

Hysteroscopy combined with laparoscopy in treatment of patients with post-cesarean section uterine diverticulum

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Abstract

Introduction: Post-cesarean section uterine diverticulum (PCSUD) is a recess in the lower uterine segment of the cesarean section incision that protrudes to the serosa due to healing defects. With the abolition of the one-child policy, allowing couples to have two children in the past year in China, more and more couples plan to give birth to a second baby. However, with the significant increase in the cesarean section rate in the past two decades in China, the incidence of PCSUD also obviously increased.

Aim: To evaluate the clinical efficacy and safety of hysteroscopy combined with laparoscopy in treatment of patients with PCSUD.

Material and methods: Fifty-two cases of patients with post-cesarean section uterine diverticulum (PCSUD) who suffered from conservative treatment failure in the Beijing Obstetrics and Gynecology Hospital (affiliated to Beijing Capital Medical University) between January 2012 and June 2017 were retrospectively analyzed in this study. Patients with reproductive requirements were treated with hysteroscopy combined with laparoscopy surgery (experimental group, $n = 31$); those without reproductive requirements were treated with hysteroscopic surgery (control group, $n = 21$). The operation time, intraoperative blood loss, hospital stay period, clinical efficacy and recurrence rate of the two groups were compared.

Results: All the patients successfully completed the operation procedure in both experimental and control groups. The operation time, intraoperative blood loss and post-operative hospital stay in the experimental group were significantly higher than those of the control group ($p < 0.05$). There was no significant difference in clinical efficacy or recurrence between the two groups ($p > 0.05$). Six months after the operation, the uterus muscularis thickness was 4.2 ± 1.9 mm and 9.8 ± 6.2 mm for control and experimental groups respectively, which indicates that the muscularis thickness in the experimental group was significantly greater than that of the control group ($p < 0.05$).

Conclusions: Hysteroscopy combined with laparoscopy was safe with satisfactory results in treatment of patients with PCSUD.

Key words: cesarean section, post-cesarean section uterine diverticulum, hysteroscopy, laparoscopy.

Introduction

Statistical data demonstrated that China's cesarean section rate remained high in recent years [1–3]. With the significant increase in the cesarean section rate, the incidence of post-cesarean section uterine

diverticulum (PCSUD) has also obviously increased. PCSUD is a recess in the lower uterine segment of the cesarean section incision that protrudes to the serosa due to healing defects. It is located in the anterior uterine wall above the internal cervical orifice. The muscularis is very thick and nearly missing.

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PCSUD is a long-term complication of cesarean section in the lower uterine segment [4, 5]. Given that the diverticulum leads to the accumulation of residual menstrual blood, menstrual prolongation, dripping, infertility, and dysmenorrhea, the second pregnancy may lead to cesarean scar pregnancy, uterine rupture, and other serious complications. At present, no standard treatment is available for this disease. The main forms of management of this disease are conservative treatment, hysteroscopic diverticulum resection, and vaginal diverticulum resection [6, 7]. In the present study, we retrospectively summarized the combined use of hysteroscopy and laparoscopic surgery in patients with post-cesarean section uterine diverticulum and further evaluated the clinical efficacy and safety.

Aim

The purpose of this retrospective study was to evaluate the clinical efficacy and safety of hysteroscopy combined with laparoscopy in treatment of patients with post-cesarean section uterine diverticulum.

Material and methods

Patients

Fifty-two cases of patients with PCSUD who suffered from conservative treatment failure in Beijing Obstetrics and Gynecology Hospital (affiliated to Beijing Capital Medical University) in the period from January 2012 to June 2017 were retrospectively included in this study. Signed informed consent

was obtained from all the included patients and the study was approved by the Institutional Review Board (IRB) of Beijing Obstetrics and Gynecology Hospital.

The patient inclusion criteria were as follows: (1) A clear preoperative diagnosis of PCSUD based on the diagnostic criteria was obtained. The PCSUD diagnostic criteria were as follows: medical record of lower uterine segment cesarean section; clinical symptoms of menstrual prolongation and endless menstrual dripping, except for other diseases that cause these clinical symptoms, such as dysfunctional uterine bleeding, endometrial polyps, and gynecological tumors; and transvaginal ultrasonography showed one or several wedge-shaped or cystic liquid dark areas in the lower uterine segment anterior wall incision connecting to the uterine cavity (Photo 1). (2) In these patients, the continuity of the myometrium was interrupted and the thinnest part of the myometrium was 2–4 mm away from the serosa. (3) Medical records of the included patients were complete; (4) all the patients were followed up more than 12 months after surgery. The patient exclusion criteria were as follows: (1) PCSUD diagnosis of patients was not clear; (2) other treatment methods for PCSUD other than hysteroscopy combined with laparoscopy surgery or hysteroscopic surgery; (3) patients without enough follow-up data; (4) the clinical records were not complete.

