

Reproductive outcome of a complete septate uterus after hysteroscopic metroplasty

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Abstract

Objective: This study aimed to evaluate the reproductive outcomes of patients who underwent hysteroscopic metroplasty for correction of a complete septate uterus.

Methods: The study population comprised 92 women with complete septate uteri. Hysteroscopic metroplasty and laparoscopy were performed simultaneously in these patients. The postoperative reproductive outcome of each patient was evaluated.

Results: In the primary infertility group, there were 32 (40%) pregnancies. In the abortion group, the number of miscarriages decreased from 68 (94.44%) to 5 (10.42%), while the number of live births increased from 1 (1.39%) to 42 (87.50%) after resection compared with before resection. The cumulative probability of pregnancy and that of live-birth pregnancy in the abortion group were significantly higher than those in the primary infertility group after surgery. Furthermore, resection of the cervical septum resulted in a significantly higher cumulative probability of live birth compared with preservation of the cervical septum.

Conclusion: Hysteroscopic uterine metroplasty may improve the reproductive performance of a septate uterus. Resection of the cervical septum may increase the probability of a live-birth pregnancy for patients with a cervical septum, and this procedure could be recommended for cases of a complete uterine septum.

Keywords

Septate uterus, hysteroscopic metroplasty, abortion, miscarriage, pregnancy, live birth

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Introduction

Since the first description of uterine anomalies in 1800,¹ a septate uterus has been the most common structural uterine anomaly.² A septate uterus, which is defined simply as a uterus with a division in the uterine cavity (septum) is associated with adverse reproductive outcomes, including a high incidence of abortion, premature delivery, and infertility.^{3,4} Over the years, numerous classification systems have been proposed to classify female genital anomalies. According to the European Society of Human Reproduction and Embryology–European Society for Gynaecological Endoscopy classification system, any uterus with a normal outline and an internal fundal midline indentation exceeding 50% of the uterine wall thickness is defined as septate. A complete septate uterus is further characterized by full division of the uterine cavity up to the level of the internal cervical os.⁵ Although the septum is usually restricted to the uterine corpus, it may also extend through the cervix and vagina, potentially leading to infertility and miscarriage.

Traditionally, a septate uterus is diagnosed by laparoscopy and hysteroscopy, and hysteroscopic metroplasty is considered the first-line therapy for restoring the uterine cavity, with high levels of improvement to subsequent reproductive outcomes.^{6,7} However, there is still uncertainty of the effectiveness of resecting the uterine septum because the evidence is mainly based on retrospective studies. Unfortunately, data of prospective studies are extremely limited.

To date, most retrospective studies have shown that septate resection has a significant positive effect on women's fertility.^{3,6,7} However, sectioning of the cervical portion of the septum has traditionally been avoided because of fear of causing cervical incompetence. However, recent evidence

suggests that sectioning of the cervical septum is safe and even associated with good obstetrical outcomes.⁸ Based on the above-mentioned findings, the present study aimed to evaluate and verify improvement in reproductive outcomes of patients who undergo hysteroscopic metroplasty to correct a complete septate uterus, and to determine whether sectioning of the cervical septum is worth recommending in clinical practice.

Materials and methods

The present study was approved by the Research Ethics Committee of Fujian Provincial Maternity and Children Hospital, Affiliated Hospital of Fujian Medical University (approval no. 2016038). Because of the retrospective nature of the study, the requirement for informed consent was waived.

Patients

This study was a retrospective analysis comprising 92 women who visited our hospital with primary infertility (n=35), recurrent or spontaneous pregnancy loss (n=45), and for whom a health examination showed uterine anomalies (n=12) and who were diagnosed with a complete septate uterus. The patients' charts were reviewed for age, main complaints, obstetric history, and postoperative reproductive outcome. Eighty patients with medical complaints in our series were divided into two groups. The first group consisted of patients with the complaint of primary infertility who failed to achieve pregnancy for over 1 year. The second group consisted of patients who had one or more abortions. The patients with recurrent or spontaneous pregnancy loss were all negative for anti-phospholipid antibodies, antinuclear antibodies, and anti-DNA antibody.

Nevertheless, chromosomal analysis was not performed in our study population.

