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Original article

Surgery experience in transvaginal cesarean section diverticulum (CSD) repair

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ABSTRACT

Objectives: The aim of this research was to investigate the feasibility, safety, and therapeutic efficacy of transvaginal cesarean section diverticulum (CSD) repair.
Materials and methods: Three CSD patients with CSD and complaint of postmenstrual spotting with prior cesarean section undergoing transvaginal CSD repair at Shanghai First Maternity and Infant Hospital, Shanghai, China were enrolled in this study. Hospital stays, the size of trauma, complication, cost, prognosis, and comparison of size of CSD were recorded.
Results: Transvaginal surgery provides less trauma, faster recovery, a shorter hospital stay, less intraoperative and postoperative complications, and lower cost.
Conclusion: Transvaginal surgery can be used to remove CSD and expose the exact site clearly, and patients recover quickly. The method, therefore, is an effective treatment and is worth promoting.

Introduction

Cesarean section plays a very crucial role in addressing complications in fetuses and pregnant women and in reducing mother and child morbidity and mortality. In the middle of the 20th century, cesarean section rates rose worldwide. In 2010, a World Health Organization (WHO) health survey reported that China's cesarean rate had reached 46.2%, of which 11.7% were cesarean sections with no indications. China has become the country with the highest cesarean section rate worldwide.

Currently, cesarean section leads to long term complications for the mother, including endometriosis, uterine scar pregnancy, uterine incision diverticulitis, and chronic pelvic pain. Uterine diverticulum (cesarean scar defect or diverticulum; CSD) is a new and specific disease, and it has been reported that the incidence of cesarean incision diverticulum is ~4–9%.[1] The clinical features of CSD are abnormal vaginal bleeding, abdominal pain, secondary infertility, infection, and diverticulosis during pregnancy.

There is no consensus treatment for CSD, but there are three types of surgery available: hysteroscopy coagulation; hysteroscopy-laparoscopy repair; and transvaginal diverticulitis repair.[2,3] Due to the uncertain efficacy of endoscopic treatment and the possibility of damage to other organs, this paper carried out transvaginal CSD repair and attempted to investigate the feasibility, safety, and therapeutic efficacy of transvaginal CSD repair.

Methods

From June 2012 to April 2013, three CSD patients undergoing treatment at Shanghai First Maternity and Infant Hospital, Shanghai, China were enrolled in this study. CSD diagnosis is mainly based on clinical presentation, history of cesarean section, ultrasonography, hysteroscopy and other auxiliary diagnostic methods. Patients were excluded if they had drugs, endometrial diseases, uterine cervix diseases, endocrine disorders, and so on. All patients had transvaginal CSD repair, postoperative recovery was observed, and a follow-up study was performed.

Case introduction

Case 1 involved a female aged 25 years, gravida 3, para 1 (G3P1), with complaints of postmenstrual spotting for over 2 years with prior cesarean section, and hospitalization on June 14, 2012. This

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patient had a cesarean section in 2010 and had normal menstruation, lasting 5 days out of 30 days, with medium menstrual blood volume and occasional dysmenorrhea, and the last menstrual period was from June 4, 2012 to June 14, 2012. After cesarean section, menstruation was abnormal, lasting 10–18 days out of 28–35 days, often dysmenorrheal, volume became large, but pain relief was not needed. A sonography on December 6, 2011 showed uterine CSD had formed. The patient was given an oral contraceptive once, which did not improve her symptoms. Sonography performed in the hospital showed poor healing of the uterine incision. Prior to hospitalization, the patient had not experienced abdominal pain and distension, fever, and so on. A review of the sonographs revealed an anechoic cyst sized 4 mm × 7 mm × 9 mm (Figure 1A). A preoperative examination was completed, and then the patient underwent transvaginal CSD repair while anti-inflammatory therapy was needed.

Case 2 involved a female aged 35 years, G1P1, with complaints of postmenstrual spotting for 6 years since the patient's prior cesarean section. Before the operation, she had normal menstruation, 6–7 days out of 25–26 days, with medium menstrual blood volume, and no dysmenorrhea. After cesarean, menstrual spotting extended from 9 days to 14 days, the volume was slightly large, and the cycle was normal. The patient received treatment and sonography in a hospital numerous times, but the examination report was normal. In 2011, curettage pathology showed endometrial hyperplasia with some secretory response. The patient took desogestrel and ethinyl estradiol and then had a normal period. Pelvic cavity MR imaging in April 2013 showed abnormal single lesions in the anterior lower uterine segment considered to be CSD. To receive a definite diagnosis, she was transferred to our hospital. Sonography in our hospital showed liquid collection in the uterine section with a volume of 7 mm × 8 mm × 14 mm (Figure 1C). She underwent transvaginal CSD repair while anti-inflammatory therapy was needed.

