Short Communication

The Strategy of Robot-assisted Hysterectomy in Patients with Morbid Obesity

Junji Mitsushita*, Chiaki Banzai, Akina Matsumoto, Emi Motegi, Katsuya Imai, Shuhei Watanabe, Tomomi Murata, Masayuki Soda

Department of Obstetrics and Gynecology, Japanese Red Cross Maebashi Hospital, Maebashi, Gunma, Japan

Abstract

Robotic hysterectomy has emerged as a superior surgical approach for patients with obesity, providing significant benefits including reduced incidence of myocardial infarction, peripheral nerve injury, wound infections, and urinary tract infections. However, these unique considerations require careful attention when managing such cases. Therefore, this study aimed to propose several key strategies for achieving optimal outcomes, including maintaining a mild Trendelenburg position (12°), ensuring the patient's secure positioning, avoiding the lithotomy position, considering a slightly higher pneumoperitoneum insufflation pressure (12 mmHg), and using a 30° endoscope for improved visualization rather than a 0° endoscope. We present three cases of stage IA atypical endometrial hyperplasia and carcinoma. All three patients underwent robotic hysterectomy and bilateral salpingo-oophorectomy, with body mass indices of 53.3, 43.8, and 43.7 kg/m^2.

Keywords: Atypical endometrial hyperplasia, body mass index, endometrial cancer, patients with obesity, robot-assisted hysterectomy

Introduction

Obesity prevalence has surged worldwide, nearly tripling between 1975 and 2016.[1] Consequently, over 1.9 billion adults aged ≥18 years are classified as overweight or obese. Obesity is a known risk factor for endometrial carcinoma and atypical endometrial hyperplasia, with the risk increasing dose dependently according to body mass index (BMI). Females with BMIs of ≥30 and ≥40 kg/m^2 exhibit an odds ratio of 5.25 and 19.79, respectively,[2] suggesting an increase in the number of obese women with endometrial carcinoma or atypical endometrial hyperplasia in future. Managing patients with severe obesity poses unique surgical challenges.[3] However, in cancer cases, the risk of cancer progression may limit the time available for weight loss interventions.[4] Minimally invasive surgeries, including laparotomic, laparoscopic, and robotic approaches, have recently replaced open hysterectomy.[5-8] Among these, robotic surgery for endometrial carcinoma exhibited the lowest incidence of intra- or postoperative complications, despite yielding comparable oncologic outcomes.[9] Here, we present three cases of atypical endometrial hyperplasia or endometrial carcinoma with severe obesity and a BMI of >40 kg/m^2. We also discussed the precautions and considerations for robotic hysterectomy in patients with severe obesity.

Case Reports

Case 1

A 47-year-old primiparous woman with a BMI of 53.3 kg/m^2 was referred to our hospital due to abnormal genital bleeding. Endometrial biopsy revealed atypical endometrial hyperplasia. Despite a 6-month weight-loss intervention program, her BMI remained unchanged. The patient underwent robot-assisted total laparoscopic hysterectomy and bilateral

Article History:
Submitted: 01-Dec-2023
Revised: 06-Mar-2024
Accepted: 17-Apr-2024
Published: 08-Jan-2025

Access this article online

Quick Response Code:

Website: https://journals.lww.com/gmit

DOI: 10.4103/gmit.gmit_147_23

Address for correspondence: Dr. Junji Mitsushita, Department of Obstetrics and Gynecology, Japanese Red Cross Maebashi Hospital, Asakuramachi 389-1, Maebashi 371-0811, Gunma, Japan.
E-mail: mitsushita@obgyn.jp

How to cite this article: Mitsushita J, Banzai C, Matsumoto A, Motegi E, Imai K, Watanabe S, *et al*. The strategy of robot-assisted hysterectomy in patients with morbid obesity. Gynecol Minim Invasive Ther 2025;14:81-4.