Grouping

According to the treatment modality, the included 52 PCSUD patients were divided into two groups.

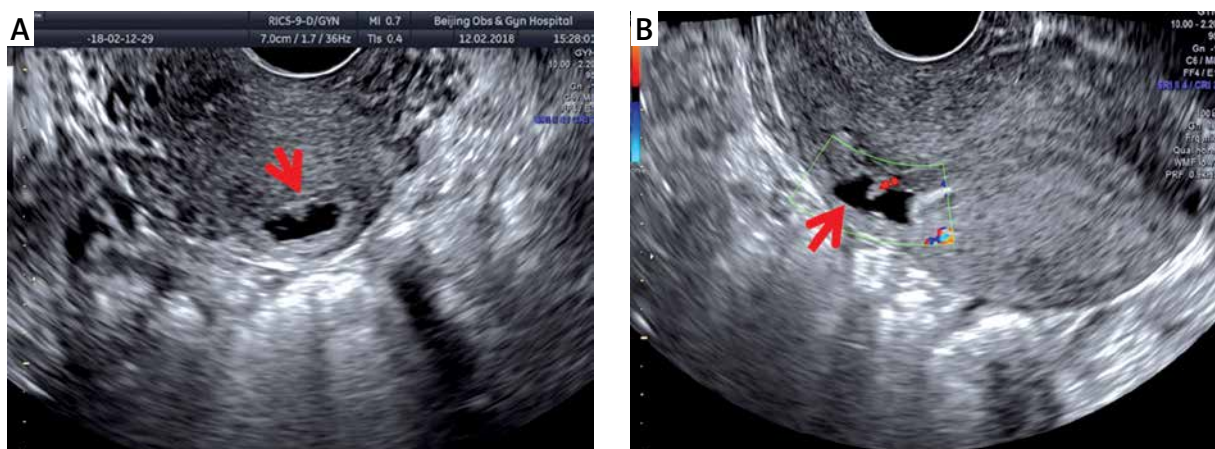


Photo 1. Transvaginal ultrasonography demonstrated post-cesarean section uterine diverticulum (red arrow)

Patients in the experimental group ($n = 31$) were treated with hysteroscopy combined with laparoscopy and patients in the control group ($n = 21$) received hysteroscopy only.

Surgical procedure

Patients with reproductive requirements were treated with hysteroscopy combined with laparoscopy surgery (experimental group); those without reproductive requirements were treated with hysteroscopic surgery (control group). The experimental group underwent the operation within 1 week after the end of their menstruation. The patients were placed in the lithotomy position under general anesthesia for conventional laparoscopy. The pneumoperitoneum pressure was controlled at about 13 mm Hg (1 mm Hg = 0.133 kPa). The abdominal wall was punctured at the umbilicus and McBurney's and anti-McBurney's points; a 5 mm laparoscope was used. During the operation, the uterus of 9 patients hung in the abdominal wall; the uterine isthmus and cervix closely adhered to the abdominal wall. The bladders of 16 patients adhered to the lower uterus. The adhesions were separated using a surgical knife. The bladder was pushed down and the lower uterine segment was exposed. The hysteroscope showed the size and location of the diverticulum; the hollow recess of the diverticulum was located at the scar [8]. Through laparoscopy, evident photopermeability of the thick part of the isthmus diverticula was found. The diverticulum and surrounding scar tissue were removed and kept away from the mucosa. A 1/0 retractable suture was used to intermittently suture the seromuscular layer by using the figure technique and to continuously suture layer one by using the mattress technique. The closed bladder was continuously sutured, and the peritoneum was refolded (Photo 2).

