

LAPAROSCOPIC ASSISTED VAGINAL HYSTERECTOMY VERSUS VAGINAL HYSTERECTOMY FOR NON PROLAPSED UTERUS

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ABSTRACT

Hysterectomy is one of the commonest gynecological operations. The outcomes following vaginal hysterectomy have been proved to be better than those following abdominal hysterectomy. Since the availability and widespread use of laparoscopic hysterectomy, the mode of hysterectomy is an issue of debate in cases of non prolapsed uteri, amongst proponents of vaginal and laparoscopic surgery. Laparoscopic surgeons propose that with the aid of laparoscope, a potential abdominal hysterectomy can be converted to a vaginal one and a difficult vaginal hysterectomy can be converted into a fairly simple vaginal hysterectomy. Laparoscopy can facilitate surgery vaginally in cases of suspected adnexal disease, endometriosis, narrow vagina and in cases where uterine size is greater than 12 weeks gestation. Many gynecologists however routinely perform salpingo oophorectomy and vaginal hysterectomy for nulliparous uteri. Vaginal hysterectomy is the route of choice for benign uterine disease. Size of uterus, previous pelvic surgery, mild endometriosis, uterine fibroids, and history of pelvic infections should not be considered as absolute contraindications for vaginal surgery. There are few trials comparing the outcomes of laparoscopic assisted vaginal hysterectomy versus vaginal hysterectomy. This article compares these outcomes and presents difference in outcomes in terms of operating time, estimated blood loss, analgesia and post-operative pain relief, recovery milestones, hospital stay and cost effectiveness, complication rates and patient satisfaction. Laparoscopic approach has definite advantages in cases of severe endometriosis, selected patients with a suspicion of coexisting pathology and post operatively to rule out hemorrhage.

KEY WORDS

Non Prolapsed Uterus, Vaginal Hysterectomy, Laparoscopic Assisted Vaginal Hysterectomy

INTRODUCTION

Hysterectomy is one of the most frequently performed major operations. Roughly 600,000 hysterectomies are performed in the United States each year [1]. 20% of women in the UK go through hysterectomy before the age of sixty [2].

The mode of hysterectomy in prolapsed uteri is quite clearly vaginal. With improvements in medical management of menstrual disorders; hysterectomy is generally a last resort. Traditionally the uterus has been removed by either the abdominal or vaginal route. The method of hysterectomy has been a subject of debate since the introduction of laparoscopy in the 1990s. Laparotomy was indicated for bulky uterus (i.e. greater than 12 weeks pregnancy), laparoscopy was preferred in case of associated adnexal pathology. Vaginal route is preferred, unless there are contraindications, because of lower morbidity and quicker recovery [3]. In spite of this, many gynecologists prefer abdominal route, particularly when dealing with pelvic pathology or carrying out oophorectomy [4].

The first laparoscopic hysterectomy [LH] was performed in January 1988 by Harry Reich in Pennsylvania [5]. Since then it has gained widespread acceptance. The aim of LAVH is to convert a potential abdominal hysterectomy to a vaginal one. There is therefore an increasing trend to perform laparoscopically assisted surgeries whilst reducing abdominal hysterectomies. During the past decade, efforts were made to show the advantages of laparoscopic over abdominal hysterectomies. The debate now “Is vaginal Hysterectomy for non descent bulky uterus feasible or is the aid of Laparoscopic assisted vaginal hysterectomy likely to improve outcomes”. Laparoscopically assisted vaginal hysterectomy has generated more controversy and discussion than any other type of gynecologic surgery in recent times. It is because benefits of LAVH remain uncertain when compared with VH. Moreover the advanced technique and expensive instruments required may lead a critic to believe that this mode of surgery is promoted by closely knit circles for financial gains. In some studies the outcome evaluated was success in removing the uterus, rather than success in providing a true benefit to the patient [6].

AIMS

The aim of this study was to compare the effectiveness and safety of laparoscopic and vaginal hysterectomies for non descent uteri. The following parameters were evaluated for both laparoscopic and open procedures.

PARAMETERS ASSESSED

- 1) OPERATIVE TIME
- 2) ESTIMATED BLOOD LOSS AND HEMATOCRIT DIFFERENCES
- 3) ANALGESIA AND POSTOPERATIVE PAIN RELIEF
- 4) INFLAMMATORY RESPONSE
- 5) HOSPITAL STAY
- 6) RECOVERY MILESTONES
- 7) HOSPITAL COSTS AND COST EFFECTIVENESS
- 8) COMPLICATION RATES
- 9) PATIENT SATISFACTION AND QUALITY OF LIFE

MATERIALS AND METHODS

A literature search was performed using Medline and the search engine Google and Online Springer facility available at Laparoscopy Hospital, New Delhi, The following search terms were used: “Laparoscopic hysterectomy”, “Transvaginal hysterectomy”, and “Laparoscopic assisted Vaginal Hysterectomy”. 450 citations were found and selected papers were screened for further references. Criteria for selection of literature were the number of cases (excluded if less than 20), methods of analysis statistical or non statistical, operative procedure only universally accepted procedures were selected and the Institution where the study was done [Specialized institution for laparoscopic surgery].