Case 3 involved a female aged 29 years, G1P1, with complaints of postmenstrual spotting for 2 years with prior cesarean section. This patient had normal menstruation, for 5 days out of 25 days, medium menstrual blood volume, no dysmenorrhea, and the last menstrual period was on April 5, 2013. The patient had a cesarean section because of fetal macrosomia in April, 2009. Menstruation returned 18 months after the cesarean, and the patient had 10 days of postmenstrual spotting. She even came to the local hospital. The patient took oral contraceptives, an anti-inflammatory agent and hemostatics irregularly and inefficiently. On February 18, 2012,

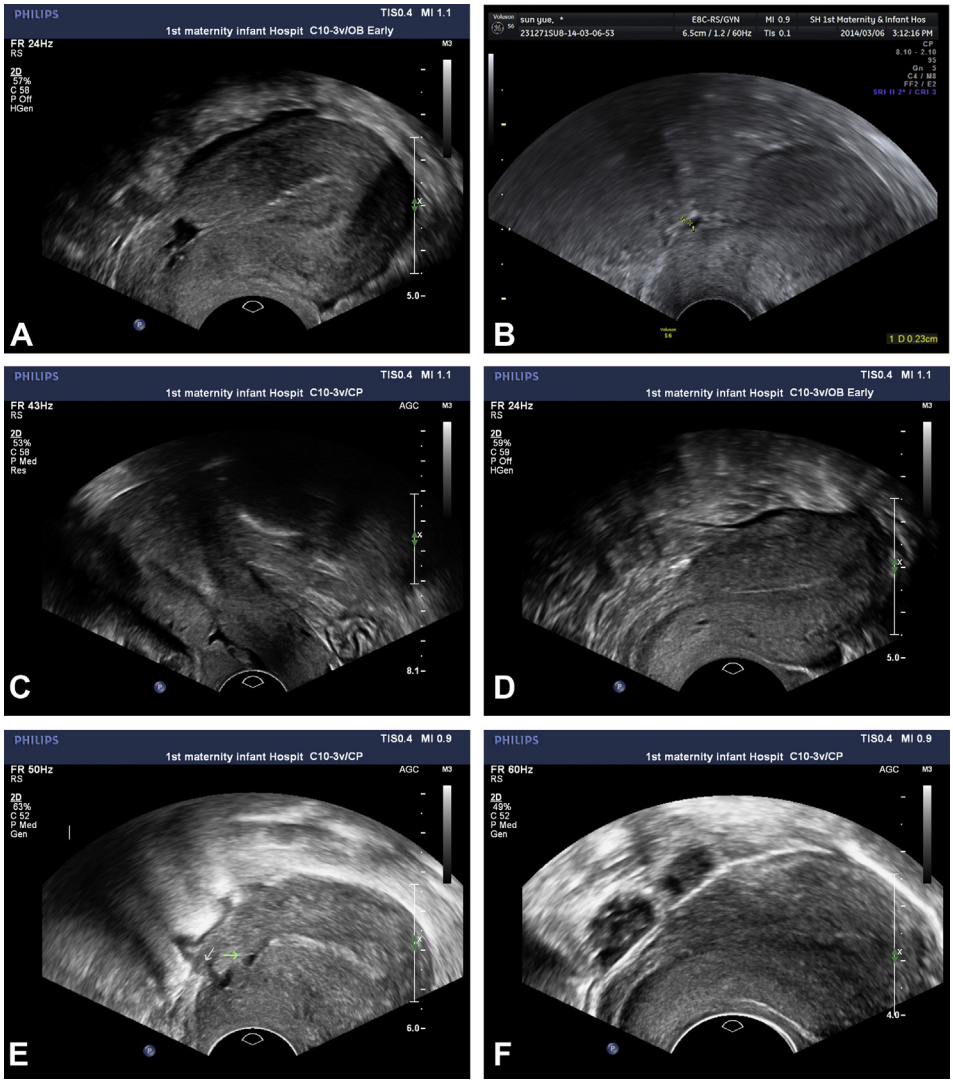

Fig. 1. Figure 1. (A) Sonography image of case 1, before operation. (B) Sonography image of case 1, after operation. (C) Sonography image of case 2, before operation. (D) Sonography image of case 2, after operation. (E) Sonography image of case 3, before operation. (F) Sonography image of case 3, after operation.

