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Review article

# Laparoscopic radical trachelectomy: The choice for conservative surgery in early cervical cancer

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ABSTRACT

Cervical cancer is the third most common female cancer worldwide. Radical hysterectomy with lymph node dissection has become a standard method for treating early stage cervical cancer. Laparoscopic radical hysterectomy for early stage cervical cancer can provide a good survival outcome, fewer complications and a faster recovery time than open surgery. For patients who wish to retain their fertility, fertility-sparing surgery is considered. Laparoscopic radical trachelectomy is a good example of such surgery. Several series have shown that it is feasible, safe and has an acceptable overall survival rate compared with radical hysterectomy. It also provides the benefits of minimally-invasive surgery. It is a good choice for fertility-sparing surgery in cervical cancer. There are currently several methods of approach to radical trachelectomy, with different fertility and oncological results.



## Introduction

Cervical cancer, the third most common female cancer worldwide, has established treatment guidelines with over 90% survival rate when caught in the early stage.[1] Radical hysterectomy with lymph node dissection has become a standard treatment method for early stage cervical cancer. The surgery includes removal of the uterus, cervix, paracervix tissue, upper vagina and pelvic or paraarotic lymph nodes. Lee et al[2] have reported on the long-term survival outcome following laparoscopic radical in early stage cervical cancer. In a median follow-up of 92.1 months, the mean cumulative disease-free and overall survival rates were 91.01 ± 2.77% and 92.78 ± 3.06%, respectively. Laparoscopic radical hysterectomy for early stage cervical cancer can provide a good survival outcome, fewer complications and a faster recovery time than open surgery.[2]

For patients who want to retain their fertility, fertility-sparing surgery is considered. Radical trachelectomy is the most popular type of such surgery and was established by Daniel Dargent in 1994.[3] Several series have shown that it is feasible, safe and has an acceptable overall survival rate compared with radical hysterectomy.[4] There are now several approaches to radical trachelectomy with different fertility and oncological results.

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## History of conservative surgery for cervical cancer

In 1948, Novak reported the use of cervicectomy to treat cervical intraepithelial neoplasias using the concept of local excision of the cervical neoplasm. Aburel described a concept of subfundic hysterectomy for carcinoma *in situ* and microcarcinoma in the 1950s, but the method did not become popular. In 1977, Burghardt explained that removal of the uterine fundus and adnexa was not necessary for a small-volume cervical cancer.[5] In 1994, Dargent introduced radical vaginal trachelectomy, and finally the fertility-sparing fundic-preserving technique became popular.[3]

## Current methods of radical trachelectomy

### *Vaginal trachelectomy*

The surgical steps involved in this procedure are as follows. The patient should be placed in the lithotomy position. A vaginal cuff incision is made in the upper vagina. The bladder base is dissected and the pouch of Douglas is opened. The pararectal spaces are then exposed and the uterosacral ligaments divided. After opening the paravesical spaces, the ureter is identified laterally. The paracervix (parametrium) is divided just below the level of the uterine arteries. The cervix is amputated 5 mm below the cervical isthmus and a cervical specimen is sent for frozen section to ensure that there is a disease-free margin. Cerclage of the uterine isthmus is

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performed and finally the isthmus and vaginal cuff are sutured together.

Since the first radical vaginal trachelectomy was announced, several reports have discussed the oncological and obstetric outcomes. Dursun et al summarized and reviewed Dargent's operation, finding that the rate of cancer recurrence is about 4.2% and the death rate is 2.8%.[6] These percentages are similar to those of classic radical hysterectomy used to treat early stage cervical cancer. A tumor size larger than 2 cm, positive of lymphovascular space involvement (LVSI), deep stromal invasion, and unfavorable histology are risk factors for recurrence. Plante and Dargent suggest that a tumor of over 2 cm is statistically significant for the risk of recurrence.[7,8]

There is lack of research into unfavorable histology. Dargent mentions that adenocarcinoma is a risk factor for recurrence,[4] but Hertel et al have reported that the difference in recurrence rate between squamous carcinoma and adenocarcinoma is not statistically significant.[9] Boss et al review 355 radical trachelectomy procedures,[10] where 153 procedures were attempted to preserve fertility. Seventy per cent (107/153) of women reported a pregnancy after radical vaginal trachelectomy, but 21% had a miscarriage in the first trimester and 8% in the second trimester. Twenty-one per cent had preterm delivery (before 36 weeks). Due to about 30% miscarriage and 2 % preterm delivery, Boss et al suggest that post-trachelectomy pregnancy should be considered a high-risk pregnancy and women should be followed up closely.

*Abdominal trachelectomy*

Aburel first described abdominal radical trachelectomy in 1932 and J R Smith re-announced the procedure in 1997.[11] This is a similar procedure to radical hysterectomy and does not need additional training. The Lukas et al review of abdominal radical trachelectomy reported a recurrence rate of 4.8%.[12] They also report that some studies subdivided the tumors into two groups: tumors of less than 2 cm and those larger than 2 cm. The recurrences differed in these groups, with a 1.9% recurrence rate in tumors less than 2 cm *versus* 20% in those larger than 2 cm. In the study, 194 abdominal radical trachelectomies were performed and 30 women subsequently became pregnant (15.5%). Premature labor was mentioned in seven cases (35%) from a possible 20 deliveries.[12]

*Laparoscopic radical trachelectomy*

Nezhat and Querleu first reported on laparoscopic radical hysterectomy in 1993.[13,14] Minimally-invasive surgery in early cervical cancer is less invasive than open surgery and has a similar survival outcome.[2] Lee et al have reported a high success rate following laparoscopic radical trachelectomy in early stage cervical cancer.[15] Several authors also report similar results.[16–18]

Under the directly enhanced vision of the laparoscope, it is easy to identify and preserve ascending branches of the uterine arteries and to divide ligaments surrounding the cervix and vagina. When taking a vaginal approach, it is difficult to individually determine the radicality and the hypogastric nerve cannot be identified.

