

Clinical comparison of minimal invasive hysterectomy techniques: laparoscopic hysterectomy vs. vaginal hysterectomy

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Summary

Purpose: To compare the clinical outcomes of total laparoscopic hysterectomy (TLH) and vaginal hysterectomy (VH). **Materials and Methods:** A retrospective chart review of 385 women who underwent TLH or VH between November 2012 and October 2013 was accomplished. Clinical outcomes including operation time, hemoglobin change, rate of complications, febrile morbidity, consumption of analgesics, and hospital stay were estimated. Sexual activity and resumption to work of these patients were evaluated according to outpatient medical records and additional questionnaire. **Results:** There were no differences in outcomes between the two groups other than the mean weight of uterus (VH: 243.93, TLH: 216.94 grams, $p = 0.019$) and operating time (VH: 97.2, TLH: 142.58 minutes, $p < 0.001$). TLH was also associated with a shorter hospital stay (VH: 5.23, TLH: 3.50 days, $p < 0.001$) and less consumption of analgesics. Sexual activity after the operation was not different but resumption to work was definitely earlier in the TLH group ($p < 0.001$). **Conclusions:** TLH could be a potent alternative to VH for benign disease, considering its benefits in clinical outcomes and quality of life.

Key words: Minimal invasive technique; Total laparoscopic hysterectomy; Vaginal hysterectomy.

Introduction

Hysterectomy is the most frequently performed gynecological procedure world widely [1]. In the United States, almost 30-40% of women younger than 65 years have undergone a hysterectomy [2, 3].

Traditionally, abdominal hysterectomy accounts for about 70-80% of cases [3, 4]. However, total laparoscopic hysterectomy (TLH) has become widely accepted in managing benign uterine pathology since the first report by Reich in 1989 [5]. Moreover, as the minimal invasive approach has been preferred recently, vaginal hysterectomy (VH) is also reevaluated of its value [6-10]. Although there are number of studies comparing clinical outcomes between those three routes, it is still debated which should be preferred in case of benign pathology [10-12]. Especially for the two minimal invasive procedures including TLH and VH, it is still inconclusive which procedure is more beneficial. The authors therefore, compared the clinical outcomes including quality of life in these two procedures: TLH vs. VH.

Materials and Methods

From November 2012 to October 2013, 198 women underwent VH, and 187 underwent TLH in the Department of Obstetrics and Gynecology at Hallym University Hospital. All procedures were performed by one of the three senior surgeons who had performed VH or TLH in more than 30 cases respectively. Women with prolapsed uterus were excluded from this study group. Kangnam Sacred Heart Hospital of Hallym University Institutional Review Board approved for this study (2016-02-08).

Patient characteristics (age, parity, gravidity, body mass index (BMI), history of cesarean section or other pelvic surgery including myomectomy and adnexectomy, and indications for surgery), operative time (from incision to the final abdominal or vaginal closure suture), weight of the surgical specimen recorded on the pathologic report, estimated blood loss, hemoglobin change between the preoperative and the postoperative day 1, day of restarting bowel motility (day of gas passing), day of restarting voiding, total consumption days of analgesics, and length of hospital stay were retrieved from medical records. Intraoperative complications included conversion to laparotomy, visceral injury (bowel, bladder, ureter), and hemorrhage (blood loss requiring intraoperative transfusion). Also fever (temperature $> 38^{\circ}\text{C}$ on two occasions six hours apart), hemorrhage, infection, ileus, stump cellulitis or disruption, fistula, deep venous thrombosis, pulmonary embolus, and urinary problems (urgency, incontinence) were included as postoperative complications. Resumption to work and to sexual activity after surgery were investigated in the outpatient clinic after discharge.

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Foley's vesical catheter was maintained until the second day morning after surgery. As prophylactic antibiotics, intravenous cefotiam 1 gram or clindamycin 600 mg (if allergic to penicillin) was given to all patients 20 minutes prior to surgery and repeated every 12 hours until the first day after surgery.

The patients were assessed for discharge from hospital in the next few days and seen again in the outpatient clinic at one and four weeks, and at six and 12 months after discharge. The parameters used for making the decision to discharge included restarting bowel motility, lack of urinary problems or fever, absence of wound problems, and patient's comfort.

All TLH were performed under general anesthesia, in contrast to VH which were mostly performed under epidural anesthesia. Patients with a history of spinal surgery or who had poor compliance performed VH under general anesthesia exceptionally. All patients were injected preoperatively intravenous prophylactic antibiotics and had bladder catheterization during surgery.