Table 1
Summary of the three cases.

		Case 1	Case 2	Case 3
Menstrual period (d)	Before repair	10–18/28–35	9–14/25–26	10/25
	After repair	6–7/28–30	7/26–28	6–7/25
Abdominal pain	Before repair	Occasional	No	No
	After repair	No	No	No
CSD size (mm)	Before repair	4 × 7 × 9	7 × 8 × 14	10 × 14 × 9
	After repair	2 × 5 × 10	No	No
Repair operation time (min)		55	54	51
Length of hospital stay (d)		4	4	4
After repair	Pathology	Endometriosis	Broken smooth muscle tissue	Cesarean section scar tissue, broken smooth muscle tissue
	Fever	No	No	No
	Vaginal bleeding	No	No	No
	Follow-up time (mo)	20	14	10

CSD = cesarean section diverticulum.

sonography in another hospital showed that the uterus was normal, but there was an anechoic cyst in the anterior uterine wall isthmus (size was 10 mm × 14 mm × 9 mm). On April 11, 2013, our sonography showed separated hydrops in the incision (Figure 1E). The patient had no fever, no abdominal pain, and chose to be treated surgically. A preoperative examination was completed, and then the patient underwent transvaginal CSD repair while anti-inflammatory therapy was needed.

Diagnosis

The main clinical features of CSD patients are postmenstrual spotting, infertility, chronic lower abdominal pain and dysmenorrhea, and these symptoms cannot be explained by other diseases, such as dysfunctional uterine bleeding, endometrial polyps, pelvic inflammatory disease, and so on. CSD diagnosis is mainly based on clinical presentation, history of cesarean section, ultrasonography, hysteroscopy, and other auxiliary diagnostic methods. The main auxiliary diagnostic method of CSD is transvaginal ultrasonography. Ultrasonography is a common tool for the diagnosis of uterine diseases, and provides an effective, simple, fast, noninvasive, and inexpensive diagnostic method. Transvaginal ultrasonography images are primarily prompted by the triangular or serous fluid areas that are convex to the muscular layer after anterior uterine segment cesarean section incision. Studies by Fabres et al[1] have suggested that the best time during the cycle to identify diverticulosis using sonography was during the bleeding episode. After menstrual drainage, the diverticulosis disappears. Some reports in the literature have reported that hysterosalpingography and hysteroscopy are also methods for diagnosing CSD. In hysteroscopic images, CSD manifests as an anterior cervical bulging outward from the uterus, under which there is a fibrous scar area that may be encircled by capillaries, polyps, adenomyosis, and foreign body granuloma.[2] Hysterosalpingography is commonly used in the diagnosis of infertility and is sometimes used in CSD patients, but it is not routinely used to make an auxiliary clinical diagnosis.

Treatment

All patients included in the present study underwent transvaginal CSD repair. Patients received continuous epidural anesthesia while in the bladder lithotomy position; additionally, perineal and vaginal disinfection were performed according to conventional vaginal surgery procedures. Patients were catheterized with a metal catheter, and their bladders emptied. The cervix and fornix were fully exposed by two small S hooks, and then the cervix clamped down by the upper lip using two Allis forceps. At a distance of 0.5 cm below the site of the bladder cervix reflexed, the cervix–vagina area was cut across between 3 o'clock and 9 o'clock using an electric knife, after which the bladder cervix was separated upward using a surgical knife handle and forefinger. Due to the longer cervix, it was impossible to separate the reflexed site; so, the two sides of the bladder pillar were cut off first, and the interrupted suture was replaced by a 1-0 absorbable suture. Then, Allis forceps clamps were used to lift the upper edge of the cut cervical vaginal wall, while the other two Allis forceps clamped the cervix down, fully exposed the gap, and then carefully separated toward the abdominal cavity until the peritoneum was reached. Due to adhesions caused by cesarean section, we were able to make a sharp separation using scissors, but were careful not to injure the bladder. Under the surgery lights, the site slightly reflected white, where a finger was slid into place to cut the site and enter the abdominal cavity. The author in Case 2 found that the CSD site was lower, and the surgery could have been fully completed outside of the peritoneum. However, to better expose the surgical site and avoid accidental injury to the abdominal internal organs, the author chose to cut the peritoneum and completely expose the uterus. After entering the abdominal cavity, the cervix was pulled down, and the cervical and lower uterus were exposed; the probe was then placed into the uterine cavity through the cervix and slid down from the bottom of the uterus to the cervix. Using an index finger, the thickness of the lower uterine segment could be felt, and in the CSD area, the uterine wall between the probe and forefinger is very thin. By cutting here, the CSD site could be clearly exposed. The surgeon then cut around the thin tissue using dissecting scissors, resected the site completely, and revealed a consistent thickness of isthmus muscle tissue. The probe was again placed into the uterine cavity through the cervix as a marker, and the site was then sutured using a 1-0 absorbable suture. The probe prevented accidental cervical suture. After adequate hemostasis, the peritoneum and bilateral bladder column were sutured, followed by the cut cervical vaginal area. After disinfection, dry gauze was applied, to be removed after 24 hours.

