

Oncological and Obstetric Results After Radical Trachelectomy as the Fertility-Sparing Therapy on Early-Stage (FIGO 2018 Stage IA2-IB3) Cervical Cancer Patients

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Abstract

Purpose To explore the oncological and obstetric results after radical trachelectomy in early-stage cervical cancer.

Methods Retrospective analysis of the oncological and obstetric results to 23 patients with early cervical cancer (stage IA2-IB3; International Federation of Gynecology and Obstetrics 2018) accepting radical trachelectomy in The Maternal and Child Health Care Hospital of Guiyang from Oct 2004 to Sep 2018.

Results Among those patients with tumor size ≤ 4 cm (up to 5cm) three patients who wished to preserve fertility accepted radical trachelectomy after neoadjuvant chemotherapy. 23 patients had cervical tumors of the histological type squamous cell carcinoma (SCC). All of the patients retained reproductive function. The mean time of the follow-up was 112.87 ± 55.75 months (36-199 months). The median tumor size was 2.00 ± 1.35 cm (invisible by eyes-5.00cm). No occurred recurrence in any of the cases. Pregnancy outcomes are described as follows: 17 cases attempted to pregnancy, in which 8 cases (47.06%) conceived 12 times. First-trimester abortion and voluntary abandonment of pregnancy occurred in 4 cases (33.33%) respectively, one among patients who choose to abandon pregnancy being induced at 24 weeks of gestation. Second-trimester abortion occurred in 3 cases (25.0%), and the reason for abortion was chorioamnionitis. Premature delivery at 32 weeks occurred once (8.33%).

Conclusion Radical trachelectomy is a safe and effective treatment for young women with early-stage cervical cancer. Neoadjuvant chemotherapy and Radical trachelectomy provides the possibility of preserving pregnant ability for patients with cervical tumor ≤ 4 cm. However, it is worth further exploration.

Introduction

Cervical cancer ranks the fourth among the most common malignant diseases in women all over the world[6]. Its incidence related to the regional economic level, because the incidence and mortality rates of cervical cancer were more focused on regions with low and medium Human Development Index[26]. For China, a developing country with a large population, also has a large patient group of cervical cancer. With the continuous progress and popularization of cervical cancer screening technology, this group has a trend of early onset of the disease and younger population. Epidemiology surveys have shown that the average age of onset has decreased by 5 to 10 years compared to pre-2000, and an increasing number of patients were diagnosed the disease during their reproductive years[13, 29]. A growing number of patients have had only one child or even are non-pregnant at the time of diagnosis of cervical cancer[13]. The preservation of reproductive function would have a positive impact on their lives and psychological well-being in the long run. However, radical hysterectomy (RH) as the standard operation for the treatment of cervical cancer at the present, although it brings a high cure rate for patients, it also makes patients lose their fertility function due to the overall hysterectomy. Therefore, a safe and effective method to preserve the reproductive function of patients is a milestone for the treatment of cervical cancer.

In terms of the growth characteristics of cervical cancer, parauterine and vagina are more easily involved, while the involvement of uterine and uterine adnexa are rare. These characteristics provide a feasible basis for the conservative surgery of cervical cancer to preserve reproductive function. Burghardt[3] presented his idea of a fertility - preserving surgical approach for early-stage cervical cancer in 1977, but it has never been implemented. It was not until the year of 1987 that Dargent et al[4] implemented laparoscopic pelvic lymphadenectomy (LPL) combined with vaginal radical trachelectomy (VRT) and successfully led to a full-term pregnancy, the ideal of preserving fertility function in patients with early-stage cervical cancer has become a reality. Subsequently, with the efforts of Smith[27], Shepherd[25] and other scholars, the techniques of radical trachelectomy through different pathways such as abdominal, laparoscopy and robot-assisted also appeared successively. This type of surgery not only can completely remove cervical cancer lesions, but also can preserve the patient's uterus and uterine adnexa. Great progress has been made in the treatment of early-stage cervical cancer. Nevertheless, since this type of surgery is not the standard treatment for cervical cancer and requires strict admittance criterion, not many patients undergone the procedure all over the world. In addition, this kind of surgery was implemented in China later than developed countries, thus the proportion of these patients is even smaller. Therefore, it is particularly significant to collect and evaluate the experience and outcome of the surgery.

