

Total Robotic Hysterectomy: Thailand's First Case Report of Gynecologic Robotic Surgery

Korakot Sirimai, M.D.*, Perapong Inthasorn, M.D.***, Pavit Sutthritpongsa, M.D.*, Prasong Tanmahasamut, M.D.***

*Division of Gynecologic Endoscopy, **Division of Gynecologic Oncology, ***Division of Reproductive Medicine, Department of Obstetrics and Gynecology, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok 10700, Thailand.

ABSTRACT

Objective: This study aimed to report the feasibility, trouble shooting and surgical technique in the total robotic hysterectomy for the patient with adenomyoma uteri.

Methods: A 51 year-old patient was diagnosed with adenomyosis. Total robotic hysterectomy was performed.

Results: Total operating time was 350 min, estimated blood loss was 50 ml, and length of hospitalization was 6 days. The pathologic section revealed adenomyosis with myoma uteri. The intraoperative and post-operative complications were unremarkable. The patient was in good conditions at 6th week, 3rd, 6th, 12th and 24th month.

Conclusion: Total robotic hysterectomy for benign gynecologic condition, such as adenomyosis, is safe and feasible. However, the sustained high consuming cost must be weighted with the patient's advantages.

Keywords: Robotic, hysterectomy, adenomyosis, myoma uteri

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INTRODUCTION

For gynecologic arena, Minimally Invasive Surgery (MIS) has been accepted for a long time in terms of microsurgery and laparoscopic surgery. Since 1992, modern laparoscopic surgery has been used in the Department of Obstetrics and Gynecology, Faculty of Medicine Siriraj Hospital, Mahidol University. It is currently advanced and has been accepted as a standard of care in many benign and malignant gynecologic conditions.

The advantages of three-dimensional (3D) HD vision in conjunction with the more precision of robotic motion without tremor as well as the over-rotated-movement of the endowrist beyond human hand make the over-expected surgery pos-

sible. The robotic assisted laparoscopic surgical project in our hospital has been successfully pioneered by the urologists and the general surgeons. Through these promissive outcomes, this project has been extended to the gynecologic operation and the first total robotic hysterectomy with adhesiolysis in adenomyosis has been evaluated in this report.

The purpose of this report is to present the initial surgical experience, safety and feasibility of the da Vinci S robotic system for the first total robotic hysterectomy in Siriraj Hospital. This report will pave the way for the beginner to have more knowledge and experience for proper decision making and procedure performance.

CASE REPORT

A 51-year-old woman, body mass index 27.01, presented with chief complaint of metro-menorrhagia and pelvic pain for one year. The patient had increasing frequency of voiding

Correspondence to: Perapong Inthasorn,
E-mail: perapong_i@hotmail.com

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especially 3-4 times of nocturnal urea with pelvic pain for one year. The pelvic examination revealed the globular enlargement of the uterus. Uterine enlargement was about 14 week's gestational size. Adenomyosis was diagnosed and the trans-vaginal ultrasonography confirmation showed 105 mm intramural mass was present.

The total robotic hysterectomy with bilateral salpingo-oophorectomy associated with preoperative 3 months GnRh analog (Enantone[®] 3.75 mg) was performed.

Surgical technique

The standard plastic draped da Vinci S Robotic Surgical System (Intuitive Surgical, Sunnyvale, California) was used for the operation.

After finishing the general anesthesia with endotracheal and gastric intubation, the patient was put in lithotomy position with 10-15 degree raised legs on the stirrup arm with leg supports. After the proper position was achieved, the patient's shoulders were fixed to the operating table with jacket suit and belt. Sponge padding was used to protect the patient's head and both legs. The patient's arms were always placed beside her body. Finally, the patient was covered with a warm blanket.

For boundary of the operation, the upper border was the level of the lower sternal border, the lower border was in the level of symphysis pubis, and lateral borders of both sides extended a few centimeters beyond the anterior superior iliac spine. A uterine manipulator was inserted to the uterine cavity with sterile technique. Then the universal preoperative cleaning and draping were done.

An initial pneumoperitoneum up to 18 mmHg was established using a Veress needle through a supraumbilical incision about 2-5 cm above the umbilicus, then the optical port (12 mm diameter obturator with 150 mm length, ENDO-PATH[®] XCEL[®] Bladeless Trocars) was introduced afterward.

Two robotic trocars 8 mm were inserted at the position of both iliac fossa which corresponded to the operative field under direct visualization. Their position was about 5 cm cephalad and 2 cm medial to anterior superior iliac spine. Another 12

mm accessory port was also placed under direct visualization at the left subcostal region 5 cm above the midpoint between optical port and right iliac port. (Fig 1) All port sites were determined after completeness of the pneumoperitoneum and properly adjusted before insertion of the trocars, to guarantee the proper space between the ports, which should not be less than 10 cm. The internal organs inspections as well as surgical planning were performed at the deep Trendelenburg position after the completeness of ports insertion. The deep Trendelenburg position is able to move the bowel out of the pelvis. The robotic patient cart was then docked between the patient's legs.