For the VH group, bowel preparation with fleet enema was done 12 hours before and at morning of surgery. During the surgery, patients were placed in lithotomy position and VH was performed following standard techniques.

For the TLH group, massive bowel preparation with clear fluid diet 24 hours before surgery was done. During surgery, patients were placed in the modified semi-lithotomy position with deep Trendelenburg position. Accessing peritoneal cavity was accomplished by open technique using Hasson cannula [13]. The TLH techniques can be classified into IV E according to the American Association of Gynecologic Laparoscopists (AAGL)[14]. Type IV hysterectomy means the complete detachment of cardinal uterosacral ligament complex. And "E" describes the removal of the whole uterus, the laparoscopic closure of vaginal stump, and its suspension to the uterosacral ligaments.

Statistical analysis was performed using χ^2 test for comparison of dichotomous data, and *t*-test for continuous data. Data were reported as mean \pm 1 standard error or number (percentage). Probability value below 0.05 was considered statistically significant.

Results

One hundred and ninety eight women underwent VH, and 187 women underwent TLH during the study period.

Patient characteristics are summarized in Table 1. Though BMI was greater in TLH group (24.14 ± 3.37 vs. 23.49 ± 2.73 , $p = 0.04$), there were no statistical differences between the two groups in age, gravidity, parity, and history of cesarean section or pelvic surgery.

The surgical indications for each group are shown in Table 2. The uterine fibroids occupied the largest portion (83.9% in TLH group and 90.9% in VH group) as expected. There was one case of TLH for cornual pregnancy, hematometra, pyometra, and choriocarcinoma, respectively, and one case of VH for early stage endometrial cancer.

Surgical data and clinical outcomes are described in Table 3. The TLH group was associated with a shorter hospital stay (3.50 ± 2.16 vs. 5.23 ± 0.89 days, $p < 0.001$) and less consumption of analgesics. (5.35 ± 4.06 vs. 6.04 ± 0.23 days, $p = 0.02$) The significantly longer operating time in the TLH group might be due to the data collected at early

Table 1. — Patient characteristics.

Characteristics	TLH (n=187)	VH (n=198)	p-value
Age, years	45.80 \pm 5.45	46.76 \pm 4.84	0.06
BMI, kg/m ²	24.14 \pm 3.37	23.49 \pm 2.73	0.04
Gravidity	1.95 \pm 0.74	2.02 \pm 0.64	0.29
Parity	3.78 \pm 1.88	3.91 \pm 1.90	0.48
Previous cesarean section	28 (14.9)	22 (11.1)	0.31
Previous pelvic surgery	44 (23.5)	58 (29.2)	0.27

Data are presented as mean \pm SD or absolute numbers (%).

Table 2. — Indications for surgery.

Indication	TLH (n=187)	VH (n=198)
Fibroids/menorrhagia	157	180
Adenomyosis/dysmenorrhea	5	6
Endometrial hyperplasia	1	4
Preinvasive lesion of the cervix	14	6
Dysfunctional uterine bleeding	3	0
Adnexal disease	3	1
Others	4 ^a	1 ^b

Data are presented as absolute numbers.

^aIncludes an unruptured cornual pregnancy, hematometra, pyometra, and choriocarcinoma. ^bIncludes an early stage of endometrial cancer.

Table 3. — Surgical data and clinical outcome.

Variable	TLH (n=187)	VH (n=198)	p-value
Uterine weight, g	216.94 \pm 105.15	243.93 \pm 118.6	0.01
Operative time, minutes	142.58 \pm 32.65	97.2 \pm 28.63	< 0.001
Estimated blood loss, mL	388.24 \pm 85.32	394.39 \pm 64.2	0.42
Hemoglobin change, g/dL	1.12 \pm 0.91	1.16 \pm 1.01	0.65
Hospital stay, days	3.50 \pm 2.16	5.23 \pm 0.89	< 0.001
Restarting bowel motility	2.49 \pm 0.50	2.27 \pm 0.44	0.33
Restarting voiding	2.07 \pm 0.45	2.03 \pm 0.30	0.32
Total days of analgesics consumption	5.35 \pm 4.06	6.04 \pm 0.23	0.02

Data are presented as mean \pm SD.

Table 4. — Intra- and postoperative complications.

