

Society for Maternal-Fetal Medicine

Consult Series #63: Cesarean scar ectopic pregnancy



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Cesarean scar ectopic pregnancy is a complication in which an early pregnancy implants in the scar from a previous cesarean delivery. This condition presents a substantial risk for severe maternal morbidity and mortality because of challenges in securing a prompt diagnosis. Ultrasound is the primary imaging modality for cesarean scar ectopic pregnancy diagnosis, although a correct and timely determination can be difficult. Surgical, medical, and minimally invasive therapies have been described for cesarean scar ectopic pregnancy management, but the optimal treatment is unknown. Patients who decline treatment of a cesarean scar ectopic pregnancy should be counseled regarding the risk for severe morbidity. The following are the Society for Maternal-Fetal Medicine recommendations: we recommend against expectant management of cesarean scar ectopic pregnancy (GRADE 1B); we suggest that operative resection (with transvaginal or laparoscopic approaches when possible) or ultrasound-guided uterine aspiration be considered for the surgical management of cesarean scar ectopic pregnancy and that sharp curettage alone be avoided (GRADE 2C); we suggest intragestational methotrexate for the medical treatment of cesarean scar ectopic pregnancy, with or without other treatment modalities (GRADE 2C); we recommend that systemic methotrexate alone not be used to treat cesarean scar ectopic pregnancy (GRADE 1C); in patients who choose expectant management and continuation of a cesarean scar ectopic pregnancy, we recommend repeated cesarean delivery between 34 0/7 and 35 6/7 weeks of gestation (GRADE 1C); we recommend that patients with a cesarean scar ectopic pregnancy be advised on the risks of another pregnancy and counseled regarding effective contraceptive methods, including long-acting reversible contraception and permanent contraception (GRADE 1C).

Key words: cesarean scar ectopic pregnancy, cesarean scar pregnancy, placenta accreta spectrum

Introduction

Cesarean scar ectopic pregnancy (CSEP) is a complication in which an early pregnancy implants in the scar from a previous cesarean delivery. Perhaps because of high worldwide cesarean delivery rates, there seems to be increased incidence and recognition of this condition over the past 2 decades. The clinical presentation is variable, and many are asymptomatic at presentation. Patients may present to various obstetrical and gynecologic care providers, but maternal-fetal medicine subspecialists are often involved in the diagnosis and subsequent management of

these pregnancies. CSEP can be difficult to diagnose in a timely fashion. Ultrasound imaging is the primary imaging modality for CSEP diagnosis. Expectantly managed CSEP is associated with high rates of severe maternal morbidity, such as hemorrhage, placenta accreta spectrum (PAS), and uterine rupture. Given these substantial risks, definitive surgical or medical management is recommended after CSEP diagnosis. Several surgical and medical treatments have been described for this disorder; however, optimal management remains uncertain at this time. For this reason, registries have been created for providers to submit data on diagnosis, natural history, and management (<https://csp-registry.com> and <https://octri.ohsu.edu/redcap/surveys/?s=XCK7FLEA84>).

What is cesarean scar ectopic pregnancy, and what is its incidence?

CSEP occurs when an embryo implants in the fibrous scar tissue of a previous cesarean hysterotomy.¹ This abnormal implantation presents a substantial risk of severe maternal morbidity and mortality complicated by challenges in securing a timely diagnosis and uncertainty regarding optimal treatment once identified.

Although relatively uncommon, reported international experience with CSEP seems to be increasing, likely because of high contemporary cesarean delivery volume. High cesarean delivery rates are observed in many of the world's most populous developed nations, with an estimated 18.5 million women undergoing this procedure each year.² Consequently, there is mounting collective awareness of rare cesarean delivery-associated complications such as CSEP.

The true incidence of CSEP is unknown because the condition is likely underdiagnosed and underreported. Reported single-center estimates of incidence range from 1 in 1800 to 1 in 2656 of overall pregnancies.^{3,4} Although CSEP incidence is believed to have increased over time, other factors, including improved imaging with ultrasound and magnetic resonance imaging (MRI), increased use of transvaginal ultrasonography, and possibly increased physician awareness, may contribute to a perceived increase in incidence.

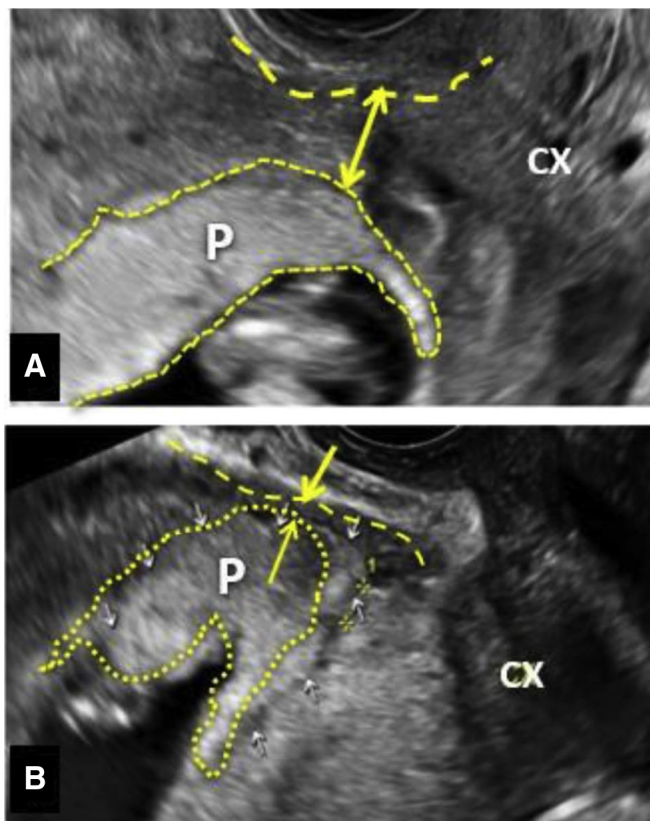
What is the pathogenesis of cesarean scar ectopic pregnancy?

