A Comparative Study between Laparoscopically Assisted Vaginal Hysterectomy and Abdominal Hysterectomy

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Objective: *To compare efficiency of laparoscopically assisted vaginal hysterectomy (LAVH) and total abdominal hysterectomy (TAH)*

Material and Method: *Medical records of 50 cases of LAVH and 50 cases of TAH were reviewed from January 2004 to December 2004*

Results: *There was no significant difference between the two groups in basic clinical characteristics. Myoma uteri was the major cause of operation. The operative time (115.9 ± 40.8 min vs. 68.2 ±14.2 min), the operative cost (26,763.48 ± 2,718.37 Baht vs. 22,345.50 ± 4,057.40 Baht), diclofenac for postoperative analgesics (135.0 ± 67.5 mg vs. 300.0 ± 75.0 mg), the postoperative hospital stay (2.6 ± 0.9 days vs. 4.5 ± 1.1 days), and the time to return to work (30.4 ± 3.1 days vs. 50.9 ± 6.6 days) were significantly different in the LAVH group compared to the TAH group. There was no significant difference in blood loss between the two groups. The mean score of recovery scale for LAVH was 9 and 7 for TAH at the 28th day of post-op. There was one bladder injury in the LAVH group. The common complications in both groups were hemorrhage and febrile morbidity. The learning curve of LAVH procedure showed that operative time was significantly different between the 30th and 40th cases (122.0 ± 31.8 min vs. 91.0 ± 26.5 min). Doing LAVH with condition of uterine weight will not effect the operative time and blood loss.*

Conclusion: *LAVH is less painful, has a shorter length of hospital stay and quicker return to work than TAH. Moreover, LAVH does not increase intra- or postoperative complications. LAVH is another alternative choice to treat myoma uteri in a well trained operator.*

Keywords: *LAVH, TAH*

J Med Assoc Thai 2007; 90 (5): 837-43
Full text. e-Journal: *http://www.medassocthai.org/journal*

Since Harry Reich first described his laparoscopic hysterectomy (LH) technique in 1989, Laparoscopically assisted vaginal hysterectomy (LAVH) has become a popular alternative to abdominal hysterectomy in cases difficult to manage via vaginal route alone[1]. Within the past decade, acceptance of minimally invasive techniques has changed the traditional approach to hysterectomy from open abdominal procedures to laparoscopy[2]. Moreover, LAVH technique is further developed. Variations relate mainly to the dissection of major vessels and the cardinal ligaments where electrosurgery, stapling devices, and/or extra- or intra-corporeal sutures may be used[3,4].

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Recently the evaluation study concluded that LAVH was associated with a significantly higher rate of operative time and cost, hospital stay, estimated blood loss, and major complication than total abdominal hysterectomy (TAH). LAVH took longer to perform but was associated with less pain, quicker recovery, and better short-term quality of life measures[5]. Another study[6] did not show any difference in post-surgery recovery, satisfaction with the outcome of the operation, or quality of life 4 weeks postoperatively between LAVH and TAH.

In Thailand, most gynecologists are trained for abdominal hysterectomy when they are residents. However, efficiency of hysterectomy has not been a concern. Thus, LAVH is considered to increase efficiency of the treatment[5,6].

The author aimed to compare efficiency of

LAVH with TAH in terms of operative time and cost, estimated blood loss, hospital stay, analgesics, intra- and postoperative complication rates, patient recovery time, and the learning curve and outcomes after stratifying the patients by uterine weight in the LAVH group. The study design was a retrospective non-randomized analysis.

Material and Method

A retrospective observational study in the Uttaradit Hospital was carried out comparing LAVH and TAH. The study period was from January 2004 to December 2004 inclusive, a 12-month period. Patients undergoing LAVH and TAH by the same surgeon for non-malignant conditions were identified from medical records.

