

# Laparoscopic Radical Hysterectomy versus Open Radical Hysterectomy for Carcinoma Cervix Stage 1

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## Abstract

The present review has considered good number of studies involving fair large number of patients operated with both modalities for carcinoma cervix stage 1. Minor differences in the operative techniques are ignored. Overall operation time for laparoscopic procedures was required more. Incidence of intraoperative complication was also higher in addition to inherent complications related to pneumoperitoneum. However, results in terms of disease free survival between the groups were comparable.

Advantages pertaining to reduced hospital stay and better cosmesis with laparoscopic modality at present do not outweigh the higher incidence of intraoperative complication than that in open radical hysterectomy group.

**Keywords:** Radical hysterectomy, stage 1 cancer cervix, laparoscopy.

## INTRODUCTION

In Indian population cervical cancer is in the first position amongst cancers of reproductive organs. Even in the patients where detection of disease is not very late the easy and fully satisfactory modality of treatment still is been searched. Advent of modern technology has made available laparoscopic mode. It is worthwhile to find whether the laparoscopic radical hysterectomy with pelvic and para-aortic lymphadenectomy is a better option.

## METHODOLOGY

Scope of review of published articles on this subject was made available through the search into Google, Highwire Press, Yahoo, and Surgical Endoscopy journals.

## REVIEW ARTICLES

In a study at the university of Puerto Rico nineteen women underwent laparoscopic radical hysterectomy or laparoscopically assisted vaginal radical hysterectomy, with pelvic node dissection and para-aortic node dissection when indicated. One procedure was converted to laparotomy due to equipment failure, two minor postoperative complications. The second was incisional bleeding, which was controlled with sutures applied using a local anesthetic, there have been no incidents of recurrence.<sup>1</sup>

Study of patients treated by laparoscopic-assisted radical vaginal hysterectomy (LARVH) with time-matched radical abdominal hysterectomy (RAH) controls at our center. Records of all patients with FIGO stage IA/IB cervical cancer undergoing radical surgery was studied.

*Results:* Between November 1996 to December 2003, 71 and 205 patients have undergone LARVH and RAH, respectively, for FIGO stage IA/IB carcinoma of the cervix. Both groups were similar with respect to age and Quetelet index. All laparoscopic procedures were completed successfully with no conversions to laparotomy. Intraoperative morbidity characteristics analyzed (LARVH vs RAH) were blood loss 300 ml vs 500 ml ( $P < 0.001$ ), operative time 3.5 hours vs 2.5 hours ( $P < 0.001$ ), and intraoperative complications 13% vs 4% ( $P < 0.03$ ). Intraoperative complications in the LARVH group included: cystotomy (7), ureteric injury (1), and bowel injury.<sup>1</sup> There was no difference in transfusion rates. There was no difference between postoperative infectious and noninfectious complications (LARVH vs RAH), 9% vs 5% and 5% vs 2%, respectively. The median time to normal urine residual was 10 days vs 5 days ( $P < 0.001$ ), and the median length of hospital stay was 1 day vs 5 days ( $P < 0.001$ ). After a median follow-up of 17 and 21 months, there have been 4 recurrences in the LARVH group and 13 in the RAH ( $P = NS$ ). The overall 2 years recurrence-free survival was 94% and 94% in the LARVH and RAH groups, respectively ( $P = NS$ ). The major benefits are less intraoperative blood loss and shorter hospital stay. It is a safe procedure with low overall morbidity and complication rates. However, at present, LARVH is associated with an increase in intraoperative complications, and patients may have an increased time to return to normal bladder function.<sup>2</sup>

## STUDY DESIGN-1

Seventy-eight consecutive patients with stage IA<sup>2</sup> and IB cervical cancer with at least 3 years of follow-up consented to

undergo this surgical procedure with argon beam coagulation and endoscopic staplers. Sixty-eight patients had squamous cell carcinomas; 8 patients had adenocarcinomas, and 2 patients had adenosquamous carcinomas of the cervix.

