Laparoscopic management of ectopic pregnancies in unusual locations

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Abstract

Objective: The aim of this study was to evaluate the feasibility and efficacy of laparoscopic surgery for patients with ectopic pregnancies in unusual locations.

Materials and methods: This is a retrospective case series of 31 patients from 6 weeks to 10 weeks postmenstrual who were referred for diagnosis and treatment and suspected of having an unruptured cesarean scar pregnancy (CSP) or cornual pregnancy (CP). The diagnosis was confirmed with transvaginal ultrasound, and all of the patients underwent laparoscopic management.

Results: A diagnosis of CSP or CP was confirmed in all of the patients during the laparoscopic procedure. None of the patients required conversion to laparotomy. The total operative time ranged from 40 minutes to 120 minutes. The total blood loss was limited, ranging from 30 mL to 200 mL. All of the women tolerated the operation well and had uneventful recoveries.

Conclusion: When performed by a well-trained gynecologist, laparoscopy appears to be a reasonable alternative for the treatment of unruptured CSP or CP.

Keywords:
- cesarean scar pregnancy
- cornual pregnancy
- ectopic pregnancy
- interstitial pregnancy
- laparoscopy

Introduction

Ectopic pregnancy is the most common cause of pregnancy-related death in the first trimester of pregnancy [1]. Ectopic pregnancies are estimated to occur in 1–2% of all pregnancies, and the majority of ectopic pregnancies are located in the fallopian tubes. Pregnancies have been reported to be implanted in the cervix, the ovaries, the cornual, interstitial tubal segments, a previous cesarean scar, and the abdomen [2]. The relative infrequency of these ectopic pregnancy sites complicates the study of treatment efficacy. Much of the knowledge regarding the treatment of these conditions is largely observational and anecdotal. Most of the cases were initially undiagnosed and then complicated with massive hemorrhaging, or they became life threatening. Physicians should maintain a high index of suspicion with a close follow-up, through which an ectopic pregnancy may be detected early. We present our experience of 31 women, all of whom were diagnosed via transvaginal ultrasound with an unruptured ectopic pregnancy in an unusual location and were treated by laparoscopic management.

Materials and methods

Patients

From July 2002 to December 2010, 258 women with a nontubal ectopic pregnancy were diagnosed at Mackay Memorial Hospital, Taipei, Taiwan. Among these, 22 women had an unruptured cesarean scar pregnancy (CSP) and nine women had an unruptured cornal pregnancy (CP). Ethical approval was obtained from the Institutional Ethics Committee of Mackay Memorial Hospital, with the approval date of September 25, 2010 and the approval number 10MMHIS114. The Institutional Review Board of Mackay Memorial Hospital approved the chart evaluation of this retrospective study. Each patient underwent a face-to-face structured interview that included questions related to her age, parity, medical illness, and previous surgery. A drug history was obtained to exclude a cause that might aggravate the symptoms. The physical examination included the height, weight, and a pelvic examination to detect the presence of an adnexal mass. Serum β human chorionic gonadotropin (β-hCG) determination was obtained in all of the patients. The diagnoses were made by the authors using transvaginal ultrasonography, and the treatments were performed by video laparoscopy. Before surgery, each woman received extensive counseling regarding the condition, the management options, the risks and benefits of treatment, further fertility concerns, and...
whether to continue the pregnancy. After counseling, each patient selected her treatment choice.

A diagnosis of CSP was made if the following sonographic criteria were met: (1) an empty uterine cavity with a clearly demonstrated endometrium; (2) an empty cervical canal; (3) a gestational sac located at the anterior part of the uterine isthmus; and (4) a gestational sac embedded in and surrounded by the myometrium and the fibrous tissue of the sac, separate from the endometrial cavity or the fallopian tube (Fig. 1A) [3,4]. A diagnosis of CP was made if a transvaginal ultrasound revealed an empty endometrial cavity and an extremely eccentrically located gestational sac surrounded by a layer of thin myometrium (Fig. 2A) [5]. Laparoscopy was performed to confirm the diagnosis and to remove the conception products. The defect in the uterus was repaired by laparoscopic suturing.

Operative procedure

Under general anesthesia, a Foley catheter was inserted to empty the bladder and monitor the urine output. With the patient in the supine position, a Verres needle was inserted through a small incision just inferior to the umbilicus and a pneumoperitoneum created by insufflation with carbon dioxide to a maximal pressure of 20 mmHg. Then, a 10-mm operative trocar was inserted into the abdominal cavity. A laparoscope with an attached video camera was passed through the cannula to visualize the intra-abdominal organs with simultaneous recording. The patient was placed in the 15° Trendelenburg position. A 5-mm trocar was inserted suprapubically in the midline and passed into the pelvic cavity, and two additional 5-mm trocars were inserted at the level of the anterior superior iliac spine, lateral to the epigastric blood vessels. After placement of the trocars, the intra-abdominal pressure was decreased to 15 mmHg. A laparoscopic assisted vaginal hysterectomy (LAVH) or conversion to laparotomy was performed if massive bleeding occurred.
Technique for CSP