The inclusion criteria for LAVH were: the uterine size of the patient did not exceed that equivalent to 14 weeks of pregnancy; the patients had no cardiac or pulmonary disease, no contraindication for gas insufflations, no lithotomy position, and no extensive adhesion in the pelvis.

Medical records of the patients identified were reviewed; factors examined included demographic details, uterine weight, indication for operation, operative time and cost, estimated blood loss, hospital stay, intra- and post operative complication rates, patient recovery time, and histopathology summary. One hundred hospital charts were reviewed, 50 for patients undergoing LAVH and 50 for TAH. In the LAVH group, the patients were divided into five subgroups by using a sequence of every 10 cases and the relation between learning curve and operative time was studied. The author also compared operative time and estimated blood loss after stratifying the patients by uterine weight into two groups: 200 g or less (small uterus) and more than 200 g (larger uterus).

Informed consents were obtained before surgery. They were admitted to the hospital a day before the operation. Two grams of ampicillin were given intravenously as prophylactic antibiotics approximately one hour before the operation in both groups. General anesthesia with endotracheal intubation was employed in every case. Foley's catheter was retained. Lithotomy was arranged for patients with LAVH and supine position was for TAH.

LAVH was performed as follows: under general anesthesia, the Ramathibodi's uterine manipulator was positioned and then the pneumoperitoneum was created. The author routinely places a 12 mm. disposable trocar through a subumbilical incision for insertion of the 10 mm. video-laparoscope. Two 5 mm. disposable trocars are inserted for ancillary instruments and placed lateral to the inferior epigastric vessels in the lower abdomen. The left lower quadrant puncture is the major portal for operative manipulation. The right trocar sleeve is used for retraction with atraumatic grasping forceps. LAVH[7] began with electro-coagulation and transection of the bilateral round ligaments. In patients who desired to preserve the adnexa, the fallopian tube and ovarian ligament were transected, whereas in those who preferred a salpingo-oophorectomy, the infundibulopelvic ligaments were isolated, coagulated, and transected. Then the vesicouterine peritoneum was opened and anterior portion of the lower segment of the uterus was marked with bipolar forceps to make the subsequent hysterectomy easier to perform. The vaginal procedures began with anterior and posterior colpotomies. The vesicocervical, uterosacral, cardinal ligaments, and uterine vessels were clamped, transected, and sutured until vaginal hysterectomy was completely done. For the uterus that was too large to remove, vaginal morcellation was done by using #11 blade on a long handle. With care multiple wedge resections were done until the whole uterus was pulled out of the peritoneal cavity. Peritoneal closure with pedicles exteriorized and closure of the vaginal vault concluded the vaginal phase. Finally, pelvic cavity and abdomen were laparoscopically re-evaluated and lavaged after hemostasis, if necessary. Operative time began at the first incision and finished after skin closure. Blood loss was collected in a suction bottle and measured in milliliters.

TAH with or without bilateral salpingo-oophorectomy was performed according to the method reported by Mattingly and Thompson[8].

Student's t-tests, Chi-squared and Fisher Exact test were used when appropriate to test for differences between outcomes for LAVH and TAH. All statistical analyses were performed with SPSS 10.1 for Windows (SPSS Inc, Chicago. IL). A $p < 0.05$ was considered statistically significant.

Results

Table 1 shows the indications for surgery in the two groups, myoma uteri being the main cause for the majority of the patients. Table 2 shows the basic clinical characteristics of the patients. There was no significant difference in terms of age, parity, body weight, and prior pelvic surgery except uterine weight.

Table 3 shows the surgical characteristics and clinical outcomes of the patients. The operative

time was significantly longer and the operative cost was higher in the LAVH group compared to the TAH group (115.9 ± 40.8 min vs. 68.2 ± 14.2 min, 26,763.48 ± 2,718.37 Baht vs. 22,345.50 ± 4,057.40 Baht; $p < 0.05$). There was no significant difference in estimated blood loss between the two groups. As to postoperative pain, significantly less diclofenac was required in the LAVH group (135.0 ± 67.5 mg vs. 300.0 ± 75.0 mg for TAH; $p < 0.05$). The postoperative hospital stay and the time to return to work in the LAVH group were significantly shorter than the TAH group (2.6 ± 0.9 days vs. 4.5 ± 1.1 days, 30.4 ± 3.1 days vs. 50.9 ± 6.6 days; $p < 0.05$). Pathological reports mainly were leiomyoma and adenomyosis in LAVH and TAH group (48% vs. 54%, 36% vs. 34%, respectively).

