Hysteroscopic management of cesarean scar ectopic pregnancy

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Objective: To present our experience with hysteroscopic removal of cesarean scar ectopic pregnancy (CSP) and review the literature on the current management.
Design: Retrospective cohort study.
Setting: A tertiary referral university hospital, Sydney, Australia.
Patient(s): Six patients diagnosed with CSP.
Intervention(s): Four patients were successfully treated with primary hysteroscopic removal of the ectopic pregnancy. Two patients were treated with systemic methotrexate (MTX), which failed; one patient had a subsequent hysteroscopic removal of CSP, and the second had local injection of MTX to the gestational sac.
Main Outcome Measure(s): Clinical, serological, and ultrasound data and follow-up for subsequent pregnancies.
Result(s): For the women treated surgically, the median time for the return of βhCG to <5 mIU/mL was 30 days, the mean operative time was 35 minutes, and the mean estimated blood loss was 140 mL. Three pregnancies were achieved: a miscarriage, a term pregnancy that resulted in a live birth, and an ongoing intrauterine pregnancy. The patient who was managed by MTX took 105 days for the βhCG to normalize and had an ongoing hematoma at the site of the CSP that took 247 days to resolve.
Conclusion(s): Hysteroscopic management of CSP offers advantages over local injection with MTX and systemic MTX with a more rapid return to normal βhCG level and reduction in follow-up time. (Fertil Steril® 2009;■:■–■. ©2009 by American Society for Reproductive Medicine.)

Key Words: Cesarean, ectopic pregnancy, hysteroscopic surgery

The incidence of cesarean scar ectopic pregnancy (CSP) is a rare and potentially catastrophic late effect of cesarean delivery. With rates of abdominal delivery increasing worldwide, this complication is likely to become more common. The recent recognition of this problem has meant that diagnosis and management are still in their infancy, and there is no consensus regarding the best management of CSP. Medical management using systemic methotrexate (MTX) and local injection of embryocides has been used successfully in a number of small series; however, the time taken for serum βhCG to return to normal can be prolonged. The extended time for resolution of the trophoblast and associated tissue at the site of the scar increases surveillance time and delays subsequent conception.

Hysteroscopic removal of CSP has been reported to be safe and effective in a small case series (1). It offers a short operative time, short postoperative stay, and rapid return of βhCG to normal. To date there are eight cases in the literature reporting 100% treatment success for CSP (2). We share our experience with hysteroscopic management for this increasingly common problem.

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MATERIALS AND METHODS

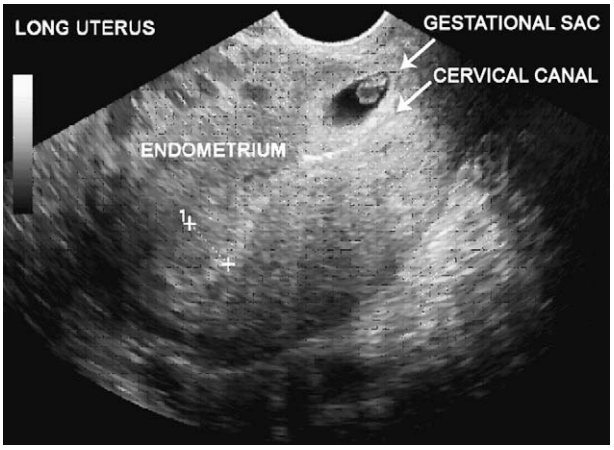
A retrospective observational study was undertaken at a tertiary referral obstetric unit. Between May 2004 and May 2007, six women were diagnosed with CSP using high-resolution transvaginal ultrasound (TVUS) in the sagittal view (Fig. 1). As per diagnostic criteria, all patients had a gestational sac with or without fetal pole and with or without fetal cardiac activity (depending on gestation) in the anterior part of the uterine isthmus; an empty uterine cavity without contact with the sac; a clearly visible empty cervical canal; and absence of, or a defect in, the myometrial tissue between the bladder and the sac (3, 4).

Under general anesthesia, a 30° operative hysteroscope with a 10-mm external diameter continuous flow sheath was used to visualize the uterine cavity, and distension was obtained using 1.5% glycine (Baxter Medical, Melbourne Australia). The pregnancy was located in the myometrial defect and removed under direct vision with cold resection without electrosurgery by a 4-mm loop in the working element of the operative hysteroscope (Karl Stortz GmbH, Tutlingen, Germany). The ectopic pregnancy was removed, either whole or piecemeal, under direct vision. This process continued until all products were removed and the myometrium was visualized. In cases in whom the myometrial defect did not allow visualization in its most anterior part, a 70° hysteroscope was on standby to assist.