Clinical efficacy evaluation

Clinical efficacy evaluations were conducted using ultrasound at 6 months after the surgery and divided into cure, improvement and invalid [9]. Cure: The menstrual period was shortened to 7 days, the ultrasound indicated that the fluid area of the lower uterine scar disappeared, and the myometrial continuity recovered. Improvement was achieved when the menstrual period was 2 days shorter than before but longer than seven days and the postoperative ul-

trasound indicated that the fluid area of the lower uterine scar had shrunk. An invalid outcome indicated that no significant change was observed in the menstrual period, or the menstrual period was shortened by less than 2 days; in addition, the ultrasound indicated that the dark fluid area of the lower uterine scar did not shrink. A relapse indicated that an improvement was observed in the first 3 postoperative months but a relapse occurred 6 months postoperatively; moreover, the ultrasound indicated the existence of the fluid areas of the lower uterine scar.

Statistical analysis

The data were analyzed by STATA 11.0 statistical software (<http://www.stata.com>), the measurement data were expressed as $\bar{x} \pm s$ and the comparison between groups was made based on Student's *t*-test of the sample mean. The enumeration data were expressed as a relative number (n , %), and the comparison between groups was made based on the χ^2 or Fisher's exact probability test. Two-tailed $p < 0.05$ indicated a significant difference.

Results

General characteristics of included patients

The general characteristics of the two groups are presented in Table I. There was no significant difference in the aspects of age, caesarean section history, menstrual period, uterus features and diverticulum features between the two groups ($p > 0.05$).

Operating time and intraoperative blood loss

The operation time, intraoperative blood loss and post-operative hospital stay of the two groups are presented in Table II. The operation time, intraoperative blood loss and post-operative hospital stay in the experimental group were significantly higher than those of the control group ($p < 0.05$).

Clinical efficacy

The clinical efficacy of the two groups were evaluated at the end of the 6 months after the operation. The distribution of cure, improvement, invalid and recurrence rates of the two groups is shown in Table III. There was no significant difference of the clinical efficacy and recurrence rate of the two groups ($p > 0.05$).