Table 4 shows intra-operative and post operative complications respectively. Intra-operative complications in the LAVH group included one case of bladder injury and five cases of blood transfusion. Four cases needed blood transfusions in the TAH group. Post operative complications in the LAVH group included five cases of febrile morbidity, three cases of urinary tract infection and one case of vaginal cuff infection. Complications in the TAH group were four cases of febrile morbidity, two cases of urinary tract infection, and one case of incisional wound infection.

Fig. 1 shows the relation between learning curve and operative time for the LAVH group. The first 10 cases took 155.0 ± 50.4 min on average, while in a sequence of every 10 cases studied, the average operative time was 120.5 ± 35.2 min, 122.0 ± 31.8 min, 91.0 ± 26.5 min, and for the last 10 cases 91.0 ± 21.3 min. The operative time was significant different between the third and fourth 10 cases (122.0 ± 31.8 min vs. 91.0 ± 26.5 min)

Table 5 shows clinical outcomes of operative time and estimated blood loss of the patients receiving LAVH, stratified by uterine weight. The uterine weights

Table 1. Indications for hysterectomy

Indication	LAVH (n = 50)	TAH (n = 50)
Myoma uteri	42 (84%)	44 (88%)
Endometriosis	4 (8%)	3 (6%)
Chronic pelvic pain	2 (4%)	1 (2%)
Cervical dysplasia	2 (4%)	2 (4%)
Total	50	50

Values are case number (%)

Table 2. Basic clinical characteristics of subjects

	LAVH (n = 50)	TAH (n = 50)
Age (y)	43.8 +/- 5.5	42.7 +/- 5.8
Parity	1.9 +/- 0.7	1.7 +/- 1.2
Body weight (kg)	59.4 +/- 7.7	56.2 +/- 10.5
Uterine weight (g)	199.6 +/- 76.9	381.8 +/- 238.2*
Prior pelvic surgery	5	7

Values are mean ± standard deviation or case number
* $p < 0.05$

Table 3. Characteristics and clinical outcomes

	LAVH (n = 50)	TAH (n = 50)
Operative time (min)	115.90±40.80	68.20±14.20*
Operative cost (baht)	26,763.48±2,718.37	22,345.50±4,057.40*
Estimated blood loss (ml)	203.00±197.40	235.00±168.80
Postoperative pain control (Diclofenac) (mg)	135.00±67.50	300.00±75.00*
Hospital stay (d)	2.60±0.90	4.50±1.10*
Time to return to work (d) (normal activity)	30.40±3.10	50.90±6.60*
Pathological report		
Leiomyoma	24 (48%)	27 (54%)
Adenomyosis	18 (36%)	17 (34%)
Endometriosis	6 (12%)	3 (6%)
Cervical dysplasia	2 (4%)	2 (4%)
Others	-	1 (2%)

Values are mean ± standard deviation or case number (%)
* $p < 0.05$

Table 4. Complications of hysterectomy

	LAVH (n = 50)	TAH (n = 50)
Major complication		
- Hemorrhage (requiring blood transfusion)	5 (10%)	4 (8%)
- Bladder trauma	1 (2%)	0
- Bowel trauma	0	0
- Ureteral trauma	0	0
- Laparotomy / laproscopy	0	0
Minor complication		
- Febrile (> 38 C)	5 (10%)	4 (8%)
- Urinary tract infection	3 (6%)	2 (4%)
- Vaginal cuff infection	1 (2%)	-
- Wound infection	-	1 (2%)
Total	15	11

