Laparoscopic combined hysteroscopic management of cesarean scar pregnancy with temporary occlusion of bilateral internal iliac arteries

A retrospective cohort study

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Abstract

To report on our experience of surgery of cesarean scar pregnancy with temporary occlusion of the bilateral internal iliac arteries.

Single center, retrospective review of patients who were diagnosed as cesarean scar pregnancy between December 2017 and December 2018. All patients were managed by laparoscopic cornuostomy and simultaneously repair the defect with temporary occlusion of the bilateral internal iliac arteries, followed by hysteroscopy to confirm no remnants of the pregnancy and deal with intrauterine lesions synchronously.

Five patients were enrolled, the vital signs of all the patients were stable. All 5 patients were managed by laparoscopic cornuostomy and simultaneously repair the defect with temporary occlusion of the bilateral internal iliac arteries, followed by hysteroscopy to confirm no remnants of the pregnancy and 3 patients’ free intrauterine adhesions synchronously. No one was converted to laparotomy. Intra-operative bleeding was minimal and the postoperative recoveries were uneventful. Human chorionic gonadotropin was normalized after 3 to 4 weeks.

Laparoscopy with temporary internal iliac artery occlusion technique offers effective surgical management of cesarean scar pregnancy, and hysteroscopy is necessary to deal with intrauterine lesions.

Abbreviations: CSP = cesarean scar pregnancy, GS = gestational sac, UAE = uterine artery embolization.

Keywords: cesarean scar pregnancy, ectopic pregnancy, hysteroscopy, internal iliac artery occlusion, laparoscopy

1. Introduction

Cesarean scar pregnancy (CSP) refers to the implantation of gestational sacs, fertilized eggs, or embryos at the site of a previous cesarean delivery scar; this concept was first proposed in 1978.[1] It was recently estimated that 1 in 500 women with a cesarean scar would have a CSP and that 4% of ectopic pregnancies were CSP.[2] Two different types of CSP are described depending on the depth of the implantation with type 1 progressing toward the uterine cavity and type 2 with a gestational sac (GS) located in the anterior uterine wall with diminished myometrium between the sac and the bladder.[3,4]

CSP can lead to life-threatening consequences like massive bleeding and uterine rupture. An ideal treatment should be capable to eliminate the embryo, repair the uterine defect and preserve fertility without massive bleeding. The currently available treatment reported in the literature includes medical therapy, uterine artery embolization (UAE) in combination with dilatation and curettage, hysteroscopic resection, laparotomic resection, laparoscopic resection, or transvaginal resection. As we all know, medical therapy involves long recovery times, whereas UAE has complications such as post-thrombotic syndrome, injury to ovarian function and urinary system, even pulmonary embolism, sepsis rectal perforation.[5–8] Moreover, UAE requires an interventional radiologist, which may limit the availability of the treatment. In addition, neither medical therapy nor UAE in combination with dilatation and curettage cannot repair the scar...
dehiscence, and to some extent it makes no contribute to reduce the relapse, particularly for patients who have fertility desire. In this study, we report on our experience of treatment of cesarean scar pregnancy with temporary occlusion of bilateral internal iliac arteries, containing some important surgery details leading to successful outcomes.

2. Methods

2.1. Patients

This retrospective study included patients who were diagnosed as type 2 CSP between December 2017 and December 2018 in Sir Run Run Shaw Hospital in Hangzhou. Data of all CSP patients, including demographic features, clinical symptoms, transvaginal sonography examinations, laparoscopic findings, hysteroscopic findings, management details, operative time, occlusion time, blood loss, and prognostic information were reviewed for further detailed analysis. The follow-up time ranged from 4 months to 16 months. Written permissions were obtained from the patients. This work has been reported in line with the STROCSS criteria.[9] IRB of our hospital verified that ethical approval of this retrospective study was exempt.

2.2. Diagnosis of CSP

A diagnosis of CSP was made by two-dimensional transvaginal ultrasound or magnetic resonance imaging and confirmed with a laparoscope (Fig. 1).

2.3. Management

Informed consent was obtained before the operation. The patients were placed in the 15° Trendelenburg position. Diagnostic and operative laparoscopy was arranged to clean the pregnancy tissue and repair the scar dehiscence after temporary occlusion of bilateral internal iliac arteries, followed by hysteroscopy to confirm no remnants of the pregnancy or any other intrauterine problems. Under general endotracheal anesthesia, the abdominal cavity was insufflated with carbon dioxide and intra-abdominal pressure was maintained at 15 mmHg. A 10-mm trocar was inserted through a supra umbilical port, with the hope of visualization the implantation site within a previous uterine scar. Then, 3 more ancillary trocars were placed: one in the left mid quadrant (12-mm trocar); one in the left lower quadrant 5 cm medial to the left anterior superior iliac crest (5-mm trocar); and one at the McBurney’s point (5-mm trocar). After separation of pelvic and abdominal cavity adhesions, open the bilateral pelvic peritoneum and expose bilateral internal iliac arteries. 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. The removable metal lips (bulldog clips; Aesculap, Tuttlingen, Germany) (Fig. 2) were applied to the bilateral internal iliac arteries. 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 spoon forceps (Fig. 3). The cesarean scar dehiscence was repaired by one layer of continuous laparoscopic sutures with 2–0 spiral PDO (Ethicon,

Figure 1. (a) Two-dimensional transvaginal ultrasound picture of CSP. (b) Magnetic resonance imaging of CSP. (c) Laparoscopic image of CSP. (*gestational sac).