Dissection was performed with the robotic EndoWrist Fenestrated Maryland Bipolar Cautery on the left hand and EndoWrist monopolar curved scissors on the right hand. The following laparoscopic instruments were used by the assistants: the atraumatic graspers, the suction device, and the bipolar cauterization device. One scrub nurse and 1 circulating nurse stood by the surgeons and the patient.

The surgical procedure was controlled by the console surgeon and started with grasping of the right round ligament close to the abdominal wall with EndoWrist Fenestrated Maryland Bipolar Cautery on the left hand, then coagulated and cut by monopolar curved scissors. The 2 leaves of the right board ligaments were separated with monopolar curved scissors then the window opened at right posterior board ligament peritoneum with awareness about the vessels, in order to drop the right ureter down and expose the infundibulopelvic ligament clearly. The right

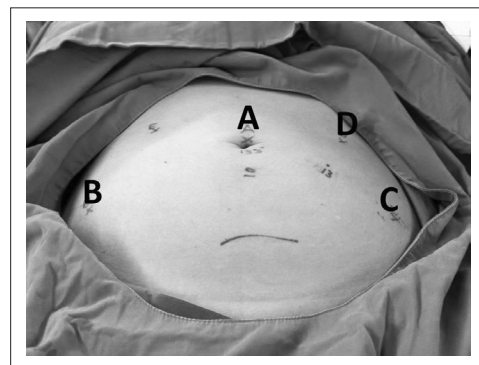


Fig 1. Ports placement

A= Camera port, B= Instrument arm 1, C= Instrument arm 2, D= Accessory port

infundibulopelvic ligament was ligated with Vicry no.1, coagulated and was cut with the right hand EndoWrist monopolar curved scissors. Then, the vesico-uterine peritoneal incision was extended from round ligament to uterovesical fold at the ischmic level and the peritoneal leave with the bladder were detached and pushed downward away from the cervix and upper portion of vagina by blunt dissection and monopolar coagulation. The high précision dissection of the tissue plane between bladder and the cervix should be focused for the beneficial dissection by the right hand EndoWrist monopolar curved scissors.

For the prevention of ureteric injury, the ureter was dissected and identified to the level of the uterine artery. The uterine artery was dissected and ligated with Vicryl no.1 then cut. The same procedure was carried out on the left side.

The adhesion between the lower part of the uterus and the rectum was removed through the opening of pararectal space at both sides. Then, the rectovaginal septum was exposed clearly. Then both cardinal ligaments were sharply dissected downward with monopolar coagulation of the scissors tip, while they were counteracted by EndoWrist Fenestrated Maryland Bipolar Cautery on the left hand.

The uterine manipulator was removed from the uterine cavity, and the vaginal tube (Fig 2) was inserted to the vaginal fornixes. Transverse incision was done at the anterior vaginal wall just below the cervix by sharp coagulation with monopolar curved scissors tips anteriorly, and then extended circumferentially around the cervix. The vaginal vault closure was performed by using 3 figure of eight Vicry no.1 stitches.

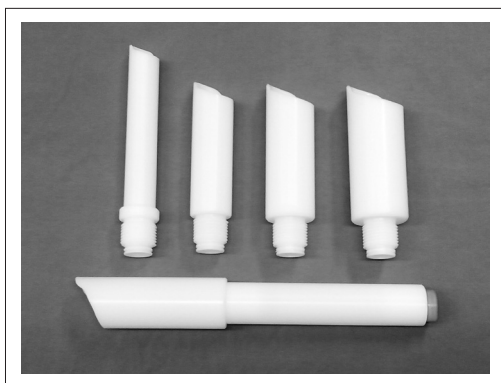


Fig 2. Vaginal tubes

After completeness of the hemostasis, undocking the robotic arm at the left iliac port and morcellation of the uterine specimen through this port was done under vision. Copious saline irrigation and suction was performed to recheck the bleeding point.

Undocking of the robotic machine was done at the end of the procedure. The fascia and skin incisions were closed with absorbable sutures.

The operating time was measured from the first incision until closure. The blood loss was estimated from the difference between suction and irrigation fluids. The estimated blood loss was 50 ml. The total operative time was 350 minutes. The total robotic setup time (preparation, port placement, docking) was 50 minutes with a console time of 230 minutes. There were no intraoperative complications. The post-operative course was uneventful and the patient was discharged from the hospital on 5th post-operative day.

The uterine weight was 183 gm. Pathological result confirmed adenomyosis in myometrium with intramural myoma. The patient was stitched off on the seventh post-operative day and revealed normal pelvic examination at 6th week post-operative. Estrogen replacement therapy was provided post-operatively. At 6th week, 3rd, 6th, 12th and 24th month follow-up, she was in good condition without any symptom suggesting recurrent pelvic pain.

DISCUSSION

Reich has operated and published successfully on the first case of laparoscopic assisted vaginal hysterectomy in the patient who was suffering from endometriosis and leiomyoma uteri since 1989. Since then, laparoscopy approach for hysterectomy has increased remarkably worldwide. In the year 2002, the newly developed da Vinci robotic system was first reported for performing hysterectomies by Diaz-Arrastia et al¹.

