Low Complication Rate Associated with Total Laparoscopic Hysterectomies Using the Retroperitoneal Approach: A Series of 1,092 Cases in Siriraj Hospital

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ABSTRACT

Objective: This study was performed to evaluate the incidence of and risk factors for major complications associated with the Siriraj total laparoscopic hysterectomy (SiTLH) technique.

Methods: In total, 1,092 patients who underwent SiTLH from January 2009 to December 2013 were enrolled in this retrospective study. The incidence of major complications such as death, vascular injury, visceral injury was the main outcome. Comparison between the patients with and without complications was such as unintended laparoconversion, vascular injury, visceral injury performed to determine associated risk factors. Patient satisfaction was also evaluated.

Results: The incidence of major complications was 2.1%. There was a significantly increased risk of major complications among the patients with a uterine weight of ≥500 g (7.5% vs 1.8%, P =0.002), the patients with a uterine weight of ≥400 g and pelvic endometriosis (14.3% vs 1.9%, P =0.033), or experience of surgeon <15 years (2.9% vs 1.2%, P=0.049). In total, 1,031 (94.4%) of the patients were extremely satisfied with the results of surgery.

Conclusion: SiTLH technique is feasible and safe. However, the authors believe that good surgical skills and an understanding of the pelvic anatomy are essential to ensure good outcomes using our technique.

Keywords: Total laparoscopic hysterectomy; complication; associated factor (Siriraj Med J 2018;70: 191-197)

INTRODUCTION

Hysterectomy is the most common major gynecological procedure in Thailand. Traditionally, it is performed by laparotomy or a vaginal approach. However, during the past two decades, laparoscopic surgery has played an important role in hysterectomy since its initial report in 1989.[1] The advantages of laparoscopy include decreased postoperative pain, a more rapid return to normal activities, fewer wound complications, and a lower incidence of postoperative adhesion.[2] Johnson et al.,[3] compared the methods of hysterectomy and found a significantly quicker return to normal activities in association with vaginal hysterectomy. When vaginal hysterectomy is not possible, laparoscopic hysterectomy is preferable to abdominal hysterectomy, although this is at the cost of a greater chance of bladder or ureter injury. Conversely, several studies[4,5] found no significant differences in major complications between total laparoscopic hysterectomy (TLH) and total abdominal hysterectomy. This discrepancy is probably a result of the technical difficulty of the procedures, the steep learning curve, and selection bias.

We performed the first TLH in Siriraj Hospital in

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2004 and subsequently initiated a Siriraj TLH technique (SiTLH) in 2006. The aims of the present study were to determine the complication rate of this novel technique and to evaluate the risk factors associated with these major complications.

MATERIALS AND METHODS

This was a retrospective, descriptive study. Medical records were retrieved from the Department of Obstetrics and Gynecology, Faculty of Medicine Siriraj Hospital, Mahidol University.This study was reviewed and approved by the Ethics Committee of the Faculty of Medicine Siriraj Hospital, Mahidol University before the study began (Si 004/2015). All patients who underwent SiTLH by the staff working in the Thai-German Multidisciplinary Endoscopic Training Center between 5th January 2009 and 27th December 2013 were eligible. Patients with incomplete medical records were excluded. Informed consent was not required because of the retrospective nature of the study.

In total, 1,092 patients who met our criteria were recruited for the study. Data collection included preoperative, intraoperative, and postoperative characteristics of the patients. The operative time was defined as the duration from skin incision to wound closure. The uterus was weighed immediately after the operation. Major complications were defined as death, vascular injury, visceral injury, unintended laparoconversion, massive blood loss requiring blood transfusion, and vaginal cuff bleeding or dehiscence requiring readmission or surgical intervention. Laparoconversion was described as the need to change from laparoscopic surgery to laparotomy. Blood loss was measured by the difference between the volume of fluid in the suction equipment and the volume of saline solution used during irrigation. Organ injuries were defined as those requiring surgical correction. Massive blood loss was defined as a total blood loss of >1,000 ml. Postoperative fever was defined as a temperature of at least 38°C, measured on two separate occasion at least 12 hours apart, after the first day of the postoperative period. Three months postoperatively, all patients were assessed regarding their long term complication and satisfaction level on a Likert-type scale[6] of 1 to 5 by a telephone interview and feedback.

The incidence of major complications was determined as the main outcome. Comparison of patients with and without complications was performed to identify associated risk factors. All statistical analyses were performed using SPSS version 13 software (SPSS Inc., Chicago, IL, USA). Demographic data are presented as number (percentage), mean ± standard deviation, and median (range). Student's t test, the Chi-square test, and Fisher's exact test were used to compare the two groups. A *P* value of <0.05 was considered statistically significant.