Although the pathogenesis of CSEP is incompletely understood, the mechanism has been postulated to involve blastocyst implantation within a microscopic dehiscence tract in the scar from a previous cesarean delivery.^{5–8} Because of the fibrous nature of scar tissue, these inherently deficient implantation sites are at risk for dehiscence, PAS, and hemorrhage as the CSEP enlarges.

CSEP and placenta accreta seem to have similar disease pathways and may exist along a common disease continuum.⁹ In one series in which pregnancies complicated by either CSEP or early PAS underwent histopathologic analysis by blinded pathologists, findings were indistinguishable between groups, with a high interobserver correlation.¹⁰ Histopathologic analyses for both groups were characterized by myometrial or scar tissue villous invasion with little or no intervening decidua.

The implantation patterns of CSEP can be categorized as either endogenic (also referred to as “on the scar”) or exogenic (“in the niche”).^{11,12} Endogenic is defined as growing within the uterine cavity and exogenic as arising from a deeply implanted gestational sac into the scar that may grow toward the bladder or abdominal cavity. These ultrasonographic appearances may influence obstetrical prognosis.^{11,12} It has recently been suggested that early first-trimester determination of whether a CSEP is growing “on the scar” or “in the niche” of the previous cesarean

FIGURE 1
Implantation patterns of cesarean scar ectopic pregnancy



A, “On-the-scar” or endogenic form has a considerable myometrial layer (clear space) between the placenta and anterior uterine surface (solid arrow). **B**, “In-the-niche” or exogenic form has a thin myometrial interphase below the placenta (between the 2 arrows). (Used with permission from Kaelin Agten et al.¹³)

CX, cervix; P, placenta.

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hysterotomy may be used to predict subsequent pregnancy outcome^{12,13} (Figure 1). In one small retrospective study, patients with pregnancies growing “on the scar” had variable obstetrical outcomes, whereas those with pregnancies growing “in the niche” all underwent hysterectomy with PAS at delivery.¹³

How does cesarean scar ectopic pregnancy present clinically, and are there known risk factors?

Although second-trimester diagnoses have been reported, CSEP usually presents in the first trimester. In one review of published CSEP case series, the average gestational age at diagnosis was 7.5 ± 2.5 weeks.¹¹ The clinical presentation is variable, ranging from asymptomatic ultrasonographic detection to a presentation with uterine rupture and

hemoperitoneum, typically in the absence of a timely diagnosis. In the previously mentioned review, approximately one-third of cases were asymptomatic, and approximately one-third presented with painless vaginal bleeding.¹¹ Nearly one-quarter of presentations involved pain, with or without bleeding. Patients with ruptured CSEP may also present with hemodynamic collapse.

Although by definition previous cesarean delivery is a prerequisite for CSEP development, and placenta previa may modify this risk, it is not clear if the number of previous cesarean deliveries further increases the risk. Notwithstanding that some reports and anecdotal observations suggest an overrepresentation of women with multiple previous cesarean deliveries in CSEP cohorts, a review of the literature reveals that 52% of CSEP cases occur in women with a single previous cesarean delivery.^{1,3,14} Interestingly, the indication for previous cesarean delivery may be a risk factor for CSEP, with previous delivery for breech presentation seeming to be a more common indication in women who later experience CSEP.^{6,11,15,16} It is hypothesized that the lower uterine segment is often less well developed in pregnancies that are delivered for malpresentation, and that a thicker hysterotomy scar presents a greater risk of poor healing and resultant microscopic dehiscence. No published data exist regarding an association between the hysterotomy closure technique and CSEP.

How is cesarean scar ectopic pregnancy diagnosed?

Ultrasound imaging is the primary imaging modality for CSEP diagnosis, although a correct and timely determination can be difficult. The initial finding of a low, anteriorly located gestational sac should raise concern for a possible CSEP and warrants further investigation.¹⁷ When patients with suspected CSEP are evaluated, a high degree of clinical suspicion is needed because a missed or delayed diagnosis can result in uterine dehiscence, hemorrhage, loss of fertility, or maternal death.