Coagulation was used to control bleeding if required. Balloon catheterization of the cervical canal by a 30-mL Foley

FIGURE 1

Sagittal view of CSP by ultrasound. The pregnancy is located at the level of the uterine isthmus, entirely within the myometrium, separate from the endometrial cavity and cervical canal.



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catheter to tamponade postprocedure bleeding was used if required. Patients were monitored in the hospital overnight with an indwelling catheter to the bladder and discharged the day after surgery if they were well. Patients were followed weekly to review their serum βhCG and clinical status. An ultrasound was performed at 3 months postprocedure to review the uterine cavity for residual mass in the cesarean scar and defect in the myometrium. Since this was a retrospective case review, institutional ethics committee approval was not sought or required.

RESULTS

Six cesarean scar ectopic pregnancies is an incidence of 1:2250 in our hospital. The median age of patients was 41 years (range, 35–43 years), and the median parity was 1 (range, 1–2). The clinical characteristics are summarized in Table 1. Four of the six patients had a single previous cesarean delivery, one of which was a classical section, and two patients had two previous lower segment cesarean deliveries. The mean βhCG level at presentation was 41,309 mIU/mL (range, 18,330–78,000 mIU/mL). The mean gestational age at presentation was 7 weeks (range, 6–10 weeks). Cardiac activity was present in 50% of cases at presentation. Four of the six patients in our series presented with vaginal bleeding, with two patients complaining of associated pain, and two patients were asymptomatic. Ultrasound was the mode of diagnosis for all patients.

Of the patients managed endoscopically, the mean operating time was 35 minutes (range, 20–45 minutes). Two patients had a 30-mL Foley catheter to the cervix; for the first patient in the series it was prophylactically used for expectant hemorrhage. After this, expectant management was implemented, and only one patient required a Foley catheter for clinical hemorrhage. This same patient also received 250 μg ergometrine to control active bleeding at the site of implantation. Visualization was considered optimal in four cases to allow for complete removal of the conceptus under direct vision. In one case, bleeding toward the end of the procedure impaired vision, although it was considered that all products had been removed before the onset of bleeding. The plane of dissection was apparent in two cases and was unclear in three cases. In all patients, the conceptus had to be removed piecemeal. Electrosurgery was not used in any case nor was the 70° hysteroscope required.

The mean intraoperative blood loss was 140 mL. For all cases except one, the hospital stay was overnight. The exception was a patient who had ongoing hematuria postprocedure; this was investigated by cystogram, which showed no evidence of bladder injury. She was managed conservatively with the hematuria resolving spontaneously on day 3, and she was discharged on day 4 with no ongoing morbidity.

TABLE 1

Clinical data for patients with CSP.

Case	Age, years	Previous no. of cesarean sections	Gestation age, weeks	Cardiac activity	Initial βhCG, mIU/mL	Treatment	βhCG to normal, days	Time mass resolve, days
1	35	1	6	–	12,294	Hysteroscopy	14	30
2	41	1	7	+	78,000	Hysteroscopy	24	32
3	41	1	6	–	15,654	Hysteroscopy	30	28
4	43	2	10	+	29,950	Systemic MTX, hysteroscopy	45	31
5	33	2[a]	6	–	55,983	Hysteroscopy	36	30
6	41	1	7	+	78,965	Systemic MTX, local MTX	105	247

[a] One lower segment cesarean and one classical cesarean in the same patient.

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Ultrasound at 3 months in patients who had hysteroscopic removal of CSP revealed no residual mass or collection. A myometrial defect was demonstrated sonographically at the location of the cesarean scar in two patients, and it is uncertain whether this defect was present before pregnancy implantation. Quantitative βhCG levels declined to normal with an average return time of 30 days (range, 14–45 days). No blood transfusions were required, and no repeat medical or surgical intervention undertaken. Fertility-conserving surgery was possible in all women.

The patient who had treatment with local injection of MTX had a return of βhCG to normal in 105 days with a residual hematoma at the site of implantation evident on ultrasound. She had ongoing suprapubic pain at her monthly follow-up visits but did not attend between months 4 and 9 after MTX. A clinical review at 247 days revealed resolution of the pain and hematoma on ultrasound.

All of the patients who had CSP treated medically or surgically were advised to have an early ultrasound in their next pregnancy to locate the implantation site. At 1–3 years follow-up, two patients decided they did not wish to have any further pregnancies; two patients were trying to conceive but have not yet been successful, and two patients have had three subsequent pregnancies. One patient had a miscarriage with fundal implantation and was managed by hysteroscopic removal of retained products of conception. She then had a term pregnancy and was delivered at 37 weeks' gestation by cesarean delivery. A second patient has an ongoing uncomplicated intrauterine pregnancy with anterolateral placentation after her CSP.