Variable	TLH (n=187)	VH (n=198)	p-value
Intraoperative complications	1	1	0.36
Conversion to laparotomy	0	1	
Hemorrhage ^a		1	0
Postoperative complications	9	7	0.19
Hemorrhage ^b		4	4
Stump cellulitis		1	0
Urinary problem (Urgency/Incontinence)	4	3	

Data are presented as absolute numbers.

^aRequired intraoperative blood transfusion.

^bRequired postoperative blood transfusion.

Table 5. — Long-term variables after 12 months of surgery.

Variable	TLH (n=187)	VH (n=198)	p-value
Sexual activity			0.11
No	20	49	
Yes	167	149	
Resumption to work (days)			< 0.001
≤ 21	130	61	
> 21	57	137	

Data are presented as absolute numbers.

period of the TLH procedure in the present hospital. (142.58 ± 32.65 vs. 97.2 ± 28.63 minutes, $p < 0.001$) According to more recent data, there seems to be no difference between the two groups. The estimated blood loss and hemoglobin change were not different in both groups.

Intra- and postoperative complications are described in Table 4. Complication rates during surgery were not different between the two groups. One patient in VH group required a conversion to laparotomy because of unexpected severe pelvic adhesions. One patient in TLH group required blood transfusion during surgery because of a massive intraoperative bleeding. There were no visceral injuries including bowel, bladder, and ureters. Postoperative complications were also rare. Four patients in TLH group and three patients in VH group presented with urinary problems (urgency or incontinence) which were resolved with maintaining Foley's vesical catheter and medication.

All patients were asked about their sexual activity and resumption to work after 12 months of surgery in outpatient clinic. For the patients with follow-up loss, investigation was completed through telephone research. The long-term variables are listed as Table 5. Although the sexual activity after surgery was not different between the two groups ($p = 0.11$), resumption to work was definitely earlier in VH group than TLH group ($p < 0.001$).

Discussion

In recent studies, transabdominal hysterectomy was demonstrated to have a longer hospital stay, and also longer convalescence compared to both vaginal and laparoscopic hysterectomies. As a result, less invasive procedures came into the spotlight in managing benign uterine pathology. Recently published national data for 2005 indicate that vaginal hysterectomies were performed in about 22% of cases and that 14% of hysterectomies were done by laparoscopy [15].

VH is a conventional procedure, which can be performed to treat almost all benign lesions without abdominal incision and with cost-effectiveness. Moreover, bilateral adnexectomy for benign pathology could be effectively performed by experienced surgeons without any impact on intra- and postoperative complications and length of hos-

pital stay [16, 17]. However, thorough abdominal inspection is not possible in VH. Also, patients with narrow pelvis such as nulliparous women and patients with extremely large sized uterus could be contraindications for VH, and although there is a general consensus that VH should be a gold standard for benign pathology, its substantial superiority to laparoscopic hysterectomy has not yet been clearly demonstrated [10, 18].

In comparison, TLH has the advantages of laparotomy, i.e. possibility of thorough abdominal inspection to assess the abdominal cavity for extra-uterine spread and collection of peritoneal fluid for cytology, and contraindications for TLH are relatively narrower than VH. Moreover, because the patients do not have a large abdominal wound, the laparoscopic approach results in a shorter hospital stay, less abdominal wound morbidity, and quicker return to the activities of daily life [19, 20]. In one prospective study, TLH group was related to a shorter hospital stay, less blood loss, and less postoperative pain compared with VH group [21]. Similarly, other studies reported higher intraoperative blood loss and significantly higher reduction in hemoglobin levels in the VH group ($p = 0.0001$ and $p = 0.0023$, respectively) [22, 23]. Nevertheless, for several reasons laparoscopy is not yet an established procedure. The first reason is the inexperience of surgeons in this advanced laparoscopic procedure, which results in a higher peri-operative complication rate during the learning curve [24]. The other reason is economic: including higher per-operative costs, longer operation time, expensive surgical (disposable) equipment, and extra costs in converted procedures. However, laparoscopic approaches can offer the prospect of improved outcomes and gains in cost effectiveness through better and quicker convalescence and shorter length of inpatient stay. In the present study, the authors therefore compared the clinical outcomes of these two minimal invasive procedures, retrospectively.

Patient characteristics between the two groups were not significantly different except for BMI. Although BMI was greater in the TLH group than in the VH group, the average BMI in both groups were all less than 25, and thus has no clinical significance. Meanwhile, we can consider that this difference in BMI had no influences in clinical results of the two groups, according to the review of several literatures. Firstly, Ozugar *et al.* reported that obesity does not increase the operating time, hospital stay, and perioperative complications in VH procedures [25]. Moreover, they could not find any differences in rate of conversion to laparotomy and perioperative hemoglobin change between the obese and non-obese patients [25]. Likewise, we know that the BMI does not influence the time of surgery, blood loss, day of hospitalization, and intra- or postoperative complication rate in TLH [26, 27]. Theoretically, obesity can affect abdominal wound problems including disruption, dehiscence, and infection, but the present authors did not experience those complications in the TLH group.