Our institution is a tertiary hospital in China, and we began to perform radical trachelectomy (RT) in 2004. Since then, we have successfully performed this procedure on 23 patients who required to preserve fertility. What noteworthy is that three of the patients received neoadjuvant chemotherapy (NACT) for the size of cervical tumors ≥ 4 cm, and RT was performed after re-evaluation of chemotherapy. After a long period of follow-up, we collected and retrospectively analyzed the relevant information of these patients with the aim of assessing the oncological and obstetric outcomes after RT in early-stage cervical cancer. Besides, we also have a purpose to explore the oncological safety and clinical outcomes of RT after neoadjuvant chemotherapy in female with cervical tumors ≥ 4 cm.

Methods

Patients

The clinical data and follow-up data were collected from 23 patients who received RT to preserve fertility function in Maternal and Child Health Care Hospital of Guiyang from October 2004 to September 2018 were collected. All the patients were diagnosed with cervical cancer by cervical biopsy under colposcopic or cervix conical resection. Pelvic examination was performed by two chief or associate chief gynecologic oncologists to assess the size of the tumor, and pelvic magnetic resonance imaging (MRI) was used to assess the size of the lesion and exclude whether there have suspected parauterine infiltration and swollen lymph nodes of pelvic. What's more, preoperative communication was made with all patients to understand whether they have strong desire to preserve reproductive function. These patients were informed that this procedure was not a standard procedure for cervical invasion cancer and related risks about the operation, so as to ensure that the patients were fully informed consent. Finally, 23 patients

with 2 cases of FIGO stage IA2, 16 cases of IB1, 2 cases of IB2 and 3 cases of IB3 were included. All the pathological types were cervical squamous cell carcinoma(SCC) with primary lesions located in the cervix vagina. The clinical characteristic of all patients are shown in table 1.

Preoperative treatment

Three patients with stage IB3 (tumor diameter both are 5cm, exophytic) who insisted on fertility preservation received platinum-based NACT preoperatively. Whether RT is appropriate to be performed according to the effect of chemotherapy.

Surgical procedures

The operation consists of two parts: pelvic lymph node dissection and radical tracheectomy. There are two methods of pelvic lymph node dissection: extraperitoneal pelvic lymph node resection (EPL) and laparoscopic pelvic lymph node resection (LPL). Common iliac lymph nodes, external iliac lymph nodes, deep inguinal lymph nodes, internal iliac lymph nodes and obturator lymph nodes were isolated and removed along the iliac vessels. Frozen section and pathological examination of bilateral pelvic lymph nodes. Negative results were followed by RT. The positive result was followed by RH instead of the original surgical plan.

We performed RT in two different methods–vaginal radical trachelectomy (VRT) and laparoscopy radical trachelectomy (LRT). No matter which method we used, the separated vaginal wall was cut circularly at 3cm away from the outer opening of the isthmus, and the cervix was removed below 1cm away from the inner opening of the cervix. The cervix was sent to the intraoperative frozen section for examination. RT can be performed continuously when the incision margin is 8 mm away from the lesion; if the distance between the cutting edge and the upper edge of the lesion is less than 5 mm, the remaining cervix should be removed by 3-5 mm; if the incision margin is involved, radical hysterectomy (RH) can be performed. In the end, the cervix was sutured by stumdorf method and a intrauterine drainage tube was remained for a week to prevent the cervical adhesion. Whether cerclage was performed during the operation or not depend on the patients' aspiration.

Postoperative adjuvant therapy

According to the pathological examination results, the patients with risk factors of lymphatic vascular space invasion, deep matrix invasion and low differentiation degree were treated with platinum based combination chemotherapy for 4-6 courses of adjuvant chemotherapy.