Values are case number (%)

Table 5. Mean operative time and estimated blood loss of the patients receiving LAVH, stratified by uterine weight

	Uterine weight equal or less than 200 g (n = 20)	Uterine weight more than 200 g (n = 30)
Uterine weight (g)	150.67±41.10 (70-200)	273.00±56.86 (250-420)*
Operative time (min)	115.83±37.99 (60-200)	114.75±46.86 (60-200)
Estimated blood loss (ml)	164.00±153.66 (80-800)	264.00±239.86 (70-800)

Values are mean ± standard deviation (range)
* $p < 0.05$

in the small and larger uterus were 150.67 ± 41.10 g and 273.00 ± 56.86 g, respectively. There were no statistically significant differences of operative time and estimated blood loss between the two groups (115.83 ± 37.99 min vs. 114.75 ± 46.86 min, 164.00 ± 153.66 ml vs. 264.00 ± 239.86 ml, respectively; $p > 0.05$).

Discussion

Because not all gynecologists are prepared to perform difficult vaginal procedures, LAVH may be an opportunity to become familiar with a vaginal approach[9]. LAVH was introduced to allow surgeons with limited experience in vaginal surgery to remove the uterus without an abdominal incision in the presence of pelvic adhesion, endometriosis, adnexal disease, or large uterus[10].

In Thailand, LAVH is a relatively new surgical technique and rarely performed by general gynecologists. In 2001, Mongkol Chantapakul[11] presented his first publication about LAVH compared to TAH. After his publication, the author trained practicing laparoscopic surgery from Siriraj Hospital and further shared the experience with Dr. Mongkol at Uttaradit Hospital two years after his publication. Totally, the author has 3 years experience of conducting LAVH.

Although there is no consensus about indications of LAVH, relative to TAH, the major indication was myoma uteri in both groups in the present study (84% for LAVH, 88% for TAH). Most studies are retrospective and uncontrolled. The 1995 American College of Obstetricians and Gynecologists (ACOG) criteria set for LAVH states that the indication for LAVH is: "To assist in the performance of a vaginal hysterectomy in a situation in which an abdominal approach might otherwise be indicated"[12]. Indications for LAVH may be the same as those for TAH but there may be some limitations, such as large fibroids, which have typically been the main reason for conversion to TAH[13].

According to the basic clinical characteristics, there was no significant difference in terms of age,

