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CLINICAL ARTICLE

Prospective evaluation of five methods used to treat cesarean scar defects

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ABSTRACT

Objective: To evaluate operative and nonoperative therapies for cesarean scar defects (CSDs). *Methods:* A prospective study was conducted among patients who underwent treatment of CSDs at a hospital in Shanghai, China, between April 1, 2010, and December 31, 2014. Treatment included laparoscopy (group 1), vaginal surgery (group 2), hysteroscopy (group 3), combined oral contraceptives (group 4), and the levonorgestrel intrauterine system (group 5). *Results:* Among 142 participants, 119 patients underwent surgical repair and 23 received nonsurgical (conservative) treatment. Operation time, blood loss, and length of hospital stay reported for patients in group 3 (n = 19) were all lower than those reported for patients in group 1 (n = 86) and group 2 (n = 14; $P < 0.001$ for all comparisons). Patients who underwent surgery and those in group 4 (n = 18) experienced shortened menstrual periods after treatment ($P < 0.001$ for all comparisons). For group 5 (n = 5), the duration of menstruation was similar before and after therapy ($P = 0.89$). All 32 women who desired fertility underwent laparoscopy; 12 (37.5%) became pregnant after this procedure. *Conclusion:* All treatments for CSDs other than the levonorgestrel intrauterine system shortened menstrual periods. Laparoscopic surgery was effective for patients with fertility requirements.

1. Introduction

The incidence of cesarean delivery has increased substantially worldwide in the past 25 years [1]. A 2010 report [2] indicated that approximately one-third of all deliveries in the USA occur by cesarean. In China, the rate of cesarean delivery is reported to be 22%–77% [3].

In addition to obstetric complications, postmenstrual abnormal uterine bleeding can occur among patients with a history of cesarean delivery [4]. A reservoir-like pouch has been detected on the anterior wall of the uterine isthmus at the site of a previous cesarean delivery scar; this structure is known as a cesarean scar defect (CSD) [4]. As well as vaginal spotting, the accumulated blood in the CSD can cause secondary infertility [4]. A diagnosis of CSD is made depending on the symptoms experienced by the patient and the findings of investigations by ultrasonography, magnetic resonance imaging (MRI), or hysterosalpingography [5]. Furthermore, endometrial sampling is necessary to exclude endometrial malignant tumors before starting treatment of CSDs [5]. However, appropriate treatment of CSDs is a major challenge for clinicians.

The aim of the present study was to compare the advantages and disadvantages of operative and nonoperative methods for the treatment of CSDs.

2. Materials and methods

A prospective study was conducted among patients with CSDs who underwent treatment at the Obstetrics and Gynecology Hospital of Fudan University, Shanghai, China, between April 1, 2010, and December 31, 2014. Patients were eligible for inclusion in the present study if all CSDs had been evaluated and confirmed by ultrasonography and MRI before treatment, and if they had prolonged menstrual periods, a desire for treatment, and no endocrine disorders. Patients with endometrial diseases diagnosed by curettage were excluded. The protocol was approved by the institutional review board of the Obstetrics and Gynecology Hospital of Fudan University. All participants provided written informed consent.

All participants were informed of the risks and benefits of five methods available to treat CSDs in the present study: laparoscopic surgery, vaginal surgery, hysteroscopy, oral contraceptives, or the levonorgestrel intrauterine system (LNG-IUS). One treatment was then chosen for each patient.

Participants in group 1 underwent laparoscopic surgery. Patients with a maximum CSD diameter of greater than 1 cm or a distance between the uterine serosa and diverticulum of less than 5 mm (and

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especially if this distance was <2 mm) were eligible for this treatment. The patients were placed in a dorsal lithotomy position under general anesthesia, and excision was performed at some distance from the edges of the defect using hysteroscopic guidance. The excised tissue resembled a bowl (Fig. 1). To preserve the continuity of the cervical canal with the uterine cavity, a Hegar probe (Lutong, Shanghai, China) was inserted into the cervix before suturing the myometrial layer with 1-0 polydioxanone II delayed absorbable material (Ethicon, Sommerville, NJ, USA). A second myometrial layer and the serosa were reapproximated, and the peritoneum was then closed. At the end of the operation, hysteroscopy was applied to confirm repair of the cervical canal, which indicated complete correction of the defect and patency of the cervix [6,7].

Participants in group 2 underwent vaginal surgery. This procedure was not available at the start of the study. The inclusion criteria for this procedure were the same as those for group 1; patients in group 2 chose to undergo vaginal surgery. The preoperative preparation was as previously described [8]. Hysteroscopy was performed to confirm the presence of a CSD. The cervix was grasped by two Allis forceps. A diluted extract of bovine pituitary hormones (1%, in normal saline) was injected subepithelially at the level of the cervicovaginal junction to define tissue planes and reduce minor bleeding. The incision was made over the area that had been permeated by the pituitary hormone extract. The bladder was then deflected off the anterior cervix using blunt dissection with gauze. Once identified at the level of the uterine isthmus, the CSD was excised and the defect repaired as described for group 1.