LAPAROSCOPIC ASSISTED VAGINAL HYSTERECTOMY

The most common medical reasons for performing hysterectomies include uterine fibroids (30 percent of cases), abnormal uterine bleeding (20 percent), endometriosis (20 percent), genital Prolapse (15 percent) and chronic pelvic pain (about 10 percent) [7].

Indications of LAVH are traditionally contraindications of vaginal Previous hysterectomy. These include Previous pelvic surgery, Endometriosis, , Acute or , Suspected adnexal pathology, Uterine myoma C.S., Pelvic pain chronic pelvic inflammatory disease, Minimum uterine mobility and limited vaginal access due to nulliparity or narrow sub pubic arch Incidence of laparoscopic hysterectomy varies world wide with highest rates reported in the USA. Surgeon preference and training in laparoscopy has been a factor in choosing LAVH.

CLASSIFICATION

Garry and Reich classification:

Type 1 - Diagnostic lap + Vaginal Hysterectomy

Type 2 - Lap vault suspension after Vaginal Hysterectomy

Type 3 – Laparoscopic Assisted Vaginal Hysterectomy

Type 4 - LH [lap ligation of uterine art.]

Type 5 – Total Laparoscopic Hysterectomy

Type 6 - LSH [lap supra-cervical hysterectomy]

Type 7 - LHL [lap hysterectomy with lymphadenectomy]

Type 8 - LHL + O [as above + omentectomy]

Type 9 - RLH [radical lap hysterectomy]

In laparoscopic assisted vaginal hysterectomy [LAVH], the procedure is done partly laparoscopically and partly vaginally, but the laparoscopic component does not involve uterine vessel ligation. In uterine vessel ligation laparoscopic hysterectomy (Type IV), although the uterine vessels are ligated laparoscopically, part of the operation is done vaginally. In total

laparoscopic hysterectomy, the entire operation including suturing of the vaginal vault] is done laparoscopically. This method of laparoscopic hysterectomy requires the highest degree of surgical skill and is currently done only by a very small proportion of gynecologists. It has been unclear whether total laparoscopic hysterectomy offers benefits over other forms of hysterectomy. The main step in hysterectomy is securing the uterine vessels. There is no point comparing LAVH type I-II, in which all main steps are done vaginally, with vaginal hysterectomy. Reich declared in his LAVH review that the sine qua non for laparoscopic hysterectomy is laparoscopic ligation of the uterine vessels [6, 8].

VAGINAL HYSTERECTOMY IN NON DESCENT UTERI

VH is a feasible option in non prolapsed uterus [9,10]. There is wealth of data on superiority of vaginal mode of hysterectomy. Therefore; there is a changing trend in choosing the route of hysterectomy and preferring vaginal mode over abdominal.

To validate a method of assigning patients to a particular mode of Hysterectomy, 617 patients were assigned a mode of hysterectomy on the basis of uterine size (greater than or less than 280 gms), presumptive risk factors such as endometriosis, adenexal disease, chronic pelvic pain, chronic inflammatory disease and adenexal immobility or inaccessibility. The latter was defined as bituberos diameter < 9 cms and pubic arch less than 90 degrees as well as a vagina narrower than 2 fingerbreadths. Vaginal hysterectomy alone [n = 548] or in conjunction with laparoscopy [n = 63] was successful in 99.5% of women assigned to these groups. Patients in whom the vaginal route was successful included 94% of those with uterine weights exceeding 280 g and 97% of those having risk factors often cited as reasons for selecting abdominal hysterectomy [11].

In a prospective one year study of women requiring hysterectomy for benign gynecological disorders of the uterus without descent. 50 of the 102 vaginal hysterectomies were performed on a non-descent uterus that met prerequisites, ie, uterine size not exceeding 16 weeks of gravid uterus, adequate vaginal access and uterine mobility. Benign ovarian cysts less than 8 cm in size were included. Patients with severely restricted mobility, complex adenexal mass and suspicion of malignancy were excluded. This study recorded a 10 fold increase in VH compared to previous year. . Morcellation techniques like bisection, myomectomy, wedge debulking or combinations of these were employed in bigger size. 68% of the cases were for fibroid uterus

and surgery was successful in all but one. Operating time was less than one hour [54.5 minutes], blood loss 290 ml [200-700 ml] and hospital stay 3 days. Complications were minimal thereby concluding that vaginal hysterectomy for non-descent large uterus is safe and practical provided one is familiar with the morcellation techniques [12].