Results

The surgeries were successful. The pathology showed endometriosis (cesarean section scar tissue). The patients had good postoperative recovery, no vaginal bleeding, normal temperature, and had a long follow-up period. The average length of stay was 4 days, the average operation time was approximately 53 minutes for the three cases, and postoperative follow-up sonography showed no obvious abnormalities in the uterus. Menstrual period was restored to 7 days, and the earliest case had already been followed up for 2 years (Table 1; Figure 1B, D, and F).

Discussion

Risk factors of CSD

CSD after cesarean section can occur for a number of reasons, as outlined below. (1) CSD can occur as a result of the differences in myometrial contraction on either side of the incision, as the superior edge of the incision typically is thicker than the inferior edge.[3] (2) If the incision was sutured with overcrowded sutures, blood supply can be reduced, causing ischemia, necrosis, hemorrhage, wound dehiscence, and so on; as a result, a cavity can easily form.[4] (3) The traditional method used to suture the uterine incision is to suture two layers using a continuous or lock stitch. Fabres et al[1] reported that the presence of CSD could be related to the suture material used for the uterine incision, to the suturing technique itself, or both. Most likely, the most ischemic technique and the slowest reabsorbable suture would be the worst combination. Talamonte et al[5] also believed that the suturing technique used was related to the formation of diverticula. Continuous suturing may cause tissue necrosis and form diverticula easily compared to interrupted suturing. (4) The infection of a cesarean incision may form diverticula. Compared to emergency cesarean sections, selective surgery provides better preoperative preparation, lower surgical difficulty, and fewer cesarean section incision infections. (5) Repeated cesareans and retroversion of the uterus are also risk factors for CSD.[6] In short, the current causes of CSD formation are the factors listed above, but some of these factors have not been corroborated in large-scale clinical factor control studies.

The advantages of transvaginal surgery in the treatment of CSD

Although different studies have reported different treatments for CSD, surgery is still the main means of treatment. At present, hysteroscopy, laparoscopy, hysteroscopy-laparoscopic, and transvaginal CSD resection are the commonly used surgical treatments. Fabres et al[7] reported 24 cases of CSD patients with good outcomes after undergoing hysteroscopy; 84% of the patients were completely cured, and nine of 12 patients with infertility became pregnant again. These cases also suggested that hysteroscopic surgery had high risks, such as uterus rupture, bladder injury, and so on. However, there have been few international reports showing laparoscopic surgery and hysteroscopy–laparoscopy as treatments for CSD.[4,8]

We believe that for symptomatic patients, surgical treatment may be appropriate, and in our hospital, we preferred to use transvaginal CSD repair. Compared with laparoscopic surgery, transvaginal surgery has a number of advantages. (1) An auxiliary light source or probe is required with laparoscopic surgery, but the location of the diverticulum can be explored directly when performing transvaginal surgery. (2) Because of prior cesarean section, CSD patients may have bladder adhesion at the cover, which increases the difficulty of laparoscopic surgery and the chances of damage to the bladder. Using transvaginal surgery, we can fully push aside the bladder and reduce the risk of bladder injury, and we do not even need to enter the abdominal cavity. (3) Suturing skill is very important when performing laparoscopic surgery because in transvaginal surgery we can completely remove the lesion, accurately stitch and reinforce, and avoid the recurrence of diverticulitis. (4) We found that with respect to CSD transvaginal surgery, the majority of cases can be repaired using an extraperitoneal approach. (5) Transvaginal surgery provides less trauma, faster recovery, a shorter hospital stay, less intraoperative and postoperative complications, and lower costs.

In summary, transvaginal surgery can be used to remove CSD and expose the exact site clearly, and patients recover quickly. The method, therefore, is an effective treatment and is worth promoting. However, further controlled studies are required to determine whether the procedure is better than other surgical methods.

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