Transvaginal ultrasound imaging is the optimal modality for the evaluation of suspected CSEP because it provides the highest image resolution¹⁸ (Figures 2 and 3). Grayscale combined with color Doppler ultrasound imaging is recommended for CSEP diagnosis. One group suggests combining transvaginal ultrasound imaging with a transabdominal ultrasonogram with a full maternal bladder to provide a “panoramic view” of the uterus and the relationship between the gestational sac and bladder.⁶ Although test performance characteristics are unknown and likely influenced by examiner experience and skill, in one review, 94 of 111 (84.6%) CSEP cases were detected by transvaginal ultrasound imaging, with the remaining 17 (15.4%) pregnancies incorrectly diagnosed as incomplete abortions or cervical pregnancies.¹¹

Since diagnostic criteria were first proposed by Vial et al¹⁶ in 2000, other authors have suggested modifications to

FIGURE 2
Transvaginal 2-dimensional ultrasound image of a cesarean scar ectopic pregnancy

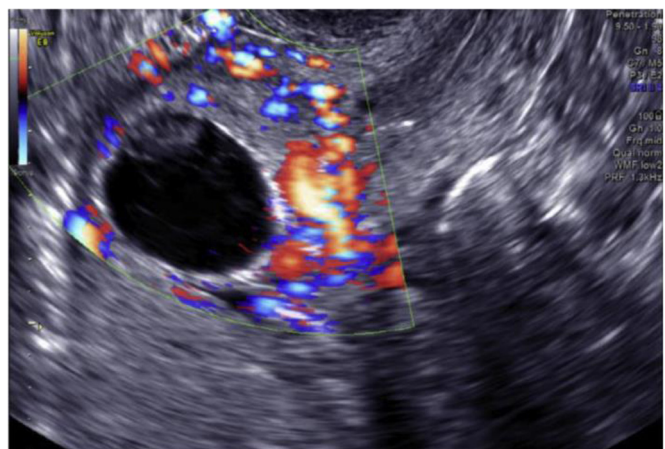


A gestational sac can be seen clearly embedded within a hysterotomy scar.

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enhance the ultrasonographic detection of CSEP.^{3,18} One approach proposes the following ultrasonographic criteria to diagnose CSEP: (1) an empty uterine cavity and endocervix; (2) placenta, gestational sac, or both embedded in the hysterotomy scar; (3) a triangular (at ≤ 8 weeks of gestation) or rounded or oval (at > 8 weeks of gestation) gestational sac that fills the scar “niche” (the shallow area representing a healed hysterotomy site); (4) a thin (1–3 mm) or absent myometrial layer between the gestational sac and bladder; (5) a prominent or rich vascular pattern at or in the area of a cesarean scar; and (6) an embryonic or fetal pole,

FIGURE 3
Doppler image of a cesarean scar ectopic pregnancy

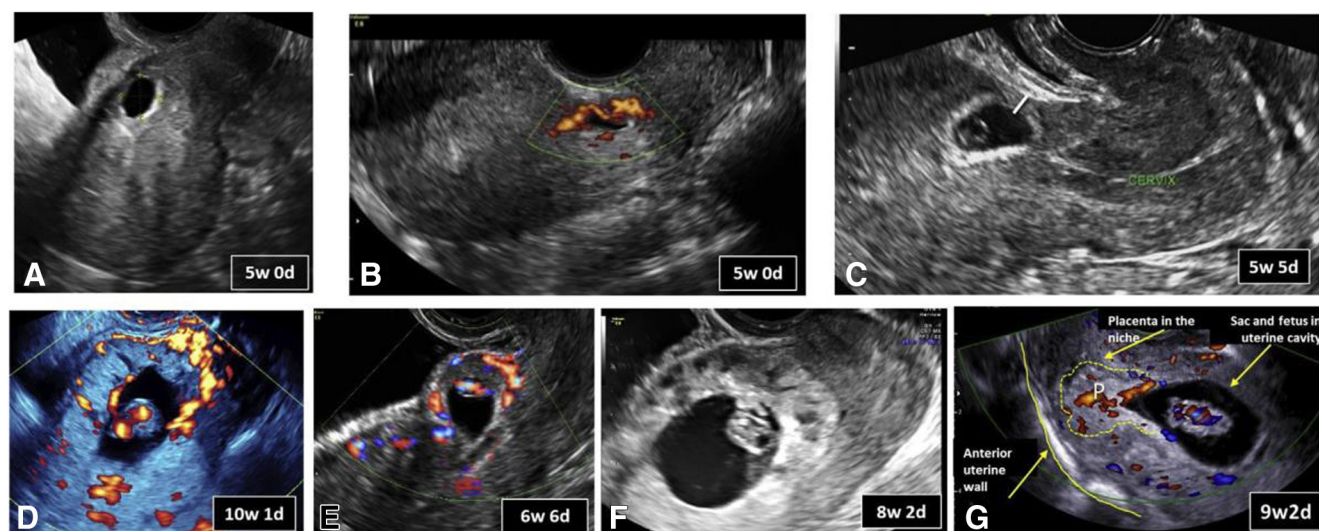


The image shows a prominent vascular pattern in the area of a hysterotomy scar.

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FIGURE 4

Ultrasonographic features of first-trimester cesarean scar ectopic pregnancy



A, Two-dimensional ultrasound image shows an empty uterine cavity and closed, empty endocervical canal. **B**, Low implantation with blood flow around the gestational sac. **C**, Implantation “in the niche” with thin myometrial layer between gestational sac and bladder (*line*). **D**, Doppler imaging shows blood flow around the chorionic/gestational sac at the site of placental implantation. **E**, Altered bladder line with bulging of the gestational sac into the bladder. **F**, Placental lacunae in a cesarean scar pregnancy at 8 weeks of gestation. **G**, After 7 weeks of gestation, the gestational sac extends toward the uterine cavity, elongates, and eventually assumes an intracavitary position. The placenta stays anchored in the area of the scar/niche in its initial site of implantation.

P, placenta.

