

# Total laparoscopic versus vaginal hysterectomy: the experience of a training hospital

## Całkowita laparoskopowa versus pochwowa histerektomia: doświadczenie ośrodka szkolącego

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### Abstract

**Objective:** To compare the operative outcomes of total laparoscopic hysterectomy (TLH) and vaginal hysterectomy (VH) in a training and research hospital.

**Material and Methods:** Retrospective data analysis of all women who underwent either TLH or VH at gynecology unit for benign pathologies between January, 2012 and June, 2015 were conducted. Hysterectomies for desensus uteri were excluded. Groups were compared regarding operation time, change in hemoglobin value, intraoperative complications, postoperative complications and length of hospital stay.

**Results:** During the study period, 120 patients underwent TLH and 192 patients underwent VH. Indications for surgery except desensus uteri were myomas ( $n=55$ ), endometrial hyperplasia ( $n=43$ ), dysfunctional uterine bleeding ( $n=37$ ), adenomyosis with chronic pelvic pain ( $n=13$ ), and adnexal mass ( $n=6$ ). Operation time was shorter for VH in comparison with TLH ( $108 \pm 38.3$  minutes versus  $151 \pm 41.5$ ;  $p < 0.001$ ). Delta hemoglobin was smaller for TLH in comparison with VH ( $1.7 \pm 0.98$  versus  $2.8 \pm 1.03$ ;  $p < 0.001$ ). Intraoperative complications and postoperative complications were comparable ( $p = 0.16$  and  $p = 0.25$ ; respectively). Postoperative hospital stay was shorter in TLH group compared to VH group ( $p < 0.001$ ).

**Conclusion:** Although VH is the suggested approach for the removal of uterus in literature, this study showed the non-inferiority of TLH against VH.

Key words: **laparoscopic hysterectomy / benign gynecologic diseases / vaginal hysterectomy /**

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## Streszczenie

**Cel:** Porównanie wyników operacji usunięcia macicy metodą laparoskopową (TLH) i pochwową (VH) w szpitalu szkolącym i prowadzącym badania naukowe.

**Materiał i metoda:** Przeprowadzono retrospektywną analizę danych od wszystkich pacjentek, które przeszły TLH lub VH w oddziale ginekologicznym z powodu niezłośliwych patologii, w okresie pomiędzy styczniem 2012 a czerwcem 2015. Z analizy wyłączono histerektomie z powodu wypadania macicy. Grupy porównano pod względem czasu trwania operacji, zmian hemoglobiny, powikłań w trakcie i po operacji oraz czasu trwania hospitalizacji.

**Wyniki:** W okresie trwania badania, 120 pacjentek przeszło TLH i 192 VH. Wskazaniami do operacji poza wypadaniem macicy były: mięśniaki ( $n=55$ ), endometrial hyperplasia ( $n=43$ ), nieprawidłowe krwawienia maciczne ( $n=37$ ), adenomyosis z przewlekłym bólem miednicy mniejszej ( $n=13$ ) i guz przydatków ( $n=6$ ). Czas operacji był krótszy dla VH w porównaniu do TLH ( $108\pm 38,3$  minut versus  $151\pm 41,5$ ;  $p < 0,001$ ). Delta hemoglobina była niższa dla TLH w porównaniu do VH ( $1,7\pm 0,98$  versus  $2,8\pm 1,03$ ;  $p < 0,001$ ). Powikłania w trakcie i pooperacyjne były porównywalne ( $p=0,16$  i  $p=0,25$ ; odpowiednio). Pooperacyjny czas hospitalizacji był krótszy w grupie z TLH niż w grupie VH ( $p < 0,001$ ).

**Wnioski:** Chociaż VH jest sugerowaną w literaturze metodą usunięcia macicy, to badanie wykazało, że TLH nie jest gorsza niż VH.

