

Laparoscopic Radical Trachelectomy: Technique, Feasibility, and Outcomes

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ABSTRACT

Background and Objectives: Our objectives are to describe our surgical technique for laparoscopic radical trachelectomy, to evaluate its feasibility, and to present the perioperative results at Hospital Italiano de Buenos Aires, Argentina.

Methods: We analyzed 4 patients who underwent laparoscopic radical trachelectomy for early-stage cervical cancer between December 2011 and May 2013.

Results: Four patients were included in this study. Total laparoscopic radical trachelectomy was performed in all cases. The mean age was 26 years (range, 19–32 years), the mean body mass index was 21 (range, 18–23), and the mean length of hospital stay was 33 hours (range, 24–36 hours). The mean operative time was 225 minutes (range, 210–240 minutes), and no complications were reported. During the postoperative period, only 1 patient presented with left vulvar edema, which resolved spontaneously. The pelvic and parametrial lymph nodes, as well as the vaginal cuff and cervical resection margins, were negative for malignancy in all cases. On average, 18 pelvic lymph nodes (range, 15–20) were removed. The tumor stage was IB in all 4 patients, and the mean tumor size was 17 mm (range, 12–31 mm). No patient required conversion to laparotomy.

Conclusion: We consider laparoscopic radical trachelectomy, performed by trained surgeons, a feasible and safe therapeutic option as a fertility-sparing surgical technique, with good perioperative outcomes for women with early-stage cervical cancer with a desire to preserve their fertility. Minimally invasive surgery provides the widely known benefits of this type of approach.

Key Words: Laparoscopy, Trachelectomy, Cervical cancer.

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INTRODUCTION

Cervical cancer remains a major health care problem in developing countries, where there are no organized screening programs allowing an early diagnosis of the disease. However, a considerable percentage of cervical cancer cases can be diagnosed at an early stage in young women, during their reproductive age, when they have not completed their childbearing.

Data in the literature have indicated that radical trachelectomy is a feasible procedure and can yield oncologic outcomes similar to those of radical hysterectomy. Thus this procedure has become the treatment of choice for women with early-stage cervical cancer with a desire to preserve their fertility.

In 1994 Dargent et al¹ described vaginal radical trachelectomy with laparoscopic pelvic lymphadenectomy for young patients who have early cervical carcinoma and a desire to preserve their fertility. Vaginal radical trachelectomy has been shown to be a feasible and safe procedure but with some limiting factors related to training gynecologic oncologists. Not many of them are familiar with this technique, requiring skill in both laparoscopic surgery and vaginal surgery.^{2–3} Smith JR. et al⁴ presented a new approach to fertility-sparing surgery, namely, abdominal radical trachelectomy. The technique was similar to a standard radical hysterectomy and lymphadenectomy. Ungár L. et al⁵ affirmed that abdominal radical trachelectomy is a fertility-preserving alternative to radical hysterectomy or chemoradiation for young women with stage IA2 to IB cervical cancers.

Advances in minimally invasive surgery have shown the advantages of the aforementioned approach, which include a reduced length of hospital stay, less blood loss, lower analgesic requirements during the postoperative period, a decrease in the rate of blood transfusions, a decrease in the rate of complications, an early recovery of physiological functions, and better esthetic outcomes.^{6,7}

The aim of our work is to present a series of patients with early-stage cervical cancer who underwent laparoscopic radical trachelectomy. We describe our surgical technique, assessing the feasibility and perioperative outcomes at Hospital Italiano de Buenos Aires, Argentina.

MATERIALS AND METHODS

We performed a retrospective review and analysis of a database of recent conservative surgical procedures for the treatment of early-stage cervical cancer. Between December 2011 and May 2013, 4 laparoscopic radical trachelectomies were performed in the Gynecologic Oncology Unit of the Department of Gynecology at Hospital Italiano de Buenos Aires.

The criteria for considering performing this surgery were the same as the criteria used for abdominal radical trachelectomy, namely (1) desire to preserve fertility, (2) tumor size <2 cm in diameter, (3) International Federation of Gynaecology and Obstetrics stage IA–IB1, (4) absence of distant metastasis on magnetic resonance imaging (MRI), and (5) absence of unfavorable histologic types (eg, neuroendocrine tumors). The absence of malignancy in the pelvic lymph nodes and endocervical margin was considered during the surgical procedure.