In another similar study in U K over a 5 year period, an investigation was done for a deliberate decision to carry out as many as possible by vaginal route for benign conditions in the absence of prolapse. Patients with prolapse, adnexal disease, leiomyoma larger than 16 weeks, and malignancy were excluded, leaving 272 hysterectomies of 553 originally. Change in the route of hysterectomy, the main endpoint, was observed at yearly intervals. At the start of the study, the route of surgery was 68% abdominal and 32% vaginal. By the end of the fifth year the pattern was 5% abdominal 95% vaginal. The conversion from vaginal to abdominal hysterectomy occurred in only two cases during the study period. There was no change in the case mix during this period. In the fifth year of study most associated oophorectomies were also performed vaginally. There was no increase in patient morbidity. This study demonstrates that a surgeon's attitude is an important determinant of the route of hysterectomy [13].

GUIDELINES TO DETERMINE THE ROUTE OF HYSTERECTOMY

There is an ongoing debate to decide guidelines for the route of hysterectomy. ACOG established some guidelines for the route of Hysterectomy by stating that the choice depends on the patient's anatomy, surgeon's experience, and that vaginal hysterectomy is usually performed in women with mobile uteri no larger than one at 12 weeks gestation, i.e 280 gms, especially if there is some uterine descent [14,15]. Kovac has described a scoring system which involves grading of uterus, length of infundibulopelvic ligament, presence of adnexal adhesions, status of cul-de-sac, and degree of endometriosis. Patients with scores of 10 or less were considered as candidates for Vaginal Hysterectomy; those with 11-19 were candidates for laparoscopic surgery to reduce their scores to less than 10, so as to undergo vaginal hysterectomy [13].

Fig. 1: Guidelines for determining route of hysterectomy [11].

* Morcellation, bivalving, or coring of uterus to allow removal vaginally.

** Presumptive factors suggestive of serious pelvic disease [endometriosis, adnexal disease, chronic pelvic pain, chronic PID.

Uterine and adnexal mobility or accessibility [tuberos diameter < 9cm, pubic arch <90°

Scoring system for pelvic disease (grading of uterus, length of infundibulopelvic ligament, presence of adnexal adhesions, status of cul-de-sac, and degree of endometriosis).

COMPARATIVE STUDIES

There were 6 studies comparing various outcomes between laparoscopic and Vaginal Hysterectomies in non descent uteri. One study compares LH versus AH and LH versus VH. Four studies comparing LH versus VH versus AH are included.

A randomized study was done by Darai et al [16], to compare short-term results of vaginal hysterectomy [VH] with those of laparoscopically assisted vaginal hysterectomy [LAVH] in women with enlarged uteri. Eighty women referred for abdominal hysterectomies for benign disease were assigned randomly to vaginal hysterectomy or LAVH [40 in each group]. Inclusion criteria were uterine size larger than 280 gm and one or more of the traditional contraindications of vaginal hysterectomy like previous pelvic surgery, history of pelvic inflammatory disease, moderate or severe endometriosis, concomitant adnexal masses, indication for adnexectomy, and nulliparity without uterine descent. Exclusion criteria included anesthetic contraindications for laparoscopic surgery and suspicious adnexal mass based on ultrasound examination, ovarian blood flow and tumor markers. Also women with vaginas narrower than 2 fingers wide and immobile uteri with no descent and lateral mobilization were excluded. No size limit for uterus was set. There were no differences in patient's mean age, parity, rate of postmenopausal state, previous pelvic surgery, preoperative hemoglobin levels, and mean uterine weight. Indications for surgery were similar between groups. No women were treated with GnRH in each group. The laparoscopic procedure was LAVH Type IV. All cases were done by experienced surgeons. At the end, uteri were weighed .Operating time; complications, febrile morbidity, analgesia requirements, and postoperative hospital stay were recorded in all cases. Women were reviewed 6–8 weeks after surgery.

Richardson et al [17] did a prospective study to determine if vaginal hysterectomy is a feasible option in most women and to determine the relative merits of laparoscopic and vaginal hysterectomy [VH] and the best technique for LH. They prospectively studied 98 women who had relative contraindications for vaginal surgery by traditional criteria like nulliparity, absence of prolapse, previous pelvic surgery, endometriosis, need for oophorectomy. Women with uterine size greater than 16 weeks were excluded. 75 underwent LH and 23 VH. The LH group included 22 women who had been assigned to this route of surgery as part of a prospective randomized controlled comparison with VH (23 women). One woman had stage 0 LH, Two had Stage 1 LH. Eight women had Stage 4 procedures and Stage 5 LH was done in 3 cases. Laparoscopy was repeated in LH group to check hemostasis. The Complication rates, blood loss, analgesia requirements, Hospital stay, febrile morbidity and recovery were assessed. Patients were reviewed 6-8 weeks after surgery.