Siriraj TLH technique (SiTLH)

We developed a new surgical technique to reduce the rate of internal organ injury and blood loss during TLH. The principles of our technique include early identification of both ureters at the beginning of surgery, dissection of the ureter and uterine artery in the retroperitoneal space, ligation of the uterine artery to reduce the blood supply to the uterus, and restoration of the pelvic anatomy from the adhesion-free area to the adhesion area.

All laparoscopic procedures were performed under general anesthesia with the patient in the lithotomy position. A sound-tenaculum uterine manipulator was placed. Bladder drainage was established by insertion of a 14-French Foley catheter. The abdominal entry technique was introduced with the Veress needle/trocar technique. A10-mm laparoscopic trocar was inserted at intraumbilical area for the optic, and two or three 5-mm trocar at both iliac and suprapubic regions for ancillary instruments. In difficult cases, the10-step SiTLHwas routinely performed as follows. (I) The round ligament was grasped, bipolarly cauterized, and cut downward to the vesico-uterine peritoneum. (II) The bladder was dissected from the lower uterine segment. (III) The posterior leaf of the broad ligament was opened, and the infundibulopelvic ligament or the ovarian ligament was tied with 1-0 Polyglactin, bipolarly cauterized, and cut depending on whether the ovaries were being preserved. (IV) The retroperitoneal space was created. (V) The uterine artery was isolated and ligated at its origin with 1-0 Polyglactin. (VI) The ureter was identified, and ureterolysis was performed from the cephalic to caudal part as shown in Fig 1. The same procedure was also performed on the other side. (VII) In patients with severe pelvic adhesion such as those with severe pelvic endometriosis, restoration of the pelvic anatomy commenced from the adhesion-free area to the adhesion area. Dissection between the rectum and posterior wall of the uterus was achieved by creation of the medial pararectal space and rectovaginal space as shown in Fig 2. (VIII) Both cardinal ligaments were sutured above the ureter with 1-0 Polyglactin, then bipolarly cauterized and cut as shown in Fig 3. (IX) The vaginal tube was inserted. Colpotomy was performed with a monopolar hook at the level of the vaginal fornix. If the uterus was large, the specimen was morcellated via the 11-mm trocar with morcellator. The rest of the uterus was removed through the vagina. (X) The vaginal vault was sutured laparoscopically with 1-0 Polyglactin.

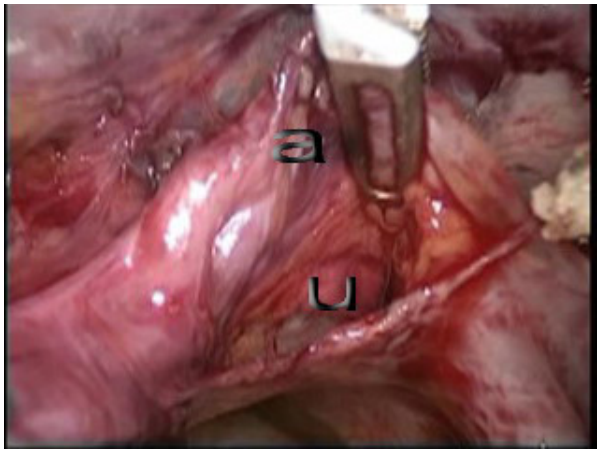

Fig 1. Retroperitoneal dissection showed uterine artery (a), ureter (u).

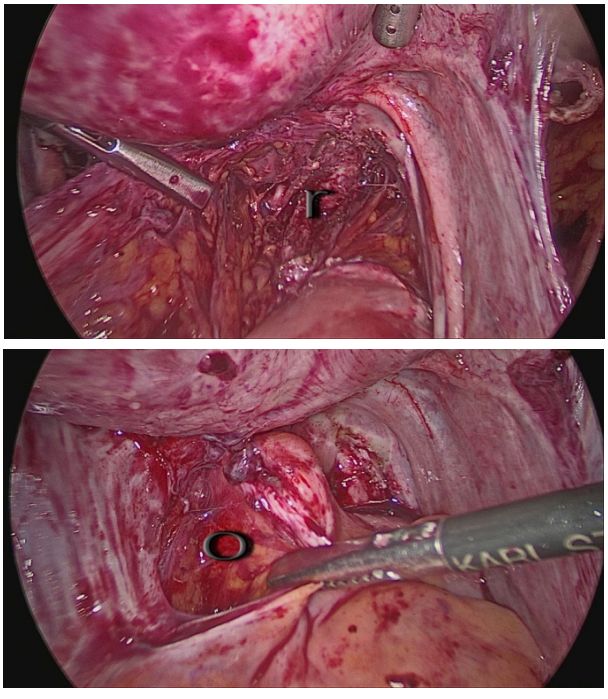

Fig 2. Dissection between the rectum and posterior wall of the uterus was archived by creation of the medial pararectal space (o) and rectovaginal space (r).