In 2011 we incorporated the laparoscopic approach as a therapeutic option for radical trachelectomy in our department. Since then, the laparoscopic approach has been used in patients meeting the criteria for conservative treatment.

Of the 4 patients included, 3 met the requirements for conservative treatment. The remaining patient had a larger tumor but expressed her desire to preserve her fertility and did not accept the radical treatment. So, taking into account previous reports published in the literature,^{8,9} we carried out neoadjuvant chemotherapy, followed by radical trachelectomy. **Table 1** summarizes the patient population and tumor characteristics.

Characteristic	Data
Age [median (range)] (y)	26 (19–32)
Tumor size [median (range)] (mm)	17 (12–31)
FIGO stage IB	4 of 4 (100%)
Histotype	
Squamous cell	2 of 4 (50%)
Adenocarcinoma	1 of 4 (25%)
Adenosquamous	1 of 4 (25%)

Abbreviations: FIGO, International Federation of Gynaecology and Obstetrics.

All patients were informed about their oncologic disease and the possibility of undergoing radical surgical treatment without fertility preservation. Informed consent was obtained from all patients before surgery.

Surgical Technique

Four laparoscopic trocars were placed. The primary, 12-mm trocar was placed in the umbilical region, whereas the other 3 accessory trocars were placed as follows: 10 mm in the right iliac fossa, 5 mm in the left iliac fossa, and 5 mm in the suprapubic region (**Figure 1**).

The patient was placed in the Trendelenburg lithotomy position, with compression stockings worn during surgery to prevent thromboembolic events. In addition, anti-thrombotic prophylaxis with low-molecular weight heparin was used.

The uterus was mobilized by placement of a VCare manipulator (ConMed, Utica, New York). Pneumoperitoneum was established and maintained with a pressure of 12 mm Hg. The Harmonic scalpel (UltraCision; Ethicon Endo-Surgery, Cincinnati, Ohio) was used as a source of energy in all surgical procedures.

The peritoneum was sectioned in front and behind both round ligaments, parallel to the ovarian vessels. Both round ligaments were preserved. The retroperitoneum was exposed up to the junction of the ureter with the iliac artery.

A bilateral pelvic lymphadenectomy was performed from the circumflex vein to the junction of the ureter with the external iliac artery. The external iliac, hypogastric, and obturator lymph nodes were completely removed. The pelvic lymph nodes were intraoperatively evaluated.



Figure 1. Trocar placement.

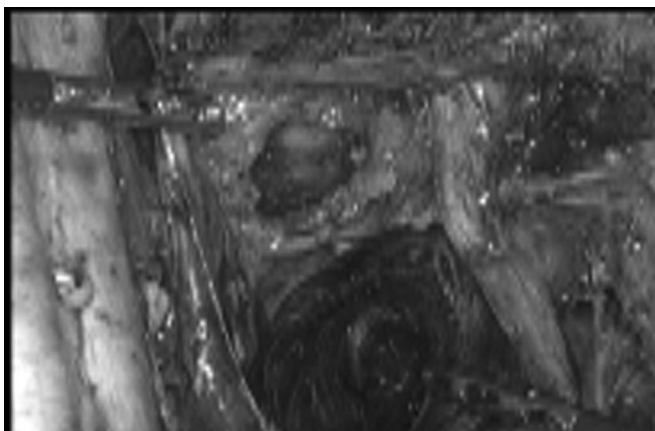


Figure 2. Opening of paravesical and pararectal space.

