Comparison of laparoscopic continuous inverting mattress suture + suction curettage and laparoscopic hysterotomy for exogenous cesarean scar pregnancy(CSP-Ⅱ)

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Research Article

Keywords: Cesarean scar ectopic pregnancy, Cesarean section; continuous inverting mattress suture, Laparoscopy

Posted Date: March 19th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-265149/v1>

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Abstract

Background:Type II CSP is usually treated by surgery, such as transabdominal, transvaginal, hysteroscopic and laparoscopic resection, It takes a long time for contraception,For patients with urgent fertility requirements, the above methods lack advantages,We are trying to find a safe and effective treatment to shorten the time of contraception.

Methods: A total of 41 cases of CSP were selected from January 1, 2019 to June 30, 2020 in the first people's Hospital of Kunshan City, Jiangsu Province,The patients were divided into two groups, group A(20 cases) was laparoscopic continuous inverting mattress suture + suction curettage,Group B(21 cases) was laparoscopic hysterotomy.Group A was compared with group B:serum β -hCG levels on the first day after operation;Inpatient time;time for serum β -hCG levels to return to normal;HGB on the first day after operation;menstruation recovery time;The differences in the intraoperative blood loss;operation time;The decrease rate of serum β -hCG level on the first day after operation.

Results: Group A was compared with group B,serum β -hCG levels on the first day after operation,Inpatient time were not statistically significant ($p > 0.05$),time for serum β -hCG levels to return to normal,HGB on the first day after operation,menstruation recovery time were statistically significant ($p < 0.05$),Group A was significantly higher than group B;The differences in the intraoperative blood loss,operation time were significant difference between the two groups ($P < 0.05$),Group A was significantly lower than group B;The level of serum β -hCG on the first day after operation decreased by 50% in both groups.In group B, the pathology of the excised scar muscle layer showed that there was a little villus tissue in the muscle layer, and a large number of trophoblast cells were seen between the fibrous smooth muscle tissues.

Conclusions: In group A,the method is more simple, less bleeding, shorter operation time and less trauma;it also can remove the diverticulum and increase the thickness of the lower uterine segment;the contraception time was shortened,but the decrease of serum β -hCG was slow and the recovery time of menstruation was long.

Background

CSP refers to the cesarean scar implanted in the myometrium and fibrous tissue of the uterus[1].The increase in global cesarean section rate has led to an increase in the incidence rate of CSP.In particular, the phasing out of the one-child policy in China has also led to an increase in the incidence rate of CSP.Patients with this disease may have severe bleeding, life-threatening, if not treated in time and effectively, hysterectomy is almost inevitable[2],Therefore, early diagnosis is very important for reducing incidence rate and mortality rate of the pregnant women.Transvaginal ultrasonography greatly improved the diagnosis of CSP.Vial et al. [3]Classified CSP by transvaginal ultrasound.Endogenous CSP (CSP-I) is caused by the implantation of amniotic sac into the scar site of cesarean section and then developing into uterine isthmus or uterine cavity.Exogenous CSP (CSP-II) is caused by the implantation of amniotic sac into the scar defect of previous cesarean section, and the growth infiltrates into the myometrium, resulting in the eminence of uterine serosa.In clinical practice, the use of ultrasound to assess the risk of CSP has been confirmed [4, 5], which is widely used in China.

Due to the weak myometrium of uterine isthmus and the lack of contractile capacity of scar at cesarean section incision, the ruptured blood vessels of CSP can not be closed naturally during abortion or suction curettage surgery, resulting in fatal bleeding and uterine rupture.Laparoscopic continuous inverting mattress suture, do not need to remove uterine scar tissue,continuous mattress suture at the outer edge of the lesion myometrium, the blood supply artery branches were sutured together, after blocking the local blood supply of the lesion, suction curettage and hysteroscopy were performed.