Słowa kluczowe: **histerektomia laparoskopowa / niezłośliwe choroby ginekologiczne / histerektomia pochwową /**

## Introduction

Hysterectomy is the most frequent gynecological surgery in reproductive age women. In the last twenty year period, hysterectomy rates of initially high countries (e.g. Australia and United States) show a tendency of decrement and vice versa is true for initially low rate countries (e.g. Ireland and England). This can be interpreted as a worldwide convergence for indications [1, 2]. Recent reviews addressing the surgical approach for hysterectomy suggests minimally invasive routes, because of their various advantages over laparotomy [3, 4]. In addition to this, within the minimally invasive routes VH is suggested as first line therapy while laparoscopic approaches are proposed for the cases that are inevitable for VH [3].

Despite the convergence on indications and suggested methods, the vast majority of hysterectomies (60-75%) are performed as AH and only a minority (10-20%) are practiced as VH or TLH [2, 4]. A possible explanation to the discordance between practice and recommendations might be clinician's inexperience in laparoscopy.

This study aimed to compare intra- and postoperative outcomes of VH and TLH performed by a senior surgeon and an assistant doctor for benign pathologies to assess the most feasible route for hysterectomy in a training hospital.

## Material and methods

### Study design

The study conducted in Etlik Zubeyde Hanim Women's Health Training and Research Hospital between January 2012 and June 2015. We reviewed the medical records of all patients that underwent either VH or TLH for benign pathologies. In our institution patients are consent about use of their medical reports for scientific purposes at the hospitalization. The operation team included a senior surgeon and an assistant doctor. Chart reviews were performed by doctors other than the ones included in the operations. This study was approved by Institutional Review Board.

Patients with desensus of greater than first degree and hysterectomies with concomitant procedures (except salpingo-oophorectomy) such as transobturator tape insertion for incontinence were excluded from the study in order to compare the pure operation outcomes of each technique. The decision on the route of hysterectomy was given according to the patient's chose after an informed consent, size and mobility of uterus and presence of any associated adnexial pathologies.

Chart reviews included age, parity, body mass index, uterine volume, history of pelvic surgery (including cesarean section), history of abdominal surgery and indication for hysterectomy. Intraoperative variables as operation time, change in hemoglobin value, requirement of transfusions and complications (including bladder, ureteral, bowel and other organ injuries) were recorded. Postoperative complications (fever, abscess or hemorrhage requiring re-laparotomy) and length of hospital stay were registered.

### Terminology

Uterine volume was calculated with the formula  $\frac{4}{3} \times \text{Pi} \times \text{Length}/2 \times \text{Width}/2 \times \text{Antero-posterior diameter}/2$  [5]. Operation time was the period depicted in the patients' anesthesia charts: from start of induction to the recovery. Change in hemoglobin value was the difference between preoperative hemoglobin level and hemoglobin level at postoperative 24. hour. Fever was defined as more than  $38.5^{\circ}\text{C}$  measured at least at two occasions.

### Total laparoscopic hysterectomy

Under general anesthesia and a single dose of intravenous prophylactic cefazolin (Cefozin, Bilim Pharmaceuticals, Turkey) administration, uterine manipulator (RUMI/Koh-Efficient System, Cooper Surgical inc, USA) was placed. Then umbilical incision of 0,8 - 1 cm was created. Veress needle directing uterus at  $45^{\circ}$  angle was inserted with elevation of the abdominal wall. A pneumo-peritoneum was created with 18 mm Hg pressure, than umbilical trocar of 10 mm inner diameter was placed at midline.

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After insertion of umbilical trocar, intra-abdominal pressure of 12 mm Hg was kept constant with an automated insufflator. The insertion site, upper abdomen and pelvic structures were evaluated. Then patient was placed in trendelenburg position. Secondary trocars were placed lateral to rectus abdominis muscle bilaterally (contralateral port position) under direct visualization of abdominal wall and the abdominopelvic organs. Any adhesion related with site of surgery was cauterized and cut. For electrocoagulation and cutting 50W current was used.

First round ligament was coagulated and transected with a bipolar (Ligasure, Covidien Surgical Solutions, USA). Uterus was pulled to opposite site. The incision in the peritoneum was enlarged to form a pyramid with its top from dissected round ligament and the base parallel to the ovarian vessels and the bladder peritoneum. The ureter was identified at lateral pelvic wall. Then the ovarian vessels were coagulated. Dome of bladder with its peritoneum was grasped and elevated. This tract was dissected until blue reflection of manipulator seen at vagina. Posterior leaf of broad ligament was dissected to approach uterine vessels, than they were coagulated bilaterally. Uterus was elevated and a circumferential incision of vagina separated the uterus from vagina. After delivery of uterus, vault was closed with No: 1 polyglactin (Vicryl, Ethicon, Sweden).