A literature review was performed using the Ovid Medline and Embase and PubMed databases with medical subject headings such as "Pregnancy Ectopic," "Cesarean Section," "Cicatrix," "Cesarean Scar Pregnancy," and related key words, to obtain a comprehensive list of articles 1966–2007. To date, 109 primary procedures have been reported in the literature for management of CSP. These have been summarized in Table 2.

DISCUSSION

The incidence of CSP is unknown, however, the estimated prevalence is reported to be between 1:1800 and 1:2226 (2, 5). Little is understood about the natural history or the pathophysiology of the CSP. It is defined as a pregnancy embedded in a previous cesarean scar and completely surrounded by myometrium and fibrous tissue. It has been proposed that the implantation invades the myometrium through a microtubular tract between the cesarean scar and endometrial cavity (3, 6, 7). It differs from placenta previa accreta by its early invasion into the myometrium and is completely surrounded by fibrous scar tissue. The pregnancy may grow back toward the uterine cavity, potentially forming a pregnancy increta or percreta, or out of the uterus toward the bladder and abdominal cavity, implanting elsewhere in the abdomen, which is the type most prone to rupture (8). Pathological specimens of the uterus from CSP show that chorionic villi are not merely penetrating the myometrium but are bound and implanted in it (2, 9). As in our series, diagnosis is most often obtained by TVUS, allowing early intervention. It has been estimated that TVUS with color Doppler has a sensitivity of 86.4% (10). Magnetic resonance imaging is usually reserved for cases in which the TVUS is equivocal (2).

The management of this rare condition has varied, with few centers having significant experience to date. Uterine-conserving treatment is preferred, and expectant management not recommended due to a high risk of uterine rupture (11). Termination of pregnancy by medical or surgical methods during the first trimester is the treatment of choice due to the reduced risk of invasion into the bladder and surrounding organs.

Primary and secondary surgical management includes dilation and curettage, hysteroscopic removal, laparoscopic resection, and laparotomy with wedge resection of cesarean scar or hysterectomy. Initial reports of dilation and curettage were associated with a high failure rate (2), although improvement was made by a Shirodkar suture being placed prophylactically before curettage to achieve hemostasis (12). Hysteroscopic removal was first described by Wang et al. in 2005 (13), where the CSP was removed without complication, and at 4 weeks after the procedure there was normal sonographic echotexture of the uterus and normal serum βhCG. A further series of six patients (1) treated by hysteroscopic removal of CSP reports no complication, blood transfusion, and rapid return of negative pregnancy test (mean 22 days). Such treatment offers visualization of the implantation site and the ability to separate the gestational sac from the myometrium under operator view. The removal is performed without electrosurgery, however, this should be available to address bleeding (Fig. 2). Surgical removal has also been described as a rescue after failed medical management (14). In the literature to date there is a success rate of this procedure of 8/8 (2). Our five cases increase this number to 13, with a 100% success rate and minimal associated morbidity.

Maymon et al. (5) described systemic MTX as an appropriate management option when the woman is pain free and hemodynamically stable, with an unruptured CSP of <8 weeks' gestation. More than half the women treated in this manner required a secondary procedure including local injection of MTX with or without sac aspiration and in some instances laparotomy and hysterotomy. Other investigators (6, 15–18) have described intrasac aspiration and injection of embryocides, resulting in higher success rates as a primary procedure, which is further improved by a combination of systemic and local injection of embryocides. Other more novel approaches include uterine artery embolization as a single procedure or in combination with systemic MTX (19–22). Medical management is less invasive for the patient, but the extended surveillance time, the prolonged return time of βhCG to normal, and resolution of local scar mass are problematic and may not be acceptable for patients or health care

TABLE 2

Summary of CSP.

Procedure	Gestational age, weeks	Primary treatment, n (references)	Successful, %	Secondary treatment, n (references)	Comments
Expectant	6–9	7 (5, 10, 17, 22, 25, 27)	42.8	0	
Medical management					
Systemic methotrexate	5–11	23 (15, 22, 25, 26–34)	45.5	2 (14, 22)	
Local injection embryocide[a]	6–12	39 (6, 16, 17, 18, 22, 31, 35–42)	90.4	5 (22, 25, 31, 32, 48)	All for failed systemic treatment
Combined systemic and local injection	6–9	19 (22, 38, 43, 44)	100	0	
Gestational sac aspiration	6–7	4 (18, 22, 27)	100	2 (15, 31)	
Uterine artery embolization[b]	6–13	5 (19, 20, 22, 25, 45)	80	4 (25, 53, 54)	Three of four secondary procedures after laparotomy
Surgical management					
Dilation and curettage[c]	7–12	50 (10, 12, 21, 40, 46–49)	86	2 (39)	One maternal death in next pregnancy
Hysteroscopic	7–11	10 (1, 13)	100	3 (1, 14)	100% successful
Laparoscopic resection	8–10	15 (22–24, 50)	92.9	3 (25)	Two convert to open procedures
Laparotomy and hysterotomy	6–8	12 (7, 8, 22, 27, 47, 48, 51, 52, 53)	66.7	6 (22, 38, 45)	Two required hysterectomy
Laparotomy and hysterectomy	6–32	6 (7, 27)	100	7 (10, 20, 21)	One cesarean hysterectomy
Total		190		31	