Methods

This study was approved by the ethics committee of The First People's Hospital of Kunshan City (approval No.: 2020-04-132-k01), Informed consent for the surgery and participation was obtained from each patient in the study in order to use their data in future research.A total of 41 cases of CSP were selected from January 1, 2019 to June 30, 2020 in the first people's Hospital of Kunshan City, Jiangsu Province,The patients They were randomly divided into two groups, group A(20 cases) was laparoscopic continuous inverting mattress suture + suction curettage,Group B(21 cases) was laparoscopic hysterotomy.All patients had stable hemodynamics and no CSP lesion rupture or internal bleeding.There were no significant difference between the two groups ($p >$

0.05):the age ,Gestational age ,time interval from last cesarean section ,cesarean section,number of pregnancies,parity,number of times of suction curettage ,pre-operative serum β -hCG levels,pre-operative serum-hCG level,CRL,muscular thickness,GS maximum diameter and fetal heart beat.(Table 1)

Table 1
Comparison between group A and group B before operation

	Group A(20 cases)		Group B(21 cases)		P value
	Mean	$\pm$ SD	Mean	$\pm$ SD	
Age (years)	32.75	4.05	32.05	3.14	0.636
Gestational age (days)	49.45	9.58	56.48	13.67	0.097
Time interval (years)	6.4	3.73	7.10	3.87	0.547
Times of CDs	1.55	0.51	1.48	0.81	0.318
Gravidity	4.55	1.05	4.10	1.00	0.144
Parity	1.65	0.49	1.57	0.93	0.239
Times of suction curettage	1.85	0.93	1.62	0.80	0.419
HGB (g/L)	126.90	10.57	118.95	17.31	0.114
β -hCG (miU/mL)	85364.05	39109.37	115002.43	79004.14	0.514
GS (mm)	27.1	8.13	28.38	4.98	0.37
CRL (mm)	6.90	6.77	14.56	12.99	0.057
Myometrial thickness (mm)	1.43	0.82	1.36	0.94	0.692
Abbreviations: age years old; d days; CD cesarean delivery; Time interval time elapsed between CD and CSP; GS maximum diameter of GS mm; CRL: mm; Thickness of muscular layer: mm.					

In our hospital, ultrasonography is performed by several experienced doctors to ensure accurate descriptions, including the maximum size (length, width and height) of the gestational sac; and the thickness of the weakest muscular layer in the lower uterine segment[6].the vascular pattern in the scar (rich or not rich);CSP type [3] (type- I and type- II), fetal CRL and cardiac activity.

This prospective cohort study started from January 2019 to July 2020 in Kunshan first people's Hospital of Jiangsu Province.The inclusion criteria were as follows: a)an initial diagnosis of CSP- $\square$ in our hospital;b)Cesarean scar repair is needed;c)Exogenous CSP;d)There is a need to have another child.The exclusion criteria were:a)Endogenous CSP;b)previous treatment in another hospital;c)) unwillingness or inability to be followed up.

In the course of the study, we divided into groups after expert group discussion and full communication with patients,Group A was treated with laparoscopic continuous inverting mattress suture + suction curettage + hysteroscopy, and group B was treated with laparoscopic hysterotomy for cesarean scar pregnancy.

During the study period, serum β -hCG levels and venous hemoglobin were measured at 6:00 a.m. on the first day before operation and the first day after operation,the patients without fetal heart beat by TVS should be checked twice before operation.The blood loss was estimated by the volume of blood in the vacuum tank and the changes of hemoglobin before and after the operation.After 2 weeks of treatment, the patients were followed up in the outpatient department, including TVs, serum β -hCG levels, vaginal bleeding, abdominal pain, fever, etc. Until serum β -hCG levels returned to normal.

Recovery included the categories of complete cure and incomplete cure,Complete cure refers to complete recovery without adjuvant treatment or serious adverse events,and that serum β - hCG level drops to normal level or uterine mass disappears within

60 days after treatment[7].Adjuvant therapy includes systemic / local methotrexate (MTX) and repeated curettage or other surgical treatments.Severe adverse reactions include massive bleeding (> 500 ml) and / or hysterectomy[8].