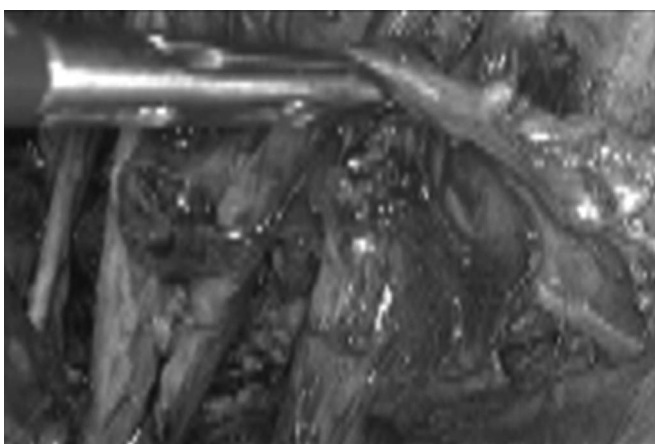


Figure 3. Preservation of left uterine artery and ureteral dissection.

Both paravesical spaces were dissected up to the pelvic muscles, with exposure of the vascular structures (vesical artery and uterine artery), ureter, and vaginal lateral wall (**Figure 2**).

Both uterine vessels were preserved in 2 cases, and in the 2 remaining cases, we preserved only 1 uterine vessel (**Figure 3**). This procedure was performed because of intraoperative vascular injury to prevent bleeding. In those cases in which the uterine arteries were sectioned, they were sectioned at their origin, meeting the principles of radicality. We separated the ureter, removing it from the total extension of the parametrium until its insertion into the bladder. These steps were performed with the Harmonic scalpel (**Figure 4**).

The pararectal spaces were dissected (**Figure 2**). The rectum was mobilized, and the rectovaginal space was dissected. The lateral and posterior parametria were

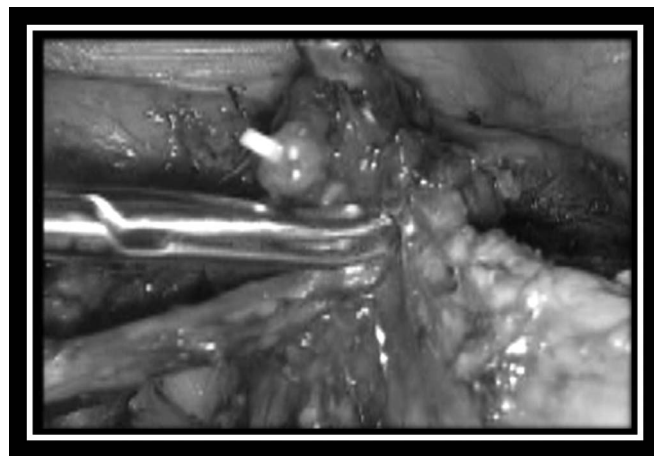


Figure 4. The ureter is separated up to its insertion into the bladder.

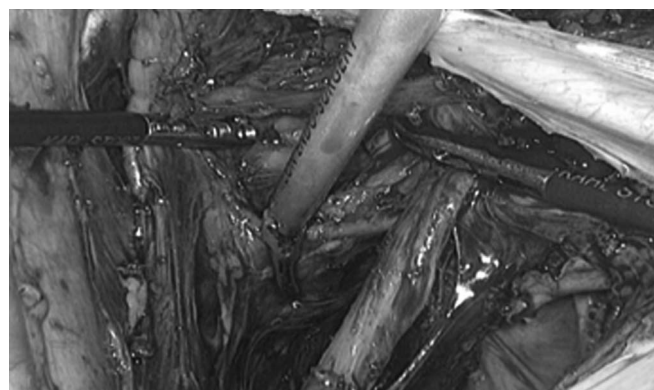


Figure 5. Resection of parametria meeting radicality criteria.



Figure 6. Cervical amputation 2 cm above cervicovaginal junction.

dissected at their origins with the Harmonic scalpel (**Figure 5**).

For the cervical section, we usually take into account the tumor size, the colposcopic image, the length of the cervix,

and the endocervical involvement measured with an MRI scan. The section was performed to obtain negative margins and leave a neocervix of 1 to 1.5 cm below the internal cervical os (**Figure 6**). A frozen section of the endocervical margin

The amputated cervix, vaginal cuff, and parametria were removed. In our center, an intrauterine 8-mm silicone catheter was inserted and sutured into the neocervix to maintain patency of the cervical canal (**Figure 7**) and was left in place for 15 days. An uterovaginal anastomosis was performed with No. 2-0 Vicryl suture (Ethicon, Somerville, New Jersey) (**Figure 8**).