The mean uterine weight was heavier in the VH group compared with the TLH group. The present authors consider that this difference is relevant to a patient selection bias for TLH at initial stage in this hospital. Actually, the present authors began performing TLH actively several years ago, and in early stage, relatively large-sized uterine fibroids were frequently indicated for abdominal hysterectomy or VH. As a result, the laparoscopic approach was preferentially attempted for small fibroids. However the difference between the two groups was about 30 grams, which is of little clinical importance in the present authors' view.

The operating time was shorter for VH, which is consistent with other previous reports. The mean difference in operating time was 45 minutes which is also similar to previously reported values in other studies [28].

As for the estimated blood loss during the surgery and perioperative hemoglobin change, there were no differences between the two groups. This result is incompatible with the result reported by Jugnet *et al.*, who found less blood loss during laparoscopic hysterectomy compared with VH [29]. Similarly, the present result is in contrast to the result reported by Ribiero *et al.*, who described a higher reduction in hemoglobin and hematocrit levels in VH group ($p = 0.0001$ and $p = 0.023$, respectively) [22].

Although no statistical differences were observed in restarting bowel motility and voiding between the two groups, the mean hospitalization was definitely longer in VH group (3.50 vs. 5.23 days, $p < 0.001$) This result is same as other studies previously reported, but in the present study, the mean hospitalization was about two to three days longer in both groups comparing to other studies [21, 30]. This might be due to a cultural difference in Eastern and Western countries. In Korea, most patients wish to be discharged only after complete recovery. Therefore, the length of stay could be a little longer until the drainage tubes and stitches are completely removed. Moreover, patients are less concerned about the duration of hospital stay since medical insurance companies fully reimburse medical costs in Korea [31].

There was also significant difference in the mean days of analgesic consumption between the two groups. However, the pain request was significantly reduced at day 1 or 2, which is the mean time for restarting bowel motility, in the TLH group. This more analgesic request might affect a longer hospitalization in the VH group.

Although the intra- and postoperative complications were rare, the TLH group was involved in urinary problems more frequently. This result is contrary to the report by Johnson *et al.* who did not find significant differences between the two groups [28]. Theoretically, laparoscopic approach can visualize bladder and ureteral system, which can be a good advantage over vaginal procedure in terms of urinary problems. However the surgeon's skill and experience also can be a potent influence. Recent published data of a series of

3,190 laparoscopic hysterectomy for benign uterus disease clearly demonstrated that laparoscopic approach is a safe alternative with no increase in major complications when applied by experienced surgeons [32]. Nevertheless, some studies have stressed that the laparoscopic approach is related to a high incidence of ureteral and bladder lesions, as in the present results [33]. It is still not known whether this is related to the type of laparoscopic hysterectomy, the size of the uterus, the surgeons' experience, the sealing technique or other influencing factors.

The resumption to work was earlier by about one week in the TLH group compared to the VH group. This result is discordant with those published in the literature, which reported that the resumption to usual activities were not different between the two groups [21, 28, 29]. The present authors did not ask why women after VH required more time to recover and to return to work, and they also did not ask about the type of work. This can be regarded as a shortcoming of the study. The vaginal discharge after surgery, which is frequently complained of by patients with VH at outpatient clinic, could be an important factor to influence on later return to work. There are very few studies comparing VH and TLH with available data on recovery time, except for Maher *et al.* who reported that patients with VH required almost 34 days to resume normal daily activities [34].

No significant differences were observed in terms of sexual activity at 12 months after surgery, which is already confirmed by other authors [35]. However, the larger scaled prospective study would be required to attain more definitive results.

In conclusion, although there are some benefits in VH procedure including easy learning curve and low cost, TLH could offer more clinical benefits such as less postoperative pain, reduced hospital stay, and early recovery. Moreover, the laparoscopic approach allows bilateral adnexectomy more easily compared with vaginal approach, although the present authors did not include this factor in this study. Therefore, TLH could be preferred as a primary choice for treatment of benign uterine pathology, in some selective circumstances. In the future, a more large-scaled prospective study would be required to support this suggestion.

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