The serosa of the uterovesical flexion was incised, and the bladder was pushed caudally to allow access to the lower uterine segment. In each case, a mass with a thin wall of myometrium was seen (Fig. 1B). Dilute vasopressin (1 unit/mL) was used to minimize bleeding during the procedure. In total, 5-10 mL of the vasopressin solution was injected into the myometrium at one or more sites with an 18-gauge spinal needle placed directly through the abdominal wall. After blanching of the myometrium was noted, a transverse incision was made over the most prominent area of the mass, revealing in each case a dark red gestational sac, which was removed using grasping forceps. The resulting defect in the myometrium was cleaned using suction irrigation, and hemostasis was achieved using Wolf bipolar forceps at 20 W. One layer of interrupted 2-0 polyglactin sutures was placed in the uterine wall using an 18-gauge spinal needle placed directly through the myometrium at one or more sites with an 18-gauge spinal needle placed directly through the myometrium. The resulting defect in the myometrium was cleaned using suction irrigation, and hemostasis was achieved using Wolf bipolar forceps at 20 W. One layer of interrupted 2-0 polyglactin sutures was placed in the uterine wall using the extracorporeal method (Fig. 1C). The gestational tissue was removed in an Endobag (Covidien, Mansfield, MA, USA).

Technique for CP

A protruding cornual mass was identified (Fig. 2B), and dilute vasopressin was used to assist hemostasis, as in the procedure for CSP. A midline transverse incision, wide enough to allow sufficient access, was made in the cornual mass. Excessive extension toward the fallopian tube was avoided to minimize the possibility of an interstitial stricture or obstruction after the wound repair. The gestational tissue was evacuated using a suction irrigator and grasping forceps. One layer of interrupted 2-0 polyglactin sutures using the extracorporeal method was used to close the defect in the cornu (Fig. 2C). The gestational tissue was removed in an Endobag.

The postoperative serial serum β-hCG concentration was determined in all of the patients at follow-up to ensure that the surgical treatment was successful.

Results

During the study period, 31 unruptured CSP (n = 22) and CP (n = 9) cases were treated by laparoscopy. The clinical data of the patients are presented in Table 1. Histological confirmation of the gestational tissue was made in all of the cases. The patient ages ranged from 27 years to 44 years. All previous cesarean sections had been performed using the lower segment transverse incision method. One woman had four previous cesarean sections, three women had three previous cesarean sections, nine women had two previous cesarean sections, and nine women had only one previous cesarean section. Of the nine CP cases, ectopic cardiac activity was identified in three cases. Of these three cases, one patient had undergone two cesarean sections and an appendectomy, and one patient had undergone an ipsilateral salpingectomy for a tubal pregnancy.

Laparoscopic management was successful in the 31 cases; no cases required conversion to laparotomy. The total operative time ranged from 40 minutes to 120 minutes, and the total blood loss ranged from 30 mL to 200 mL. The pathological examination of the laparoscopic removal tissue in each case revealed blood clots, chorionic villi, and prominent decidua tissue, all consistent with an extrauterine gestational sac.

Table 1

Patients’ clinical data.

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β-hCG — β-human chorionic gonadotropin.
ectopic pregnancy. Patients 3, 7, and 10 selected to undergo tubal ligation. Patients 4 and 15 successfully conceived again at 3 months and 10 months, respectively, after laparoscopy, and they both delivered a healthy baby at term by lower segment cesarean section. Patient 15 successfully conceived an intrauterine pregnancy. All of the women were discharged on the 2nd day after laparoscopic surgery.

**Discussion**

CSP and CP pose a significant diagnostic and therapeutic dilemma. Although cesarean section is a very common procedure, embryo implantation into the previous cesarean scar occurs very rarely. The increased incidence appears to be largely attributable to a rise in the cesarean rate and the more widespread use of transvaginal ultrasound scan examination as a diagnostic method. CP cases account for 2–4% of ectopic pregnancies. They are defined by their implantation site, and are found in the interstitial region between the proximal portion of the fallopian tube and the musculature of the uterus [5]. Early intervention is important because CSP and CP might result in uterine rupture and massive hemorrhaging. Ultrasound is a first-line diagnostic tool for CSP and CP; however, it is difficult to differentiate a scar pregnancy from a miscarriage in progress or a cervicoisthmic pregnancy. Because of the unique location of a CP, it could be difficult to detect early. Differentiating a CP from an eccentric intrauterine pregnancy is also extremely challenging. Serial transvaginal ultrasound scans plus serum β-hCG monitoring should be employed in all women with uncertain gestation.

The diagnosis of CSP is frequently difficult, and there is no universal treatment guideline [6]. Curettage is contraindicated in an unruptured CSP because it might result in rupture of the implanted gestation and massive hemorrhaging. The trophoblastic tissue is outside the uterine cavity and thus unreachable by a curette. A review by Arslan et al [7] indicated that uterine curettage was unsuccessful or caused complications in eight of nine women. In our series, four women who had undergone dilatation and suction curettage at local medical clinics all presented with profuse vaginal bleeding, and two women required blood transfusions.