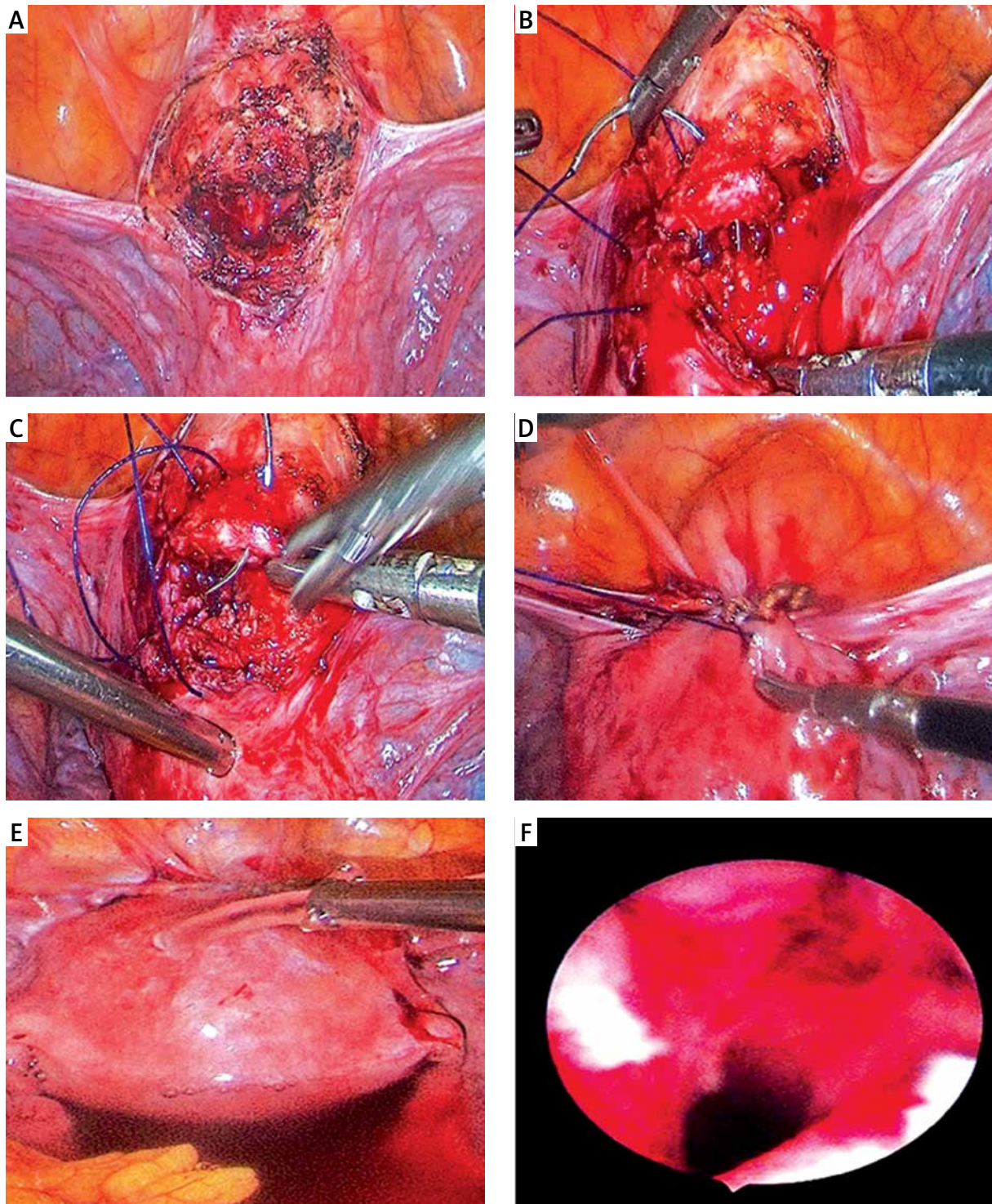


Photo 2. Surgical procedure of hysteroscopy combined with laparoscopy in treatment of patients with post-cesarean section uterine diverticulum (A – uterine diverticulum was cut through, B, C – uterine diverticulum was sutured intraoperatively, D, E – uterine diverticulum was successfully sutured through laparoscopy, F – post-operation uterine diverticulum viewed from hysteroscopy)

Table I. General characteristics of the two included groups of patients

Character	Control (n = 21)	Experimental (n = 31)
Age [years]:		
Range	26–41	27–43
Mean	32.4 ±12.5	33.6 ±11.8
Caesarean section history, n (%):		
Once	21 (100.0)	29 (93.5)
Twice	0 (0.0)	2 (6.5)
Menstrual period [days]	5.6 ±2.4	5.9 ±2.8
Uterus features [mm]:		
Uterus length	53.2 ±7.6	52.6 ±7.5
Uterine width	42.3 ±8.1	43.8 ±7.5
Uterine thickness	39.3 ±7.5	42.6 ±6.9
Endometrium thickness	8.6 ±3.3	9.1 ±2.78
Diverticulum features [mm]:		
Diverticulum depth	5.5 ±2.1	5.9 ±1.7
Residual muscularis thickness	3.8 ±1.8	4.1 ±1.7
Total muscularis thickness	8.8 ±2.2	9.0 ±2.1

Uterus muscularis thickness

Six months after the operation, the uterus muscularis thickness was 4.2 ±1.9 mm and 9.8 ±6.2 mm for the control and experimental group respectively, indicating that the muscularis thickness in the experimental group was significantly higher than that of the control group ($p < 0.05$) (Table IV).

Discussion

Vaginal bleeding caused by PCSUD seriously affects the quality of life of relevant patients. Repregnancy along with uterine diverticulitis may lead to uterine rupture and bleeding, which endanger the lives of patients [10, 11]. Thus, PCSUD should be treated immediately after diagnosis. The clinical indication of uterine diverticulum is a remnant muscular layer of < 2.5 mm, but the thickness of the residual muscular layer is not an indication for surgery at present. Attention is paid to the patient’s clinical symptoms, even if the muscular layer is thick, but evident clinical symptoms can also be used as indications for surgery [12].

Table II. Operating time and intraoperative bleeding comparison of the two groups

Items	Control (n = 21)	Experimental (n = 31)
Operation time [min]	41.2 ±13.6	82.3 ±22.1*
Intraoperative bleeding [ml]	16.8 ±8.2	48.6 ±23.4*
Post-operative hospital stay [days]	2.2 ±1.1	5.1 ±2.3*

* $P < 0.05$, compared with control group.

