

REVIEW ARTICLE

Laparoscopic Hysterectomy: Revisited

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ABSTRACT

Laparoscopic hysterectomy is an alternative to abdominal hysterectomy. Different techniques are described and illustrated. Most laparotomies for hysterectomies can be avoided by using the laparoscopic approach including cases of adhesions, adnexal masses and endometriosis. According to the expertise of the surgeon the time to perform the laparoscopic surgery can be reduced. There are many advantages of laparoscopic hysterectomy for the patient including the length of hospital stay and convalescence. Most hysterectomies currently requiring an abdominal route may be performed with laparoscopic dissection in part followed by removal of uterus vaginally.

Keywords: Laparoscopy, Total laparoscopic hysterectomy, Laparoscopic assisted vaginal hysterectomy, Complications.

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INTRODUCTION

Hysterectomy is the most commonly performed gynecological surgical procedure. There are three approaches to hysterectomy: abdominal hysterectomy (AH), vaginal hysterectomy (VH) and laparoscopic hysterectomy. The reason for the hysterectomy, risk and benefit of the procedure, alternatives and expectation for the outcome should be discussed with the woman in detail.

Informed consent with thorough exploration of patient preferences and expectation is particularly important. The vast majority is without problems, but there is serious complication in about 1 in 1,000.

The indications for laparoscopic hysterectomy are similar to the generally accepted indications for hysterectomy. The specific indication for LH is when vaginal hysterectomy is

not feasible because of, for instance, a history of previous surgery, adhesions, endometriosis, adnexal masses, a narrow vaginal space in a nulliparous woman, narrow subpubic arch and difficult vaginal exposure.

Operations where laparoscopy is used as an aid to hysterectomy (Reich classification):^{1,2}

- Diagnostic laparoscopy with vaginal hysterectomy indicates that laparoscopy is used for diagnostic purposes to determine if vaginal hysterectomy is possible and also to assure vaginal cuff and pedicle hemostasis and allows clot evacuation.
- Laparoscopic assisted vaginal hysterectomy (LAVH) — a vaginal hysterectomy after laparoscopic adhesiolysis, endometriosis excision or oophorectomy.
- Laparoscopic hysterectomy (LH) — denotes laparoscopic ligation of the uterine arteries either by electro surgery, suture ligation or staples. All surgical steps after the uterine vessels desiccation can be performed either vaginally or laparoscopically. Laparoscopic ligation of the uterine vessels is the sine qua non for laparoscopic hysterectomy. Identification of ureters is always advised.
- Total laparoscopic hysterectomy (TLH) — here, the laparoscopic dissection continues until the uterus lies free of all attachment in the peritoneal cavity. The uterus is removed through the vagina with morcellation if necessary. The vagina is closed with sutures applied laparoscopically. No vaginal surgery is done unless morcellation is necessary.⁴ LAVH is really a vaginal hysterectomy (almost all LAVHs can be done as complete vaginal hysterectomies). TLH implies that a vaginal hysterectomy will be difficult or impossible to perform, i.e. TLH is a substitute for abdominal hysterectomy but not for vaginal hysterectomy.
- Laparoscopic supracervical hysterectomy (LSH) — a less risky procedure with decreased risk of ureter dissection. The uterus is removed by morcellation from above or below.
- Laparoscopic pelvic reconstruction (LPR) with vaginal hysterectomy.

Vaginal surgery completes the procedure in types I to IV. If the patient is multiparous, laxity of pelvic supports provides easy maneuverability to the vaginal surgeon even in the presence of significant uterine enlargement. In fact, many cases of laparoscopic hysterectomies would have been easily operated vaginally anyway.

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The main advantage of VH, LAVH or LH is to avoid a painful abdominal incision. There are many surgical advantages also like magnification of anatomy, easy access to the vagina and rectum. In LAVH, laparoscopic inspection at the end of the procedure permits the surgeon to control any bleeding and evacuate clots. Laparoscopic cuff suspension may limit future vault prolapse.³

For every 20 women undergoing laparoscopic hysterectomy, one will experience a complication additional to those likely to be experienced by women undergoing abdominal hysterectomy.³ Urinary tract damage, in particular ureteric injury, remains the major concern in relation to the laparoscopic approach. In a series of 13,885 hysterectomies, the incidence of urinary tract injuries was highest with the laparoscopic approach (2.2%) and lowest with the vaginal hysterectomy at 0.04%.⁴ The complications related to trocar entry and CO₂ pneumoperitoneum are exclusive to the laparoscopic route.