Postoperative follow-up

Based on the cervical cancer follow-up criteria, the frequency of follow-up should be appropriately increased. The interval of follow-up was 3 months within 2 years after the operation, 6 months between 2 and 5 years after the operation, and 1 year after 5 years. If there are abnormal conditions such as abnormal vaginal bleeding or menstrual changes, the patients should see doctors immediately. Routine

follow-up included gynecological examination, TCT, HPV test and gynecological ultrasonography. Pelvic and abdominal MRI should be taken if necessary. The special content is sex life and pregnancy guidance.

Statistical analysis

All data were analyzed by social science statistical program 23.0 (SPSS, Chicago, Illinois, USA). The measurement data (age, operation duration, lymph nodes count, anal intraoperative bleeding follow-up time and so on) were measured as the mean±standard deviation, and the count data (intraoperative complication, postoperative complication, recurrence, pregnancy and so on) were expressed as rate.

Results

Operation and complications

3 patients with IB3 stage who insisted on preserving reproductive function received NACT before surgery. After 2 courses of chemotherapy, the tumor size of each patient has shrunk more than 50 percent. The maximum tumor diameter in 3 cases were reduced to 1.8cm, 1.5cm and 2.0cm respectively. Finally, 23 patients (100%) underwent RT and reproductive function was successfully preserved. 6 patients underwent cervical cerclage during surgery. The operation methods, the average operation duration, the average intraoperative bleeding and the average lymph node count are shown in table 1.

During the operation, there were no intraoperative complications in all patients except one patient with severe pelvic and abdominal adhesion leading to a large amount of bleeding (2000ml). And the patient developed a complication of left tubal vaginal fistula after surgery, which was completely recovered 4 months after double J tube implantation. In addition, One patient developed urinary retention after surgery. After bladder function recovery exercise, the urinary tube was removed and spontaneous urination resumed 21 days after surgery. One patient developed intrauterine adhesions 18 months after operation and underwent hysteroscopic adhesions separation.

Postoperative supplementary treatment

The pathological examination of intraoperative frozen sections and postoperative paraffin sections of 23 patients showed that there was no tumor metastasis in pelvic lymph nodes, no residual lesions were found in the stump of cervical tissue, and no invasive lesions were found within 8mm of cervical cutting edge. Only one patient's postoperative pathological examination results showed a lymph node metastasis. So the patient was recommended by us to receive postoperative complementary therapy with concurrent chemoradiotherapy. However, she refused radiotherapy for personal reasons and only received 2 courses of supplementary chemotherapy after operation (the patient had received 2 courses of neoadjuvant chemotherapy before operation).

In total 8 patients (28.6%) with risk factors received platinum based combination chemotherapy for 4-6 courses, and the details are shown in Table 2.

Oncological and obstetric outcomes

None of the 23 patients got loss in the follow-up. The average follow-up was 112.87 ± 55.75 months (36 ~ 199 months). There was no recurrence. The recurrence rate was 0%. All the 23 patients were satisfied with their sexual life after operation, the sexual life satisfaction was 100%. One patient underwent bilateral tubal ligation due to severe pelvic and abdominal adhesion and bilateral fallopian tube deformation during the operation. Six patients (26.09%) were confirmed to have infertility factors through examination, and the remaining 16 patients (69.56%) did not undergo examination so that they were unknown to have infertility factors.

Six patients (26.09%) gave up trying pregnancy for reasons of divorce, fear of tumor recurrence, Ovarian hypofunction, or had given birth. A total of 17 patients (73.91%) had pregnancy attempts, of which 8 patients had successful pregnancies 12 times (pregnancy rate was 47.06%). Ten times were spontaneous pregnancies and two were pregnancies after assisted reproduction. 2 cases (16.67%) had spontaneous abortion and 2 cases (16.67%) had missed abortion at 8 weeks of gestation. The reason for spontaneous abortion was unknown. 3 cases (25%) had a spontaneous abortion at 16weeks, 17 weeks and 19weeks of gestation respectively, and the cause of abortion was chorioamnionitis. One case (8.33%) had spontaneous mid-term induction of labor to terminate the pregnancy at 6 months of gestation. One case (8.33%) had a vaginal delivery at 32 weeks of gestation, and the cause of premature delivery was cervical insufficiency. The child is now healthy.

