

Cesarean Scar Pregnancy: Diagnosis and Treatment

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Abstract

Development of a gestational sac in a cesarean scar of the lower uterine segment is a rare form of ectopic pregnancy. Cesarean scar pregnancy (CSP) is rising in frequency, as are cesarean section deliveries. CSP is a potentially life-threatening condition which, if not detected early and managed aggressively, can result in uterine rupture, massive hemorrhage and maternal death. The most common presentation of CSP is abdominal pain and vaginal bleeding. CSP is diagnosed using ultrasonography, magnetic resonance imaging, and endoscopic modalities. There is currently no standard treatment protocol in CSP. In this article, we aim to find the most appropriate methods of diagnosis and treatment modalities, with their implications in clinical practice for this condition.

Keywords: Early diagnosis; Ectopic pregnancy; Previous cesarean scar

Introduction

Cesarean scar pregnancy (CSP) is a rare form of ectopic pregnancy in which the gestational sac is implanted in a cesarean scar of the lower uterine segment. The incidence of CSP has risen during the past 5-6 years due to rising cesarean section rates worldwide [1]. It was first reported by Larsen and Solomo in 1978 [2], and incidence is estimated at 1:1, 800 to 1:2, 216 pregnancies [3-5]. This condition represents 6.1% of all ectopic pregnancies with a history of at least one caesarean section [3,4,6]. CSP is a dangerous condition, possibly leading to uterine rupture, massive bleeding, and life-threatening complications as the pregnancy advances [1].

We performed the electronic search of the PubMed (National Library of Medicine, USA) using subheading search words such as 'CSP' and 'CSP treatment and management'. Articles written in English that were published from Aug 1978 to April 2014. We chose only those on CSP published in English language journals and the English abstracts of original articles in other languages from Pubmed. We scanned 51 case report, 14 review article and 4 case series about CSP the electronic search of the PubMed. Additional

The etiology and pathophysiology of CSP is still unknown. CSP occurrence may be linked to an existing scar defect or microscopic dehiscent tract generated between the prior cesarean scar tissue and the endometrial canal [3]. In the first days of gestation the blastocyst invades the myometrium through a microscopic lesion present in the cesarean scar related to a previous trauma such as cesarean section, metroplasty, myomectomy, and even manual removal of the placenta [7,8]. Seow et al. showed a possible correlation between intrauterine device, pelvic inflammatory disease, and CSP [4].

The most common symptom is painless vaginal bleeding that may be massive. There is no specific clinical sign of CSP. Of presenting symptoms in 57 women with CSPs, Silver et al. found that 37% were

asymptomatic, 38% had painless vaginal bleeding, 16% had painful vaginal bleeding, and 9% experienced abdominal pain without vaginal bleeding [9].

Diagnosing Modalities

Early diagnosis and termination of pregnancy is crucial to avoid the risk of uterine rupture. Today, serial serum human chorionic gonadotropin (HCG) measurements and transvaginal ultrasound examination can provide early detection of most ectopic pregnancies. Ultrasound, magnetic resonance imaging (MRI), and endoscopic modalities may be used in diagnosis of CSP [10].

Ultrasound is the firstline imaging modality for evaluation of a potential CSP, with the majority of CSPs diagnosed on the basis of transvaginal ultrasound (TVUS). TVUS has a reported sensitivity of 84.6% [11]. Until recently, most studies of CSP have been based on ultrasound. MRI now provides a more detailed image of a tissue [12].

Ultrasound criteria for the diagnosis of a CSP include the following [13,14];

- I - The uterus was empty, with clearly demonstrated endometrium,
- II- A clearly visible empty cervical canal, without contact with the sac,
- III- Presence of the gestation sac with or without a fetal pole with or without fetal cardiac activity (depending on the gestation age) in the anterior part of the uterine isthmus,
- IV- Absence of or a defect in the myometrial tissue between the bladder and the sac.

Color Doppler imaging and 3-dimensional power Doppler ultrasonography may enhance the diagnostic capability of endovaginal ultrasonography by evaluating the flow, resistance, and pulsatility indices in the peritrophoblastic vasculature. On pulsed Doppler examination, flow waveforms of high velocity (peak velocity >20 cm/s)

and low impedance (pulsatility index <1) have been reported in cases of cesarean scar pregnancies [15].

MRI provides a more detailed image of a tissue. It is usually needed for cases in which the TVUS is not conclusive. More specifically, while the ultrasound images did not clearly demonstrate urinary bladder involvement, the MRI was more conclusive and showed the intrauterine pregnancy bulging through the myometrium of the lower uterine segment [11]. Finally, cystoscopy was used to rule out bladder penetration [16]. Roberts et al. described using hysteroscopy for diagnosing CSP [17].