In a prospective, randomized, multicenter study done by Soprano D et al short term recovery from vaginal hysterectomy compared with laparoscopy-assisted vaginal hysterectomy [18]. Eighty patients referred for hysterectomy for benign pathology were randomized to either vaginal hysterectomy [40 patients] or laparoscopic assisted vaginal hysterectomy [40 patients]. Inclusion criteria were uterine size larger than 280 gm and one or more of the following: previous pelvic surgery, history of pelvic inflammatory disease, moderate or severe endometriosis, concomitant adnexal masses, and indication for adnexectomy. No upper limit of uterine size was set. There was no statistically significant difference in terms of patient's age, parity, postmenopausal state, indication for surgery and mean uterine weight between the 2 groups. Analgesia requirements, Hb drop, hospital stay were compared.

Randomized comparison of laparoscopy-assisted vaginal hysterectomy with standard vaginal hysterectomy was done in an outpatient setting by Summitt RL Jr et al [19]. Fifty-six women scheduled for vaginal hysterectomy were randomly assigned to undergo either a laparoscopy-assisted vaginal hysterectomy with endoscopic staples [N = 29] or a standard vaginal hysterectomy [N = 27]. The criteria used for this selection included uterine size no larger than 16 weeks, presence of uterine mobility and pubic arch of at least 90 degrees. Need for oophorectomy, history of previous pelvic surgery, preoperative pelvic pain did not influence the decision. Women who needed a concomitant anterior or posterior repair were excluded. Absolute contraindications to laparoscopy were excluded. Vaginal hysterectomy was performed by a

gynecology resident with a faculty member as a first assistant. Laparoscopic hysterectomy was performed by a operating team of 3 surgeons, 2 faculty members and one senior resident. Stage V Hysterectomy was performed in all cases. Same day discharge was possible with instructions if patient was eligible. Analgesia requirements and morbidity was analyzed.

452 patients undergoing hysterectomy [LAVH, stage IV or transvaginal] for noninvasive diseases of the uterus (eg, leiomyomas, adenomyosis, abnormal uterine bleeding, and cervical carcinoma in situ) were retrospectively studied by Wen-Chun Chang et al to define a rational guideline for the use of either laparoscopically assisted vaginal hysterectomy [LAVH] or transvaginal hysterectomy in dealing with a nonprolapsed uterus [20]. The patients underwent either LAVH or transvaginal hysterectomy without specific clinical bias preoperatively. Two hundred eighty-four patients underwent transvaginal hysterectomy and 168 patients underwent LAVH. The operative time, estimated blood loss, uterine weight, complications, and hospital stay were also recorded before discharge. The hysterectomies were performed by a team mainly composed of the senior authors the operative time, Blood loss, uterine weight .and complications were recorded.

Soriano et al did a prospective randomized multicenter study to evaluate short term recovery of vaginal hysterectomy with those of LAVH, in which they included 80 patients. Inclusion criteria were uterine size larger than 280 g and one or more of the following: previous pelvic surgery, history of pelvic inflammatory disease, moderate or severe endometriosis, concomitant adnexal masses, and indication for adnexectomy. No upper limit of uterine size was set. [21]

The eVALuate study [22] consists of two parallel multicenter randomized concurrent

trials, one comparing laparoscopic with abdominal hysterectomy other comparing laparoscopic with vaginal hysterectomy The aim of the study was To test the null hypothesis of no significant difference between laparoscopic hysterectomy [LH], abdominal hysterectomy [AH] and vaginal hysterectomy [VH] with regard to each of the outcome measures of the trial, and also to assess the cost-effectiveness of the alternatives 1380 women were recruited; 1346 had surgery; 937 were followed up at one year. In the vaginal arm of the trial, 168 women had a vaginal hysterectomy and 336 had laparoscopic surgery which was one of the four approaches to laparoscopic hysterectomy: laparoscopic hysterectomy, laparoscopic assisted vaginal hysterectomy, laparoscopic supracervical hysterectomy, and total laparoscopic hysterectomy.

Patients who needed a hysterectomy for non-malignant conditions were eligible. Patients who had a second or third degree uterine prolapse, a uterine mass greater than the size of a 12 week pregnancy, a medical illness precluding laparoscopic surgery, or a requirement for bladder or other pelvic support surgery were excluded. Gynecologists were responsible for recruitment and on clinical grounds entered patients for randomization into either the abdominal or the vaginal trial. Follow up of patients took place in a clinic at six weeks and then by postal questionnaire, at four months and one year after their operation. The primary outcome was the rate of major complications. Secondary outcomes included Minor complications, additional pathology found during the operation, pain, length of surgery, length of stay and quality of life. A cost--utility analysis was undertaken based on a 1-year time horizon. Quality-adjusted life years [QALYs] were estimated using the EQ-5D.