Surgical procedure

Hysteroscopic metroplasty and laparoscopy were performed simultaneously in all of the patients. The aim of surgery was to differentiate a septate uterus from a bicornuate uterus by checking the serosal surface of the uterus. The tubes, ovaries, and abdominal cavity were also observed to define any concurrent pathologies, such as endometriosis, polycystic ovary syndrome, unilateral and/or bilateral tubal occlusion, and hydrosalpinx or adhesions related to infertility. Male factors were also evaluated by semen analysis in our study. Patients with the infertility factors mentioned above were excluded from this study.

The hysteroscopic procedure was performed during the early follicular phase of the menstrual cycle. All patients received antibiotics for prophylaxis to prevent secondary pelvic inflammatory disease. All procedures were performed under general anesthesia and in sterile conditions. Surgery was performed through a 6.5-mm operating hysteroscope with a bipolar VersaPoint Electro-Surgical system (Gynecare, division of Ethicon, Inc., Menlo Park, CA, USA). Distention and irrigation were performed using normal saline solution at a pressure of 90 to 110 mm Hg. The cutting current was set at 80 to 100 W. After visualizing both tubal ostia, an incision of the septa was started from the lower margin and continued upward with the horizontal section until the hysteroscope could be moved freely from one tubal ostium to the other without obstruction and until both tubal ostia could be visualized. All surgical procedures took 10 to 20 minutes and were made by the same surgeon (Xi Xie) with more than 20 years of experience in hysteroscopic surgery.

Management of a septate cervix

Among our 92 patients with complete septate uteri, 38 had a septate cervix. Additionally, to investigate the effect of resection of the cervical septum on the reproductive outcomes of patients complicated by a septate cervix, 38 patients with a septate cervix were additionally divided into two groups on the basis of whether the septum was removed. There was no significant difference in age between the two groups. The patients were allocated to either of the groups by using a heads-tails binary result coin toss method before surgery and the allocation was not masked. A Foley catheter was inserted into one side of the uterine cavity and 3 mL of normal saline solution was injected into the balloon. A hysteroscope was placed in the other side of the uterine cavity. A small incision was then made in the uterine septum at the level of the internal orifice of the cervix to expose the catheter balloon. After this incision, an incision of the septa was started from the incision opening and continued upward with the same method and principle as the other incision.

Postoperative management and follow-up

After resection was completed, an intrauterine device was inserted into the uterine cavity in all patients after the procedure, and the patients were treated with cyclic estrogen-gestagen therapy for 3 months to reduce formation of adhesions and ensure rapid epithelialization. The intrauterine device was removed 3 months after the operation and re-hysteroscopy was performed to evaluate the effectiveness of the procedure. Patients with a residual notch larger than 1 cm were corrected by re-hysteroscopy. We evaluated the reproductive outcome of each patient for whom re-hysteroscopy was performed by telephone or mail during a follow-up period of 24

months. If the patient was pregnant at the end of follow-up, the obstetric outcome was still followed up.

Statistical analysis

Statistical analysis was performed using the chi-square test. The cumulative pregnancy rate for the 24-month follow-up period was calculated by Kaplan–Maier analysis. Comparison of the probability of pregnancy between groups was evaluated by using the log-rank test. IBM SPSS software version 24.0 for Windows (IBM Corp., Armonk, NY, USA) was used for analysis. $P < 0.05$ was considered statistically significant.

Results

The primary infertility group ($n=35$) had a mean (standard deviation) age of 27.60 ± 6.18 years and the spontaneous abortion group ($n=45$) had a mean age of 26.78 ± 3.46 years. Fluid overload syndrome was not observed in any of the patients. Uterine perforation did not occur in any of the patients. However, another procedure was necessary for nine (9.78%) patients because of a residual notch that was larger than 1 cm.

In our series, before surgery, 45 women in the spontaneous abortion group had 72 pregnancies, of which 68 (94.44%) ended in miscarriage, 3 (4.17%) ended in preterm delivery, and 1 (1.39%) ended in term delivery (Table 1). Therefore, while there were 72 pregnancies, there was only 1 (2.4%) live newborn. However, after resection of the septum, there was a notable change in the outcomes (Table 1). After resection of the septum, 80 pregnancies in 70 patients were achieved during the follow-up period of 24 months. There were 32 pregnancies in the primary infertility group and 43 women achieved 48 pregnancies in the abortion group. The number of miscarriages was

less after resection of the septum compared with before resection in the abortion group. Furthermore, the number of live births was much higher after resection of the septum compared with before resection in the abortion group.