Treatment Modalities

Treatment modalities are either medical or surgical, and there is no consensus on the preferred mode of treatment. Medical treatment involves systemic or local administration of methotrexate (MTX), potassium chloride, trichosanthin, or mifepristone. Primary surgical treatment options for CSP in patients wishing to preserve fertility include uterine curettage, hysteroscopic resection, laparoscopic resection, and laparotomy with resection [18]. Optimal treatment choice depends on factors such as pregnancy size, the haemodynamic status of the patient, absence or presence of scar rupture, hCG levels, and desire for future fertility [19,20].

Systemic MTX administration is the least invasive treatment and has been widely used for stable patients. The advantages include preservation of fertility and eliminating the need for surgery with its associated risks and complications. However, it requires a long period of follow-up for beta-hCG to decline to normal levels and for the gestational mass to resolve completely [18]. MTX is an antimetabolite and antifolate drug widely used in treatment of ectopic pregnancies [1]. CSP has been shown to respond well to the dose of 50 mg/m² when HCG level is lower than 5000 mIU/ml [21-24]. Systemic MTX may induce side effects of nausea, vomiting, elevated hepatic enzymes, or marrow depression [1]. Muraji et al. reported three cases of CSP that they successfully treated with MTX. In all of the cases single-dose, systemic MTX was not sufficient, so they had to perform multiple doses of MTX in two cases, and systemic and local MTX in one case to obtain a complete remission [25].

Direct local injection of MTX into the amniotic cavity of a CSP produced excellent outcomes. Local methotrexate administration increases the success rate due to the high concentration of methotrexate deposited in the lesion. Godin et al. described a 9-week CSP treated successfully with localized injection of potassium chloride and MTX into the gestational sac [26]. Wang et al. demonstrated that patients receiving only local or systemic MTX had a longer period of CSP resolution compared with women receiving additional uterine curettage [14].

Uterine curettage risks severe haemorrhage, resulting from gestational sac rupture and myometrial disruption. Arslan et al. reported a case of CSP successfully treated using suction curettage without any additional therapy [10]. Conversely, suction curettage failed or caused complications in 27 other patients. These patients were treated with different methods such as hysterectomy [27,28], systemic MTX [29] or laparotomy with excision of the mass [30-34]. Haimov-Kochman et al. that gestational sac bulging into the uterine cavity after systemic methotrexate injection allows the practitioner to perform an easier and uncomplicated dilatation-curettage procedure [35].

Huang et al. described a new technique for CSP treatment *high-intensity focused ultrasound (HIFU)* combined with dilatation and curettage. HIFU has been developed successfully to treat a variety of diseases, including uterine myoma, adenomyosis, and malignant or recurrent tumors. Through HIFU treatment, coagulation necrosis of the targeted tissue was achieved by instantaneous temperature elevation to 60-100°C, utilizing the physical characteristics of tissue penetration by the low-energy ultrasound waves produced and focused by the Chongqing Haifu HIFU treatment system. In four cases, Huang et al. demonstrated that HIFU was effective for management of CSP [36].

Recently, *uterine artery embolization (UAE)* combined with local MTX was reported in several studies as an alternative or remedial measure for systemic administration of MTX. UAE in combination with local MTX produced satisfactory results in the treatment of CSP. Ghezzi et al. reported the first case in which uterine artery embolization was used in addition to potassium chloride and methotrexate treatment to terminate a cesarean scar pregnancy [37].

Operative hysteroscopy can be utilized for the CSP that grows inwards toward the uterine cavity, while laparoscopy is suitable for a deeply implanted CSP growing towards the abdominal cavity and bladder and is an alternative treatment for CSP to control bleeding and preserve future fertility. Wang et al. have described a successful treatment of CSP by operative hysteroscopy and suction curettage, the first of its kind reported in English language literature [38]. Lee et al. were the first to perform a successful laparoscopic resection of a CSP [39].

Laparotomy followed by wedge resection of the CSP is the best treatment option, because of the excision of the old scar, this treatment modality avoids the possibility of leaving residual trophoblasts, which may reduce the risk of recurrence [40]. Larsen and Solomon described total abdominal hysterectomy as a successful treatment for a patient presenting with severe hemorrhage [41]. Lai et al. reported a ruptured gestational sac in the myometrium that was initially treated with direct and systemic MTX injection, but persistent bleeding necessitated hysterotomy with gestational sac excision and reapproximation of the cesarean section defect [42].

Conclusion

CSP is the rarest form of ectopic pregnancies and can result in serious complications. Therefore, obstetricians/gynecologists should have a heightened awareness of this serious and potentially fatal pregnancy complication. Early diagnosis and early treatment of cesarean scar ectopic pregnancy is essential to prevent maternal morbidity and mortality. Haemodynamically stable patients have more treatment options, including conservative management. The treatment should be planned taking into consideration the pregnancy size, the haemodynamic status of the patient, absence or presence of scar rupture, hCG levels, and desire for future fertility.

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