Hwang JL et al did a prospective randomized Comparative study of vaginal, laparoscopically assisted vaginal and abdominal hysterectomies for uterine myoma larger than 6 cm in diameter (predetermined by ultrasound) or uterus weighing at least 450 g [23]. The study included 90 patients. Patients were randomized into laparoscopic-assisted vaginal hysterectomy [30 patients], vaginal hysterectomy [30 patients] and abdominal hysterectomy [30 patients] groups. The purpose of this study was to compare peri-operative morbidity, preoperative sonographic estimation of uterine weight and postoperative outcomes of women with uterine fibroids larger than 6 cm in diameter or uteri estimated to weigh at least 450 g, undergoing either vaginal, laparoscopically assisted vaginal or abdominal hysterectomies.

Ottosen C et al [24] did a randomized, prospective study wherein three methods for hysterectomy were compared to analyze the short term outcomes. There were 40 cases in each group. The inclusion criteria were menorrhagia, leiomyomas <15 cm in diameter, dysplasia, endometrial, atypia and pain. Women with ovarian pathology, uterus, larger than 16 weeks of gestational size, previously known dense adhesions, narrow vagina or obvious inaccessible uterus were all excluded. During laparoscopic assisted vaginal hysterectomy laparoscopic part was minimized. Hemostasis was checked laparoscopically at the end of the procedure. Duration of surgery, blood loss, time in hospital and recovery time were analyzed.

Ribeiro SC et al [25] performed a randomized study of total; abdominal [n=20], vaginal hysterectomy [n=20], and laparoscopic hysterectomy [n=20]. they evaluated operative time,

blood loss and inflammatory response in patients submitted to hysterectomy. The criteria for exclusion were uterine volume higher than 400 cm³. Forty one cases were for fibroids and 19 for adenomyosis. Laparoscopic hysterectomy performed was stage IV.

Chang WC et al [26] analyzed 452 patients receiving LAVH [stage IV] or transvaginal hysterectomies were retrospectively studied. The inclusion criteria were leiomyomas, adenomyosis, abnormal uterine bleeding, and cervical carcinoma in situ. Patients who had uterine prolapse, extensive pelvic adhesion, or other concomitant surgery [eg, antiincontinence surgery, sacrospinous ligament suspension, colpoperineorrhaphy, or intestinal procedures] were also excluded. The operative time, estimated blood loss, uterine weight, and complications were all recorded for analysis. The patients underwent either LAVH or transvaginal hysterectomy without specific clinical bias preoperatively. The hysterectomies were performed by a team mainly composed of the senior authors.

Aniulienė R et al [27] did a retrospective study of 602 hysterectomies were performed: 51 [8.5%] laparoscopic, 203 [33.7%] vaginal, and 348 [57.8%] abdominal. The objective of this study was to evaluate and compare operative [complications, blood loss, hospital stay] and postoperative results and differences among laparoscopic, vaginal, and abdominal hysterectomies performed.

PARAMETERS ASSESSED

OPERATIVE TIME

In all the studies operating was more in laparoscopic hysterectomy than vaginal hysterectomy. The mean operating time was significantly longer [approximately twice] for laparoscopy-assisted vaginal hysterectomy [120.1 versus 64.7 minutes [19]. In studies comparing all three types of hysterectomies, the operating time was least in VH and longest in LAVH. The operating time ranged from 76-180 mins in LAVH, 35-150 minute for VH, 68-109 minute for TAH [17, 23, 24, 28].

The operative time in the transvaginal hysterectomy group became longer with increasing uterine weight. Generally, transvaginal hysterectomy required shorter operative time than LAVH, but significantly longer duration was needed when the uterine weight exceeded 350 g. The average

operative time [139 minutes] in the transvaginal hysterectomy group with larger uteri was significantly longer than that [118 minutes] in LAVH group, regardless of uterine weight, and longer than that [80minutes] in the transvaginal hysterectomy group with small uteri [26].

ESTIMATED BLOOD LOSS AND HEMATOCRIT DIFFERENCES

In most studies the blood loss at VH was lower than that observed during LH .In some of the studies there was no difference in blood loss [16, 17]. In 3 studies blood loss was greater in the VH group than the LAVH group.

In a study done by Summitt et al, blood loss was greater in the Vaginal Hysterectomy group 100-1000ml versus 25-500ml. In a recent study done by Aniulienė et al, higher blood loss was observed in the vaginal hysterectomy group compared to Laparoscopic hysterectomy Patients in the transvaginal hysterectomy group with larger uteri had much greater average estimated blood loss than that of the other groups [242mL compared with 66 mL, 70 mL, and 74 mL, $P < .05$], and 1 of them required a transfusion for excessive hemorrhage (600 ml) [26].

ANALGESIA AND POSTOPERATIVE PAIN RELIEF

In all studies no difference was noted in the use of analgesia between the two groups. In a Study done by Summitt et al, no significant differences were noted in patients in each group with respect to requirements of narcotics in first 6 hour of surgery. However, statistically significant differences were noted in requirements of analgesics on postoperative day 2 [19].