**Results:** All but 5 surgical procedures were completed laparoscopically. The average operative time was 205 minutes (range, 150-430 minutes). The average blood loss was 225 mL (range, 50-700 mL). One patient (1.3%) had transfusion. Operative cystotomies occurred for 3 patients: 2 cystotomies were repaired laparoscopically, and 1 cystotomy required laparotomy. One patient underwent laparotomy because of equipment failure, and another patient underwent laparotomy to pass a ureteral stent. Two other patients underwent laparotomy to control bleeding sites. All surgical margins were macroscopically negative, but 3 patients had microscopically positive and/or close surgical margins. One patient had a ureterovaginal fistula. There have been 4 documented recurrences (5.1%), with a minimum of 3 years of follow-up.<sup>3</sup>

## STUDY DESIGN-2

A type III radical hysterectomy with bilateral aortic and pelvic lymph node dissection was separated into eight component parts: (1) right and left aortic lymphadenectomy, (2) right and left pelvic lymphadenectomy, (3) development of the paravesical and pararectal spaces, (4) ureteral dissection, (5) ligation and dissection of the uterine artery, (6) development of the vesicouterine and rectovaginal spaces, (7) resection of the parametria, and (8) resection of the upper vagina. The adequacy of the component parts was determined and documented on video.

**Results:** Complete aortic and pelvic lymphadenectomy and a type III radical hysterectomy were performed by operative laparoscopy.

**Conclusion:** A complete pelvic and aortic lymphadenectomy and type III radical hysterectomy were performed laparoscopically. This approach could potentially decrease morbidity historically associated with radical hysterectomy and lymphadenectomy performed either abdominally or vaginally. Only prospective randomized trials will allow for the evaluation of potential benefits associated with this surgical technique.<sup>4</sup>

Fourteen cases of radical hysterectomy with bilateral pelvic and common iliac lymphadenectomy for a stage IB squamous carcinoma of the cervix. To date fourteen of these procedures have been performed with few complications. The complications encountered thus far include narrowing of a right ureter detected by an intravenous pyelogram obtained on postoperative day 10 and a small vesicovaginal fistula. The narrowed right ureter had a retrograde stent placed as a precaution. It would appear that laparoscopic radical hysterectomy in selected patients offers significant advantages in terms of hospitalization, incision size, and wound, pulmonary, and intestinal complications. In addition to the clinical advantages, laparoscopic radical hysterectomy appears to be more cost effective than traditional laparotomy.<sup>5</sup>

In laparoscopy-assisted radical vaginal hysterectomy, laparoscopy is used to develop the paravesical and pararectal spaces. The cardinal ligament is isolated and cut after bipolar coagulation to the level of the deep uterine vein. By the vaginal approach, the ureters are identified before their entry into the bladder pillar. The uterine vessels are pulled down until their laparoscopically coagulated ends become visible. After incision of the vesicocervical reflection, the uterine fundus is grasped and developed (Döderlein maneuver). The lower cardinal and uterosacral ligaments are exposed by pulling the cervix and fundus uteri to the contralateral side. The cardinal and uterosacral ligaments are dissected and ligated, and the specimen is removed. We combined laparoscopic lymphadenectomy with radical vaginal hysterectomy in 33 women with cervical cancer. The mean operating time was 80 minutes for the vaginal phase and 215 minutes for the laparoscopic phase, including para-aortic and pelvic lymphadenectomy and preparation of the cardinal ligaments. Blood transfusions were necessary in four women. Three patients sustained injury to the bladder, one patient to the left ureter, and another patient to the left internal iliac vein. Repair was achieved at primary surgery for all intraoperative complications. No fistula was observed. The patients had fully recuperated after a mean of 28 days. The laparoscopy-assisted Schauta-Stoeckel approach may prove to be a safe alternative to conventional radical abdominal hysterectomy.<sup>6</sup>

A vaginal or a laparoscopic approach in radical surgery for cervical carcinoma has been proposed. A pilot study of eight cases shows that an oncologic surgeon familiarized with these techniques is able to take advantage of the benefits of both routes in the same patient: Laparoscopic surgery is adapted to lymph node dissection, section of the origin of the uterine artery, and dissection of the ureter under direct vision; vaginal surgery allows a precise incision of the vaginal cuff. Both routes may be used for the section of parameters, but we propose the use of the vaginal route. The combination of vaginal and laparoscopic surgery spares the pain and discomfort of both laparotomy and perineotomy.<sup>7</sup>

The clinical usefulness of laparoscopic pelvic and para-aortic lymphadenectomy for staging and therapy of gynecological cancer was analyzed prospectively.