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yolk sac, or both, with or without fetal cardiac activity (Figure 4). All of these criteria may not be observed. Especially with very early diagnosis and before fetal cardiac activity, the patient should have confirmation of pregnancy (for example, a positive pregnancy test result).¹⁸ Bulging or ballooning of the lower uterine segment in the midline sagittal transabdominal view has also been considered to be supportive of CSEP diagnosis.^{19,20}

A challenge in the diagnosis of CSEP is distinguishing it from other clinical entities with a similar ultrasonographic appearance. In a literature review that collected 751 cases of CSEP, 107 (13.6%) cases were originally misdiagnosed as cervical ectopic pregnancies, spontaneous abortions in transit, or low implantation of an intrauterine pregnancy.²¹ Given the importance of prompt diagnosis, referral to an experienced center for a second opinion may be preferable to ongoing follow-up examinations that are likely to delay diagnosis.

Are other modalities useful for the diagnosis of cesarean scar ectopic pregnancy?

Transvaginal 3-dimensional ultrasound and 3-dimensional power ultrasound imaging have been used in an attempt to enhance the accuracy of CSEP diagnosis, with case reports supporting the utility of these techniques.^{22–24} However, because of limited published

experience with these approaches, there are insufficient data to support a benefit of routine use of 3-dimensional ultrasound imaging for the diagnosis or management of CSEP.

MRI has been used as an adjunct to ultrasound imaging for the diagnosis of CSEP, although its incremental benefit over ultrasound imaging alone is unknown.^{1,6,7,25–27} Both T1- and T2-weighted images can demonstrate a gestational sac embedded within the lower uterine segment at the level of a previous cesarean scar niche and an empty endometrial cavity and endocervix. In one MRI series, most CSEPs presented as a thin-walled diverticulum at the cesarean scar niche.²⁷ MRI may also provide useful information regarding the degree of invasion and whether there is evidence of PAS.¹ Most authors do not recommend MRI as a routine component of CSEP evaluation because transvaginal ultrasound imaging with color Doppler interrogation is believed to be reliable in securing a correct diagnosis. However, in cases in which ultrasound imaging is inconclusive, MRI could be considered as an adjunct study. Given the risks associated with delayed diagnosis, the use of multiple ultrasound imaging approaches and modalities, such as MRI, is likely preferable to serial ultrasound examinations.

CSEP diagnosis has been reported with the use of hysteroscopy and laparoscopy.^{7,11,28,29} Although these

methods are not recommended solely for diagnostic purposes, they can be used to confirm a diagnosis at the time of planned operative intervention. With laparoscopic examination, CSEP has been described as an ecchymotic bulge with a “salmon-red” appearance beneath the bladder at the level of the previous cesarean scar with an otherwise normal-appearing uterus.^{7,29}

What is the natural history of cesarean scar ectopic pregnancy?

Limited information exists regarding the natural history of CSEP because few recognized CSEPs continue to a viable gestational age. Those that do are believed to be at high risk for severe complications in the second and third trimesters, although the rates of these complications are unknown. CSEPs have resulted in live births, often associated with PAS, cesarean hysterectomy, and massive hemorrhage at delivery.^{11,15,30} Series describing outcomes of expectantly managed CSEPs all involve small case numbers and high hysterectomy rates that range from 50% to 100% and are usually associated with PAS.^{10,31–34} In case series of women who were treated expectantly, most required additional treatment, and >50% had severe complications.³⁰ In one series that prospectively followed up 10 women with a first-trimester ultrasonographic diagnosis of a pregnancy implanted in or on a previous cesarean scar, all the women had PAS diagnosed at the time of the repeated cesarean delivery.³²

Because of the high risk of severe maternal morbidity, expectant management is not recommended for a recognized CSEP, and definitive surgical or medical management generally is advised as soon as the diagnosis is confirmed.^{1,11,13} For cases where CSEP is suspected but the diagnosis is not certain, short-interval follow-up, a second opinion, or additional imaging with MRI should be considered to establish a timely diagnosis without undue delay. **We recommend against expectant management of CSEP (GRADE 1B).**

An exception to the recommendation against expectant management involves early CSEP characterized by fetal death or other evidence of early pregnancy failure. In the case of an early CSEP that is definitively diagnosed as nonviable, expectant management may be pursued with serial ultrasound surveillance, quantitative human chorionic gonadotropin (hCG) measurements, and monitoring for maternal symptoms such as bleeding or pelvic pain. However, it should be recognized that it can take several months for a nonviable CSEP to resolve spontaneously, and expectant management of nonviable CSEPs has been associated with the development of a uterine arteriovenous malformation (AVM).²⁰ Uterine AVM in this clinical context has been associated with persistent, severe vaginal bleeding and may require umbilical artery embolization or even hysterectomy. In a series by Timor-Tritsch et al,²⁰ 20% (2/10) of expectantly treated women had an AVM.

What cesarean scar ectopic pregnancy treatment modalities have been reported?

Although many different options for the management of CSEP have been reported, the optimal treatment is unknown (Table). Surgical, medical, and minimally invasive therapies and various combinations of such treatments have been described. However, the medical literature consists predominantly of case series, with a limited number of randomized controlled trials comparing treatment approaches. These series are influenced by variable levels of clinical experience, institutional capability, provider skill, and case complexity, which hinders comparisons between studies. Conclusions regarding optimal CSEP therapy are further limited by a lack of head-to-head comparisons between medical and surgical approaches.