Ten people (58.82%) gave up conceive after failure of pregnancy attempts, and refused assisted reproductive consultation due to family concept, economic factors, fear of tumor recurrence or had given birth. At present, only 7 patients are still trying pregnancy actively, and only 3 patients are receiving assisted reproductive counselling. The fertility and obstetric outcomes are shown in Table 3.

Discussion

Through clinical research and observation, it is found that there is only a small amount of parauterine involvement in the early stage of cervical cancer, and the risk of recurrence is low.

Kathleen[23] suggested that the results indicated that parauterine infiltration was only 1% in low risk of early cervical cancer patients (IA2, IB1 \leq 2cm) through searched and analyzed literatures from 1970 to 2010. And the lymph node and metastasis rates of parauterine vessel in early cervical cancer was low either . The metastasis rates of lymph node in patients with IA1, IA2 and IB1 stage were 1%, 5% to 8%, and 16% to 20% respectively. Based on a lot of researches, National Comprehensive Cancer Network (NCCN) guidelines of cervical cancer in 2020 proposed the indications for RT surgery as follows[1]: patients have strong fertility requirements after adequate communication; fertility-sparing therapy is suitable for patients with cervical squamous cell carcinoma in IA2-IB1 stage (tumor size \leq 2cm) in principle, but common adenocarcinoma is not an absolute contraindication; fertility preservation is not recommended in patients with high-risk or moderate-risk factors.

On the other hand, studies have shown that RT can remove the same parametrial tissue compared with RH, and there is no significant difference in the prognosis of patients. Han et al[8] analyzed the clinical randomized controlled trials of RT and RH from 1994 to 2010 systematically, the results showed that there was no difference between RT and RH in 5-year overall survival, 5-year disease-free survival, intraoperative and postoperative complications. Compared with RH, RT has more advantages in intraoperative blood loss, blood transfusion rate and postoperative hospital stay. Xu et al. [12] conducted a meta-analysis of 587 patients with early cervical cancer treated with RT or RH respectively. The results also showed that there were no significant discrepancy in recurrence rate, 5-year progression-free survival rate and 5-year overall survival rate between the two groups. In our study, 20 of the 23 patients fully complied with the requirements of the above indications, and no recurrence occurred. The mean follow-up was 112.87 months, 15 of them were followed up for more than 5 years. It demonstrates that to some extent it is safety for patients accepted RT to preserve fertility screened according to the existing indications. Therefore, strict control of the surgical indications and the selection of patients were crucial factors for the success of fertility-sparing therapy.