**Method:** Laparoscopic para-aortic and pelvic lymphadenectomy was performed in 150 patients with cervical (n = 96), endometrial (n = 41), or ovarian cancer (n = 13). Lymphadenectomy was combined with laparoscopically assisted vaginal radical hysterectomy in 70 patients, with laparoscopically assisted vaginal hysterectomy and/or bilateral salpingo-oophorectomy and/or appendectomy and/or omentectomy in 24 patients, with trachelectomy in 2 patients, and with laparoscopic radical hysterectomy in 2 patients; lymphadenectomy alone was performed in 52 patients. Right-sided para-aortic lymphadenectomy extended to the level of the right ovarian vein; left-sided dissection reached the level of the inferior mesenteric artery. In ovarian tumors, dissection was extended

to the level of the renal vessels; in addition, the ovarian vessels were removed with the surrounding tissue. Peri- and postoperative data were collected prospectively to monitor progress of surgical performance.

*Results:* Mean operative time was 36 minutes (15-105 minutes) for right-sided para-aortic and 24 minutes (12-49 minutes) for left-sided para-aortic lymphadenectomy; bilateral pelvic lymphadenectomy took 64 minutes (44-110 minutes). On average 26.8 (10-56) pelvic lymph nodes and 7.3 (0-19) para-aortic lymph nodes were sampled. Major vessels were injured in 7 patients of which 4 patients required laparotomy. Patients undergoing lymphadenectomy alone were admitted for 3.2 days on average.<sup>8</sup>

### STUDY DESIGN-3

The surgical-anatomic principles of radical vaginal surgery and the techniques of three increasingly extended vaginal hysterectomies are illustrated. Possible indications are pointed out on the basis of our personal experience from previously published retrospective studies.

*Results:* Class I extended vaginal hysterectomy allows the "en bloc" dissection of the uterus along with the upper third of vagina and both the adnexa. The parametria are not removed. This procedure has proved to be of value for treatment of stage I endometrial cancer. In the class II extended vaginal hysterectomy the distal tract of the anterior and posterior parametria are preserved, whereas the cardinal ligament is entirely removed. This operation has shown promising results for treatment of stage IB-IIA cervical cancer of small volume while reducing the incidence of bladder and rectal dysfunctions. The class III procedure includes the complete removal of the parametria (anterior, lateral, and posterior). This operation has been shown to provide a high rate of cure for stage IB-IIA cervical cancer.<sup>9</sup>

In 57 consecutive patients with stage Ia to IIb cervical cancer, laparoscopic radical hysterectomy and lymphadenectomy were performed. Forty-eight patients had squamous cell carcinomas, 7 patients had adenocarcinomas, and 2 patients had adenosquamous carcinomas of the cervix.

*Results:* All but 2 surgical procedures were completed laparoscopically. The average operative time was 186 minutes (150-320 minutes). The average blood loss was 168 ml (120-700 ml). Average numbers of pelvic and para-aortic lymph nodes removed were 18.6 (12-23) and 8.2 (6-12), respectively. Eight patients (14.0%) had positive lymph nodes. All surgical margins were macroscopically negative. Operative cystotomies occurred in 2 patients and one patient with venous injuries were repaired laparoscopically. Two other patients underwent laparotomy to control bleeding or repair ascending colon. After surgery, patients passed gas in 2.3 days and self-voided in 10.2 days on average. Follow-up has been provided every 3 months. There have been 3 cases of recurrences, one patient uncontrolled, and one patient ureteral constriction. Three patients have retention of urine.<sup>10</sup>

Between August 1994 and September 2003, pelvic and/or para-aortic transperitoneal laparoscopic lymphadenectomy was performed in 650 patients at the Department of Gynecology of the Friedrich-Schiller University of Jena. Retrospective and prospective data collection and evaluation of videotapes were possible in 606 patients. Laparoscopic lymphadenectomy was part of the following surgical procedures: Staging laparoscopy in patients with advanced cervical cancer (n = 133) or early ovarian cancer (n = 44), trachelectomy in patients with early cervical cancer (n = 42), laparoscopic-assisted radical vaginal hysterectomy in patients with cervical cancer (n = 221), laparoscopy before exenteration in patients with pelvic recurrence (n = 20), laparoscopic-assisted vaginal hysterectomy or laparoscopic-assisted radical vaginal hysterectomy in patients with endometrial cancer (n = 112), and operative procedures for other indications (n = 34).