In Siriraj Hospital, around 1,500 hysterectomies have been performed each year and twenty percent have been done laparoscopically. In order to expand hospital service, the more advanced da Vinci S robotic surgical system (Intuitive Surgical, Sunnyvale, California), has been launched in

Siriraj Hospital since 2007 and the first case of total robotic hysterectomy for adenomyosis has been performed.

The patient was informed of many standard methods of management preoperatively such as progestogen therapy and Myrena[®] intrauterine device insertion, or surgery. Myrena[®] intrauterine device is also the useful method to alleviate the patient's symptom, such as minimize menstrual bleeding and pain². However, this patient preferred hysterectomy in minimally invasive way. The total robotic hysterectomy with bilateral salpingo-oophorectomy was proposed to the patient because of the perimenopausal status and the diagnosis of adenomyosis. Even the ovarian conservation until at least age 65 years confers long term survival benefits for those women with average risk for ovarian cancer³. GnRH analogue (Enantone[®] 3.75 mg) intramuscular injection was prescribed for 3 months, in order to reduce uterine size and minimize pain and bleeding⁴.

Table 1 shows the outcome of robotic hysterectomy, performed in the recent years. Most of the recent literatures belong to the United States. From the reviewed literature, the robotic

hysterectomy always took more operative time. They showed the high rate of the conversion to open laparotomy in many reports. However, the other complications are always bleeding and urinary tract injuries.

Compared to world literatures and ourselves, for conventional total laparoscopic hysterectomy, the operative time of our first total robotic hysterectomy was longer. These included both robotic setup time and console time. Sait KH reported from Saudi Arabia in 2011 with the fastest docking times which averaged seven minutes⁹. The rational for longer operative time in this patient were: the beginning of the learning curve, the severe adhesions at uterus and rectum, and the bad exposure of the operative field by small bowel. However, Lenihan et al, reported in 2008 that robotic console and operative times will plateau after approximately 50 cases, so the improvement of the surgeon depends on their volume of robotic surgery¹⁰.

Fifty milliliters of blood loss and no uneventful complication were found. This confirmed the very small blood loss and small number of complications as in the literatures.

TABLE 1. Comparison of operative outcomes of robotic hysterectomy.

Surgery	OR time (min.)	Uterine weight	EBL (mL)	Hospital stay (days)	Conversions to OS	Intraoperative complications	Post-operative complications
Payne et al. 2008 ⁵	119.4±59.3	266.6±374.5	61±60.9	1±0.7	4%	1/100 bladder injury	1/100 cuff infection
Feuer et al. 2011 ⁶	80.9±3.44	138.98±10.2	63.5±3.76	1.3±0.15	0	1/55 bladder injury	3/55 nausea/ vomiting/ fever 9/55 vaginal dis- charge, urinary tract infection or pelvic abscess
Soto et al. 2011 ⁷	150.8±33.5	94	131.5	1.9±0.95	3.89%	0	0
Kilic et al. 2011 ⁸	286.2±82.87	Less than 250 g 14 (56.00%)	137.4±107.50	1.8±0.88	8.00%	1/25 ureteral injury, 3/25 uterine artery bleeding, vaginal laceration, serosal of bowel and bladder injury	1/25 both cuff cellulitis and trocar site pain 4/25 irregular blood pressure, urinary tract infection, and trocar site pain

Even the operative time was longer than normal, when compared to the total laparoscopic hysterectomy. Post-operative gas pain and discomfort, as well as pain at all surgical port sites were less with pain score one to two, post-operatively. The simple explanation was the use of low intra-abdominal pressure at 10 mmHg and the less movement at the trocar sites.

What we learnt from this case, as the surgical tips, firstly the surgeon should strictly follow the correct step of robotic set up, because the redocking of the robot consumes time. Also, the preoperative bowel preparation and positioning of the patient in the steepest Trendelenburg position are useful to help the bowel displacement out of the operative field.

Secondly, about port placement, it should be considered after pneumoperitoneum is established because the patient's abdominal wall will expand and let the surgeon have more space. The proper sites depends on the size of the specimen, but it should be mentioned about the space between the robotic arms, which should not be less than 10 centimeters. Concerning about robotic 8 mm trocars, the assistant can pass normal 5 mm laparoscopic instruments through this trocar port. These may be beneficial for some adhesiolysis before the main operation.

Thirdly, this very precious surgery offers the possibility to dissect the vital organs such as ureter and uterine artery clearly. In order to prevent the unnecessary bleeding, the main vessel to the uterus including uterine vessels and infundibulopelvic ligaments should be firstly controlled by ligation or coagulation. Also, the surgeon should be benefit from the correlated retroperitoneal space approach such as, paravesical and pararectal space.

Finally, EndoWrist monopolar curved scissors on the right hand can be used in this particular manner with use of scissor tip coagulation for cutting and sharp dissection. Since there is no tremor, it offers the chance for very sharp monopolar dissection close to vital organs such as the ureter, which cannot be easily done with monopolar instruments in normal laparoscopic surgery.

CONCLUSION

Total robotic hysterectomy for benign conditions, such as adenomyosis, is safe and feasible. However, the sustained high consuming cost must be weighed with the patient's benefits.

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