The pregnancies of all 38 patients with a septate cervix ended in miscarriage before the operation (Table 2). Resection of the cervical septum was performed in 18 (47.37%) patients. Twenty-two pregnancies in 16 patients were achieved after hysteroscopic metroplasty in women who had resection of the cervical septum during the follow-up period of 24 months. Among them, 4 (18.18%) miscarriages in three patients occurred, and there were 18 (81.82%) term deliveries. Of the patients whose septa were uncut, 13 had 15 pregnancies in total. Among these 13 patients, only 1 (6.67%) miscarriage was observed, and 14 (93.33%) term deliveries were achieved. The incidence of cesarean delivery was significantly higher when the cervical septum was preserved compared with when the cervical septum was not preserved (86.67% vs. 13.64%, $P = 0.015$).

The cumulative probability of pregnancy during 24 months postoperatively was calculated in the present study. We found that the cumulative probability of pregnancy ($P = 0.017$) and cumulative probability of live-birth pregnancy ($P = 0.004$) in the abortion group were significantly higher than those in the primary infertility group (Figure 1). When we focused on patients with a septate cervix, we did not find a significant difference in the probability of pregnancy between the cervical septum-resected group and the cervical septum-preserved group. Interestingly, the cumulative probability of live-birth pregnancy in the cervical septum-resected group was significantly higher than that in the cervical septum-preserved group ($P = 0.044$) (Figure 2). Cervical incompetence was not observed in our study population.

Table 1. Comparison of reproductive outcome before and after hysteroscopic metroplasty in patients with primary infertility and a history of abortion.

	Primary infertility (n=35)		History of abortion (n=45)		Total (n=80)	
	n	%	n	%	n	%
Before hysteroscopic metroplasty						
Pregnancy	0	–	45 (72)	–	45 (72)	–
Term delivery	0	–	1 (1)	1.39	1 (1)	1.39
Preterm delivery	0	–	3 (3)	4.17	3 (3)	4.17
Miscarriage	0	–	46 (68)	94.44	46 (68)	94.44
Live birth	0	–	1 (1)	1.39	1 (1)	1.39
Cesarean section	0	–	1 (1)	1.39	1 (1)	1.39
Late abortion	0	–	4 (5)	6.94	4 (5)	6.94
Ectopic pregnancy	0	–	1 (1)	1.39	1 (1)	1.39
After hysteroscopic metroplasty						
Pregnancy	27 (32)	–	43 (48)	–	70 (80)	–
Term delivery	24 (25)	78.13	41 (42)	87.50	65 (67)	83.75
Preterm delivery	1 (1)	3.13	1 (1)	2.08	2 (2)	2.50
Miscarriage	5 (6)	18.75	5 (5)	10.42	10 (11)	13.75
Live birth	25 (26)	81.25	41 (42)	87.50	66 (68)	85.00
Cesarean section	11 (11)	34.38	8 (8)	16.67	19 (19)	23.75
Late abortion	0 (0)	0	1 (1)	2.08	1 (1)	1.25
Ectopic pregnancy	2 (2)	6.25	0 (0)	0	2 (2)	2.50

Data are expressed as the number of patients (number of times).

Table 2. Comparison of reproductive outcome before and after hysteroscopic metroplasty in patients with a preserved cervical septum and those with a resected cervical septum.

	Preserved cervical septum (n=20)		Resected cervical septum (n=18)		Total (n=38)	
	n	%	n	%	n	%
Before hysteroscopic metroplasty						
Pregnancy	9 (17)	–	6 (11)	–	15 (28)	–
Term delivery	0 (0)	0	0 (0)	0	0 (0)	0
Preterm delivery	0 (0)	0	0 (0)	0	0 (0)	0
Miscarriage	9 (17)	100	6 (11)	100	15 (28)	100
Live birth	0 (0)	0	0 (0)	0	0 (0)	0
Cesarean section	0 (0)	0	0 (0)	0	0 (0)	0
Late abortion	0 (0)	0	1 (1)	9.09	1 (1)	3.57
Ectopic pregnancy	1 (1)	5.88	0 (0)	0	1 (1)	3.57
After hysteroscopic metroplasty						
Pregnancy	13 (15)	–	16 (22)	–	29 (37)	–
Term delivery	13 (14)	93.33	16 (18)	81.82	29 (32)	86.49
Preterm delivery	0 (0)	0	0 (0)	0	0 (0)	0
Miscarriage	1 (1)	6.67	3 (4)	18.18	4 (5)	13.51
Live birth	13 (14)	93.33	16 (18)	81.82	29 (32)	86.49
Cesarean section	12 (13)	86.67	3 (3)	13.64	15 (16)	43.24
Late abortion	0 (0)	0	1 (1)	4.55	1 (1)	2.70
Ectopic pregnancy	0 (0)	0	0 (0)	0	0 (0)	0

Data are expressed as number of patients (number of times).