Theoretically, laparoscopic trachelectomy can decrease the complication rate, reduce recovery time, and preserve the ascending branches of the uterine artery. Preservation of the ascending branch of the uterine artery may provide better blood perfusion when a woman is pregnant. Laparoscopic radical trachelectomy could therefore be a reasonable choice for sparing fertility in women diagnosed with early stage cervical cancer. Prospective, large-scale studies are still needed, however.

Angel et al reported on nine cases of laparoscopic nerve-sparing radical trachelectomy with a mean return to normal urinary function of 2 weeks.[19] Following the trend of minimally-invasive surgery, some authors have reported that robotic-assisted laparoscopic radical trachelectomy provides the same of uterine artery preservation and nerve-sparing.[20–25] They all point out that the minimally-invasive approach results in less blood loss and faster recovery, but more large-scale studies reporting long-term results are required.

## Controversial issues

To achieve the goal of adequate radicality and a good prognosis, it is necessary to have an adequate free margin around the isthmus. Dargent and Plante recommend that a 1-cm free margin is necessary after frozen section is confirmed, but some authors suggest that 5–8 mm is sufficient.[7,8] The definite minimal free margin is still under debate.

When trachelectomy is carried out to preserve fertility, preservation of the cervical stroma is critical. However, if physicians keep more of the cervical stroma, the mean result is less radicality. To prevent fetal loss before the secondary trimester, Dargent suggests cervical cerclage during trachelectomy.[4] Shepherd suggests prophylactic antibiotic administration during weeks 11–14 to prevent miscarriage.[26] Some authors prefer an antipartum exam every 2 weeks before 28 weeks and then a shift to every week.[27,28] Dargent also suggests that during the prenatal study transvaginal sonography is used to measure cervical length. The critical length of the cervix after trachelectomy, however, is not clear.

## A new trial of conservative surgeries in early cervical cancer

Radical trachelectomy was established over 10 years ago. As cases are limited and there are ethical issues regarding a comprehensive randomized study for the fertility-sparing surgery, however, some controversies stull surround it. Nevertheless the procedure itself has also been challenged. Several studies have shown that less than 1% of patients with early cervical cancer with favorable pathological characteristics have parametrial involvement. It has also been shown that in 60% of patients undergoing radical trachelectomy, the final pathological specimen contains no residual disease.[8] Kinney[29] evaluated 83 patients with Stage I B1 squamous cell carcinoma of the cervix with a tumor size of less than 2 cm and no LVSI. None of the patients in the study were found to have parametrial involvement. Another report by Covens and colleagues evaluated 842 patients with Stage I A1–B1 cervical cancer who underwent radical hysterectomy.[30] They noted that 33 patients (4%) had parametrial involvement. Parametrial involvement was associated with larger tumor size, LVSI, greater depth of invasion and positive pelvic lymph nodes. Focusing on this subgroup, including 536 patients with a tumor size ≤2 cm, negative lymph nodes and less than 10 mm of cervical stromal invasion, the incidence of parametrial involvement was only 0.6% (90% confidence interval: 0.0–1.1%). At a median follow-up of 51 months, the 2- and 5-year recurrence-free survival rates in this subgroup were 98% and 96%, respectively.[30] So in the fertility preservation surgery patients, is parametrectomy necessary or not?

Rob and colleagues published details on the concept of simple trachelectomy without parametrectomy.[31] This procedure has two steps: first, laparoscopy, sentinel lymph node (SLN) identification and frozen section; and second, conization (Stage I A1 with LVSI and Stage I A2 tumors) or simple trachelectomy (Stage I B1 tumors and those less than 2 cm) are undertaken when the SLNs are negative. Fertility was spared in 32 of the women in the study. LVSI was detected in 17 and I B1 tumors in 27. One recurrence was diagnosed, but the woman is still alive without evidence of disease more than 5

years after treatment. Of the 32 women, 17 became pregnant. Of 23 pregnancies, five were lost in the first trimester (three women) and three in the second trimester. There were 12 deliveries and three ongoing pregnancies at the time of publication.[31] The authors concluded that if SLN is negative, large cone or simple trachelectomy is a safe and feasible procedure with a high pregnancy rate in women following treatment for early stage cervical cancer. More prospective studies are still needed.

## Conclusion

Fertility-preserving surgery for early stage cervical cancer has been performed for 10 years now. Radical trachelectomy has a similar outcome to radical hysterectomy. Consultants should discuss the options and outcomes with patients who are interested in radical trachelectomy and their treatment should be individualized. The minimally-invasive approach seems to be the growing trend in radical trachelectomy. The advantages of minimally-invasive approaches are visual enhancement, more precise dissection, less blood loss, fewer complications and shorter recovery time. Such surgery can preserve the ascending branches of the uterine artery and may increase uterine perfusion. Patients can undergo nerve-sparing surgery to improve their postoperative quality of life.

The radicality of the paracervix in cervical cancer is still being debated. For more conservative surgeries, minimally-invasive approaches still provide a better option, according to a paracervix metastasis survey. Such approaches include laparoscopic frozen section of SLN or pelvic lymphadenectomyin cases where tumors are small (less than 2 cm) following simple laparoscopic trachelectomy or large cervical conization. In conclusion, laparoscopic radical trachelectomy is a good, minimally-invasive method of fertility-sparing surgery in early-stage cervical cancer.

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