The operation method was as follows:

Group A: all patients were given general anesthesia,laparoscopic continuous inverting mattress suture + suction curettage + hysteroscopy:the pelvic and abdominal cavity were explored,if necessary, pelvic adhesions were separated to restore pelvic anatomy, A uterine manipulator was placed and an ultrasound knife was used to separate the uterus and bladder,The bladder was pushed down to the level of the cervical orifice,the 2 – 0 absorbable suture was used to suture the myometrium of the upper and lower ends of CSP,do not knot or tighten. After 3 stitches are sewn, take out the uterine manipulator to start knotting, tighten the suture in turn, and then reinforce and suture one layer again;Repair the weak muscle layer of the lower uterine segment and return the gestational sac to the uterine cavity,and then the uterine cavity was aspirated after suction curettage;hysteroscopy showed no residual embryonic tissue ,The operation is over.Note: after 3 stitches in the first layer, take out the uterine manipulator and tie the knot,pay attention not to penetrate the muscular layer, and do not damage the CSP lesion as far as possible to avoid bleeding.(Fig. 1–10).

Group B: the procedure of pushing down the bladder was the same as that in group A. after dissecting the bladder, 20 ml of pituitrin 6 units of normal saline was injected at the junction of the uterine muscle layer and the lesion. The serosa layer and muscular layer on the surface of the lesion were cut with an electric hook. The embryo or villus tissue was taken out with a bag. The amniotic fluid was sucked out. The thin uterine scar tissue was trimmed with scissors, and the uterine serosa and myometrium were sutured continuously with 2 – 0 absorbable suture.Pay attention not to penetrate the endometrial layer, repair the uterus, reinforce another layer, flush the abdominal cavity, check that there is no active bleeding, the operation is over.

Statistical analyses were performed using SPSS version 19.0 (IBM, Armonk, NY, USA). Quantitative data are presented as the mean $\pm$ SD; between-group differences were assessed by Student's t-test for continuous variables such as age, gestational age, and myometrial thickness or by the chi-squared test for categorical variables such as the presence of foetal cardiac activity. P-values < 0.05 were considered to indicate a statistically significant difference.

Results

45 patients were diagnosed as CSP type II. Of these patients, 41 women were included in the study, and 4 patients were excluded because of their unwillingness to undergo laparoscopic surgery.Finally, both group A and group B were operated successfully.

Group A was compared with group B,serum β -hCG levels on the first day after operation,inpatient time were not statistically significant ($p > 0.05$);time for serum β -hCG levels to return to normal,HGB on the first day after operation,menstruation recovery time were statistically significant ($p < 0.05$),Group A was significantly higher than group B;The differences in the intraoperative blood loss,operation time were significant difference between the two groups ($P < 0.05$),Group A was significantly lower than group B(Table 2).In group A, the serum β - hCG level on the first day after operation was lower than that on the first day before operation% (66.15,65.39,74.76,53.47,80.34,68.35,66.59,67.3,72.23,67.02,56.37,58.49,79.07,65.76,63.87,63.4,70.23,76.9,71.36,85.78);In groupB, the serum β - hCG level on the first day after operation was lower than that on the first day before operation% (69.39,82.09,84.32,74.14,95.37,91.45,95.17,72.99,83.44,64.47,97.83,72.92,73.74,86.32,66.06,60.04,72.00,80.99,73.04,68.83,92.92).

Table 2
Comparison of group A and group B after operation

	Group A(20 cases)		Group B(21 cases)		P
	mean	±SD	mean	±SD	
Intraoperative blood loss (mL)	72.00	38.61	207.62	75.62	0.000
Operation time (min)	39.25	5.68	74.05	7.68	0.000
Inpatient time (days)	4.60	0.50	4.81	0.51	0.207
β-hCG (miU/mL)	27042.70	16404.86	17859.95	8712.52	0.072
Time for serum β-hCG levels to return to normal (weeks)	6.55	1.00	3.52	0.51	0.000
HGB (g/L)	114.20	11.12	101.43	14.33	0.002
Menstruation recovery time (days)	53.30	2.98	34.86	5.62	0.000

Among them, in group A, 2 cases of vaginal bleeding still occurred after uterine suction, and the vaginal bleeding was stopped by intermittent suture of myometrium on the basis of continuous inverting mattress suture ;1 patient had vaginal bleeding for more than one month, accompanied by dull pain in the lower abdomen and no fever,after explanation, the patient understood, menstruation was coming 55 days after operation, and no complaint of discomfort was found up to now.In general, compared with group B, group A had shorter operation time and less bleeding, but the decrease of β - hCG level was slow and the recovery time of menstruation was longer. No serious adverse events such as hysterectomy or massive bleeding occurred in either group.