INFLAMMATORY RESPONSE

Inflammatory response generated by VH was less than LAVH. In VH, mean CRP values were lower than those in LH [$P < 0.0001$]. IL-6 values were lower in VH in relation to LH [$P < 0.0457$]. [25]

HOSPITAL STAY

VH has shorter hospital stays and convalescence period. In most studies no difference was noted in the hospital stay between LAVH and VH. Hospital stay was significantly longer for the TAH group [3.7 days] than for the TVH [1.9 days] and LH [1.5 days] groups. For all patients, length

of hospital stay was shorter for laparoscopic-assisted vaginal hysterectomy than for total abdominal hysterectomy and total vaginal hysterectomy [31].

In the evaluate study there was no difference in the hospital stay in the vaginal trial. In a study done by Kovac et al because of the nature of the additional procedures needed to accomplish the procedure vaginally the hospital stay was longer in the VH group compare to LAVH. However, the convalescent period was significantly longer in the LAVH group compared to VH group.

RECOVERY MILESTONES

In combined retrospective cohort study (Canadian Task Force classification II-2) that was conducted in a suburban private practice, 268 patients who underwent hysterectomies over a 27-month period were analyzed to include clinical outcomes, direct hospital costs, and indirect costs (time to return to normal function, time to return to work, and time away from work required by other family members). Time of return to normal work were shorter for laparoscopic-assisted vaginal hysterectomy than for total abdominal hysterectomy and total vaginal hysterectomy. For working patients, time to return to work and time off for working family members was all significantly shorter after laparoscopic-assisted vaginal hysterectomy when compared with both total abdominal hysterectomy and total vaginal hysterectomy [29]. VH has fewer perioperative complications and allows earlier recovery and return to work. [31,32]. No statistically significant difference was recorded with respect to return to normal activities between the VH and the LAVH group [33].

HOSPITAL COSTS AND COST EFFECTIVENESS

LAVH in all studies has been found to be associated with higher cost compared to VH [6]. The cost has been to be 72% higher than that for VH. The factors responsible for increase cost were the use of disposable staples and instruments in addition increased operating and anesthesia time. The frequent need of a second experienced surgeon to perform LAVH is another cost factor that may need to be considered. Laparoscopic assistance offers the patient no additional economic advantage and uses more hospital resources than vaginal hysterectomy [34-35]. In one study the hospital charges associated with the laparoscopic technique were lower than those for an abdominal approach. The charges were \$5,869 for vaginal hysterectomy, \$6,552 for abdominal hysterectomy, and \$6,431 for laparoscopically assisted vaginal hysterectomy. These authors

achieved this reduction by eliminating all use of disposable laparoscopic trocars and equipment from their procedures and using a specialized operative team [36]. A total of 23,191 records were used to compare the 3 techniques on hospital costs and length of stay, controlling for patient differences in complicating diagnoses and related procedures [37]. LAVH is still more expensive than vaginal and total abdominal hysterectomy but offers a speedier recovery, with no measurable difference in the rate of complications. Hospital costs were significantly lower for the TVH groups as compared to TAH and LH groups. No significant cost difference was seen between TAH and LH [29]. In a combined retrospective cohort study, direct hospital costs were greatest for laparoscopic-assisted vaginal hysterectomy and least for total vaginal hysterectomy [30].

COMPLICATION RATES

Complication rates did not differ significantly between the groups [29]. In a meta analysis of RCT's, no significant differences in urinary tract injury for laparoscopic versus vaginal hysterectomy 0.36 to 2.75 or for LH versus LAVH 0.29 to 7.83. No other intraoperative visceral injuries (including bladder and ureter considered independently, and bowel and vascular injury) showed a significant difference between surgical approaches [33]. No significant differences in fistula formation, urinary dysfunction, sexual dysfunction, or patient satisfaction when we compared surgical approaches, although for most of these outcomes the analyses were underpowered to detect important differences. Data were notably not reported in trials for many important long term outcome measures, including chronic pelvic or abdominal pain, bowel dysfunction, and vaginal prolapse [33]. In the evaluate study, there was no difference in the complication rates in 2 procedures in the vaginal part of the trial (9.8% LH vs. 9.5% VH). Complication rate was statistically lower in the VH group [$p < .05$] compared to LAVH group in a study done by Darai et al and Monte David-Montefiore et al.

PATIENT SATISFACTION AND QUALITY OF LIFE

No differences was recorded in the quality of life in any components of SF12 in the vaginal part of the eVALuate study [22].

Satisfaction rates did not differ significantly between the groups though a greater percentage of patients in the LH group reported high satisfaction as compared to the other groups [29].

ROLE IN PREVIOUS PELVIC SURGERY/PELVIC ADHESIONS

Adhesions are found in many patients with a negative history and normal pelvic examination. So adhesions cannot be predicted, previous pelvic surgery is not a contraindication for VH [38]. Richardson et al In the study done by Kovac et al, vaginal route proved successful in 97% of women with history of pelvic surgery.