However, the indications for RT are not invariable, and whether it is feasible for patients with tumor diameter ≥ 2 cm is still one of the focus of controversy. Rutledge et al[22] conducted a statistical analysis of patients with stage IB cervical cancer to proved that lymphatic vascular space invasion (LVSI) and deep stromal invasion (DSI) had prognostic significance in multivariate analysis rather than tumor size. Hence, RT seems reasonable if there is no interstitial infiltration in patients with exophytic tumor lesions, even for IB2 stage with tumor diameter > 2 cm. In the study of Li. et al[12], 35 patients with cervical cancer at stage IB1 (tumor diameter > 2 cm, FIGO 2009) underwent abdominal radical hysterectomy (ART) to preserved fertility and did not receive adjuvant treatment after operation. The average follow-up period was 30.2 months without recurrence. On the other hand, a large number of studies have shown that in patients with large tumor volume locally can give NACT to reduce tumor volume effectively. In order to lay a foundation for complete resection of tumor, the area of tumor free area at the edge of incision can be increased. Therefore, some scholars suggest that NACT can apply for patients with cervical tumor size > 2 cm to retain reproductive function. Marchiole. et al[17] used NACT combined with LPL and VRT to preserve fertility in 7 patients with stage IB-IIA1 cervical cancer (tumor size 3.0-4.5cm, FIGO 2009). The tumor completely subsided in 4 patients and reduced by 50% or smaller in 3 patients after NACT. Finally, 6 patients retained fertility successfully with a median follow-up of 22 months and no recurrence occurred. One patient tried to get pregnant after therapy and succeeded. Moreover, Tesfai et al[28] conducted a retrospective analysis which included 19 patients treated with NACT for cervical tumor >2 cm (range 3.5-6.0cm) before ART. And 15 patients' fertility was successfully preserved in the end. The authors drew the conclusion that NACT followed by fertility-sparing surgery may be a viable and safe choice in select patients with cervical tumors >2 cm.

In our study, three patients with stage IB3 (FIGO 2018, tumor ≥ 4 cm) were included due to their strong desire to preserve fertility. After sufficient evaluation, they accepted NACT to reduce the tumor diameter so that to create condition for fertility-sparing surgery. After two cycles of NACT treatment, the tumor volume decreased by more than 50%. Then they were followed by fertility-sparing surgery. They also received 2-4

courses of postsurgical chemotherapy respectively. Two patients have disease-free survival for more than 5 years at present, and one remained free of recurrence more than four years. So it seems that it is feasible for patients with stage IB3 cervical cancer who are effective in NACT to receive RT to preserve fertility. However, since the research on fertility preservation of patients with large tumor diameter is still in the exploratory stage, it needs to be confirmed by large-scale clinical trials, which is worthy of further exploration.

The most common complications during RT were vascular injury and surrounding organ injury such as bladder, ureter and intestine. There were no intraoperative complications in our study except one patient with severe pelvic and abdominal adhesion leading to a large amount of bleeding (2000ml). Two patients appeared postoperative complications, including bladder dysfunction and intrauterine adhesions. Under the guidance of bladder function exercise, patients with postoperative bladder dysfunction resumed spontaneous micturition 21 days after operation. The main symptoms of a patient with intrauterine adhesions were bellyache and menstruation reduced. We performed hysteroscopy and adhesion-separation treatment on the patient after excluding cervical stenosis. The cause of intrauterine adhesion was considered to be endometrial inflammation. After the surgery, the symptoms of bellyache disappeared and the menstruation returned to normal.

Preservation of fertility after surgery is as important as survival rate for patients who has underwent RT. At present, there are different reports on obstetric outcomes after fertility-preserving therapy for early cervical cancer. In the reports of Dargent[4], Plante[21] and Shepherd[24], the pregnancy rate was all more than 50%, and the live birth rate was 52%, 72% and 50% respectively. The results of these scholars all showed that RT had a high pregnancy rate and live birth rate. In China, Li et al[14] completed a research which included 360 patients who underwent VRT, 149 patients attempted to get pregnant after treatment, finally the pregnancy rate was 17.4% and live birth rate was 63.3%. The pregnancy rate was lower and the live birth rate was similar compare to foreign data, which may be related to case selection, surgical technique, follow-up time, sample quantity and the support degree of assisted reproductive technology. Compared with the literature reports, our data showed similar pregnancy rate (47.06%) and lower live birth rate (8.33%), which may be associated to the small sample amount, patients rejected assisted reproductive technology and the statistical deviation caused by the spontaneous abandonment of pregnancy in one who elected to induced abortion of mid-trimester pregnancy.