salpingo-oophorectomy (RATH) using a 4-arm da Vinci Xi robot (da Vinci Surgical System; Intuitive Surgical Inc., Sunnyvale, CA, USA). She was positioned supine with her legs open [Figure 1]. Following general anesthesia, we conducted a tilt test to determine the angle in the Trendelenburg position. However, when the angle exceeded 15°, the end-tidal carbon dioxide pressure ($EtCO_2$) increased. Therefore, we maintained it at 12° during surgery. Initially, the pneumoperitoneum insufflation pressure was set at 8 mmHg but was subsequently increased to 12 mmHg to achieve a satisfactory working space. Despite employing a 0° endoscope, the limited endoscope mobility caused by the thick abdominal wall posed challenges in visualizing port insertions challenging [Figure 2a]. The surgical console time was 162 min, anesthesia time 339 min, and blood loss was 50 ml. The $EtCO_2$ during the surgery was kept at 35–38 mmHg. Furthermore, the postoperative course was uneventful, and the patient was discharged on postoperative day 4. The weight of the specimen was 115 g, and the final pathological diagnosis indicated atypical endometrial hyperplasia of the uterine corpus.

Case 2

A 55-year-old multiparous woman with a BMI of 43.8 kg/m^2 was transported to our hospital by ambulance because of severe postmenopausal genital bleeding. An endometrial biopsy was performed after a blood transfusion, revealing Grade 1 endometrioid carcinoma. Magnetic resonance imaging and computed tomography indicated clinical Stage IA disease. The patient also presented with multiple leiomyomas. RATH was performed following the procedure used in Case 1, excluding the use of a 30° endoscope. This choice facilitated easier visualization of the other port insertions [Figure 2b]. The surgical console time was 248 min, anesthesia time lasting 449 min, and blood loss was 95 mL. The $EtCO_2$ during the surgery was kept at 39–44 mmHg. The postoperative course was uneventful, and the patient was discharged on postoperative day 5. The weight of the specimen was 395 g, and the final pathological diagnosis indicated Grade 1 endometrioid carcinoma, pStage IA, and multiple leiomyomas of the uterine corpus.

Case 3

A 40-year-old nulliparous woman with a BMI of 43.7 kg/m^2 was referred to our hospital due to abnormal genital bleeding. An endometrial biopsy revealed Grade 1 endometrioid carcinoma. Magnetic resonance imaging and computed tomography indicated clinical Stage IA disease, and RATH was performed using a procedure similar to that in Case 2. The surgical console time was 157 min, anesthesia time lasting 355 min, and blood loss was scant. The $EtCO_2$ during the surgery was kept at 34–38 mmHg. Furthermore, the postoperative course was uneventful, and the patient was discharged on postoperative day 5. The weight of the specimen was 85 g, and the final pathological diagnosis indicated Grade 1 endometrioid carcinoma, and pStage IA of the uterine corpus.

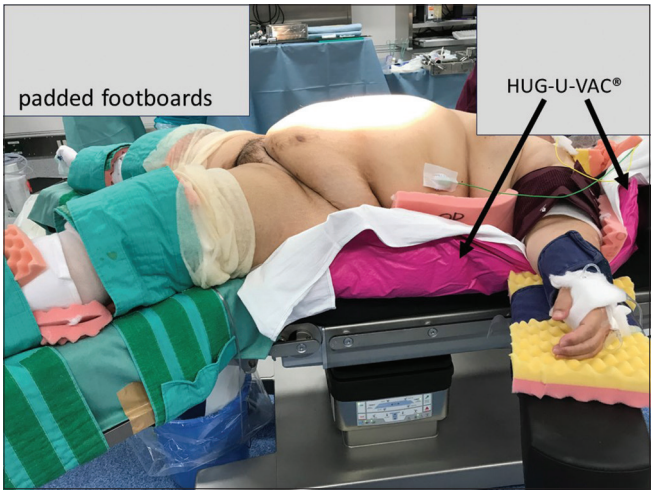

Figure 1: A patient with a body mass index of 53.3 kg/m^2 was secured using the HUG-U-VAC® system to disperse the weight throughout the body. As opposed to leg holders or stirrups, padded footboards were used to distribute the leg weight

Discussion

Patients with obesity exhibit a higher prevalence of complications, such as myocardial infarction, peripheral nerve injury, wound infection, and urinary tract infection, than their nonobese counterparts.[10] Therefore, minimally invasive surgery, particularly robotic surgery, is usually preferred to mitigate these risks.[9,11,12] However, performing minimally invasive surgery or robotic hysterectomy on patients with obesity presents the following distinct challenges:

Patient positioning

Ensuring the safe positioning of patients is paramount. Patients may experience shoulder discomfort due to