In our practice, we do not carry out cervical cerclage. The fallopian tubes and ovaries are preserved intact, and the vesical catheter is left in place for 7 to 10 days after surgery. Figure 9 shows the final specimen.



Figure 7. Intrauterine catheter.



Figure 8. Reanastomosed uterus with absorbable suture.

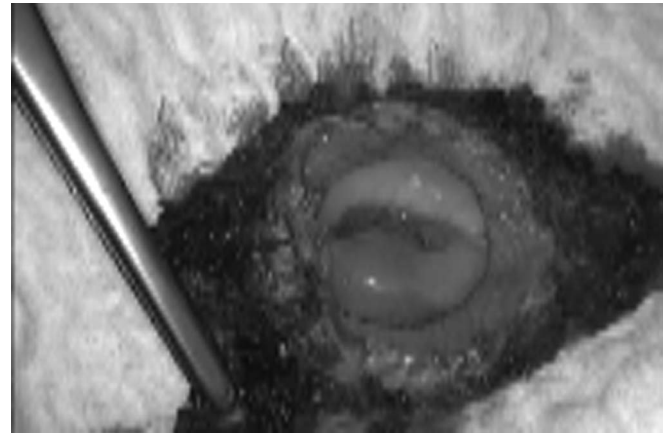


Figure 9. Specimen.

RESULTS

Four patients were included in this study. The diagnosis was made through an extended biopsy (cold-knife conization and loop electrosurgical excision procedure) or a regular exocervical biopsy. Clinical and imaging staging confirmed stage IB1 cervical carcinoma in all cases.

Regarding the patients' characteristics, the mean age was 26 years (range, 19–32 years) and the mean body mass index was 21 (range, 18–23).

Three patients met the criteria for radical trachelectomy, whereas the remaining patient presented with a larger tumor size at diagnosis, as will be discussed later.

The mean length of hospital stay was 33 hours (range, 24–36 hours), and the mean operative time was 225 minutes (range, 210–240 minutes). No intraoperative complications were reported in all cases. No patient required conversion to laparotomy. Surgery was completely performed using the laparoscopic approach in all cases. During the postoperative period, 1 patient presented with left vulvar edema that resolved spontaneously, in an ambulatory setting. No patient required blood transfusions.

In our analysis of the specimens, we found residual cancer in just 1 case and high-grade squamous intraepithelial lesions in another case. In the remaining 2 cases, there was no residual lesion. All the pelvic lymph nodes and cervical resection margins were negative for malignancy. On average, 18 pelvic lymph nodes (range, 15–20) were removed. The mean tumor size was 17 mm (range, 12–31 mm). The parametria and vaginal cuff were tumor free in all cases; thus no patient required further treatment.

Table 2.
Specimen Characteristics

Characteristic	Patient 1 (NACT)	Patient 2	Patient 3	Patient 4
Cervical length (mm)	35	40	25	20
Right parametrial length (mm)	30	25	30	15
Left parametrial length (mm)	40	15	25	20
Vaginal length (mm)	23	52	40	15
Residual tumor	No	HSIL	No	Yes, 16 mm
Histologic margin to neoplasm (mm)	—	20	—	5

Abbreviations: HSIL, high-grade squamous intraepithelial lesion; NACT, neoadjuvant chemotherapy.

Table 2 summarizes the specimen characteristics in all cases and findings regarding residual tumor.

The goal of this study was to describe our surgical technique and report our perioperative outcomes. It was not our intention to report the oncologic outcomes. However, there were no recurrences, and the mean follow-up period was 9 months (range, 5–20 months).

DISCUSSION

Quality of life and fertility preservation are very important issues for cervical cancer survivors. The current trend is to replace radical surgery with conservative and less invasive surgical procedures for young women with a desire to preserve their fertility without setting aside the oncologic results. We have reported our experience performing radical abdominal trachelectomy, but in 2011 we incorporated the laparoscopic approach.

The first report on laparoscopic radical trachelectomy was presented in 2005 by Cibula et al.¹⁰ They concluded that laparoscopic radical trachelectomy might be an alternative technique to be adopted in centers practicing abdominal trachelectomy and with knowledge of the laparoscopic technique because the surgical steps are the same.