The cervix length is 3-4 cm normally, and there are mucus plugs formed in the cervical canal, which can effectively prevent bacteria from entering. The risk of pregnancy-related complications such as preterm premature rupture of membranes (PROM), miscarriage and preterm delivery were increased due to cervical tissue morphology altered and the protective mechanisms absented after RT[5]. After statistics, it was found that the miscarriage rate in the early pregnancy of RT patients was similar to that of the general population (16%-20%), mainly made up of spontaneous miscarriage. However, the miscarriage rate in the middle pregnancy (8.6%) was twice that of the general population, and most of them were due to premature rupture of membranes caused by infection[18]. In our study, three cases of second-trimester miscarriage was caused by chorioamnionitis. More concern by doctors than the occurrence of

miscarriage is the high rate of preterm delivery in pregnant patients, the reason of which is thought to be mechanical or ascending infection, or both of them[9]. Some scholars believe that it is unnecessary to excise all the cervical tissues during the operation, and it is beneficial for reducing the incidence of premature birth to retain cervical tissues 5-10 mm as possible[2]. Some researchers put forward that cerclage can be adopted during operation to prevent cervical insufficiency[10, 14]. But some studies raised different opinions about the timing of cerclage. They believe that cerclage can actually cause cervical stenosis and become a factor of infertility. Therefore, cervical ligation is not recommended to be performed immediately during the operation[18, 19]. In our study, two patients who underwent intraoperative prophylactic cerclage still suffered miscarriage, while one patient who underwent cerclage at 14 weeks of gestation succeeded in parturition at 32 weeks and delivered a live baby via vaginal. This may suggest that prophylactic cervical cerclage during RT does not reduce the chance of postoperative miscarriage. Although many countermeasures have been proposed to deal with a series of pregnancy-related complications caused by RT, such as prophylactic use of antibiotics, regular transvaginal monitoring of cervical length, strict bed rest and vaginal irrigation, data are limited to reach consensus[15].

According to the different access, RT surgery is currently divided into vaginal radical trachelectomy (VRT), abdominal radical trachelectomy (ART), laparoscopic radical trachelectomy (LRT) and robot-assisted laparoscopic radical trachelectomy (RRT). Research data show that the pregnancy outcomes obtained by different routes of RT are not the same. Gizzo et al[7] concluded in a review study that most of the postoperative pregnancy rates reported on VRT were 50% and the abortion rate and premature birth rate of VRT were 32.4% and 28% respectively. Pareja et al[20] reviewed some literature reported from 1997 to 2012 and found that the pregnancy rate, abortion rate and premature birth rate were 59%, 24% and 35% respectively among 298 patients. Lu et al[16] reviewed the postoperative pregnancy rate of 140 patients who underwent LRT, of the 59 patients who tried to conceive after surgery, 46 (78%) had a successful pregnancy, 17 (37%) had a miscarriage, 14 (30%) had a preterm delivery, and 11 had a full-term pregnancy. Compared with the above three surgical methods, RRT was carried out late and the number of cases was limited due to technical limitations. However, according to the existing reports, the pregnancy outcome of RRT was significant. Johansen[11] reported the pregnancy of 49 patients after receiving RRT, and 17 (81%) had 20 successful pregnancies among the 21 patients who tried to get pregnant. One (6%) had an early miscarriage, 12 of the 16 patients who delivered from pregnancy to the third trimester, had gestational week more than 36 weeks, and 2 were still pregnant. In our study, postoperative pregnancy rate was higher in patients who underwent EPL combined with VRT (2/3, 66.67%) than patients who underwent LPL combined with VRT/LRT (6/20, 30.0%), which may be related to fewer pelvic adhesions caused by the former operation method. Although this data may lack of statistical significance due to the small sample amount. Therefore, no matter what surgical method is selected, different opinions during operation, careful operation and reducing unnecessary trauma are conducive to affecting the postoperative pregnancy rate. It should be noted that RT as a cancer treatment method needs to ensure the safety of oncological results as the premise rather than to pursue postoperative pregnancy rate blindly.