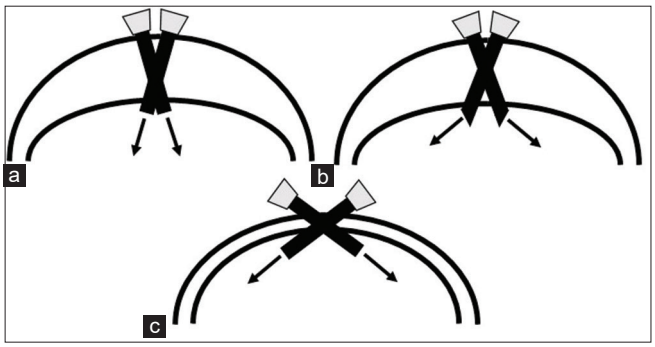

Figure 2: Influence of abdominal wall thickness on visual range. (a) A thicker abdominal wall restricts the instrument's range of motion and reduces its visual range when a 0° endoscope is used. (b) The visual range can be improved using a 30° endoscope. (c) Visual range restriction does not occur with a thinner abdominal wall, even if a 0° endoscope is used

bearing their body weights in the Trendelenburg position. To address this issue, we used the Hug-U-Vac Steep Trend Positioner® system (Baxter, USA) to disperse the weight throughout the body [Figure 1]. We also employed a mild Trendelenburg position (12°) rather than a steep Trendelenburg position (20°–40°), which is usually used in robotic hysterectomy. The lithotomy position, which is usually used, can increase the risk of peripheral neuropathy or well-leg compartment syndrome.[13,14] As opposed to leg holders or stirrups, we used padded footboards to distribute the leg weight [Figure 1] and advocated for a tilt test as a mandatory preoperative step to assess patient safety.

Port placement

We adopted the port placement procedure of Dr. Ikuko Sakamoto (Yamanashi Central Hospital, Japan) for patients with obesity.[15] First, a camera port was inserted into the umbilicus, which was relatively easier since it was the thinnest part of the abdominal wall. Subsequently, the other three working ports were inserted into the upper abdomen. For thinner abdominal walls, a 0° endoscope can be used [Figure 2c], whereas a 30° endoscope is more beneficial for obese abdominal walls [Figure 2a and b]. An assistant port was inserted into the left lower abdomen, and the distance of each port was at least 8 cm.

Intraperitoneal working space

Obesity reduces the intraperitoneal working space due to subcutaneous and visceral fat. In addition, achieving optimal pneumoperitoneum insufflation pressure can be challenging and frequently minimized. In our cases, we initiated with an 8 mmHg pneumoperitoneum insufflation pressure and gradually increased it to 12 mmHg.

For thicker abdominal walls, selecting the appropriate endoscope is essential. A thicker abdominal wall restricts the instrument's range of motion and reduces its visual range when using a 0° endoscope [Figure 2a]. However, these limitations can be improved using a 30° endoscope [Figure 2b]. This problem does not happen with a thinner abdominal wall, even when using a 0° endoscope [Figure 2c].

Effectively using a uterine manipulator to move the uterus serves as an assistant, especially as we used the right-most robot arm to lift the intestine and performed the hysterectomy mostly with the other two arms. We inserted uterine manipulator total® (Atom Medical Corp., Japan) into the uterine cavity after bilateral fallopian tubes were obstructed.

In conventional laparoscopic surgery, additional force may be required to manipulate the instruments against a thicker abdominal wall. Therefore, robotic hysterectomy provides an advantage since the mechanical wrist can be maneuvered without requiring additional force from the surgeon.

Anesthesia

Patients with obesity in the Trendelenburg position may experience deterioration in pulmonary function.[16] Therefore, if the anesthesiologist observes an elevation in end-tidal carbon dioxide levels, the gynecologist should consider placing the patient in a reverse Trendelenburg position and/or desufflating the abdomen.

Conclusion

The superiority of robotic hysterectomy over open or conventional laparoscopic approaches in patients with obesity has been well established. However, meticulously addressing these unique challenges is imperative to ensure optimal outcomes for this patient population.

Declaration of patient consent

The authors certify that they obtained all appropriate patient consent forms. In this form, the patients provided their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published, and diligent efforts will be made to conceal their identity but anonymity cannot be guaranteed.

Acknowledgments

We would like to thank Dr. Ikuko Sakamoto from the Yamanashi Prefectural Central Hospital for advising us on the surgical technique.