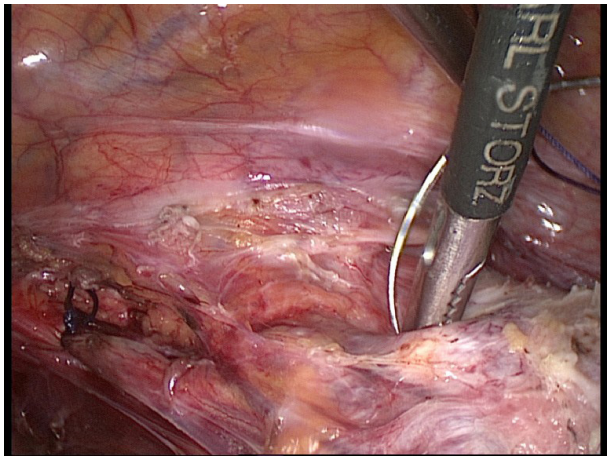

Fig 3. Cardinal ligament was sutured above the ureter with 1-0 Polyglactin.

RESULTS

In total, 1,092 patients who underwent SiTLH were enrolled during the study period. With the mean age of 43.6 years and the mean body mass index of 23.4 kg/m^2, more than one third of them had a history of previous surgery. The most common previous surgery was cesarean section (21%). Endometriosis was the most common main diagnosis (44.5%) followed by myoma uteri (38.5%) (Table 1).

With the median intra-operative blood loss of 50 ml and the mean length of hospital stay after surgery of 2.8 days, 23 of them (2.1%) had major complication (Table 2). Most of the major complications were detected intra-operatively, whereas four of them were detected after discharge.Nearly half of major complications (11/23) was bladder injury. A case of unintended laparoconversion due to uncontrollable massive bleeding was observed. The most common late complication was vaginal cuff dehiscence (Table 3).

Risk factors for major complications were the specimen weight of ≥500 g, the specimen weight of ≥400 g with pelvic endometriosis, and experience of surgeon <15 years (Table 4). By subgroup analysis, neither previous cesarean section, uterine weight ≥500 g nor previous cesarean section with uterine weight ≥500 g was correlated with bladder injury (p=0.708, 0.503, 1.00, respectively). Moreover, pelvic endometriosis was not associated with ureteric injuries (p=1.00). Not only did the experience of surgeon significantly reduce the major complications, but also massive blood loss as shown in Figs 4 and 5, respectively.

DISCUSSION

The major complication rate SiTLH in the present study was 2.1%. It represents an acceptable outcome, compared with many previous studies.[4,5,7,8] A systemic review[7] found the total complication rate of TLH varied from 0.6 to 18.0%. Additional to surgeon's experience and surgical technique, these variations depend on the inclusion/exclusion criteria, disease pathology, surgical instruments, and patient characteristics. Compared with conventional TLH technique, TLH with retroperitoneal approach had a low complication rate.[7-9] The complication rate and the number of patients in the present study were comparable with that of the report of Kobayashi et al.[8] They reported TLH with retroperitoneal approach in 1,253 patients using an early ureteral identification technique with 0.4% of ureteric injury, and 181 ml of mean blood loss. SiTLH was a retroperitoneal approach technique, not only invented to reduce ureteric injury by ureteral identification and/or ureterolysis, but also this

TABLE 1. Baseline characteristics (N= 1,092).

Characteristics	Values[a]
Age, y	43.6 ± 10.3
Body mass index[b]	23.4 ± 4.5
Morbid obesity	94 (8.6)
Previous surgery	390 (35.7)
Main diagnosis	
Severe endometriosis	486 (44.5)
Myoma uteri	420 (38.5)
Others	186 (17.0)
Additional surgical procedures	
Adnexal surgery	660 (60.5)
Lymph node dissection/sampling	20 (1.8)
Excision of deeply infiltrating endometriosis	14 (1.3)
Others	37 (3.4)

[a] Values are given as mean ± standard deviation or number (percentage).
[b] Calculated as weight in kilograms divided by the square of height in meters.

TABLE 2. Operative outcomes (N = 1,092).

