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Caesarean Scar Pregnancy: A Retrospective Study of Cases in the years 2000-2023

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Abstract

Objectives: To describe the epidemiological characteristics of Caesarean scar ectopic pregnancy cases attending King Salman bin Abdulaziz Medical City (KSAMC) in the Obstetrics and Gynecology Department, Madinah, Saudi Arabia, and to investigate the impact of different treatment modalities on outcomes and prognosis.

Materials and Methods: A cross-sectional study reviewed files of pregnant women who were diagnosed with caesarean scar ectopic pregnancy between January 1, 2000 and December 31, 2023. The retrieved data included diagnosis, case management, and future pregnancies.

Results: Medical records of 47 caesarean scar ectopic pregnancy patients were reviewed. All patients have been treated conservatively except one patient who was subjected to surgical treatment that was complicated by severe bleeding and ended with hysterectomy. 51.06% of the patients were managed through ultrasound-guided intrasac methotrexate (MTX) injection. There was no mortality recorded.

Conclusions: It is crucial to diagnose and manage caesarean scar ectopic pregnancy patients as early as diagnosed to prevent erroneous morbidities. This research endorses early diagnosis and conservative management with ultrasound-guided injection of the gestational sac.

Keywords: Cesarean scar, Ectopic pregnancy, Methotrexate, Embolization

Introduction

Cesarean scar pregnancy (CSP) is an extremely rare type of ectopic pregnancy. CSP is potentially life-threatening and was first reported in 1978 by Larsen et al as an ectopic implantation of embryos in a previous uterine scar (1). The estimated incidence of CSP is 1:1800 to 1:2226 of all pregnancies (2).

During the last decade, the incidence of CSP has been notably rising, probably due to the steady increase in cesarean section rates, as well as the advances in imaging techniques and increased awareness (3,4).

Early diagnosis followed by prompt management are the most essential steps in this disease. CSP can be associated with increased maternal morbidity and mortality due to uterine rupture, massive hemorrhage, an abnormally invasive placenta, and the need for hysterectomy (2,5). The diagnosis is typically made on transvaginal ultrasonography associated with a Doppler scan (6).

Due to the small number of reported cases and studies on CSP, there is no current agreement on the best method to manage this disease. More than 30 treatment regimens have been published in the guidelines. In addition, the Royal College of Obstetricians and Gynecologists (RCOG) states that there is insufficient evidence to support one treatment option over another (7). CSP can be managed either with medically conservative modalities, such as in situ or systemic methotrexate (MTX) injections, or with surgical and interventional methods, such as uterine artery embolization, ultrasound-guided aspiration, and transvaginal, hysteroscopic, or laparoscopic excision (8) Moreover, RCOG does not have a specific Green-top Guideline dedicated solely to CSP in 2020. However, RCOG guidelines on "Birth after Previous Caesarean Birth" (Green-top Guideline No. 45) indirectly address CSP as a potential complication. This guideline focuses on the management of women undergoing planned vaginal birth after cesarean and elective repeat cesarean section, and mentions the importance of considering CSP as a risk factor.

This study aims to describe the epidemiological characteristics of CSP in our population and investigate the impact of different treatments on maternal outcomes and prognosis.

Materials and Methods

This study was carried out in King Salman bin Abdulaziz Medical City (KSAMC), Obstetrics and Gynaecology Department, Madinah, Kingdom of Saudi Arabia, utilizing a cross-sectional methodology. Using an electronic record system, this study reviewed the twenty-three years between January 1, 2000 and December 31, 2023. All Patients diagnosed as CSP were included regardless of their gestational age or nationality, due to the rarity of the diagnosis (2).

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Key Messages

- As cesarean sections become a common practice in obstetric medicine, the incidence of cesarean ectopic pregnancy is significantly rising.
- The epidemiological data about cesarean ectopic pregnancies in Saudi Arabia needs to be updated and clarified.
- The management strategies applied to such cases were evaluated in our study.
- This study endorses early diagnosis and conservative management with ultrasound-guided intrasac methotrexate injection for the management of caesarean scar ectopic pregnancy.

The inclusion criteria were the presence of all three of the following conditions:

1. History of caesarean section (CS)
2. Current positive beta-human chorionic gonadotropin (β-hCG) level in blood test
3. Presence of diagnostic ultrasound criteria based on previous radiological studies (9-12); presence of an empty uterine cavity and/ or cervix, with absent or thin myometrium between gestational sac and posterior wall of the bladder, localization of the gestational sac at the level of the previous uterine scar, and the presence of rich trophoblastic blood flow on Doppler examination of that area.