The modalities that have been described for CSEP treatment include hysteroscopy, laparoscopy, laparotomy, open surgery, transvaginal surgery, sharp curettage, uterine aspiration, uterine artery embolization (UAE), methotrexate (both local guided injection and systemic administration), direct potassium chloride (KCl) injection, needle-guided sac decompression, high-intensity focused ultrasound imaging, the use of balloon catheters, and combinations of these methods.³⁵ In 1 review, the authors reported that treatment selection was influenced by physician specialty, with gynecologic surgeons favoring curettage, laparoscopy, and hysteroscopy, and obstetricians more readily pursuing needle-based injections and interventional radiology involvement.²¹ Publication bias likely also limits conclusions that can be drawn from the available literature.

CSEP treatment decisions are guided by the principal goal of preserving maternal health, followed by the secondary goal of preserving fertility when possible. Management decisions should be determined after considering pregnancy viability, gestational age, maternal health, future family planning wishes, physician skill and experience, and institutional resources. Preferred management may differ between institutions on the basis of resources, personnel, and clinical experience. Even with efforts to tailor treatment strategies to individual patients and clinical presentations, there remains a substantial risk for complications with any management approach.

Systematic reviews have been inconsistent with regard to the identification of a single optimal CSEP treatment modality that best balances procedural success and risks. In a review by Timor-Tritsch and Monteagudo²¹ that included 751 reported cases of CSEP and 31 different treatment approaches, a 44.1% complication rate was reported overall. Complications included unplanned emergency operations that included hysterectomy (4.8%), laparotomy (5.3%), and UAE (2.9%). Among procedures described by the authors as first-line, the highest complication rates were observed with intramuscular methotrexate alone (54/87 cases; 62.1%), curettage alone or in combination with other modalities (189/305 cases; 61.9%), and UAE alone or in

TABLE

Treatment options for cesarean scar ectopic pregnancy

Method	Number of studies		Number of patients	Efficacy, % ^a	Complications ^b
	Case series	RCTs			
Expectant management	5	0	41	41.5	53.7%
sMTX	18	3	339	75	13%
Needle aspiration+sMTX	6	0	148	84.5	15.5%
D&C	21	0	243	48	21%
Hysteroscopy ^c	7	0	95	83	3.2%
Transvaginal resection ^d	6	0	118	>99	0.9%
UAE+D&C	5	2	295	93.6	3.4%
UAE+D&C+hysteroscopy	1	1	87	95.4	1.2%
UAE+D&C+sMTX	13	1	427	68.6	2.8%
Local and sMTX	2	0	34	75	2.3%
Laparoscopy	7	0	69	97.1	0
Local MTX	2	1	74	64.9	4.1%
HIFU	1	0	16	100	0
HIFU+hysteroscopic suction curettage	1	0	52	100	0

Data adapted from Birch Petersen et al.³⁶

D&C, dilation and curettage; HIFU, high-intensity focused ultrasound; MTX, methotrexate; RCT, randomized controlled trial; sMTX, systemic methotrexate; UAE, uterine artery embolization.

^a Women who did not need additional treatment; ^b Severe complications such as hemorrhage and hysterectomy; ^c Eleven patients also had systemic MTX and hysteroscopy; ^d Twelve patients also had systemic MTX and transvaginal resection.

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combination with other modalities (30/64 cases; 46.9%). The lowest complication rates among first-line therapies were reported with hysteroscopy alone or in combination (22/119 cases; 18.4%) and local intragestational injection of methotrexate or KCl (8/81 cases; 9.6%). On the basis of observed complication rates, this review supported the use of local methotrexate and hysteroscopy-based approaches to CSEP treatment and discouraged the stand-alone use of systemic methotrexate, curettage, and UAE. Of note, most of the available literature does not distinguish between sharp and suction curettage, although the complication rates seem to be lower with suction curettage.

Different conclusions were reached in a systematic review by Birch Petersen et al³⁶ that compiled 2037 CSEP cases, some of which overlapped with the Timor-Tritsch report and included data from 4 randomized trials and 48 case series. Among CSEP cases with available gestational age data, most were detected in the first trimester. Treatment modalities were condensed into 14 main approaches. Success was defined as the efficacy of a first-line treatment modality in resolving a CSEP. Major complications were defined as hysterectomy, estimated blood loss of >1000 mL, or a need for blood transfusion. The lowest success rates were observed with expectant management (41.5% success, 53.7% complications), curettage (n=243; 48.1% success,

21% complications), UAE and methotrexate (n=427; 68.6% success, 2.8% complications), systemic methotrexate (n=339; 75.2% success, 13% complications), and combined local and systemic methotrexate (n=34; 76.5% success, 2.3% complications). Among reported therapies, the highest success rates were observed with transvaginal CSEP resection (n=118; 99.2% success, 0.9% complications), laparoscopy (n=69; 97.1% success, 0% complications), UAE with curettage, hysteroscopy, or both (n=85; 95.4% success, 1.2% complications), and UAE alone (n=295; 93.6% success, 3.4% complications). On the basis of this review of the literature, the authors concluded that interventional approaches seemed superior to medical approaches.³⁶

Since the publication of these reviews, treatment with a cervical double-balloon catheter that can terminate the pregnancy while compressing the blood supply to the gestational sac has been reported. A few series have reported a low rate of complications (4.2%) and a high success rate (97.7%) with this technique.^{37,38}

It should be emphasized that, although transvaginal CSEP resection, UAE, and laparoscopy alone or in combination seemed to be superior to medical and minimally invasive treatments in the Birch Petersen et al³⁶ review, these interventions require resources such as

specially equipped procedural suites or operating rooms, advanced equipment, anesthesia availability, and trained staff. Consequently, some of these interventions are not widely available, and they may be costly. Furthermore, little high-quality evidence exists comparing these methods head-to-head with less resource-intensive modalities, such as local intragestational injections of methotrexate or KCl.