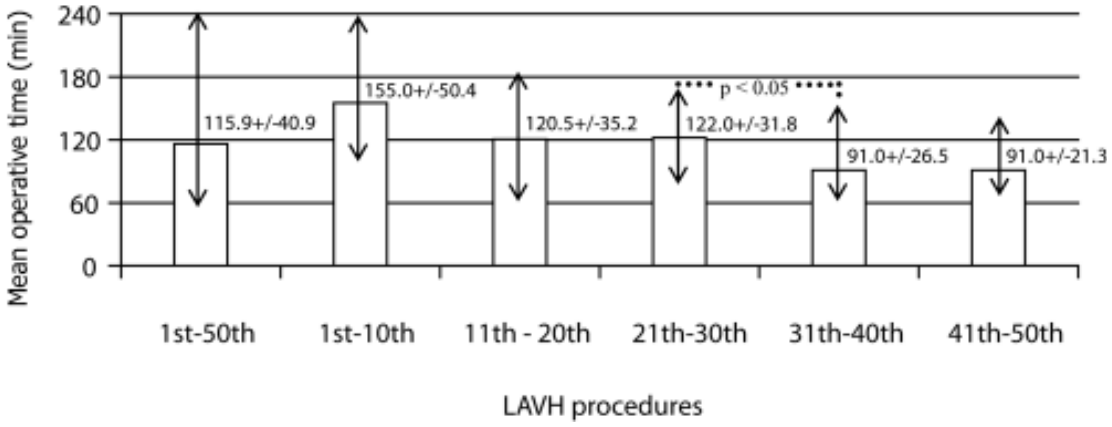

Fig. 1 Learning curve for LAVH

parity, body weight, and prior pelvic surgery. However, the uterine weight was different. The average uterine weight of the TAH group was significantly heavier than the LAVH group but operative time of the LAVH group was significantly longer than TAH group[11,14,15]. These meant that the uterine weight in conventional TAH group did not affect the operative time and the new surgical technique of LAVH needed more time to gain more skill and experience. The learning curve of the LAVH procedure showed that operative times were decreased from an average of 155 min in the first 10 cases to 91 min in the last 10 cases. Certainly, learning curve sets a baseline that directly correlates with skill. As for the estimated blood loss, there was no significant difference between both groups which was similar to most previous studies[16,17]. Fewer patients in the LAVH group needed significantly less analgesics compared to those in the TAH group[11,12, 14,16]. Also, hospital stay for patients with LAVH was significantly shorter than that for patients with TAH. This has been well supported by most earlier studies[14,15,17,18]. According to operative cost, it still remains without a consensus. The author found that the operative cost for the LAVH group was significantly higher than that for the TAH group[11,14,16,18]. This may represent individual physician practices regarding the use of disposable instrumentation and operative time as a function of skill. As demonstrated by one study if reusable instrumentation is used and operative times made efficient, operative cost for the LAVH group may be reduced to less than that of the TAH group[19]. Time to return to work was significantly shortened among the LAVH group[20,21]. Using a recovery scale of 1 to 10, it showed significant difference in recovery score between the LAVH and TAH groups as early as day 7. This was more pronounced by day 14, when the mean scores for the LAVH group were 8 and 5 for the TAH group; significant differences even persisted to day 28, with scores of 9 and 7. Regarding complications in the LAVH group, bladder perforation was the most serious one that resulted during bladder - flap dissection in a patient with previous surgery in this area. The bladder lesion was laparoscopically repaired with continuous 2-0 chromic catgut in two layers[12]. The common complications in both groups were hemorrhage and febrile morbidity.

After further stratifying these patients by uterine weight, the author found no statistical differences in operative time and estimated blood loss among the LAVH group when setting the cut-off value at 200 g. These meant that neither operative time nor estimated blood loss was affected by uterine weight in the LAVH group.

Limitation of the present study includes inadequacy of nurses and LAVH-instrument. Nurses trained for LAVH procedure are not adequate. Circulating and scrub nurses have trained for the procedure systemically in Uttaradit Hospital. Continuous quality improvement has been implemented to evaluate nursing skills. Standard LAVH-instrument is small in number. Disposable instruments are sometimes re-used. One of the pitfalls about LAVH is that all cases are successful. Nevertheless, multiple myoma and large uterus often are barriers. Thus, accurate pre-operative diagnosis is essential. However, none of the cases in the LAVH group were converted to TAH.

Conclusion

The author concludes that in the present study both LAVH and TAH are comparable in terms of pre-operative situation, intra-operative complication rates, and post operative course. LAVH is better than TAH regarding less pain, shorter length of hospital stay, and quicker return to work. Moreover, LAVH does not increase intra- or post operative complications. However, this new surgical technique should be improved in terms of operative time through a better learning curve and cost by using reusable instrumentation. Thus, LAVH is worthwhile promoting in the future for a group of well trained operators.