Outcomes	Values[a]
Readmission	5 (0.5)
Reoperation	4 (0.4)
Length of hospital stay, d	2.8 ± 1.3
Operative time, min	150 (120, 180)
Specimen weight, g	200 (120, 300)
Blood loss, ml	50 (30, 100)
Blood transfusion	5 (0.5)
Total complication[b]	45 (4.1)
Major complication[b]	23 (2.1)
Minor complication[b]	22 (2.0)
Patient satisfaction	
Extremely satisfied	1,031 (94.4)
Very satisfied	35 (3.2)
Moderately satisfied	6 (0.5)
Slightly satisfied	12 (1.1)
Not all satisfied	8 (0.7)

[a] Values are given as mean ± standard deviation, number (percentage) or median (interquartile range).
[b] Calculated as number of patients who had a complication divided by total number of patients.

TABLE 3. Complication rates associated with laparoscopic hysterectomy.

Complication rate	Values[a]
Major complication[b]	23 (2.1)
Early complications	
Bladder injury[c]	11 (1.0)
Ureteric injury[c]	2 (0.2)
Bowel injury[c]	1 (0.1)
Massive blood loss with/without blood transfusion[c]	7 (0.6)
Unintended laparoconversion[c]	1 (0.1)
Late complications	
Vaginal cuff dehiscence[c]	3 (0.3)
Ureteric stenosis[c]	1 (0.1)
Minor complication rate[b]	22 (2.0)
Fever[c]	16 (1.5)
Shoulder/epigastric pain[c]	11 (1.0)
Nausea/vomiting[c]	5 (0.5)
Urinary retension[c]	1 (0.1)
Vaginal cuff infection[c]	1 (0.1)
Total complication[b]	45 (4.1)

[a] Values are given as number (percentage).
[b] Calculated as number of patients who had a complication divided by total number of patients.
[c] Calculated as number of events divided by total number of patients.

TABLE 4. Risk of the major complications associated with various risk factors.

Risk factors	Yes	No	*P* value
Specimen weight of ≥ 500 g	5/67 (7.5)	18/1,025 (1.8)	0.002
Presence of pelvic endometriosis	10/486 (2.1)	13/606 (2.1)	0.630
Specimen weight of ≥ 400 g with presence of pelvic endometriosis	2/14 (14.3)	21/1,078 (1.9)	0.033
Surgeon experience of < 15 years	17/586 (2.9)	6/506 (1.2)	0.049
Lymph node dissection/sampling	0/20 (0)	23/1,072 (2.1)	1.000
Morbid obesity	3/94 (3.2)	20/998 (2.0)	0.443
Previous abdominal surgery	10/390 (2.6)	13/702 (1.9)	0.432

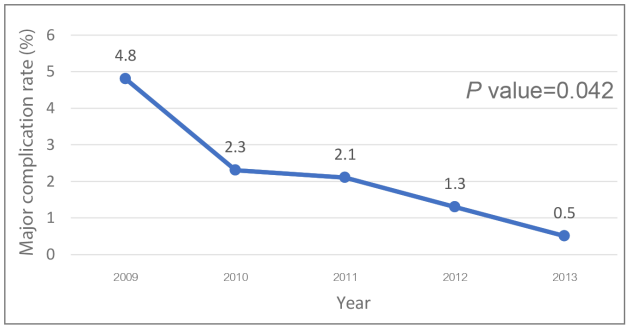

Fig 4. Major complication rate by the year of surgery.

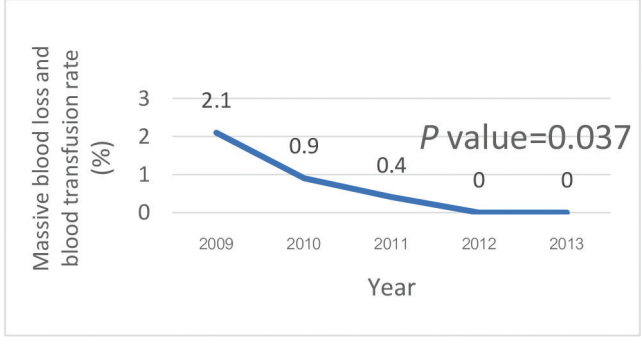

Fig 5. Massive blood loss with blood transfusion rate by the year of surgery.

technique intended to reduce blood loss by early ligation of major blood supply to uterus at the beginning of the procedure reducing the rate of ureteric injury, and the median blood loss, so the rate of blood transfusion in the present study was very low, 0.2%, 50 ml and 0.5%, respectively. Since, nearly half of the cases in the present study had severe pelvic endometriosis, they underwent difficult laparoscopic surgical procedure.This could be a benefit of SiTLH technique, because TLH in this pelvic inflammatory and adhesive disease resulted in increase in ureteric injury, intraoperative blood loss and blood transfusion.[10]