*Results:* After a learning period of approximately 20 procedures, a constant number of pelvic lymph nodes (16.9-21.9) was removed over the years. Pelvic lymphadenectomy took 28 minutes, and parametric lymphadenectomy took 18 minutes for each side. The number of removed para-aortic lymph nodes increased continuously over the years from 5.5 to 18.5. Right-sided para-aortic, left-sided inframesenteric and left-sided infrarenal lymphadenectomy took an average of 36, 28, and 62 minutes, respectively. The number of removed lymph nodes was independent from the body mass index of the patient. Duration of pelvic lymphadenectomy was independent of body mass index, but right-sided para-aortic lymphadenectomy lasted significantly longer in obese women (35 vs 41 minutes, P = 0.011). The overall complication rate was 8.7% with 2.9% intraoperative (vessel or bowel injury) and 5.8% postoperative complications. No major intraoperative complication was encountered during the last 5 years of the study.

*Conclusion:* By transperitoneal laparoscopic lymphadenectomy, an adequate number of lymph nodes can be removed in an adequate time and independent from body mass index. The complication rate is low and can be minimized by standardization of the procedure.<sup>11</sup>

Between January 1991 and March 1994, 70 patients with cervical cancer were treated by radical abdominal hysterectomy, and between August 1994 and May 1999, 70 patients with cervical cancer were treated by laparoscopically assisted radical vaginal hysterectomy. Data from both the abdominal group and the laparoscopic-vaginal group were obtained retrospectively.

*Results:* The mean duration of surgery was significantly longer for the laparoscopic-vaginal approach than for the abdominal approach (292.9 vs 209.9 minutes). Significantly more pelvic lymph nodes were removed by laparoscopy (27 vs 10.7). Blood loss and transfusion rates were significantly lower in the laparoscopic-vaginal group. Intraoperative complications were seen more often during laparoscopic-vaginal surgery (p < 0.05). Early postoperative complications occurred significantly more

**Table 1:** Comparison between laparoscopic radical hysterectomy

	Year	Type of operation	Number of patients	Time taken for surgery (min)	Blood loss (ml)	Conversion to abdominal surgery	Hospital stay (days)	Vascular injuries	Bowel injuries
Ref1	1993	Laparoscopic	19	–	–	1	–	–	–
Ref2	2003	Laparoscopic	71	210	300	–	1	–	1
Ref2	2003	Abdominal	205	150	500	–	5	–	–
Ref3	2002	Laparoscopic	78	205	225	5	–	2	–
Ref4	1996	Laparoscopic	–	–	–	–	–	2	–
Ref5	1994	Laparoscopic	14	–	–	–	–	–	–
Ref6	1996	Laparoscopic	33	295	–	–	–	1	–
Ref7	1993	Laparoscopic	8	–	–	–	–	–	–
Ref 8	1998	Laparoscopic	150	–	–	–	–	–	–
Ref 9	1996	Vaginal	–	–	–	–	–	–	–
Ref 10	2003	Laparoscopic	57	186	168	2	–	2	1
Ref11	1994	Laparoscopic	650	–	–	–	–	–	–
Ref12	2001	Laparoscopic	70	293	–	–	11.4	–	–
Ref 12	2001	Abdominal	70	310	–	–	22.9	–	–
Ref13	2003	Laparoscopic	200	–	–	–	–	–	–
Ref14	2008	Laparoscopic	200	205-344	293	14(7%)	–	–	–
Ref 15	2006	Laparoscopic	317	–	–	4	12	7	1
Ref16	2008	Laparoscopic	295	162	230	5	–	7	3
Ref17	2004	Abdominal	–	–	–	–	10.3	1	1
Ref18	1967	Abdominal	204	–	–	–	–	–	–
Ref19	1990	Abdominal	44	–	–	–	–	–	–
Ref20	1997	Abdominal	302	–	–	–	–	11	–

frequently after the abdominal approach. The mean duration of hospital stay was significantly shorter for patients treated by laparoscopic-vaginal surgery (11.4 vs 22.8 days).<sup>12</sup>

Between August 1994 and June 2002, 200 patients with cervical cancer (TNM stage 1a1, L1 n = 6, 1a2 n = 21, 1b1 n = 89, 1b2 n = 26, 2a n = 11, 2b n = 45, 3a n = 1, 4 n = 1; squamous cell carcinoma 76.5%, adenocarcinoma 23.5%) were treated with LARVH (type II n = 102, type III n = 98) (Table 1).