There have been no prospective randomized controlled trials to assess the safety of any form of hysterectomy where there is a history of previous abdominal or pelvic surgery. Previous pelvic surgery, however, is the reason why an abdominal procedure is selected over a vaginal hysterectomy in 28% of patients [39]. This could therefore imply potential indication of laparoscopic hysterectomy over vaginal hysterectomy. One of the most common abdominal procedures that is considered by some to be a contraindication to

vaginal hysterectomy is caesarean section. The main concern with a history of previous caesarean section is bladder injury. The proponents of vaginal surgery argue that vaginal hysterectomy allows the operator to start the dissection of the bladder in an area that is not scarred, and it is more likely that the correct tissue plane will be reached which could be difficult while operating abdominally. The laparoscopic route does give the option of performing a subtotal hysterectomy if scarring is severe. Pelvic adhesions and endometriosis if found at laparoscopy then adhesiolysis can make the vaginal route feasible. More studies are needed to evaluate if a diagnostic laparoscopy in suspected cases can help reduce the complications of a vaginal hysterectomy [9].

HYSTERECTOMY IN NULLIPARITY AND RESTRICTED VAGINAL ACCESS

Nulliparity has been reported to impede vaginal surgery. This is due to absent laxity of pelvic ligaments and possibly a narrower vagina. In a retrospective study of 886 consecutive patients who had undergone vaginal hysterectomy for benign gynecological diseases Vaginal hysterectomy was successfully performed in 96.1% of the nulliparous [40]. Nulliparous uterus should therefore be evaluated under anesthesia, and may be easy to remove vaginally as is of normal size more often.

In practice, it is probable that vaginal access is more important. Limited access because of a narrow pubic arch, as found in an android shaped pelvis, is more likely to cause difficulty. Good retractors and use of Clamp less technique described by Halban could help maneuverability in a limited space. The inability to perform vaginal hysterectomy because of uterine and adnexal immobility or inaccessibility occurred in only 1% of the series by Kovac [11].

OOPHORECTOMY AT HYSTERECTOMY

If oophorectomy is indicated because of a patient's request, family history of ovarian cancer, endometriosis or premenstrual syndrome, most gynecologists elect for abdominal hysterectomy, fearing technical difficulties with the vaginal route[30]. However, evidence suggests that bilateral salpingo oophorectomy at the time of vaginal hysterectomy is generally safely achievable [10,41]. Where there is difficulty, an Endoloop® (Ethicon) or other endoscopic instruments can be used. Occasionally, the laparoscope itself can be inserted vaginally to visualize the pedicle. It was possible to remove one or both ovaries transvaginally without laparoscopic assistance in 97% of women and in 100% cases [11] [17].

In a prospective randomized study undertaken to compare morbidity for women undergoing laparoscopy-assisted vaginal hysterectomy with bilateral oophorectomy [LAVHO] and vaginal hysterectomy with bilateral oophorectomy without laparoscopic assistance [VHO] 48 patients were included. The rate of complications was significantly higher in the LAVHO group 54.1% versus 25%, $P = .039$. It thus appears that laparoscopic assistance is not useful in performing vaginal hysterectomies with prophylactic bilateral oophorectomies in patients without other related disorders like endometriosis, adhesions and adnexal anomalies [42]. Similar results have been shown in another study by Olah et al [43]. In another study by CR Nwosu et al, VH+BSO had shorter operating time compared to LAVH+BSO [44].

FIBROID UTERUS AND UTERI WITH INCREASED VOLUME

An enlarged uterus due to fibroids and menstrual disturbances secondary to this are common indications for hysterectomy. Assessment of uterine size before hysterectomy is difficult and may be aided by ultrasound which can detect the size, site and location of fibroids. This helps in planning surgery, examination under anesthesia to check uterine size can be helpful [45]

Techniques such as bisection, morcellation and coring have been shown to be safe, with no added morbidity in terms of blood loss and visceral injury. Furthermore, uterine volume can be reduced by preoperative administration of gonadotrophin releasing hormone analogues. Studies have shown that, in women with fibroid uteri of 12–18 weeks of gestation size, this increases the proportion of hysterectomies performed vaginally. However, there is evidence to suggest that LAVH may be considered for large uterus in view of short operating time and less blood loss [20].

DISCUSSION

Vaginal hysterectomy is part of repertoire of every trained gynecologist. It is considered as a feasible option to abdominal hysterectomy and many studies have shown that Vaginal hysterectomy has fewer complications, short recovery, hospital stay than laparotomy. This is the era of minimally invasive surgery and there is an increasing trend to perform most operations through this route. Laparoscopic hysterectomy requires greater surgical expertise and has a steep learning curve. Randomized trials have shown advantages of laparoscopy versus laparotomy, including reduced post operative pain, shorter hospitalization, rapid recovery and substantial financial benefits to society. The objective of performing hysterectomy laparoscopically can be achieved but the question is does this offer any advantage over vaginal route. Every mode of hysterectomy has advantages and disadvantages but the indications for each remain controversial. Good surgical practice is when the indication for hysterectomy is considered as the primary criterion for selecting the route of hysterectomy and not factors such as surgeon's choice and experience. A major determinant of the route of hysterectomy is not the clinical situation but the attitude of the surgeon. There is no need for extra training and special skills or complicated equipment for vaginal hysterectomy.