What are the recommended treatment approaches for cesarean scar ectopic pregnancy?

Surgical treatment

Both medical and interventional treatment options have been described for the management of CSEP. Among surgical management options, transvaginal and laparoscopic CSEP resection seem to have low complication rates, although published data regarding these techniques are limited.^{39–41} A potential advantage of these approaches is that the scar tissue can be excised and the surrounding myometrium reapproximated at the time of CSEP removal. It is unknown if this practice decreases the risk of CSEP recurrence.

Curettage alone, without adjuvant treatments, has been associated with high complication rates, including hemorrhage and perforation, because of an inability to completely access and remove trophoblastic tissue outside of the endometrial cavity and because scar tissue contracts poorly after curettage. As with PAS, sharp curettage may sever deeply invading blood vessels and expose the patient to ongoing bleeding. In addition to a high complication rate, additional treatment is reported to be required after 52% of curettage cases.³⁶ Again, it should be noted that the published literature incompletely distinguishes between sharp curettage and uterine aspiration, which may provide different success and complication rates with CSEP management. **We suggest that operative resection (with transvaginal or laparoscopic approaches when possible) or ultrasound-guided uterine aspiration be considered for the surgical management of CSEP, and that sharp curettage alone be avoided (GRADE 2C).**

Although sharp curettage alone is not recommended as a primary CSEP treatment, higher efficacy and lower complication rates have been reported with ultrasound-guided vacuum aspiration.⁴² In a series that involved 191 women with CSEP who underwent suction curettage, there was a 4.7% rate of blood transfusion and a single case of hysterectomy owing to hemorrhage. Among patients who returned for follow-up, there was a 6% rate of repeated surgery because of retained products of conception. Shir-odkar placement as an adjunct to curettage has also been described, in which the cerclage suture is placed before curettage and only secured in the setting of hemorrhage to minimize bleeding.⁴³

Gravid hysterectomy is an alternative surgical option that may be considered for the definitive management of CSEP. This approach may be particularly appropriate for early

second-trimester CSEP presentations or for those who do not desire future fertility.

Medical treatment

When pursuing medical treatment of CSEP, local or intragestational injection of methotrexate is a preferred approach, with or without accompanying systemic methotrexate. Stand-alone systemic methotrexate is not recommended because of a higher reported risk of complications.^{16,30} Although a small randomized trial of systemic vs local methotrexate demonstrated no difference in overall cure rates,⁴⁴ reviews suggest a high risk of complications with intramuscular methotrexate alone,^{21,45} and local methotrexate seems to be a more effective approach. In a literature review by Cheung,⁴⁵ of 96 cases of intragestational methotrexate for CSEP, success was achieved in 73.9% after a single local methotrexate injection, and increased to 88.5% after an additional local or intramuscular methotrexate injection. No baseline clinical characteristics were found to influence the outcome other than serum hCG >100,000 IU/L, which was associated with treatment failure. Intragestational injection is typically performed with a 20-gauge needle under ultrasound guidance using a transvaginal approach. Sac aspiration may be performed before injection to verify appropriate needle placement. There are limited data regarding optimal dosing for local methotrexate injection, with dosages of 1 mg/kg of maternal weight and up to 50 mg being described.^{18,36,45,46} Varying dosages of systemic methotrexate have been reported in the management of CSEP; in general, these dosages are comparable with those used for ectopic pregnancy.^{7,47} **We suggest intragestational methotrexate for medical treatment of CSEP, with or without other treatment modalities (GRADE 2C). We recommend that systemic methotrexate alone not be used to treat CSEP (GRADE 1C).**

When patients with CSEP who have been treated medically are observed, the gestational mass can take weeks to months to resolve. A transient increase in hCG levels and CSEP mass size can be observed after methotrexate therapy. After local conservative CSEP treatment that involved 22 women, one study reported a mean time to resolution of 88 days (range, 26–177).¹⁸ An understanding of this anticipated posttherapy course may help to minimize unnecessary additional treatments. During the posttreatment observation period, patients should be monitored for concerning symptoms, such as hemorrhage or uterine AVM development. Interval ultrasonographic surveillance may be helpful in observing for CSEP resolution.