Many surgeons ignore to perform early ligation of both uterine arteries and infundibulopelvic (IP) ligaments. By the author's experience, doing early ligation can dramatically reduce blood loss from many raw surface areas fed by small branches of these major vasculatures. Moreover, the benefit of both IP ligament ligations before coagulation and cutting them in SiTLH technique can absolutely prevent the venous reflux. Without IP ligament ligation, the venous reflex from these ligaments is commonly found during the surgical process. It is not only unnecessary blood loss, but it also hinders the maintenance of the surgical field leading to increased risk of retroperitoneal structural injuries.

Basic laparoscopic surgery such as diagnostic laparoscopy is sufficiently mastered during residency training, although not for the more advanced procedures. Twenty cases were required to guarantee competency, whereas 30-50 cases were required to master a specific procedure such as TLH.[11] All surgeons in the present study had performed more than 30 cases of conventional TLH before SiTLH was invented. Major complications, massive blood loss and blood transfusion rate in the present study were significantly decreased by the years of surgery. It represented that SiTLH required deep and steep learning curve for getting familiar in this sophisticated technique to gain more experience.

In difficult cases, early identification of both ureters, retroperitoneal space dissection, routine ureterolysis and dissection from the adhesion-free area to the adhesion area in this technique can decrease the rate of ureteral injury. The rate of ureteric injury in the present study was only 0.2%, compared with a rate of 2.0% to 2.5% in previous studies.[4,12] However, the authors found a case of moderate hydronephrosis after 3 months of surgery. She underwent SiTLH technique with extensive right ureterolysis due to severe pelvic endometriosis with severe retroperitoneal adhesion. Further studies are needed to verify the long-term effect of ureterolysis in case of severe retroperitoneal adhesion.

Interestingly, bladder injury was the most common complication in the present study, comparable to the previous studies.[7,13] Lafay Pillet MC et al.,[14] demonstrated the rate of bladder injuries was 1%. The risk factors were previous caesarean section and previous laparotomy. However, the rate of injury reduced with the surgeons' experience and reached a plateau of 0.4% after 100 hysterectomies performed. Of 11 cases of bladder injury, 3 patients had a history of previous cesarean section, 2 patients had a uterine weight ≥ 500 g, 2 patients had bladder endometriosis, and 7 patients were operated on by surgeon that had an experience less than 15 years. In the present study, only surgeon experience was associated with bladder injury (p=0.17), whereas the others were not. However, our study had a small sample size to detect such a complication when subgroup analysis was applied.

A meta-analysis reported the low incidence of vaginal dehiscence was 0.64%. However, this extremely serious post-operative complication, with potential heavy morbidity of patients, needs urgent intervention otherwise the severe sequelae such as bowel gangrene, and pelvic peritonitis might be developed. Laparoscopic vaginal suturing was found to be the only risk factor of this complication, whereas use of monopolar or reducing the power energy did not alter the rate of cuff separation.[15] In the present study, there were only three vaginal cuff

dehiscences (0.3%) found. Interestingly, all of them had this kind of complication during sexual intercourse at 2 months after surgery. Hence, our patients were advised to restrain from sexual intercourse for at least 3 months postoperatively. Additionally, triple layer vaginal vault closure technique was developed in 2015 to reduce this severe post-operative complication to be zero. Further studies are needed to verify the long-term effect of this type of procedure.

Several studies[16-19] demonstrated that TLH is feasible and safe for selected patients with uteri weighing >500 g. On the contrary, specimen weight of ≥500 g was a risk factor associated with major complications in our study. This discrepancy may be related with more varieties of surgical experience and more coexisting pelvic endometriosis. Most of our complicated cases were performed by less experienced surgeons (74%) and up to 43% of cases had coexisting severe pelvic endometriosis. The large uterus coexisting with severe pelvic endometriosis affected the mobility of the uterus during surgery. Bladder injury was the most common complication in the present study. After analysis, we found that it associated with less experienced surgeons and incorrect anatomical dissection was the major cause.

Additional to the number of sample size, the variations in surgical skill, and long-term follow-up for at least 3 months to detect late complication were our strengths. Moreover, coexisting pathologies such as severe pelvic endometriosis and the oncologic operations such as pelvic and para-aortic lymphadenectomy were used for determination.

In conclusion, SiTLH technique in experienced hands can decrease the complication rate especially the massive blood loss volume or blood transfusion rate and reduces the ureteric injury.

Conflict of Interest: The authors declare no conflicts of interest.

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