The exclusion criteria were: 1. Women who were treated as miscarriages in outside facilities, either surgically or medically, but were later diagnosed with CSP. 2. Those lost to follow-up were also excluded from the treatment outcome analysis.

As incomplete medical records were another exclusion criterion, this study planned to contact patients if data were missing and to report on patients with misdiagnosis. Based on this, all included records fulfilled the essential information needed for the study: diagnostic criteria, management strategy, and follow-up within the studied period.

Benign is a rare condition (9), so a total population sampling method was chosen. The analysis included all available medical records of CSP cases that met the inclusion and exclusion criteria.

Ethical practices were ensured by protecting patients' privacy and confidentiality by avoiding direct patient identification. The data was stored on a password-protected computer, accessible only to the principal researcher.

Results

There were 410 355 deliveries between January 1, 2000 and December 31, 2023.

There were 2567 ectopic pregnancies recorded during this period, and 47 of them were diagnosed as CSP. The medical records of those 47 CSP patients were reviewed. This study included all patients diagnosed as CSP.

According to demographic data, 66% of CSPs were Multipara, and 31.9% were aged between 25 and 29. 55.3% had one previous CS, while 44.7% had two or more CSs (Table 1).

Management strategies are summarized in Table 2. The first strategy was conservative, where patients received an intramuscular MTX injection (1 mg/kg) (10-12). This strategy was used in diagnosed patients before 2023, as there were several barriers for intra-sac injection of MTX, including limited awareness and experience among healthcare providers, concerns about potential toxicity and side effects of MTX, and the need for specialized expertise in ultrasound-guided injections. However, these limitations didn't significantly impact the outcome as all cases treated conservatively by MTX, either IM or intrasac, had similar outcomes during the follow-up period.

The second strategy was an intrasac injection of MTX with the help of an interventional radiologist. An experienced interventional radiologist and an experienced obstetrician performed the procedure. The patient was positioned in the lithotomy position, and general anesthesia was administered. After disinfecting the vagina and performing bladder catheterization, a punctured needle attached to an ultrasound probe was inserted transvaginally into the gestational sac. The gestational sac fluid was aspirated, and 50 mg/m^2 of MTX was injected, followed by a check for any active bleeding. The patients were discharged after 24 hours (11,13). This method was used for all patients diagnosed from January 2023 due to the availability of the interventional radiologist. Intra-sac injection of MTX was never used before 2023 due to the non-availability of an experienced interventional radiologist and an experienced obstetrician in this treatment modality.

This method was used for all patients diagnosed from January 2023 due to the availability of the interventional radiologist.

During follow-up for both previous strategies, β-hCG

Table 1. Distribution of CSP Patients Attending King Salman bin Abdulaziz Medical City From 2000 to 2023 According to Demographic Data

Variables	Frequency	Percent
Parity		
Primipara (0 previous births)	16	34
Multipara (1-2 previous)	31	66
Age group (y)		
20-24	12	25.5
25-29	15	31.9
30-34	10	21.3
35-39	8	17.0
40 years and above	2	4.3
Prior caesarean sections		
1 previous CS	26	55.3
2 or more previous CS	21	44.7

Table 2. Distribution of CSP patients attending King Salman bin Abdulaziz Medical City From 2000 to 2023, With Date and Applied Treatment Strategy

From	To	No.	Treatment
1/1/2003	31/12/2007	5	Conservative (IM MTX)
1/1/2008	31/12/2012	3	Conservative (IM MTX)
1/1/2013	31/12/2017	5	Conservative (IM MTX)
1/1/2018	31/12/2022	9	Conservative (IM MTX)
1/1/2023	31/12/2023	25	24 conservatives (Intrasac MTX) 1 operative removal

levels were measured to follow up on the effect of the MTX. β-hCG level check was performed on both day four and day seven after MTX injection, with transvaginal ultrasound on day seven.

The third strategy used to manage CSP patients was the operative removal, which was used only in one patient, where the patient suffered from bleeding and ended in total abdominal hysterectomy. The patient was later discharged in good condition.

Patients were discharged when β-hCG was less than 5 mIU/mL. All patients were followed in the clinic for at least six months after being discharged. Except for the case that ended with hysterectomy, no complications were detected during the follow-up period. Patients were advised not to get pregnant for at least one year after the negative result.

Discussion

CSP is a type of ectopic pregnancy that is extremely rare (13). This study found that in the past 23 years, CSP represents 1.8% of all ectopic pregnancies. This is less than the estimated rate of CSP, 1/2000 deliveries, as reported by other studies (14,15). The first ever reported case of CSP was in 1978, and since then, the incidence has been increasing (11-17).