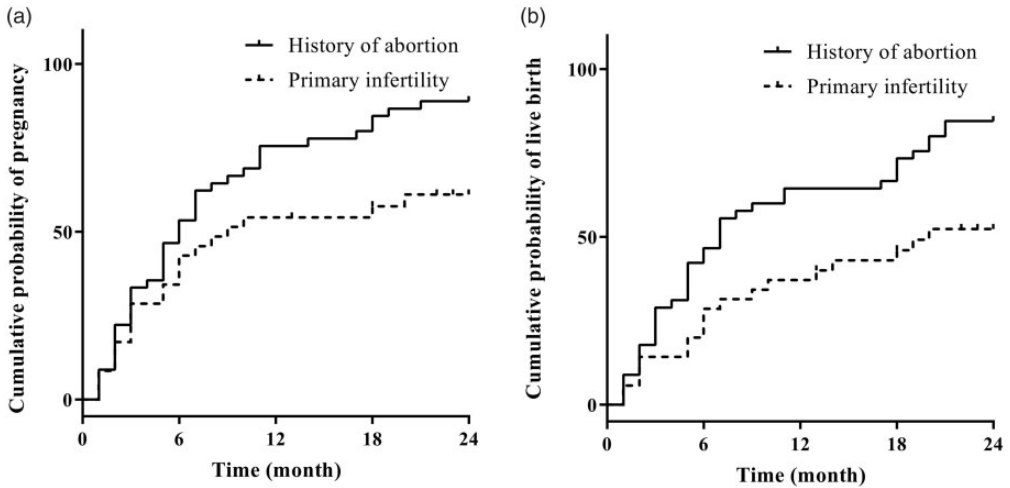


Figure 1. (a) Cumulative probability of becoming pregnant in 35 women with the complaint of primary infertility and 45 women with spontaneous abortion. (b) Cumulative probability of a live birth in 35 women with the complaint of primary infertility and 45 women with spontaneous abortion.

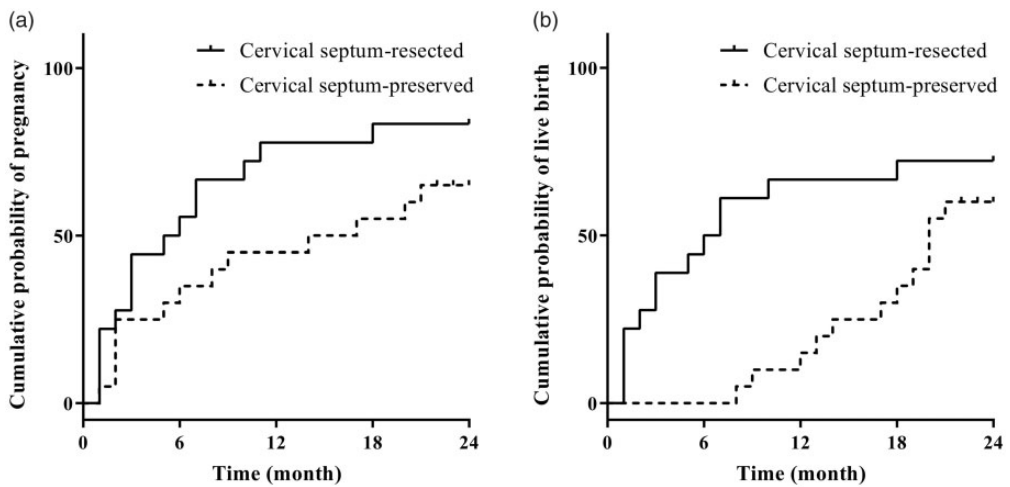


Figure 2. (a) Cumulative probability of becoming pregnant in 20 women with a preserved cervical septum and 18 women with a resected cervical septum. (b) Cumulative probability of live birth in 20 women with a preserved cervical septum and 18 women with a resected cervical septum.