The patient should be warned about the possibility of converting the procedure to laparotomy.

LAPAROSCOPIC ASSISTED VAGINAL HYSTERECTOMY

Laparoscopic assisted vaginal hysterectomy is a useful adjunct to vaginal hysterectomy for lysis of extensive adhesions and sometimes for certain concomitant adnexal surgery. LAVH can also secure the uterine vessels and adnexal collateral arterial branches.

Bipolar coagulation of ovarian vessels decreases the blood loss in cases of enucleation or morcellation of myomas during the vaginal part of the operation. Kuzel⁵ et al subjected 100 women to LAVH. In their study estimated, blood loss was 300 ml (range 100-550 ml). Two patients had dense pelvic adhesions and had adhesiolysis that caused vaginal part of surgery as safe. Three cases of vaginal bleeding and one from ovarian vessels, three had pelvic inflammatory diseases. Two had injury of urinary bladder recognized and treated during surgery.

Evaluate⁶ study consisted of two parallel multicenter randomized control trials, one comparing laparoscopic with abdominal hysterectomy and the other comparing laparoscopic with vaginal hysterectomy. The study concluded that laparoscopic hysterectomy was associated with a significantly higher rate of major complications than abdominal hysterectomy. It took longer time to perform but it was associated with less pain, quicker recovery and better short-term quality of life. The trial comparing vaginal hysterectomy with laparoscopic hysterectomy was inconclusive on the rate of major complications however vaginal hysterectomy took less time.

Stang⁷ et al in their study concluded that 10% of laparoscopic hysterectomies and 1% of vaginal hysterectomies necessitated a conversion to an abdominal hysterectomy. For both types of hysterectomies, the conversion rates were highest for primary malignant genital tract cancer and other cancers compared to the other indication groups. For both types of hysterectomies, the conversion rates were highest for primary malignant genital tract cancer and other cancers compared to the other indication groups.

Roy KK⁸ et al concluded that nondescent vaginal hysterectomy (NDVH) took least operative time and significantly lesser blood loss ($p = 0.02$) compared to TLH and LAVH. There was no significant difference between adverse events, recuperation time and postoperative pain between the three techniques.

Bijen⁹ et al concluded that TLH is cost effective compared to TAH, based on major complication-free rate. Due to comparable safety, TLH should be recommended as a standard-of-care surgical procedure in early endometrial cancer.

TOTAL LAPAROSCOPIC HYSTERECTOMY

Hemostasis of the uterine vessels may be achieved with bipolar forceps using intermittent small applications¹⁰ or by retroperitoneal uterine artery sealing using LigaSure.¹¹ It may be the method of choice in situations where the pubic angle is narrow, the vagina is small, or the uterus is high or Retroperitoneal uterine artery sealing with LigaSure was performed in 50 women by Mert Gol et al. They concluded that LigaSure is effective, safe and a fast procedure with less intraoperative bleeding, short operation time and hospital stay.

TLH IN OBESE PATIENTS

Despite technical challenges, especially with patients with BMI greater than 30 kg/m², a laparoscopic approach is well suited to the obese patient, who is inherently less mobile and therefore, more susceptible to thromboembolic events and suboptimal wound healing following laparotomy. The study concluded that total laparoscopic hysterectomy can be performed safely for obese patients, with complications rates similar to those for nonobese patients.¹²

Total laparoscopic (TLRH) and robot-assisted radical hysterectomy (RRH) with pelvic lymphadenectomy in the treatment of early stage cervical cancer Estimated mean operative time, blood loss and number of lymph nodes retrieved did not statistically differ between the RRH and TLRH method. Less blood transfusions were needed treated by RRH (5.4%) vs TLRH (9.7%, $p < 0.05$). Both methods were similar in respect to adjuvant chemo or (chemo)

radiation and recurrence rate. When complications were prioritized to severity, major postoperative complications were more frequent in RRH patients (9.6%) than in TLRH patients (5.5%, $p < 0.05$). The length of hospital stay was significantly shorter in RRH compared to TLRH treatment (3.3 vs 6.2 days respectively; p -value 0.04).¹³

TLH FOR ENDOMETRIAL CANCER

The study conducted by Katherine¹⁴ et al concluded both LAVH and TLH can be performed successfully with similar surgical outcomes in endometrial cancer. Obese patients benefit more from TLH than LAVH in terms of shorter operating time.