Nonsurgical management should be the reasonable first choice for women with an unruptured CSP who are hemodynamically stable [8]. The medical treatments include systemic methotrexate (MTX), ultrasound-guided local MTX, or a combination of the two [6]. For CP cases, a systemic injection of MTX as a single dose or in a multiple-dose regimen [9,10] is the most extensively studied medical treatment. Local MTX has also been successfully administered with ultrasound [11] and laparoscopic [12] guidance. Other medical treatments including etoposide and potassium chloride injection into the gestational sac have shown success [13,14]. The disadvantages of medical treatment are a relatively slow decline in the β-hCG levels and the potential for massive bleeding and uterine rupture before the condition resolves [15] as well as that the original scar, which has demonstrated a predisposition to further ectopic implantation, is left in place. Previous reports have shown that there are disadvantages to medical treatment for managing CP cases. The gestational sac size and serum β-hCG levels could not be used to predict the success of MTX treatment for CP. The overall failure rate for MTX treatment has been reported to be as high as 35% [9,16]. Another important issue in the selection of the appropriate treatment is the preference of the patient. There are several reasons that women might prefer a surgical approach for CSP or CP treatment, as follows: (1) a patient might not have time for frequent hospital visits for treatment; (2) personal reasons; or (3) a desire for permanent sterilization with concomitant tubal ligation.

Only surgery offers the opportunity to remove the ectopic gestational tissue in the cesarean scar and simultaneously repair the defect [17]. A review by Gherman et al [16] indicated that termination of pregnancy by laparotomy or hysterotomy with repair of the accompanying uterine scar dehiscence appeared to be the best treatment for CSP. When the initial serum β-hCG level is higher than 5000 million international units (MIU)/mL or the gestational period is longer than 8 weeks, medical treatment is less likely to succeed [18,19]. Because the mean gestational duration was 7.5 weeks, the serum β-hCG level was 25279 MIU/mL and there was fetal cardiac activity in 44.8% of the women, medical treatment was unlikely to resolve the conditions of the patients in the study.

Traditionally, surgical treatment has included laparotomy with hysterectomy or cornual wedge resection. With the advances in high-resolution transvaginal ultrasound and more sensitive β-hCG assays, it is possible to diagnose CP early in gestation. With technical improvements in laparoscopy, a few authors have advocated laparoscopic surgical treatment to preserve the uterine integrity better for future fertility [12,20].

Laparoscopy was introduced into gynecological practice several decades ago, and now most gynecological operations could be performed laparoscopically. At our hospital, LAVH is the most common procedure for hysterecctomy. Given our experience with this procedure, we hypothesized that it was safe to attempt to manage CSP and CP laparoscopically, by knowing that if intractable bleeding occurred we could perform an LAVH immediately. Conversion to open laparotomy would have been the procedure of last resort.

In 1999, Lee et al [21] performed the first successful laparoscopic resection of a CSP with primary repair of the defect in a woman who had undergone curettage for termination of her pregnancy. There was not enough information regarding gestational age and ultrasound evaluation prior to curettage to determine if it were a true ectopic pregnancy or if uterine perforation at the cesarean scar site at the time of curettage resulted in an intrauterine pregnancy passing through the rupture, thus mimicking an ectopic implantation. Four of our cases had curettage, and the identical question might be raised, although all of the four cases fulfilled the ultrasonographic criteria for CSP. The laparoscopic and pathological findings were consistent with CSP. The other 18 cases had no previous intervention, and the diagnoses in these cases were of little doubt.

In 1988, Reich et al [22] reported the first case of laparoscopic management of a CP. With the technical improvements in laparoscopy over the past 2 decades, there is more potential for conservative treatment. Hemorrhaging remains a major concern and is the major cause of complications in the laparoscopic management of CP. Recently, suture methods for more effective and reliable hemorrhage control have been introduced, including the square suture, encircling suture, endoloop, and automatic stapler [23–26]. These suture methods could cause anatomical and functional damage to the cornu and fallopian tube. Attenuation of the myometrium might result in an increased risk of uterine rupture in a subsequent pregnancy. It is very important to properly repair the cornu when the condition is managed with minimal surgical intervention. We suggest that meticulous full-thickness laparoscopic suturing of the cornu after evacuation of the products of conception and preservation of the cornu and salpinx could preserve reproductive capacity. One woman in our study successfully conceived twice after the operation.

Vasopressin is an effective hemostatic agent and has been used in vaginal surgery [27]; Bryman et al [28] demonstrated the contractile effect of vasopressin on the cervix in vitro. We use vasopressin to assist hemostasis, as in the procedures for CSP and CP, and hypothesize that the minimal bleeding in our cases was the result of a local injection of vasopressin and the tamponade effect of the pneumoperitoneum.
Our case series demonstrates the value of laparoscopy in the diagnosis and treatment of unruptured CSP and CP. Physicians should maintain a high index of suspicion and close follow-up, through which an ectopic pregnancy could be detected early. This procedure offers a rapid recovery, preserves reproductive capacity, and ensures patient satisfaction equal to that of other medical treatments.

Conflicts of interest

The authors have no conflicts of interest relevant to this article.

Acknowledgments

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References