In group B, the pathology of the excised scar muscle layer showed that there was a little villus tissue in the muscle layer, and a large number of trophoblast cells were seen between the fibrous smooth muscle tissues (Figure. 11, 12).

Discussion

Type II CSP is usually treated by surgery, such as transabdominal, transvaginal, hysteroscopic and laparoscopic resection,In order to avoid bleeding, it is often necessary to use the uterine artery embolisation (UAE) before operation[9],according to Mohan PP et al[10] UAE can lead to premature ovarian failure, oligomenorrhea and early menopause.It is reported that half of UAE patients have decreased menstruation, which is considered to have a negative impact on the quality of life of patients [11].UAE as a first-line treatment should be limited to patients with severe bleeding and / or high suspected AVM[12].In this study, 41 patients did not undergo UAE before operation. In group A, continuous suture was performed on both sides of uterine artery blood supply branch and lower uterine muscle layer of scar pregnancy mass, and continuous inverting mattress suture was performed at the weak part of uterus on the upper and lower edge of pregnancy mass. After blocking the blood flow of scar pregnancy site, suction curettage was performed to remove the pregnancy material, and then hysteroscopy was performed, it was found that the uterine cavity was empty and no embryo tissue remained.The operation is simple, safe and less bleeding. After dissecting the bladder, the CSP of the lower uterine segment can be clearly identified. Aftercontinuous inverting mattress suture, the scar weak area can be repaired theoretically.In group B, 20 ml of pituitrin 6 units of normal saline was injected into the junction of CSP lesions and myometrium, which effectively reduced bleeding and no pregnancy residue was detected by hysteroscopy.

Compared with group B, there were significant differences in blood loss and operation time between group A and group B ($P < 0.05$). Group A was significantly lower than group B, and postoperative HGB value in group A was significantly higher than that in group B, indicating that group A had less intraoperative bleeding and shorter operation time, and group A had more advantages than group B.

Although ultrasound is considered to have a sensitivity of 86.4% for CSP diagnosis% (95% CI 0.763– 0.9050)[13],the difference between type-Ⅱ and type-ⅢCSP is challenging even after the images have been examined by a professional doctor or repeated by themselves.As a result, it is difficult to select the most appropriate surgical method only by imaging. Both laparoscopic and

hysteroscopic surgery are performed under direct vision, which not only can make a definite diagnosis, but also increase the possibility of complete CSP clearance and minimize the risk of further intervention[14].

Some CSP in early pregnancy will die spontaneously like some intrauterine and ectopic pregnancies[15]. Therefore, in this study, we examined serum β - hCG twice to determine whether they were live fetuses, the serum β - hCG of the patients included in the study showed an upward trend for two consecutive times.

Billieux MH et al. [16] found that serum β - hCG level should not exceed 1 / 2 of pre-operative level 24 hours after surgery in patients with ectopic pregnancy who underwent surgical resection without residual villi, and then continuously decreased by 1 / 2 in the following 24 hours. According to Robinson JK et al. [17] if the serum β - hCG level drops below this level, it indicates the possibility of trophoblastic tissue residue (persistent CSP). This is consistent with our study results. The serum β - hCG value of 41 patients on the first day after operation decreased by more than 50% compared with that before operation, and there was no significant difference between the two groups. However, there were significant differences in the time of serum β - hCG level decreasing to negative and menstrual recovery time ($P < 0.05$). Group A was significantly higher than group B, which indicated that group A retained uterine scar tissue, and micro villi and Decidua Tissue remained under microscope (hysteroscopy found that the uterine cavity was empty and no villi remained). The decrease of serum β - hCG was slow, and the recovery time of menstruation was long, which was the limitation of group A. A few villi and a large number of trophoblast cells were found in the excised myometrium, which confirmed our inference, therefore, the result was that serum β - hCG level decreased slowly and menstrual recovery time was long, but there was no persistent CSP in 20 patients. This is not in contradiction with the research of Billieux MH et al. [16] and Robinson JK et al. [17]. All 41 patients were completely cured, The serum β - hCG level decreased to normal level at 60 days after operation [7].