Single-incision total laparoscopic hysterectomy using three ports in the single transumbilical incision is an alternative to conventional multiport laparoscopy. The advantages of single-access laparoscopic surgery may include less bleeding, infection, and hernia formation and better cosmetic outcome and less pain. The disadvantages and limitations include longer surgery time, difficulty in learning the technique, and the need for specialized instruments.

COMPLICATIONS

Provided the surgeons are experienced in laparoscopic surgery, the risk of ureteral complications after laparoscopic hysterectomy is comparable with the rate of 0.2 to 0.4% observed when total hysterectomy takes place by laparotomy (Harkki-Siren et al 1998; Mäkinen et al 2001; Carley et al 2002; Dorairajan et al 2004; Vakili et al 2005). Evaluation of the learning curve of laparoscopic hysterectomy demonstrates that the majority of major complications occur during the learning stage (Kreiker et al 2004).¹⁵ The only real problem is that of training for surgeons in this technique in order to be able to reduce the number of hysterectomies carried out by laparotomy.

The systematic review and meta-analysis and the non-randomized controlled study of 10,110 women found that incidence of urinary tract injuries was significantly higher among women who underwent laparoscopic procedures (type not specified) than those who had AH (meta-analysis: OR 2.61, 95% CI 1.22 to 5.60, 10 RCTs, $n = 1912$; non-randomized study: 1.1 vs 0.2% for ureteric injury and 1.3 vs 0.5% for bladder injury, $p < 0.0001$).¹⁷

There was no significant difference in the incidence of bowel injury between laparoscopic techniques and AH in either study (meta-analysis: two RCTs, $n = 1066$; non-randomized study: $n = 8309$).¹⁷

Comparing laparoscopic techniques with VH, the meta-analysis found no significant difference for urinary tract injury (six RCTs, $n = 805$), bowel injury (one RCTs, $n = 504$)

or vascular injury (four RCTs, $n = 685$). Comparing laparoscopic techniques with VH, the nonrandomized controlled study reported a higher incidence of injuries to the ureter in the laparoscopic group (1.1 vs 0%) and bladder (1.3 vs 0.2%) similar incidence of bowel injury (0.4 vs 0.5%).¹⁷

In the meta-analysis, there was no significant difference between laparoscopic techniques and AH for vascular injury.¹⁷

Laparoscopic Radical Hysterectomy for Early Stage Cervical Cancer

A nonrandomized comparative study of 102 patients with stage IA-IIb cervical cancer reported 3-year overall survival of 82% for patients treated by both abdominal and laparoscopic radical hysterectomy.

The nonrandomized comparative study of 127 patients reported that significantly fewer lymph nodes were removed in patients treated by laparoscopic radical hysterectomy than abdominal radical hysterectomy.

Rates of intraoperative bladder injury during laparoscopic radical hysterectomy and abdominal radical hysterectomy ranged from 1 to 10% and from 0 to 4% respectively across the studies.

The nonrandomized comparative study of 98 and 125 patients reported respectively, ureteric fistula in 2% (1/50; from ischemic necrosis requiring further open surgery at 14-day follow-up) and 1% (1/90; postoperative, managed conservatively) of patients treated by laparoscopic radical hysterectomy. Postoperative ureteric fistula was reported in 5% (5/101 of patients in the case series of 101 patients).

Postoperative vesicovaginal fistula was reported in 1 and 2% of patients treated by laparoscopic radical hysterectomy in the nonrandomized comparative studies of 125 and 98 patients.

The specialist advisers considered theoretical adverse events of LH to include inadequate lymph node sampling and excision of the primary tumor.¹⁶

ETHICAL ISSUES IN LAPAROSCOPIC HYSTERECTOMY

Laparoscopic hysterectomy has a longer learning curve during which the risk of complications is relatively higher than open abdominal hysterectomy.

At present, postgraduate training in India is limited to conventional surgeries and diagnostic laparoscopies. Gynecologists usually learn the technique by undergoing very short training programs which involve substantially high fees; this may not include hands on surgical training but training on mannequins. The cost of a laparoscopic surgical setup is very high.

CONCLUSION

The number of abdominal hysterectomies has decreased in the last 10 years because of the introduction of minimal access surgery. Since the advent of laparoscopic surgery the majority of gynecologists have reviewed their practice on the best way to remove the uterus. A new recently evolving approach is the robotic-assisted hysterectomy with the da Vinci surgical system. Approved by the Federal and Drug Administration in 2005 for gynecological surgery, this new technique has advantages and disadvantages, and experience is still at an early stage.¹⁸⁻²⁰

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