Other authors had previously tried to carry out the procedure using the laparoscopic approach but had to complete it using the vaginal approach.¹¹ Kim et al¹² described their series in which all procedures were performed by a laparoscopic approach (lymphadenectomy, dissection of paravesical and pararectal spaces, and parametrial resection) except for vaginal resection and cervical amputation, which were performed by the vaginal approach. They considered the procedure feasible and safe to perform.

In 2009 Park et al¹³ described 4 patients with early cervical cancer who underwent laparoscopic radical trachelectomy. The operative time was 250 minutes, and the amount of blood loss was 185 mL.

Ramirez et al¹⁴ described their surgical technique and the perioperative outcomes in 4 patients with early-stage cervical cancer who underwent robotic radical trachelectomy. The operative time was 282 minutes, the length of hospital stay was 1.5 days, and the number of lymph nodes removed was 20. Other authors have reported similar outcomes in patients treated with robotic-assisted surgery.¹⁵

Recently, in a review of 25 patients, Lu et al¹⁶ concluded that laparoscopy is a feasible and safe option to perform in patients with early-stage cervical cancer. The patients had a median follow-up of 66 months, and no recurrence was reported.

In our series the entire procedure was completed by the laparoscopic approach, in accordance with the conventional open technique.

Because our report only includes laparoscopic radical trachelectomies, we do not aim to make a comparison with conventional surgical procedures. However, our perioperative outcomes are similar to our recently published outcomes for abdominal radical trachelectomy.¹⁷

Although numerous reports support the use of cerclage in patients undergoing trachelectomy for early-stage cervical cancer, we did not use it in a systematic way because we consider the available evidence inconclusive.

The pathology results constitute another important parameter to be taken into account. The parametrial, vaginal, and endocervical resection margins in our series of patients were tumor free on the pathology reports. Previous

series support this finding.¹⁸ In addition, our technique shows the same benefits for patients as other minimally invasive techniques because we are trained in this approach in our center.

We included in this study a patient with a moderately differentiated squamous cell carcinoma of 31 mm, 10 mm, and 14 mm in the transverse, longitudinal, and anteroposterior diameters, respectively, who expressed her desire to undergo fertility-sparing surgery. Although she was informed about her disease and the possibility of undergoing other therapeutic options, she persisted in her desire. It was then jointly decided to perform conservative treatment. Thus a pelvic and lumboaortic lymphadenectomy was first carried out, which confirmed the absence of malignancy in all the lymph nodes analyzed. After that, 3 courses of chemotherapy treatment, with 50 mg of cisplatin, 1500 mg of ifosfamide, 1500 mg of mesna, and 900 mg of 5-fluoruracil, were carried out every 21 days. As a result, a partial clinical response was confirmed after the third cycle. The residual lesion was measured by examination and MRI, and it was 20 × 5 mm in diameter. Thirty days after the last chemotherapy course, radical trachelectomy was performed. A tumor-free endocervical margin was intraoperatively confirmed.

With respect to the use of neoadjuvant chemotherapy, several studies in the literature have shown a complete or partial response of the tumor; this allowed us to perform less radical surgical treatment. These data suggest good oncologic and obstetric outcomes. However, further investigation will give us more information.^{8,19} In addition, current research protocols have studied less radical procedures such as large cone biopsy or simple trachelectomy, with encouraging results. However, further investigation with strict selection of patients is also required.^{19,20}

Given the small number of cases and the short follow-up period, we did not aim to carry out an analysis of the oncologic outcomes. No recurrence was reported in our series at the time of publication, with a mean follow-up period of 9 months. We are looking forward to increasing the number of patients and lengthening their follow-up to allow us, in further presentations, to obtain information regarding oncologic outcomes and fertility-related data.

CONCLUSION

We consider laparoscopic radical trachelectomy performed by trained surgeons a feasible and safe therapeutic option, with good perioperative outcomes for women with early-stage cervical cancer with a desire to preserve

their fertility. Minimally invasive surgery provides the widely known benefits of this type of approach.

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