Pathological mechanisms that manipulate the implantation of the pregnancy on the scar are not well understood (15). These could be due to the invasion of the myometrium with the formation of belts or parcels of tiny voids between the scar and the endometrium (13,16,17). Uterine scar tissue always presents with inflammation, edema, and decreased density (15-17). This tissue disruption results in penetration beyond the inner third of the myometrium; thus, it may reach the outer myometrial vessels and beyond for oxygen and supplements (16). In the same way, the hypoxic environment of the scar stimulates trophoblasts of the gestational sac to penetrate deep into the thin uterine layer (16,17).

Many factors increase the risk for CSP (15-17). Having more than one CS and high parity are well-known risk factors (16,17). In addition, smoking in the first trimester increases the risk of CSP (17). There is no confirmation that the method, type, or technique of the CS may affect the risk of developing CSP (16,17). In early pregnancy, patients usually have no symptoms. On the other hand, with the pregnancy progression the main symptom is vaginal bleeding which may present with pain or painless (17). The fundamental issue is that if not diagnosed or ignored, it may lead to uterine rupture and threaten the life of the patient (12,13,15-17).

Early diagnosis of CSP guarantees an excellent chance for the patient and a wide variety of conservative management options (12,14). The transvaginal ultrasound is the most sensitive and the gold standard for diagnosing CSP. Sensitivity of transvaginal ultrasound is 86%, which may also result in false-negative results (12). In addition, CSP diagnosis is challenging to most obstetrician since it depends on excellence in using and interpreting vaginal ultrasound. Late or misdiagnosis of CSP could mean severe morbidities to the pregnant woman and rarely mortality (11,12,14,15).

Management of CSP patients is diverse, ranging from expectant management to hysterectomy (12,13). Considering expectant management, it is rarely used because of the risk of severe bleeding, and if pregnancy continues, the patient will be at risk of severe hemorrhage and rupture of the uterus (12). Expectant management is the most commonly used method (11,12,14,15). In previous years, injection of the MTX was given IM with the possibility of repeating the dose while monitoring the patient. In the last few years, with the radiological advances, intra-sac injection of MTX improved the outcomes for patients (11). In this study, the only patient who was managed by operative removal of the CSP, unfortunately, underwent hysterectomy and transfused 8 units of blood. Previous research showed that subsequent pregnancies following CSP are permissible, but regrettably, CSP may occur again (16,17).

This is the first research on CSP done in the Madinah area, preceded by fewer than 10 case reports and review studies published in the central and eastern regions of Saudi Arabia. The strength of this paper is that it studies all the cases for the past twenty-three years. Limitations for this study include the scarcity of data and details of the patients, coupled with the small number of cases, and finally, the lack of statistical data for all the patients.

Limitations of the Study

This retrospective study was conducted at a single center, which leads to the potential for unique institutional practices and patient populations to influence results, thus restricting the applicability of findings to broader settings and populations. Also, the study had a small sample size, which is attributed to the low incidence of CSP, resulting in

reduced statistical power, making it harder to detect actual effects, leading to incorrect conclusions. All patients were managed medically, and only one was subjected to surgical treatment, so the comparison was not applicable.

Conclusions

CSP is an ectopic pregnancy where the gestational sac implants and grows in the uterine cesarean scar. It is crucial to diagnose and manage CSP patients very soon in pregnancy to prevent erroneous morbidities, unfortunate mortalities, and preserve fertility. Currently, methods to manage CSP are not precise, but the results of this research indicate that conservative methods used for treatment were associated with a high success rate. This research endorses early diagnosis and conservative ultrasound-guided intra-sac injection of the gestational sac for the management of CSP patients.

Authors' Contribution

Conceptualization: Lamia Jayar, Wedad Aloufi.
Data curation: Basil M Othman, Wedad Aloufi.
Formal analysis: Wedad Aloufi.
Investigation: Lamia Jayar,Basil M Othman.
Methodology: Lamia Jayar.
Project administration: Mohammad Othman.
Resources: Wedad Aloufi.
Software: Basil M Othman, Mohammad Othman.
Supervision: Lamia Jayar.
Validation: Wedad Aloufi, Mohammad Othman.
Visualization: Basil M Othman.
Writing–original draft: Mohammad Othman.
Writing–review & editing: Mohammad Othman.

Conflict of Interests

Authors declare that they have no conflict of interests.

Ethical Issues

Ethical approval was obtained from the ethics committee of King Salman bin Abdulaziz Medical City (KSAMC) (IRB: 24-028). All information provided for the study was treated as strictly confidential, and all participants were kept anonymous.

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