**Results:** Para-aortic lymphadenectomy was performed in 170 (85%) patients and pelvic lymphadenectomy was performed in all 200 patients. In 26 (13%) patients positive lymph nodes were found. Major intraoperative injuries occurred in 6% of patients. Postoperative complications occurred in 8% of patients. Incidence of complications decreased significantly when comparing the first half with the second half of patients. After a median follow-up time of 40 months, overall 5-year survival could be projected to 83%; 18.5% of patients experienced recurrence with 35% exclusively extrapelvic and 11% of patients died of recurrence. Independent prognostic factors for recurrence-free survival were tumor stage, lymph node status, and combined involvement of lymphovascular and angiovascular space. In the absence of these risk factors projected 5-year survival was 98%.

**Conclusion:** Patients with tumor < 4 cm, negative lymph nodes, and the absence of the combination of angio- and

lymphovascular space involvement can be identified by laparoscopic staging and are ideal candidates for LARVH.<sup>13</sup>

## SUMMARY OF RESULTS

	Laparoscopic RH	Open RH
Number of patients	862	825
Time taken for operation	186-344 minutes	150-310 minutes
Blood loss	225-344 ml	400-500 ml
Conversion: Lap to open	1.5-25%	–
Hospital stay	5-12 days	10-23 days
Vascular injury	3-5%	0-1%
Bowel injury	1.5-2%	0-1%
Bladder injury	3.5-10%	1-1.34%
Ureteric injury	2%	2%
Postoperative Infective morbidity	5-7%	5-20%
Hypercarbia	0.5-1%	–
Bowel fistula	0.5-0.75%	–
Urinary fistulas	2-3%	1%
Disease free survival	83-94.9%	75.6-94%

## DISCUSSION

Looking at the comparative analysis shown in Table 2 the laparoscopic radical hysterectomy with lymphadenectomy has

**Table 2:** Complication rate laparoscopic versus open radical hysterectomy

	Bladder injuries	Ureteric injury	Hypercarbia	Postoperative fever/abscess/infection	Urinary fistula	Other post-operative complications	Two years disease free survival rate(%)
Ref1	–	–	–	1	–	1	100
Ref2	7	1	–	9	–	5	94
Ref2	–	–	–	5	–	2	94
Ref3	3	–	–	–	1	–	94.9
Ref4	3	–	–	–	–	–	–
Ref5	–	1	–	–	1	–	–
Ref6	3	1	–	–	–	–	–
Ref7	–	–	–	–	–	–	–
Ref8	–	–	–	–	–	–	–
Ref9	–	–	–	–	–	–	–
Ref10	2	1	–	–	–	4	97
Ref11	–	–	–	–	–	–	–
Ref12	–	–	–	–	–	–	–
Ref12	–	–	–	–	–	–	–
Ref 13	–	–	–	–	–	8	83
Ref 14	–	–	–	22	–	–	–
Ref 15	5	–	1	–	10	6	–
Ref 16	5	1	1	–	12	19	83.7
Ref 17	–	–	–	–	–	40%	75.5
Ref 18	–	–	–	–	–	–	83
Ref19	–	3	–	8	–	3	83
Ref 20	2	–	–	30%	3.5%	4%	–

comparable outcome except that it takes more operative time and chances of intraoperative major complications are higher. It requires extraordinary surgical skills. The laparoscopic modality gives better performance of lymphadenectomy and hence yields marginally better disease free survival.

## CONCLUSION

At present the laparoscopic approach for cervical cancer stage 1 is though not better but fairly comparable to conventional modality. The advent of robotic and with growing skill of surgeons this modality will bring about better results with fewer complications.

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