Participants in group 3 underwent hysteroscopy. As with vaginal surgery, this procedure was not available at the start of the study. The inclusion criteria for this procedure were a muscular layer defect of less than 80% or a distance between the uterine serosa and diverticulum of at least 3 mm. Surgery was performed using a continuous-flow hysteroscopic resectoscope with a bipolar electrode (Johnson and Johnson, New Brunswick, NJ, USA). A dome-like defect was noted in the lower segment of the uterine wall. The lower edge of this defect was corrected to a slope-like shape using the resectoscope to facilitate blood flow.

Participants in group 4 received oral contraceptives. The inclusion criteria were age younger than 40 years, no increased risk of thrombosis, and no fertility desires. The patients were treated with a combined oral contraceptive tablet containing 30 mg ethinyl estradiol and 150 mg desogestrel for at least three 21-day cycles. One tablet was taken daily, starting from day 3 of the menstrual cycle.

Fig. 1. The cesarean scar defect after excision by laparoscopic surgery. The fibrotic tissue was excised at some distance from the edges of the cesarean scar defect and resembled a bowl.

Participants in group 5 were treated with a levonorgestrel intrauterine system (LNG-IUS). The inclusion criterion was no desire for fertility. The LNG-IUS was placed in the uterine cavity for at least 3 months.

Perioperative data—including operative time, estimated blood loss, postoperative hospitalization length, hospital fees, intraoperative complications, postoperative complications, and duration of menstruation—were recorded for groups 1–3. The duration of menstruation was recorded for groups 4 and 5 both before and after treatment. All participants were followed up at 1, 3, and 6 months after therapy.

The data were analyzed using SPSS version 16.0 (SPSS Inc, Chicago, IL, USA). Values were expressed as mean ± standard deviation. χ^2 or Student t tests were used as appropriate. $P < 0.05$ was considered statistically significant.

3. Results

A total of 142 patients were included. Overall, 119 participants opted to undergo surgical repair of their CSDs by laparoscopic surgery (n = 86), vaginal surgery (n = 14), or hysteroscopic surgery (n = 19). The remaining 23 participants chose to undergo nonoperative treatment with either a combined oral contraceptive (n = 18) or the LNG-IUS (n = 5). The characteristics of the patients in the five treatment groups are presented in Table 1.

No intraoperative complications were recorded in groups 1–3 and none of the patients required blood transfusion. Operation time, blood loss, and length of hospital stay were all lower in group 3 than in groups 1 and 2 ($P \le 0.001$ for all comparisons) (Table 1). The hospital fees incurred by groups 2 and 3 were lower than those incurred by group 1 ($P = 0.001$ and $P < 0.001$, respectively) (Table 1).

Patients in groups 1–4 experienced shortened menstrual periods after treatment ($P \le 0.001$ for all comparisons) (Table 1). By contrast, use of the LNG-IUS did not affect the duration of subsequent menstrual periods ($P = 0.89$) (Table 1).

Overall, 32 patients wished to preserve their fertility and all underwent laparoscopy. Twelve (37.5%) of these women became pregnant after surgical repair of their CSDs. The pregnancy outcomes were preterm labor (n = 1), full-term delivery (n = 7), cesarean scar ectopic pregnancy (n = 1), and pregnant on December 31, 2014 (n = 3).

4. Discussion

The present study has shown that four of five methods used to treat CSDs shortened the duration of menstruation. When compared with the other operative methods, hysteroscopic surgery offered the advantages of shorter operation time, reduced blood loss, decreased length of hospital stay, and lower hospital fees. Laparoscopy proved useful among the subgroup of women with fertility requirements (37.5% pregnancy rate after treatment).

The increased use of cesarean delivery has created considerable clinical problems, including gynecologic consequences and the development of complications such as postmenstrual spotting, pelvic pain, infertility, cesarean scar ectopic pregnancy, and abscess [6]. Treatment of CSDs might alleviate some of these problems; however, the optimum therapeutic approach remains to be determined.

Laparoscopy has been recommended as a safe method to repair CSDs with a thin residual myometrium [6]. This technique can be performed with satisfactory anatomic outcomes when the CSD has a residual myometrial thickness of less than 2.5 mm or when the niche accounts for 80% of the anterior uterine wall [7–9]. The use of laparoscopy also offered the advantage of treating CSDs located at a high position in the uterine isthmus.

Vaginal surgery can also be used to repair CSDs [10,11]. In the present study, the hospital fees associated with the use of vaginal surgery and hysteroscopic surgery were both lower than those associated with the use of laparoscopic surgery. Vaginal surgery enabled the CSD to be

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