### **Vaginal Hysterectomy**

Under spinal anesthesia, after a single dose of intravenous prophylactic cefazolin (Cefozin, Bilim Pharmaceuticals, Turkey) injection, the posterior vaginal wall was depressed with a weighted retractor and a Deaver retractor was placed to the anterior vaginal wall. Cervix was grasped with a uterine tenaculum forceps 2x2 teeth. Vaginal mucosa over cervix was incised with circumferentially a scalpel. Depth of incision was set with the white semi-glossy reflection of cervix. In the appropriate plane, fibers were easily retracted with a blunt dissection. When posterior cul-de-sac was reached, a sharp incision was made to enter peritoneal cavity. Uterosacral ligaments of both sides were clamped, excised and sutured with No: 1 polyglactin (Vicryl, Ethicon, Sweden). After a blunt dissection in anterior compartment, a sharp incision was made to enter pubovesicocervical fascia (anterior cul-de-sac). First cardinal ligaments than uterine vessels of each side are were clamped, excised and sutured. Then apex (fundus) was pulled outward from peritoneal cavity to vagina. Two Heaney clamps were settled on the pedicles which included the round and ovarian ligaments and the fallopian tube. This site was ligated twice. Following re-peritonization, cuff was closed in a continuous manner.

### **Statistical analysis**

The data were analyzed with SPSS v.11.5 for Windows (SPSS, Inc., Chicago, IL, USA). Data were shown as mean  $\pm$  standard deviation and nominal data were expressed as number of cases and percentages. Differences between groups were analyzed with Chi-square test. A p value less than 0.05 was considered significant.

### **Results**

During the study period, a total of 1124 hysterectomies were performed for benign uterine pathologies; 812 (72.2%), 192 (17.1%) and 120 (10.7%) as abdominal hysterectomy (AH), VH

and TLH, respectively. The mean ages, number of multiparous women and body mass index were comparable between groups. The number of cases with previous surgery and the mean uterine volume were higher in TLH compared to VH group (13.3% versus 5.9% and  $234.0 \pm 98.6$  cm<sup>3</sup> versus  $176 \pm 63.2$  cm<sup>3</sup>;  $p < 0.001$ ), (Table I).

The most common indication for both TLH and VH was myoma uteri in 43 and 12 cases (35.8% versus 35.3%,  $p = 0.96$ ; respectively). Other indications for TLH and VH were endometrial hyperplasia (29.2% versus 23.5%), abnormal uterine bleeding (23.3% versus 26.5%), adenomyosis with chronic pelvic pain (6.7% versus 14.7%) and adnexial mass (5% versus 0%). Concomitant procedure in VH was salpingo-oophorectomy in 4 cases (11.8%) and in TLH group: salpingo-oophorectomy and salpingectomy in 73 (60.8%) and 10 (8.3%), cases; respectively (Table I).

Surgery related outcomes are depicted in Table II. Operation time was longer in TLH compared to VH ( $151 \pm 41.5$  minutes versus  $108 \pm 38.3$  minutes;  $p < 0.001$ ). Decrement in hemoglobin value was more in VH than TLH ( $2.8 \pm 1.03$  g/dl versus  $1.7 \pm 0.98$  g/dl;  $p < 0.001$ ). Intraoperative complications were comparable between groups. The most common intraoperative complication was bleeding that required transfusion. This was observed in 7 (5.8%) cases of TLH and in 1 (2.9%) cases of VH. Ureteric injury was observed in 3 (2.5%) cases of TLH, none in VH. Bladder injury was observed in 1 (0.8%) cases of TLH, none in VH. No bowel injury were observed in either group. Laparoscopy was converted to laparotomy in 1 (0.8%) case due to uterine size of more than 12 weeks of gestation. In one case of TLH group, anesthetic complication was observed: allergic eruption just after induction. She was recovered with suitable medication without a further intervention.