Intragestational KCl has also been described for the treatment of CSEP in a small number of cases.³³ This approach may be particularly appropriate for the management of heterotopic CSEP with a coexisting intrauterine pregnancy because methotrexate exposure may have embryocidal or teratogenic consequences for the intrauterine cotwin. As with methotrexate, ultrasound-guided KCl injection can be accompanied by sac

UNNUMBERED TABLE 1

Summary of recommendations

	Recommendation	Grade
1	We recommend against expectant management of cesarean scar ectopic pregnancy.	1B
2	We suggest that operative resection (with transvaginal or laparoscopic approaches when possible) or ultrasound-guided uterine aspiration be considered for the surgical management of cesarean scar ectopic pregnancy and that sharp curettage alone be avoided.	2C
3	We suggest intragestational methotrexate for the medical treatment of cesarean scar ectopic pregnancy, with or without other treatment modalities.	2C
4	We recommend that systemic methotrexate alone not be used to treat cesarean scar ectopic pregnancy.	1C
5	In patients who choose expectant management and continuation of a cesarean scar ectopic pregnancy, we recommend repeated cesarean delivery between 34 0/7 and 35 6/7 wk of gestation.	1C
6	We recommend that patients with a cesarean scar ectopic pregnancy be advised of the risks of another pregnancy and counseled regarding effective contraceptive methods, including long-acting reversible contraception and permanent contraception.	1C

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aspiration. In a case report and review of the literature, 5 cases of heterotopic CSEPs treated with local KCI were described.⁴⁸ All resulted in healthy live births of the cotwin, although 2 cases were complicated by postpartum hemorrhage, with 1 case resulting in hysterectomy because of placenta accreta. Hysteroscopic and laparoscopic approaches for treating heterotopic CSEPs have also been described.^{49,50}

Adjunct treatment options

UAE is a minimally invasive procedure that has been used in various combinations to treat CSEP. UAE has been reported as a stand-alone procedure and in combination with curettage, methotrexate, and hysteroscopy, which complicates comparisons between studies. One review indicated high success and low complication rates when UAE was performed without methotrexate or with and without curettage.³⁶ When methotrexate was added to a UAE strategy, there was a higher risk (31.4%) that additional treatments would be needed. In a small randomized trial that compared UAE followed by vacuum aspiration (n=37) with systemic methotrexate followed by vacuum aspiration (n=35), UAE was associated with a significant reduction in blood loss.⁵¹ Two women in the methotrexate group required hysterectomy vs none in the UAE group. UAE may be a uterine- and fertility-preserving procedure, although reported outcomes in the setting of CSEP vary significantly, and its role as an adjunct to other management approaches requires further study.

As previously mentioned, Timor-Tritsch et al^{37,38,52} have also reported ultrasound-guided placement and inflation of balloon and Foley catheters to tamponade a CSEP gestational sac that is complicated by bleeding or as a prophylactic measure. Their experience suggests that this technique may be well tolerated and efficacious, which supports a potential option that warrants further study.

How should cesarean scar ectopic pregnancy be managed in patients who decline treatment?

Patients who decline treatment of a CSEP should be counseled about the risk for significant obstetrical complications, including PAS, massive hemorrhage, uterine rupture, severe maternal morbidity, and potentially maternal death. Management of such cases should include a very high index of suspicion for PAS with appropriate antepartum management and delivery planning. Patients should be counseled regarding signs and symptoms of preterm labor or any symptoms that suggest uterine rupture. A repeated cesarean delivery is recommended between 34 0/7 and 35 6/7 weeks of gestation. As with other medically indicated late preterm births, betamethasone administration is recommended before delivery.⁵³ **In patients who choose expectant management and continuation of a CSEP, we recommend repeated cesarean delivery between 34 0/7 and 35 6/7 weeks of gestation (GRADE 1C).**

As with PAS, delivery should occur at level III or level IV facilities with appropriate expertise and resources, which includes the capability to manage massive hemorrhage.⁵⁴ A multidisciplinary team approach to delivery is recommended, and the team should be prepared for the potential need for cesarean hysterectomy and massive transfusion.

How does a history of cesarean scar ectopic pregnancy affect future pregnancies?

Patients can become pregnant after uterine-preserving management of a CSEP, although there seems to be an increased risk for recurrent CSEP and other severe maternal morbidities. Ben Nagi et al⁵⁵ reported a 5% rate of recurrent CSEP among 21 pregnancies achieved after previous conservative CSEP management. However, other series have reported high rates of complications. Seow et al⁵⁶ reported 7 pregnancies among 14 women with

UNNUMBERED TABLE 2

Society for Maternal-Fetal Medicine grading system: Grading of Recommendations Assessment, Development, and Evaluation (GRADE) recommendations^{67,a}