Table III. Clinical efficacy of the two groups (n (%))

Efficacy	Control (n = 21)	Experimental (n = 31)
Cure	13 (61.9)	22 (71.0)
Improve	4 (19.1)	7 (22.6)
Invalid	2 (9.5)	2 (6.5)
Recurrence	2 (9.5)	0 (0.0)
Total efficacy	17 (81.0)	29 (93.6)

Table IV. Uterus muscularis thickness comparison of the two groups [mm]

Muscularis thickness	Control (n = 21)	Experimental (n = 31)
Pre-operative	3.8 ±1.8	4.1 ±1.7
Post-operative	4.2 ±1.9	9.8 ±6.2**

Compared with pre-operative, * $p < 0.05$; Compared with control group, ** $p < 0.05$.

At present, the most used treatment methods reported in the literature and clinically are as follows:

- (1) Drug treatment: In addition to symptomatic treatment, oral contraceptives for three menstrual cycles can shorten the menstrual cycle, but it may lead to relapse of the disease when stopping given the drug. In addition, drug treatment is limited due to its long duration, numerous side effects, and poor patient compliance.
- (2) Vaginal resection of the diverticulum [6, 13]: This treatment modality can significantly improve the patients’ symptoms. However, the operation is performed through the vagina, the surgical field is narrower, and surgical exposure is more difficult than that of gynecological surgery. The surgeons should have skillful vaginal surgery techniques and experience. In addition, to locate the correct position of the scar diverticulum, the

surgeons need to have extensive experience in palpating the surface of the uterus, in reference to the location and extent of the intrauterine probe and scar weakness. The patient's cesarean section uterine scars usually closely adhere to the abdominal wall or bladder. Vaginal surgery can easily damage the bladder and urethra while pulling down the uterus; postoperative uterine retrograde prolapses have been reported in the literature.

- (3) Hysteroscopic resection [14]: Hysteroscopy is performed to find the site of diverticulum, cut the lower edge and surrounding tissue of the diverticulum, expand the diverticulum to flatten it, and remove the dead space. Given that suturing is difficult during hysteroscopy, hysteroscopic resection usually fails to repair the diverticulum. Although it can remove the diverticulum, it can expand the area of weakness [13]. In theory, the method may lead to long-term relapse or worsening of the disorder, and postoperative patients must practice strict contraception. Patients with fertility requirements should not be treated using this method. In addition, several complications were also found during the operation such as bleeding, uterine perforation and bladder injury. Fabres *et al.* [15] reported a series of 24 PCSUD patients treated with hysteroscopy and found good clinical efficacy in terms of symptom improvement. However, the rate of operative complications such as developing uterine perforation and bladder injury was high. Other uncommon complications such as intravascular absorption syndrome have also been reported during the operation of hysteroscopy. This complication can be a first sign of otorrhagia and nosebleed [16]. Some published studies indicated that good preoperative preparation can decrease the rate of complications relevant to hysteroscopy surgery, such as vaginal danazol, oral desogestrel plus vaginal raloxifene, oral contraceptives, gonadotropin-releasing hormone analogue (GnRHa) and progestin-only therapy. These preoperative medications can make the endometrium as thin as possible, reduce operative time and lessen the severity of bleeding [17].
- (4) Hysteroscopy combined with laparoscopy surgery [8, 18–21]: Compared with the aforementioned surgical treatments, hysteroscopy allows accurate positioning and identification of the lo-

cation and extent of scar weakness. Hence, the diverticulum can be thoroughly cut. A stratified suture during laparoscopy is more conducive to wound healing. The uterine ligaments are maintained in their original positions, and no uterine prolapse occurs after surgery. The clear vision provided by laparoscopic surgery can reduce the injuries to the bladder and urethra. Given that the suture site is close to the bladder, ureter, and uterine artery, the surgeons should be skilled in laparoscopy and familiar with pelvic anatomy. In the current study group, 31 patients underwent hysteroscopy combined with laparoscopy to repair their cesarean section diverticulum. Their postoperative symptoms significantly improved, and the muscular layer thickness of patients' postoperative uterus was significantly improved, which is beneficial for patients who want to conceive again. In addition, surgical intervention can reduce the incidence of cesarean scar pregnancy and increase the number of live deliveries, which is important for clinical practice [22, 23].

Conclusions

According to the present results, hysteroscopy combined with laparoscopy was safe with satisfactory results in treatment of patients with PCSUD, especially for patients with a reproductive requirement. However, due to its small sample size and retrospective study design, the conclusion should be further confirmed by prospective randomized clinical trials.

Conflict of interest

The authors declare no conflict of interest.

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