancies. The complications did not exhibit statistically significant differences between the treatment modalities (P>0.05).

Conclusion: The findings of the present study highlight the significant rates of subsequent pregnancies following CSP treatment and the associated complications that may arise. The findings also underscore the need for careful monitoring and individualized management strategies for women with a history of CSP to optimize maternal health outcomes and inform future reproductive planning.

Keywords: Cesarean Scar Pregnancy, Ectopic Pregnancy, Treatment Outcomes, Complications

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1. Introduction

Cesarean scar pregnancy (CSP) is a rare and potentially life-threating condition that occurs when an embryo implants and grows within a previous cesarean section scar or other uterine scars **(1)**. The exact incidence of CSP remains unknown due to its rarity; however, it is estimated to occur in approximately 1 in 1,800 to 1 in 2,000 pregnancies **(2)**. The incidence of CSP is increasing, largely attributed to the growing number of primary cesarean sections and a decrease in vaginal deliveries following a previous cesarean. Currently, CSP represents approximately 6.1% of all ectopic pregnancies **(3)**.

The early symptoms of CSP are atypical and if not diagnosed timely, it may lead to the risk of miscarriage or the need for a dilation and curettage, which can result in incomplete abortion. This often leads to significant vaginal bleeding, posing a serious threat to the patient's life **(4, 5)**. Furthermore, CSP can cause severe complications, including heavy vaginal bleeding, placenta accreta spectrum, uterine arteriovenous fistula, and uterine rupture that may impact on the mother's health and require immediate medical attention **(6-8)**.

The primary goal in treating CSP is to reduce the impact on fertility and future pregnancies. CSP is typically diagnosed before delivery using ultrasound. The diagnosis is based on observing the gestational sac in the previous cesarean scar, along with an empty

uterine cavity and thin myometrium **(9, 10)**. Although women with a history of CSP are at higher risk for recurrent CSP and other serious maternal complications in subsequent pregnancies, those who maintain their fertility after CSP treatment can become pregnant again **(11)**.

The gestational age, desire for future fertility, and available resources are the factors affecting the choice of treatment method **(12)**. There are various treatment options, including medical and surgical approaches such as laparoscopy, laparotomy, uterine artery embolization, and the injection of potassium chloride and methotrexate directly into the gestational sac **(13)**. If the uterus is successfully preserved after CSP treatment, women can attempt to conceive again. However, complications in subsequent pregnancies may include recurrent CSP, missed abortions, placenta previa or accreta, and life-threatening hemorrhage **(4, 11)**. Given the rising number of cesarean sections and consequently increased cases of CSP, examining these complications can enhance clinical management and treatment decision-making. Accurate information regarding the frequency and types of complications associated with CSP can not only assist physicians in early diagnosis and appropriate treatment, but also provide awareness of risks and treatment options for women with a history of cesarean delivery. Therefore, this study was conducted with aim to investigate the outcomes of subsequent pregnancies in women following successful treatment of CSP.

2. Materials and Methods

This cross-sectional (descriptive-analytical) research was conducted on patients who were treated for CSP at Imam Khomeini Educational Hospital, affiliated with Ahvaz University of Medical Sciences in 2017 to 2021.

Following the approval of the research proposal by the Research Council of Jundishapur University of Medical Sciences and obtaining an ethical code (IR.AJUMS.REC.1403.060), data were collected through a census of patients with a history of treated CSP. This information was gathered using a researcher-designed checklist. Given that patients with a history of CSP undergo treatment during their hospital stay following diagnosis, follow-up assessments were conducted via phone calls after hospital discharge. During these follow-up calls, various aspects were assessed, including the history of recurrent cesarean scar pregnancy, abnormal uterine bleeding (AUB), miscarriages, preterm births, placenta accreta, dysmenorrhea, dyspareunia, and infertility. All diagnoses were confirmed based on pelvic ultrasound findings, and patients received comprehensive treatment.