Grade of recommendation	Clarity of risk and benefit	Quality of supporting evidence	Implications
1A. Strong recommendation, high-quality evidence	Benefits clearly outweigh risks and burdens, or vice versa	Consistent evidence from well-performed, randomized controlled trials, or overwhelming evidence of some other form Further research is unlikely to change confidence in the estimate of benefit and risk	Strong recommendation that can apply to most patients in most circumstances without reservation Clinicians should follow a strong recommendation unless a clear and compelling rationale for an alternative approach is present
1B. Strong recommendation, moderate-quality evidence	Benefits clearly outweigh risks and burdens, or vice versa	Evidence from randomized controlled trials with important limitations (inconsistent results, methodologic flaws, indirect or imprecise), or very strong evidence of some other research design Further research (if performed) is likely to have an impact on confidence in the estimate of benefit and risk and may change the estimate	Strong recommendation that applies to most patients Clinicians should follow a strong recommendation unless a clear and compelling rationale for an alternative approach is present
1C. Strong recommendation, low-quality evidence	Benefits seem to outweigh risks and burdens, or vice versa	Evidence from observational studies, unsystematic clinical experience, or randomized controlled trials with serious flaws Any estimate of effect is uncertain	Strong recommendation that applies to most patients Some of the evidence base supporting the recommendation is, however, of low quality
2A. Weak recommendation, high-quality evidence	Benefits closely balanced with risks and burdens	Consistent evidence from well-performed randomized controlled trials or overwhelming evidence of some other form Further research is unlikely to change confidence in the estimate of benefit and risk	Weak recommendation; best action may differ depending on circumstances, patients, or societal values
2B. Weak recommendation, moderate-quality evidence	Benefits closely balanced with risks and burdens; some uncertainty in the estimates of benefits, risks, and burdens	Evidence from randomized controlled trials with important limitations (inconsistent results, methodologic flaws, indirect or imprecise), or very strong evidence of some other research design Further research (if performed) is likely to have an effect on confidence in the estimate of benefit and risk and may change the estimate	Weak recommendation; alternative approaches likely to be better for some patients under some circumstances
2C. Weak recommendation, low-quality evidence	Uncertainty in the estimates of benefits, risks, and burdens; benefits may be closely balanced with risks and burdens	Evidence from observational studies, unsystematic clinical experience, or randomized controlled trials with serious flaws Any estimate of effect is uncertain	Very weak recommendation, other alternatives may be equally reasonable
Best practice	Recommendation in which either: (1) there is an enormous amount of indirect evidence that clearly justifies strong recommendation (direct evidence would be challenging, and inefficient use of time and resources, to bring together and carefully summarize), or (2) recommendation to the contrary would be unethical		

^a Adapted from Guyatt et al.⁶⁸Society for Maternal-Fetal Medicine (SMFM). Consult Series #63: Cesarean scar ectopic pregnancy. *Am J Obstet Gynecol* 2022.

previous CSEP who were treated conservatively. The mean interval between CSEP and subsequent pregnancy was 13 months (range, 0–34 months). Four pregnancies were intrauterine, with 1 twin pregnancy; all were delivered by uncomplicated cesarean delivery between 35 and 36 weeks of gestation. Two pregnancies were complicated by placenta accreta: one was a triplet pregnancy (involving intrauterine twins and a recurrent CSEP) that resulted in a cesarean hysterectomy and massive hemorrhage at 32 weeks of gestation, although the other involved accreta noted at the time of cesarean delivery that did not require hysterectomy at 37 weeks of gestation. The final pregnancy involved a woman who became pregnant 3 months after curettage and cervical balloon treatment for a CSEP. In the subsequent pregnancy, she experienced spontaneous uterine rupture and died of hypovolemic shock with a stillborn fetus.

In a review of the literature, which included the series mentioned previously, Sadeghi et al⁵⁷ reported 59 subsequent pregnancies (81%) among 73 women with a CSEP who retained their uterus. Of these, 15 cases (25%) were complicated by recurrent CSEP. The largest single-center experience to describe pregnancy after CSEP included 32 pregnancies, with a 15.6% recurrent CSEP rate.⁵⁸ A more recent single-center series included 10 spontaneous pregnancies in 8 women with a history of CSEP; 4 (40%) were repeated CSEPs.⁵⁹ Patients who consider pregnancy after a CSEP should be informed that there is a significant risk of recurrence and severe maternal morbidity. **We recommend that patients with a CSEP be advised of the risks of another pregnancy and counseled regarding effective contraceptive methods, including long-acting reversible contraception and permanent contraception (GRADE 1C).**

Although a short interval between successful conservative CSEP management and subsequent pregnancy may increase the risk for recurrent CSEP or PAS, there is no consensus about how long to wait before attempting another pregnancy for patients who desire another pregnancy after counseling regarding the risks.^{14,30} Some experts have recommended waiting 12 to 24 months before attempting another pregnancy, although there is limited supporting evidence for this recommendation.^{4,60}

Given the increased risk for CSEP recurrence, some advocate evaluation of the uterus and cesarean scar by saline infusion sonohysterography before a subsequent pregnancy. However, it is not clear whether the detection of a defect is associated with higher risks and should influence counseling regarding the advisability of another pregnancy. Interpregnancy repair or revision of a cesarean scar has been reported with the use of a variety of surgical modalities. However, there are insufficient data to support a benefit to this practice.^{21,61–66}

Should a patient with a history of CSEP become pregnant, close ultrasonographic monitoring is recommended to confirm the presence of an intrauterine pregnancy and to

exclude recurrent CSEP or PAS. An initial ultrasound examination is recommended on presentation to prenatal care, ideally at <8 weeks of gestation, to confirm a normal intrauterine location. Repeated cesarean delivery is recommended between 34 0/7 and 35 6/7 weeks of gestation, before the onset of labor. Betamethasone administration is recommended before anticipated late preterm delivery.⁵³ The delivery team should be prepared for obstetrical hemorrhage and the potential need for cesarean hysterectomy (Unnumbered Table 1).

Conclusion

Because of high worldwide cesarean delivery rates, an increased incidence of CSEP has been recognized. CSEP can be difficult to diagnose in a timely fashion; this diagnosis should be considered in patients with a previous cesarean delivery who undergo early first-trimester ultrasonography. Several surgical and medical treatments have been described for this disorder; however, optimal management remains uncertain at this time. For this reason, registries have been created for providers to submit data on diagnosis, natural history, and management (<https://csp-registry.com> and <https://octri.ohsu.edu/redcap/surveys/?s=XCK7FLEA84>) (Unnumbered Table 2).

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