Postoperative complications were comparable between groups. Fever was observed in 1 (0.8%) cases of TLH and none in VH. Cuff hematoma was observed in 1 (0.8%) case of TLH and in 1 (2.9%) case of VH. The case in TLH group resolved without any complication, the case in VH group treated with red blood cell transfusion and re-laparotomy. Average days of postoperative hospitalization were 1.9 days (range 1–4 days) and 3.0 days (range 2–8 days) for TLH and VH; respectively ( $p < 0.001$ ) (Table II).

### **Discussion**

This study was to present the experience of a training hospital on two minimally invasive techniques of hysterectomy. Our study suggests: firstly TLH is not a sub-alternative to VH, instead at least equally effective modality for handling benign uterine pathologies. This statement is true even for the disadvantageous situations such as larger uterine volumes and history of previous surgery. Secondly, although TLH provides a broader perspective for inspection, injuries to abdominopelvic structures (especially ureters) are more common compared to VH. Thirdly, TLH has the advantage of adnexal removal with less complication.

Hysterectomies can be performed vaginally, laparoscopically and abdominally, depending on the preference and suitability of both the patient and the surgeon [6]. In United States, hysterectomy is the 8. most common operation room procedure in 2012, that is, it is performed at a rate of 99.4 per 100000 population [7]. Cochrane review concerning the route of choice

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**Table I.** Baseline characteristics.

	TLH (n=120)	VH (n= 34)	P
Age (years)	48,6 ± 7,6	51,2 ± 8,3	0,3
Multiparous women, n (%)	108 (90%)	34 (100%)	0,46
BMI (kg/ m <sup>2</sup> )	29,9 ± 4,1	30,1 ± 3,95	0,06
Uterine volume (cm <sup>3</sup> )	234.0 ± 98.6	176 ± 63.2	<b>&lt; 0.001</b>
Previous pelvic surgery, n (%)	32 (26.7%)	5 (14.7%)	0,15
Previous abdominal surgery, n (%)	16 (13.3%)	2 (5.9%)	<b>&lt; 0.001</b>
Indications for surgery, n (%)			
Myoma uteri	43 (35.8%)	12 (35.3%)	0,96
Endometrial hyperplasia	35 (29.2%)	8 (23.5%)	0,53
Dysfunctional uterine bleeding	28 (23.3%)	9 (26.5%)	0,69
Adenomyosis and chronic pelvic pain	8 (6.7%)	5 (14.7%)	0,17
Adnexal mass	6 (5%)	0 (0%)	0,21

Data expressed as mean ± SD or number (%) where applicable. TLH – total laparoscopic hysterectomy, VH – vaginal hysterectomy. p <0,05 considered significant.

**Table II.** Surgery related outcomes.

	TLH (n=120)	VH (n=34)	p
Operation time (minutes)	151 ± 41,5	108 ± 38,3	<b>&lt; 0,001</b>
Change in hemoglobin values (g/dl)	1,7 ± 0,98	2,8 ± 1,03	<b>&lt; 0,001</b>
Intraoperative complications, n (%)	13 (10.8%)	1 (2.9%)	0,16
Bleeding requiring transfusion	7	1	
Ureteric injury	3	0	
Bladder injury	1	0	
Unintended laparotomy	1	0	
Anesthetic complications	1	0	
Postoperative complications	2 (1,7%)	2 (5,9%)	0,25
Fever > 38,5° C	1	0	
Cuff hematoma	1	1	
Re-laparotomy	0	1	
Postoperative hospital stay (days)	1,9 (1 – 4)	3,0 (2 – 8)	<b>&lt; 0,001</b>

Data expressed as mean ± SD or number (%) where applicable. TLH – total laparoscopic hysterectomy, VH – vaginal hysterectomy. p <0,05 considered significant.

for hysterectomy suggests VH as the first line therapy in feasible cases, and in inconvenient cases laparoscopic hysterectomy to avoid AH [3]. Laparoscopic assisted vaginal hysterectomy (LAVH) has the advantages of laparoscopy, but still not an alternative for the cases that are not suitable for VH [6]. Our hospital is a referral center serving to whole country by being in the capital city. Still only 10.7% of hysterectomies are performed as TLH in our institution. According to the evidence based medicine laparoscopic hysterectomy has the benefits of shorter hospital stay and quick recovery period [3, 8].