Author contributions

JM, CB, AM, and KI were involved in the patient management in case 1. JM, CB, AM, and TM were involved in the patient management in case 2. JM, CB, EM, and SW were involved in the patient management in case 3. All managements were supervised by MS. JM drafted the manuscript. All authors contributed to and approved the final version of the manuscript.

Data availability statement

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. World Health Organization. Obesity and Overweight. Available from: https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight. [Last accessed on 2023 Sep 19].
2. Wise MR, Jordan V, Lagas A, Showell M, Wong N, Lensen S, *et al.* Obesity and endometrial hyperplasia and cancer in premenopausal

women: A systematic review. Am J Obstet Gynecol 2016;214:689.e1-17.
3. Otake A, Horai M, Tanaka E, Toda A, Miyoshi Y, Funada R, *et al.* Influences of total laparoscopic hysterectomy according to body mass index (underweight, normal weight, overweight, or obese). Gynecol Minim Invasive Ther 2019;8:19-24.
4. Isono Taniguchi R, Tsubamoto H, Inoue K, Ueda T, Saeki S, Takimoto Y, *et al.* Weight-loss interventions and levonorgestrel intrauterine system implantation for early-stage endometrial cancer and atypical endometrial hyperplasia to reduce perioperative risk of severely obese patients. Gynecol Minim Invasive Ther 2023;12:175-8.
5. Kantarci S, İnan AH, Töz E, Bolukbasi M, Kanmaz AG. Analysis of hysterectomy trends in the last 5 years at a tertiary center. Gynecol Minim Invasive Ther 2023;12:135-40.
6. Kanti V, Verma V, Singh M, Vishwakarma S, Mittal N, Singh NP. A comparative analysis of nondescent vaginal hysterectomy, laparoscopy-assisted vaginal hysterectomy, and total laparoscopic hysterectomy for benign uterine diseases at a rural tertiary care center. Gynecol Minim Invasive Ther 2022;11:164-70.
7. Gupta N, Miranda Blevins DO, Holcombe J, Furr RS. A comparison of surgical outcomes between single-site robotic, multiport robotic and conventional laparoscopic techniques in performing hysterectomy for benign indications. Gynecol Minim Invasive Ther 2020;9:59-63.
8. Tan SJ, Lin CK, Fu PT, Liu YL, Sun CC, Chang CC, *et al.* Robotic surgery in complicated gynecologic diseases: Experience of tri-service general hospital in Taiwan. Taiwan J Obstet Gynecol 2012;51:18-25.
9. Raventós Tato RM, de la Torre Fernández de Vega J, Sánchez Iglesias JL, Díaz Feijoó B, Sabadell J, Pérez Benavente MA, *et al.* Surgical approaches in women with endometrial cancer with a body mass index greater than 35 kg/m(2). J Obstet Gynaecol Res 2019;45:195-202.
10. Bamgbade OA, Rutter TW, Nafiu OO, Dorje P. Postoperative complications in obese and nonobese patients. World J Surg 2007;31:556-60.
11. Bouwman F, Smits A, Lopes A, Das N, Pollard A, Massuger L, *et al.* The impact of BMI on surgical complications and outcomes in endometrial cancer surgery – An institutional study and systematic review of the literature. Gynecol Oncol 2015;139:369-76.
12. Chan JK, Gardner AB, Taylor K, Thompson CA, Blansit K, Yu X, *et al.* Robotic versus laparoscopic versus open surgery in morbidly obese endometrial cancer patients – A comparative analysis of total charges and complication rates. Gynecol Oncol 2015;139:300-5.
13. Velchuru VR, Domajnko B, deSouza A, Marecik S, Prasad LM, Park JJ, *et al.* Obesity increases the risk of postoperative peripheral neuropathy after minimally invasive colon and rectal surgery. Dis Colon Rectum 2014;57:187-93.
14. Simms MS, Terry TR. Well leg compartment syndrome after pelvic and perineal surgery in the lithotomy position. Postgrad Med J 2005;81:534-6.
15. Sakamoto I. More effective operation of robot-assited-surgery (in Japanese). Obstet Gynecol Pract 2020;69:343-7.
16. Blecha S, Harth M, Zeman F, Seyfried T, Lubnow M, Burger M, *et al.* The impact of obesity on pulmonary deterioration in patients undergoing robotic-assisted laparoscopic prostatectomy. J Clin Monit Comput 2019;33:133-43.