[a] Embryocide: methotrexate, potassium chloride, hyperosmolar glucose, crystalline trichosanthes, vasopressin, or combination of agents.
[b] In combination with embryocide for clinical hemorrhage or prophylaxis.
[c] Twenty-eight cases of dilation and curettage had prophylactic Shirodkar suture placed for hemostasis; 22 of these cases required suture to be tied (12).

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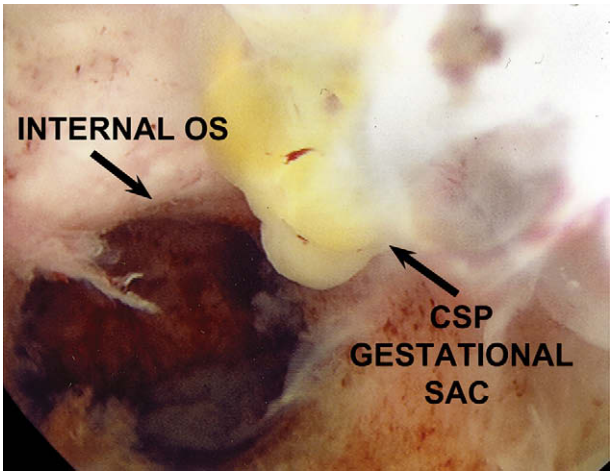
FIGURE 2

Hysteroscopic view of CSP. The pregnancy is seen caudal to the internal os at the location of the previous cesarean scar.



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providers. Since medically managed CSP has been reported to take 2 months–1 year to resolve (4), the patient's age and desire for fertility must be considered and openly discussed before making a management plan with the patient.

Laparoscopy and laparotomy have also been described as a method to treat CSP. Laparoscopy has been described successfully in a small case series (23, 24) and is appropriate if the pregnancy is seen to be protruding into the abdominal cavity or bladder, where the patient is hemodynamically stable, and there are appropriate facilities with experienced surgeons to undertake this procedure (8, 23). Laparotomy and wedge resection should be considered for women who do not respond to conservative, medical, or surgical therapies or when the patient is hemodynamically unstable and uterine rupture is suspected or diagnosed (2, 11).

Hysteroscopy is a minimally invasive operative technique that offers direct visualization, low morbidity, and high primary success rates to date, although numbers are small and further experience would be helpful to determine the safest and most appropriate technique. It has the distinct advantage over systemic and local injection techniques in that it affords the patient shorter follow-up time and a more rapid return to fertility. Our operative results indicate a variety of pathological findings with a variable plane of dissection and sporadic and unpredictable bleeding. We recommend the availability of alternately angled hysteroscopes and electrosurgery should complications be encountered. The short time interval to return of normal βhCG levels indicates that complete removal of all gestational material is likely even when visualization is not optimal.

In our series, the median age of patients was 41 years. The median age of patients with CSP reported in the literature is 35 years (range, 24–46 years), although of the hysteroscopic cases reported, the median age of patients was 37 years (range, 29–43 years), a slightly older subset of patients. It is not clear if age was a factor in decision making for surgical treatment in this group of patients, and certainly in our cohort the decision was made based on the surgeon's experience and level of comfort with hysteroscopy. However, given that surgical procedures appear to require a shorter follow-up, perhaps it is a more appropriate option for women in the older age bracket, particularly when subsequent fertility potential is a priority.

Conclusions

In this retrospective observational study, we found that systemic medical management was unsuccessful for treating CSP. Both local injection with MTX and hysteroscopic removal of CSP were successful in terminating a CSP and retaining the woman's uterus and future fertility. Hysteroscopic removal of CSP has the advantage of a rapid return to normal βhCG and normal morphology of the uterine cavity. It requires a shorter follow-up and allows the patient more time to recommence conception. In the hands of an experienced endoscopist, it is an effective means of treating this difficult clinical problem.

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