However, lack of experience holds back the gynecologists from performing (even suitable cases) as TLH. In gynecology department, we have two senior gynecologists who can complete hysterectomy laparoscopically (including closure of vault). Long training curve and medico-legal controversies with malpractice directs the clinician to “better known is more suitable”. In our cross sectional study, we observed surgically harder cases with greater uterine volumes and previous surgery were inadvertently

accumulated in TLH group. Despite these inconveniences, surgical outcomes of TLH is not inferior to VH.

The route of choice for repair of pelvic organ prolapse is vaginal in literature and in our center [9]. In our practice, we add hysterectomy to the operation to reduce the risk of recurrent prolapse [10]. It is well known that decent uteri are much easier to remove vaginally. This study excluded the cases with this indication to focus on the outcome at equal conditions. In our center, majority of patients with this complaint are postmenopausal. In postmenopausal period, elective oophorectomy during hysterectomy is a risk reducing surgery because the probability of ovarian cancer is increased up to 1% [11]. In addition to this, elective oophorectomy bypasses the gynecologic problems as torsion and other benign adnexal pathologies which can occur at a prevalence of 7.91 per 1000 hysterectomies [12]. Removal of adnexa is possible via vaginal approach, but traction of the postmenopausal atrophic infundibulopelvic ligament might result breaking off the ovarian vessels and retroperitoneal hemorrhage.

That happened in one case included in this study. Laparotomy for drainage of the hematoma and transfusion were required for hemodynamic stability in this patient.

A greater hemoglobin decrement was observed in VH group. This is in contrary with the present literature [3, 4, 13]. This result in our study can be due to more intraoperative transfusions in TLH, which increased the postoperative hemoglobin level. Laparoscopic inspection provides a greater sight with magnification. This is both an advantage to observe pelvic anatomy with their contiguity, and a disadvantage that exaggerates relatively small bleedings to be transfused. Another issue that might increase amount of bleeding in VH is that we do not prefer vasoconstrictors in VH, because the patients are generally elder and absorption of the medication may not be tolerable at this age group.

In our study we observed more organ injuries in TLH group, including ureteral injury. In all three cases, the injuries were realized and repaired during operation. In the previous reports by Candiani [11], Bogani [14] and Roy [15] ureteral injury were reported as null. This might be due to an expertized team of laparoscopist in such clinics. We think that our results are more applicable to a standard training hospital. When we checked the time of our ureteric injuries, we observed that all occurred within the first 50 cases. After the learning curve, visceral injury of TLH is comparable to VH. In our study, no bladder or ureteral injury were observed in VH, which is a more practiced operation. Also, we prefer posterior cul-de-sac entrance to the peritoneal cavity, then use its guidance to dissect the vesico-uterine pouch. We think this is an effective way to prevent possible bladder injuries especially in patients with previous cesarean section.

The main restrictions of this study are its retrospective design that prevent patient allocation and small sample size. This is also the strength of the study, showing the real tendency of gynecologist, which we think need to be changed. How can we perform TLH in cases that are inconvenient to VH, while practicing 80% of hysterectomies abdominally? Second limitation of the study is we could not question whether this shorter hospitalization is a request of patient because she felt better after TLH, or this was the preference of the gynecologist depending on literature. It would be better if we demonstrate that it was the patient's own assessment with a validated questionnaire.

In conclusion; laparoscopic hysterectomy is a patient friendly and convenient way of hysterectomy. After learning curve, the only drawback compared to vaginal hysterectomy is the operation time, whereas laparoscopy adds advantage of safe removal of adnexa and shorter hospital stay.

#### Authors' contribution:

1. Funda Akpınar – concept, analysis and interpretation of data, article draft, revised article critically, corresponding author.
2. Neslihan Yerebasmaz – analysis and interpretation of data, revised critically article.
3. Eylem Unlubilgin – analysis and interpretation of data, revised critically article.
4. Ertugrul Karahanoglu – analysis and interpretation of data.
5. Fulya Kayikcioglu – acquisition of data, analysis and interpretation of data.
6. Suat Dede – revised critically article.

#### Authors' statement

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