This article compares vaginal hysterectomy and Laparoscopic assisted vaginal hysterectomy outcomes as per existing studies. Laparoscopic hysterectomy took a long time to perform in all studies. However with increasing weight of the uterus, there was a linear increase in operating time and blood loss in hysterectomy performed vaginally which was not observed in laparoscopic assisted vaginal hysterectomy. There was no statistically significant difference in post-operative analgesia requirement, hospital stay, recovery milestones or complication rates. The biggest drawback of laparoscopic route over Vaginal one is its cost due to expensive

disposable instruments, prolonged operating and anesthesia time and the need for a trained senior gynecologist. For laparoscopic assisted vaginal hysterectomy to be cost effective expensive disposable instruments have to be eliminated.

Laparoscopic surgeons argue that subtotal hysterectomy can be performed laparoscopically but most randomized trials have failed to demonstrate any benefit of subtotal hysterectomy over total hysterectomy. In women who wish to retain their cervix vaginal subtotal hysterectomy described by Doderlein Kronig Technique can be performed. The disadvantage of vaginal approach is vault hematomas. The abdominal approach to hysterectomy does ensure good hemostasis under direct vision, while during the vaginal operation the vault is closed and subsequent bleeding from the vagina between the mucosa and the peritoneum can give rise to problems, especially if a vasoconstrictor has been given that subsequently wears off. Laparoscopic approach can help check hemostasis and reduce the incidence of vault hematomas. However this aspect needs to be evaluated in studies [45].

Lack of uterine descent and nulliparity, fibroid uterus, need for oophorectomy, previous pelvic surgery are no more considered as contraindications to the vaginal route. With adequate vaginal access and technical skill, and good uterine mobility, vaginal hysterectomy can easily be achieved. Multiparity, lax tissues due to poor involution following multiple deliveries and lesser tissue tensile strength afford a lot of comfort to vaginal surgeon even in the presence of significant uterine enlargement. No evidence supports the use of laparoscopic hysterectomy rather than VH if latter can be performed safely. No outcomes are significantly worse for vaginal hysterectomy compared to LAVH. There are clinical situations where vaginal surgeries is not appropriate such as dense pelvic adhesions, severe endometriosis adnexal disease, when vaginal access is reduced when laparoscopic hysterectomy is indicated as it has advantages over the abdominal approach. Laparoscopic approach may be helpful post operatively to rule out hemorrhage in some cases. Laparoscopic assistance should not be used to supplant inadequate skills of vaginal hysterectomy.

Lack of training in vaginal surgery is not a reason for not removing uteri vaginally. The learning curve of VH is very short compared to laparoscopic surgery, however, the current scenario in residency programmes is not providing a level of surgical competency in performing difficult vaginal hysterectomies and there is a need to improve this training.

In order to compare the complication rates of different types of hysterectomies, considering an incidence of 4-5% of serious complications of hysterectomies 1461 women would be required in each arm of the study to detect 50% increase in the complication rate. Therefore larger randomized controlled trials are required to compare different types of hysterectomies.

When the size of the uterus is greater than 16 weeks gestation there is an increase in the operative time and blood loss in VH compared to LAVH which is statistically significant

Laparoscopically assisted vaginal hysterectomy is a useful adjunct to transvaginal hysterectomy for lysis of extensive adhesions and sometimes for certain concomitant adnexal surgery. Besides, LAVH can also secure almost all the main blood supplies to the

uterus, i.e., the uterine vessels and the adnexal collaterals. Although a skilled surgeon can do transvaginal hysterectomy with a larger uterus by employing volume-reducing techniques, Kohler reported that laparoscopic coagulation hemostasis of the uterine vessels was associated with less blood loss. It may take time to achieve these goals, but they may make subsequent extirpation or volume reducing procedures easier and safer to perform. Therefore, the average operative time and estimated blood loss for the LAVH remained almost constant regardless of increasing uterine weight. Generally, the average operative time for LAVH was longer than that for transvaginal hysterectomy. It takes time to secure the uterine blood supply before extirpation and volume reducing procedures, but it also makes LAVH superior to transvaginal hysterectomy when dealing with a larger uterus.

CONCLUSION:

LAVH should be considered a better approach for a larger uterus in view of the relatively shorter operative time and less blood loss, whereas transvaginal hysterectomy is preferable for a small uterus, not only for shorter operative time and minimal wound, but also for much lower costs. Due to lack of large randomized controlled trials, the role of Laparoscopic hysterectomy is difficult to define. It is quite clear that it cannot replace vaginal hysterectomy, but may aid vaginal route in selected cases discussed above.

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