The inclusion criteria were a history of treated cesarean scar pregnancy and women under 45 years of age. The exclusion criteria were uterine scar pregnancy associated with heterotopic pregnancy, concurrent hysterectomy or sterilization leading to the loss of natural fertility capabilities, and severe adhesions in the uterus post-surgery affecting fertilization. The complications and outcomes included the frequency of pregnancy occurrences, recurrent CSP, AUB, miscarriages, preterm labour, placenta accreta, dysmenorrhea, dyspareunia, and infertility. This information was obtained through reviewing patient records or follow-up via telephone.

Statistical analysis was performed using Stata software (version 17). Descriptive statistics, including mean and standard deviation for continuous variables and frequency and percentage for categorical variables were calculated to summarize the demographic and clinical characteristics of the participants. Comparisons between treatment groups were conducted using one-way ANOVA for continuous variables and the Chi-square test for categorical variables. $P<0.05$ was considered statistically significant.

3. Results

The research involved 261 patients with a history of treated CSP with an average age of 34.81 ± 9.25 years and a mean gestational age at diagnosis of 48.74 ± 10.33 days. The study included patients in six treatment groups: curettage (n=155), conservative treatment (n=12), medical treatment (n=19), resection (n=31), combination of curettage and medical treatment (n=35), and hysterectomy (n=9). Significant differences were observed across the treatment groups regarding age ($P = 0.003$), gestational age ($P < 0.001$), and gravidity ($P = 0.033$). However, the study groups were homogenous in terms of parity, previous cesarean number, abortion and ectopic pregnancy ($P>0.05$) (Table 1).

Following CSP treatment, 36.78% of patients became pregnant again. Moreover, various complications were reported: 13.03% experienced infertility, 5.36% had recurrent CSPs, and 5.75% developed placenta accreta. Additionally, 24.14% of patients reported abnormal uterine bleeding (AUB), 9.58% experienced abortion in subsequent pregnancies, and 4.21% had preterm labour. Gynecological symptoms were also prevalent among the patients treated, with 26.44% reporting dysmenorrhea and 21.07% experiencing dyspareunia (Figure 1). The outcomes were compared across different treatment approaches. While some variations in outcomes were observed across the groups, complications did not show statistically significant differences between the treatment modalities ($P>0.05$) (Table 2).

Table 1. Demographic and clinical characteristics of patients with CSP by treatment modality

Variable	Total	Curettage	Conservative treatment	Medical treatment	Resection	Curettage + Medical	Hysterectomy	P.Value*
Age (year)	34.81 ± 9.25	34.9 ± 4.94	30.92 ± 8.09	36.21 ± 4.38	33.32 ± 5.68	35.11 ± 4.84	39.44 ± 3.47	0.003
Gestational age (day)	48.74 ± 10.33	48.15 ± 9.09	43.33 ± 6.15	43.11 ± 3.03	56.35 ± 15.62	48.66 ± 10.36	52 ± 8.5	<0.001
Gravidity (number)	3.92 ± 1.25	3.91 ± 1.21	3.5 ± 1.57	3.95 ± 1.39	3.61 ± 0.99	4.09 ± 1.22	5.11 ± 1.54	0.033
Parity (number)	2.29 ± 0.92	2.3 ± 0.95	2.17 ± 1.03	2.32 ± 1.003	2.19 ± 0.95	2.29 ± 0.75	2.78 ± 0.67	0.69
Previous cesarean number	2.13 ± 0.84	2.13 ± 0.85	1.83 ± 0.94	2 ± 0.67	2.1 ± 0.94	2.21 ± 0.77	2.78 ± 0.67	0.18
Abortion, n (%)	114 (43.68)	62 (40)	3 (25)	10 (52.63)	15 (48.39)	18 (51.43)	6 (66.67)	0.28
Ectopic pregnancy, n (%)	7 (2.68)	6 (3.87)	0	0	0	1 (2.86)	0	0.95