Conclusion

RT is feasible as a fertility preservation treatment for young patients who are diagnosed with early cervical cancer, and can effectively preserve fertility function. In addition, Neoadjuvant chemotherapy combined with RT offers the possibility of preserving fertility function for patients with cervical cancer \leq 4cm. However, since the research on such patients is still in the exploratory stage, it needs to be confirmed by large-scale clinical trials, which is worthy of further exploration.

Declarations

Ethics approval and consent to participate

This study was approved by ethics committee of The Maternal and Child Health Care Hospital of Guiyang.

Competing interests

We declare that we have no financial or non-financial interests.

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Authors' contributions

Tao Chen and Jia Li contributed to the manuscript writing, data analysis and literature review. Yan Zhu and Li Zhou were responsible for gathering and checking the data. JianSan Wang and Ying Zhang performed the data check and analysis. AnWei Lu designed the work and revised the final manuscript. JunTao Wang designed the work, revised the final manuscript and approved the final version. All authors read and approved the final manuscript.

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Tables

Table 1 The clinical characteristic and operative details of 23 patients

	Average (range) or N (%)
Age (years)	32.22±4.09 (26-40)
Follow-up (months)	112.87±55.75 (36-199)
Fertility status	
With children	9 (39.13%)
Nulliparous	14 (60.87%)
FIGO stage	
IA2	2 (8.70%)
IB1	16 (69.57%)
IB2	2 (8.70%)
IB3	3 (13.04%)
Degree of differentiation	
Highly differentiation	8 (34.78%)
Moderately differentiation	11 (47.83%)
poorly differentiation	4 (17.39%)
The max diameter of tumor (cm)	2.00±1.35 (invisible by eyes-5.00)
Operation methods	
EPL+VRT	3 (13.04%)
LPL+VRT	9 (39.13%)
LPL+LRT	11 (47.83%)
Operation duration (minutes)	203.91±52.66 (150-420)
Intraoperative bleeding (ml)	345.65±376.26 (100-2000)
lymph node count	21.52±7.06 (10-33)
Postoperative complications	
Urinary retention	1 (4.35%)
Tubal vaginal fistula	1 (4.35%)
Intrauterine adhesions	1 (4.35%)

EPL: extraperitoneal pelvic lymphadenectomy

VRT: vaginal radical trachelectomy.

LPL: laparoscopic pelvic lymphadenectomy

LRT: laparoscopic radical trachelectomy

Table 2 the details of postoperative supplementary treatment of 8 patients with risk factors

Serial number	Risk factors	Chemotherapy regimens
1	poorly differentiated SCC, scattered in the myometrium of the cervix	DC
2	poorly differentiated SCC, invading the middle myometrium of the cervix	DC
3 ^a	tumor diameter \geq 4cm	TC
4 ^a	tumor diameter \geq 4cm, poorly differentiated SCC, invading the middle myometrium of the cervix	TC
5	tumor diameter \geq 2cm, invading the middle myometrium of the cervix	DC
6	tumor thrombus can be seen in the lymphatic vessel	TC
7 ^a	tumor diameter \geq 4cm, poorly differentiated SCC, a lymph node metastasis	TP
8	tumor diameter \geq 2cm	DC

SCC: squamous cell carcinoma

DC: docetaxel+carboplatin

TC: taxol+carboplatin

TP: taxol+cis-platinum

^a the patient who accepted neoadjuvant chemotherapy

Table 3 Fertility and obstetric outcomes following 23 patients

	N(%)
Sexual satisfaction	23(100%)
Had pregnancy attempts	17(73.91%)
Still have pregnancy attempts	7(30.43%)
Got pregnancy	8(47.06%)
Pregnancy ways	
Spontaneous	10(83.33%)
In-vitro fertilization	2(16.67%)
Infertility factors	
Ovarian	2(8.70%)
fallopian tubes	5(21.74%)
Unknown	16(69.56%)
obstetric outcomes	
First-trimester loss	4(33.33%)
Second-trimester loss	3(25.0%)
Premature delivery(live birth)	1(8.33%)
Voluntary abortion	4(33.33%)