Discussion

Although there is insufficient evidence to conclude that a uterine septum is associated with infertility,^{2,9-11} there is sufficient evidence indicating that a uterine septum

contributes to miscarriage, preterm birth, and other adverse pregnancy outcomes.¹⁰⁻¹³ In the present study, there were 32 new pregnancies in the primary infertility group after surgery compared

with no preoperative pregnancies. Furthermore, the miscarriage rate was lower and the live birth rate was higher in the abortion group after surgery compared with before surgery. These findings suggested the value of improvement from hysteroscopic metroplasty in treatment of a septate uterus. In accordance with our results, several observational studies showed that hysteroscopic septum incision was associated with improved clinical pregnancy rates in women with infertility.^{10,14-16} Additionally, many retrospective studies have suggested that a septal incision leads to improved miscarriage rates and obstetric outcomes.^{10,11,17,18} Therefore, although a few studies have not shown an improvement in reproductive outcome following hysteroscopic uterine metroplasty,¹⁹ this operation is highly recommended in patients with fertility requirements.

The clinical effectiveness of hysteroscopic metroplasty varies depending on the situation. We found that the cumulative probability of pregnancy and that of live-birth pregnancy for the 24-month follow-up were significantly different between the study groups. Patients with primary infertility would benefit from this procedure, but would still have a lower pregnancy rate than patients with recurrent miscarriages. This indicates that there are other factors influencing fertility in the population of women with primary infertility and that additional research is required. However, the effect of this procedure on improving the clinical pregnancy and miscarriage rates are undeniable.

Resection of the cervical septum during hysteroscopy still remains controversial, and some investigators believe that the cervical septum should not be removed to decrease the risk of cervical incompetence.^{13,20-22} Other studies have confirmed the safety of resection of the cervical septum.^{6,23,24} In our study population, no cervical incompetence was observed.

Interestingly, we did not find a significant difference in the probability of pregnancy between the cervical septum-resected group and the cervical septum-preserved group. However, the cumulative probability of live-birth pregnancy in the cervical septum-resected group was significantly higher than that in the cervical septum-preserved group. The underlying reason for this finding could not be clarified in the present study. Nevertheless, this may be explained by less injury to the endometrium or by better correction of the uterine cavity because of the short operation time and ease of procedure with a favorable field of vision when the cervical septum is resected.⁶

Another interesting finding in our study is that subsequent pregnancy-related uterine rupture and cervical cerclage were not observed in either group. Additionally, the incidence of cesarean delivery was significantly higher when the cervical septum was preserved. Cervical dystocia resulting from a persistent cervical septum may be the main reason for this finding because we excluded social factors associated with cesarean sections. An increase in the cesarean section rate will inevitably increase maternal and infant complications. Therefore, resection of the cervical septum is of certain significance in clinical practice.

A strength of this study is its large sample size. Furthermore, data were entered prospectively at the time of clinical management, and follow-up data were obtained for all patients, which increased the generalizability of our results. Most importantly, to the best of our knowledge, no previous study has discussed the effect of resection of the cervical septum on pregnancy outcome. Our results not only showed that hysteroscopic uterine metroplasty may improve the reproductive performance of the septate uterus to a certain extent, but also provided new information for clinical

practice in management of the cervical septum.

Limitations of our study are that we did not have a non-surgical control group, which potentially limits the evidence strength of the results. Additionally, factors such as preoperative management to thin the endometrium, operating time, operation equipment, distending media used, intraoperative bleeding, and complications, were not included. In particular, similar to previously studies, the major flaw in our study is the before/after design. The effectiveness of removing the septum remains controversial because the reproductive outcome without surgery is usually good in this population. Bias can only be eliminated by well-designed, randomized, controlled trials. Therefore, results of the first registered, multicenter, randomized controlled trial (TRUST²⁵) are highly expected.

In conclusion, hysteroscopic uterine metroplasty may improve the reproductive performance of the septate uterus, and it may be considered and highly recommended in clinical practice. Resection of the cervical septum may increase the probability of a live-birth pregnancy for patients with a cervical septum, and this procedure could be recommended for cases of a complete uterine septum.


Declaration of conflicting interest

The authors declare that there is no conflict of interest.

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