*One-way ANOVA

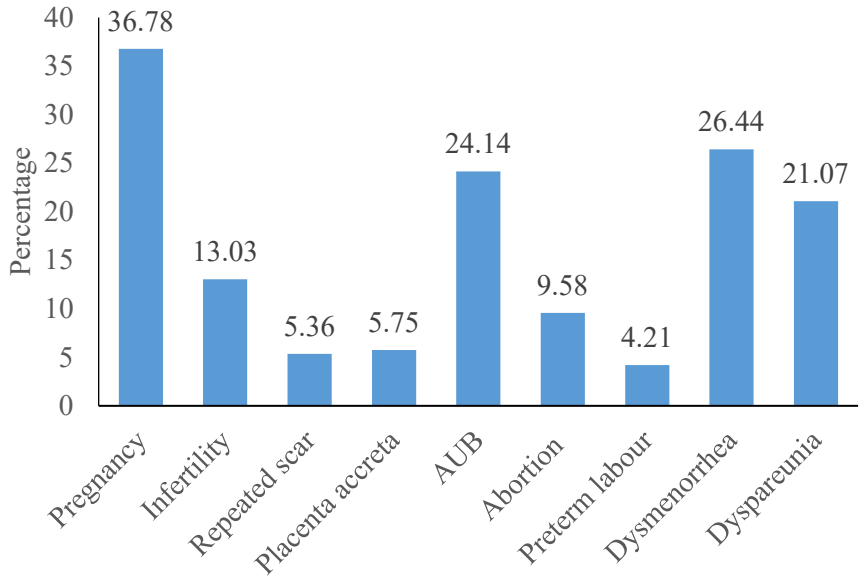


Figure 1. Outcomes and complications of subsequent pregnancies in patients treated for CSP

Table 2. Outcomes and complications of subsequent pregnancies in CSP patients by treatment modality

Variable	Total	Curettage	Conservative treatment	Medical treatment	Resection	Curettage ± Medical	Hysterectomy	P.Value*
Pregnancy	96 (36.78)	61 (39.35)	6 (50)	6 (31.58)	11 (35.48)	12 (34.29)	0	0.23
Infertility	34 (13.03)	22 (14.19)	1 (8.33)	1 (5.26)	7 (22.58)	3 (8.57)	0	0.45

Variable	Total	Curettage	Conservative treatment	Medical treatment	Resection	Curettage ± Medical	Hysterectomy	P.Value *
Repeated scar	14 (5.36)	10 (6.45)	0	0	2 (6.45)	2 (5.71)	0	0.96
Placenta accreta	15 (5.75)	10 (6.45)	2 (16.67)	0	2 (6.45)	1 (2.86)	0	0.49
AUB	63 (24.14)	39 (25.16)	1 (8.33)	3 (15.79)	9 (29.03)	11 (31.43)	0	0.24
Abortion	25 (9.58)	17 (10.97)	2 (16.67)	1 (5.26)	1 (3.23)	4 (11.43)	0	0.62
Preterm labour	11 (4.21)	8 (5.16)	0	1 (5.26)	2 (6.45)	0	0	0.73
Dysmenorrhea	69 (26.44)	46 (29.68)	2 (16.67)	2 (10.53)	8 (25.81)	11 (31.43)	0	0.19
Dyspareunia	55 (21.07)	33 (21.29)	2 (16.67)	1 (5.26)	5 (16.13)	12 (34.29)	2 (22.22)	0.21

AUB: abnormal uterine bleeding, * Chi-square or exact fisher test

4. Discussion

The purpose of the present study was to investigate the outcomes and complications of subsequent pregnancies in women who had previously been treated for CSP. The various complications and outcomes following CSP treatment, including AUB, dysmenorrhea, dyspareunia, infertility, abortion in subsequent pregnancies, placenta accreta, recurrent CSPs, and preterm labor were reported as 24.14%, 26.44%, 21.07%, 13.03%, 9.58%, 5.75%, 5.36%, and 4.21%, respectively. Additionally, the study noted that 36.78% of patients became pregnant again after CSP treatment. While some variations in the outcomes were observed across different treatment approaches, most complications did not show statistically significant differences between the treatment modalities in the current research.