Figure 2. (a) Bulldog clip was applied to the left internal iliac artery. (b) Bulldog clip was applied to the right internal iliac artery.
Angiotech Puerto Rico, Inc.). After bulldog clips were removed from bilateral iliac arteries, the uterus restored blood supply without wound bleeding. Finally, as planned, hysteroscopy was performed in order to confirm no diverticulum or remnants, and to deal with other intrauterine lesions.

3. Results

A total of 5 patients, 4 patients had had one low-segment cesarean delivery and 1 patient had had two low-segment cesarean deliveries, were enrolled for analyses (Table 1). All the patients had fertility desire.

A diagnosis of CSP was confirmed in all the patients during the laparoscopic procedure. All the patients were type 2 CSP. None of the patients required conversion to laparotomy. The total operative time ranged from 60 minutes to 165 minutes, because of different degrees of pelvic and abdominal adhesions. The occlusion time ranged from 20 minutes to 26 minutes. The total blood loss was limited, ranging from 20 mL to 40 mL. All the women tolerated the operation well and had uneventful recoveries. The human chorionic gonadotropin was normalized 3 to 4 weeks after operation, which is the earliest case,\[15\], from 2006, was about bilateral iliac artery ligation followed by dilatation and evacuation under laparoscopic guidance in the selective operation of an advanced cesarean scar pregnancy. Similarly, one case of iliac artery ligation combined dilatation and evacuation under emergency circumstances was reported in a case series.\[16\] One case of temporary occlusion of bilateral iliac artery followed by ultrasound to confirm no pregnancy remnants was reported.\[17\] In that case the waiting time before surgery was 7 days, during which there was a high risk of massive hemorrhage.

We reviewed the literature on the application of internal iliac artery ligation or temporary occlusion in cesarean scar pregnancy. No complications had been reported in all these cases. The earliest case,\[13\] from 2006, was about bilateral iliac artery ligation followed by dilatation and evacuation under laparoscopic guidance in the selective operation of an advanced cesarean scar pregnancy. In that case the waiting time before surgery was 7 days, during which there was a high risk of massive hemorrhage.

Combining laparoscopic and hysteroscopic management has advantages over other treatment methods. First, the scar diverticulum can be repaired laparoscopically, while uterine cavity problems can be treated simultaneously with hysteroscopy. This combined approach might improve fertility outcomes in future pregnancies and reduce the risk of recurrence of cesarean scar pregnancy. Second, the occlusion of the internal iliac arteries

4. Discussion

The mechanism of cesarean scar pregnancy is most probably explained as the migration of the blastocyst into the myometrium though a defect of the cesarean scar,\[10\] which probably develops from the previous uterine procedures, such as curettage, cesarean delivery, myomectomy, metroplasty, and hysteroscopy.

Temporary occlusion of bilateral internal iliac arteries decreases the uterine blood flow by 48% and decreases the pulse pressure by 85%,\[11\] which results in better control of bleeding than UAE, because of vascular anastomosis between uterine artery, vaginal artery and internal pudendal artery, which are all the branches of internal iliac artery. With adequate bleeding control, laparoscopic adhesiolysis, dissection of the bladder, elimination of embryo and suturing may be more leisurely and precise. However, to protect ovarian function, efforts should be made to reduce the time of arterial occlusion, such as completing adhesiolysis before the arterial occlusion when the hemorrhage risk is low. One study confirmed uterine artery recanalization with magnetic resonance angiography 4 months after UAE.\[12\] In contrast, the duration of arterial occlusion in our cases were ranged from 20 minutes to 26 minutes. No complication has been observed so far.

Intrauterine adhesions were visualized under hysteroscopy, and adhesiolysis was performed, which might improve the fertility outcomes in future pregnancies and reduce the risk of recurrence of cesarean scar pregnancy. We consider it to be necessary to perform hysteroscopy in cesarean scar pregnancy, especially in women who wish to preserve fertility.

To the best of our knowledge,\[13,14\] this is the first series of patients with CSP who were treated by combination of hysteroscopy and laparoscopic occlusion of bilateral internal iliac arteries, with simultaneously repair of a scar diverticulum and treatment of uterine cavity problems with minimal hemorrhage.

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![Figure 3. Removal of pregnancy tissue (*) with spoon forceps into the white endobag.](image-url)
was temporary, and no complications of temporary occlusion of the bilateral internal iliac arteries have been reported to date. In contrast, ligation of the iliac artery can lead to irreversible damage, whereas UAE may lead to post embolization syndrome and other complications. The possible drawbacks of our strategy are also evident. This strategy may be used only in selected patients, and a study with a larger sample size is needed to verify the validity and safety of this method.

5. Conclusions
In conclusion, temporary occlusion of bilateral internal iliac arteries seems to be a good strategy to reduce the hemorrhage of cesarean scar pregnancy, and hysteroscopy is necessary to deal with intrauterine lesions. And further study with a larger sample size is in urgent need to confirm the validity and security of temporary arterial occlusion.

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