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ศึกษาเปรียบเทียบระหว่างการผ่าตัดมดลูกทางช่องคลอดโดยใช้กล้องวีดิทัศน์ช่วยกับการผ่าตัดมดลูกทางหน้าท้อง

ประสงค์ จตุรศรีวิไล

***วัตถุประสงค์**: เปรียบเทียบประสิทธิผลของการผ่าตัดมดลูกด้วยกล้องวีดิทัศน์ (LAVH) กับการผ่าตัดมดลูกทางหน้าท้อง (TAH)*

***วัสดุและวิธีการ**: รายงานผลการศึกษาบันทึกข้อมูลของคนไข้ที่ผ่าตัดมดลูกทางช่องคลอดโดยใช้กล้องวีดิทัศน์ช่วย จำนวน 50 ราย กับคนไข้ผ่าตัดมดลูกทางหน้าท้อง จำนวน 50 ราย ในช่วงเวลาตั้งแต่ 1 มกราคม พ.ศ. 2547 ถึง 31 ธันวาคม พ.ศ. 2547*

***ผลการศึกษา**: ประวัติข้อมูลพื้นฐานไม่แตกต่างกันทั้งสองกลุ่ม เวลาที่ผ่าตัด (115.9 $\pm$ 40.8 นาที และ 68.2 $\pm$ 14.2 นาที) ค่าใช้จ่ายในการผ่าตัด (26,763.48 $\pm$ 2,718.37 บาท และ 22,345.50 $\pm$ 4,057.40 บาท) จำนวนยาแก้ปวด diclofenac (135.0 $\pm$ 67.5 มก และ 300.0 $\pm$ 75.0 มก) ระยะเวลานอนพักรักษาในโรงพยาบาล (2.6 $\pm$ 0.9 วัน และ 4.5 $\pm$ 1.1 วัน) และระยะฟื้นตัวกลับไปทำงานปกติได้ (30.4 $\pm$ 3.1 วัน และ 50.9 $\pm$ 6.6 วัน) มีความแตกต่างอย่างมีนัยสำคัญในกลุ่ม LAVH เมื่อเทียบกับกลุ่ม TAH จำนวนเลือดที่เสียในการผ่าตัดไม่แตกต่างกันทั้งสองกลุ่มภาวะแทรกซ้อนที่สำคัญในกลุ่ม LAVH คือ การทะลุของกระเพาะปัสสาวะจำนวน 1 ราย แต่ไม่พบในกลุ่ม TAH การเสียเลือดและการมีไข้เป็นภาวะแทรกซ้อนที่พบบ่อยในทั้งสองกลุ่ม ระยะช่วงเวลาการเรียนรู้การผ่าตัด LAVH พบว่า เวลาที่ใช้ในการผ่าตัดผู้ป่วย ระหว่าง 10 รายชุดที่ 3 และ 10 รายชุดที่ 4 (122.0 $\pm$ 31.8 นาทีและ 91.0 $\pm$ 26.5 นาที) มีความแตกต่างอย่างมีนัยสำคัญ ในกลุ่ม LAVH ที่ถูกแบ่งเป็น 2 กลุ่มย่อยโดยใช้น้ำหนักมดลูก 200 กรัม เป็นจุดแบ่งไม่พบความแตกต่างของเวลาผ่าตัด และจำนวนเลือดที่เสีย*

***สรุป**: LAVH มีข้อดีในแง่ลดความเจ็บปวด ลดระยะนอนพักรักษาในโรงพยาบาล ลดระยะฟื้นตัวกลับไปทำงานปกติเร็วขึ้น แต่มีความแตกต่างในเรื่องค่าใช้จ่ายที่สูงขึ้นและระยะเวลาในการผ่าตัดนอกจากนี้ภาวะแทรกซ้อนที่พบไม่ได้แตกต่างจากกลุ่ม TAH*

LAVH เป็นหัตถการใหม่ที่มีประโยชน์ ควรค่าแก่การศึกษาและสามารถนำไปใช้กับผู้ป่วยที่มีข้อบ่งชี้ที่เหมาะสม และผู้ป่วยจะได้ประโยชน์จากหัตถการนี้มากที่สุด ในมือของแพทย์ที่ได้รับการฝึกอบรมในการใช้วิธีนี้เป็นอย่างดีมาแล้ว และไม่คำนึงถึงค่าใช้จ่ายที่เพิ่มขึ้นจากการผ่าตัดด้วยวิธีนี้