Calì et al **(4)** study, similar to our study reported the rates of complications following CSP treatment, particularly focusing on miscarriage, AUB, and the occurrence of placenta accrete **(4)**. In our study, 36.78% of patients became pregnant again after CSP treatment, with complications including 13.03% experiencing infertility, 5.36% having recurrent CSPs, and 5.75% developing placenta accreta. Similarly, Calì et al **(4)** found that 13.0% of women with embryonic/fetal heart activity experienced uncomplicated miscarriages, and uterine rupture occurred in 9.9% of cases **(4)**. Additionally, both studies highlighted the prevalence of AUB; our study reported a rate of 24.14%, while Calì et al **(4)** noted severe bleeding in 39.2% of women who progressed to the third trimester. Furthermore, both studies emphasize the importance of monitoring complications associated with CSP management and the potential impact on future pregnancies. Notably, consistent with the findings of the present study, Xu et al **(14)** reported that 42.11% of women succeeded in conceiving again after treatment, reinforcing that a significant proportion of women can achieve subsequent pregnancies despite the challenges posed by CSP **(14)**.

In our study, the recurrence rate was 5.36%, while Wang et al **(15)** reported a higher rate of recurrence (15.6%). One possible reason for this discrepancy is the variation in patient populations and their treatment histories. The present study consisted of 261 patients with a diverse range of treatment modalities, which may have influenced the outcomes. Furthermore, the different follow-up methods and criteria for defining recurrent CSP may also contribute to the differences in the recurrence rates.

Şimşek et al **(16)** reported surgical modalities for CSP had significantly higher success rate and lower complication rate compared with medical approaches. In contrast, the present study found no statistically significant differences in complications across various treatment methods, indicating that the outcomes were relatively homogenous among the different approaches. The discrepancy in the results may be attributed to several factors, including different populations in the two studies, variations in the severity of CSP cases and the specific treatment protocols used. Additionally, our study included a broader range of treatment modalities, such as conservative management and a combination of methods, which could dilute the impact of any single approach on overall outcomes. Furthermore, the criteria for defining success and complications may vary between studies, potentially leading to different interpretations of the data.

Several authors have explored potential parameters for predicting the effectiveness of various management

strategies for CSP and found that less invasive medical approaches are suitable for patients presenting with low beta-hCG levels, type 1 CSP, and a small gestational sac diameter at diagnosis. Conversely, surgical treatment modalities are recommended as the primary approach for patients with larger gestational sac diameters and increased trophoblastic charge **(17-19)**.

The current research, including a large cohort of 261 patients and utilizing various treatment modalities offers a robust analysis of the effectiveness and safety of different management strategies. The findings highlight the significant rates of subsequent pregnancies and the prevalence of complications such as infertility, recurrent CSP, and abnormal uterine bleeding, which can inform healthcare providers about potential risks and guide decision-making for future pregnancies.

The limitations of this study include its retrospective design, which may introduce biases in data collection and interpretation. Additionally, the research was conducted at a single institution, which may limit the generalizability of the findings. While the sample size was adequate for preliminary analysis, it may not fully capture the diversity of experiences among women with CSP. Furthermore, the potential for confounding factors, such as variations in patient characteristics, may impact on the conclusions regarding the effectiveness of different treatment modalities.

5. Conclusion

The findings indicate that while 36.78% of patients became pregnant again after CSP treatment, they encountered a range of complications, including abnormal uterine bleeding, dysmenorrhea, dyspareunia, infertility, and recurrent CSPs. Notably, despite variations in outcomes across different treatment modalities, complications did not show statistically significant differences, suggesting that the choice of treatment may not significantly influence the risk of these complications. The results of the present study underscore the need for careful monitoring and management for women with a history of CSP to enhance their understanding of potential risks and improve clinical outcomes in future pregnancies.

6. Declarations

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Ethical Considerations

The project was approved by the ethic committee of Ahvaz Jundishapur University of Medical Sciences (IR.AJUMS.REC.1403.060).

Authors' Contributions

SM conceptualized the study and contributed to manuscript writing. SM, FM, NS, and SR were involved in data collection. SR also contributed to manuscript writing. All authors critically reviewed and appraised the manuscript.

Conflict of Interest

The authors declare no conflict of interest.

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