Because of the preservation of cesarean scar, it may lead to the residual of micro villi and decidua under microscope (hysteroscopy found that the uterine cavity was empty and no villi remained), the decrease of serum β - hCG was slow, menstrual recovery time was long, and it needed a long follow-up time. In the follow-up process, there was a risk of infection due to the longer vaginal bleeding time; this was the limitation of group A.

In conclusion: Laparoscopic continuous inverting mattress suture + suction curettage has the following advantages: a) The scar is not excised, the integrity of the uterine wall is preserved, thus shortening the contraceptive time; while laparoscopic hysterotomy will form new scars, and it takes 6 months to get pregnant [18]; b) This method is more simple and less difficult; c) Avoid pelvic uterine incision and vaginal communication, reduce the risk of infection; d) Less bleeding, shorter operation time and less trauma. Limitations: (1) Because of the retention of cesarean scar, villi and decidua may remain, the decrease of serum β - hCG was slow and the recovery time of menstruation was long, longer follow-up time is required; (2) During the follow-up period, there was a risk of infection due to the long duration of vaginal bleeding; (3) The number of cases is small, and the risk assessment of surgery and its impact on long-term fertility function need to be further studied. The key points of operation are as follows. a) Separate the bladder peritoneum, find the right bladder cervix space, correct separation of the space, can avoid damage to the bladder and lower uterine muscle layer, avoid bleeding caused by unclear vision affect the operation; b) The lower uterine segment and upper cervical segment should be fully exposed to avoid bladder and ureter injury during suture; c) Selection of suture site: to clear the boundary of the lesion, continuous suture of myometrium between the two sides of the lesion and uterine artery branches, and continuous inverting mattress suture at the weak part of the upper and lower edge of the lesion to block the blood flow of the lesion. d) If vaginal bleeding still occurs after the above treatment, the vaginal bleeding can be stopped by intermittent suture of the whole myometrium.

Conclusions

advantage: a) There is uncertainty in scar healing after scar resection, and diverticulum may be formed again, This method can remove the diverticulum and increase the thickness of the lower uterine segment; b) The scar was not excised, the integrity of uterine wall was preserved, and the contraception time was shortened; c) This method is more simple and less difficult; d) Avoid pelvic uterine incision and vaginal communication, reduce the risk of infection; e) Less bleeding, shorter operation time and less trauma. Limitations: a) Because of the preservation of cesarean scar, it may lead to the residual of micro villi and decidua under microscope (hysteroscopy found that the uterine cavity was empty and no villi remained), which needed MTX adjuvant

treatment;b)The decrease of serum β - hCG was slow, menstrual recovery time was long, and it needed a long follow-up time;c)In the follow-up process, there was a risk of infection due to the longer vaginal bleeding time.d)The number of cases is small, and the risk assessment of surgery and its impact on long-term fertility function need to be further studied.

Abbreviations

CSP- $\square$:cesarean scar pregnancy; MTX: methotrexate; UAE: uterine artery embolisation.

Declarations

Acknowledgements

None.

Authors'contributions

ZY conceived the idea, done data extraction, and analysis. ZQB had also a role in data extraction. ZY and ZQB have contributed to the analysis, writing, drafting, and editing. All the authors read and gave final approval for the manuscript.

Funding

No funding is available for this work.

Availability of data and materials

Data will be available upon reasonable request of the corresponding author.

Ethics approval and consent to participate

All procedures performed in this study were in accordance with the ethical standards of the ethics committee of The First People's Hospital of Kunshan City (approval No.: 2020-04-132-k01)and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent for the surgery and participation was obtained from each patient in the study in order to use their data in future research.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Figures

Figure 1

Front view

Figure 2

Side view after suture

Figure 3

The CSP lesions in the isthmus of the uterus protruding to the pelvic cavity before operation

Figure 4

Suturing of the upper myometrium of CSP lesions

Figure 5

Suturing of the myometrium at the lower end of CSP lesions

Figure 6

Three stitches were sutured continuously at the upper and lower ends of CSP lesions

Figure 7

Knotting of the first stitch

Figure 8

Tightening of all three needles

Figure 9

Stitching of the ends in the second layer

Figure 10

Postoperative uterine cavity

Figure 11
Intramuscular trophoblast

Figure 12

Intramucosal villi