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Does Obesity Forbid Robotic Gynecological Surgeries? An Urban Legend

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Rezumat

Este obezitatea o contraindicație pentru abordul chirurgical robotic al afecțiunilor ginecologice? O legendă urbană

Introducere: Obezitatea reprezintă o problemă la nivel mondial şi o provocare pentru managementul chirurgical optim al patologiilor abdomino-pelvine. În ultimii zece ani, evoluția tehnologiei în chirurgia minim invazivă a transformat abordul robotic într-o metodă de elecție pentru managementul chirurgical al populației obeze.
Scop: Acest studiu evidențiază beneficiile laparoscopiei asistate robotic în comparație cu laparotomia deschisă şi laparoscopia convențională la femeile obeze cu afecțiuni ginecologice.
Metode: Acesta este un studiu retrospectiv, unicentric, care include paciente cu obezitate (IMC > 30 Kg/m^2) la care s-au practicat proceduri ginecologice asistate robotic din ianuarie 2020 până în ianuarie 2023. Scorul „Iavazzo" a fost utilizat pentru a prezice preoperator fiabilitate abordului robotic, precum şi timpul durata intervenției. Au fost documentate şi analizate managementul perioperator precum şi evoluția postoperatorie a pacienților obezi.
Rezultate: 93 de femei obeze au fost supuse tratamentului chirurgical robotic pentru afecțiuni ginecologice benigne şi maligne. 62 dintre aceste femei au avut IMC între 30 şi 35 kg/m^2 şi 31 au avut IMC > 35 kg/m^2. Nicio intervenție nu a fost convertită la laparotomie. Toți pacienții au avut o evoluție postoperatorie favorabilă, lipsită de complicații şi au fost externați în prima zi postoperatorie. Durata medie a intervenției chirurgicale a fost de 150 min.
Concluzii: Experiența noastră de 3 ani în chirurgia ginecologică robotică la pacienții obezi a evidențiat numeroase beneficii în ceea ce priveşte managementul perioperator şi reabilitarea postoperatorie.

Cuvinte cheie: obezitate, afecțiune ginecologică, chirurgie robotică, laparoscopie, laparotomie

Abstract

Introduction: Obesity is a worldwide problem that considered to be a challenge in optimal surgical management. A breakthrough in the technologies of minimal invasive surgery over the last ten years has turned robotic approach into the widespread method for surgical management of obese population. *Aim:* In this study we emphasize the benefits of the robotic assisted laparoscopy versus open laparotomy and conventional laparoscopy in obese women with gynecological disorders.

Methods: We conducted a single center experience retrospective study of obese women (BMI> 30 Kg/m^2) that underwent robotic assisted gynecologic procedures from January 2020 till January 2023. "Iavazzo" score was used in order to predict preoperatively the feasibility of robotic approach as well as the overall operative time. The perioperative management a well as the post-operative course of obese patients were documented and analyzed.

Results: 93 obese women underwent robotic surgical management for benign and malignant gynecological disorders. 62 of these women had BMI between 30 and 35 kg/m^2 and 31 had BMI> 35 kg/m^2. None of them was converted into laparotomy. All of the patients had a smooth post-operative course without any complications and were discharged at the first postoperative day. Mean operative time was 150 min.

Conclusions: Our 3-year experience in robotic-assisted gynecologic surgery in obese patients has revealed numerous benefits concerning perioperative management and postoperative rehabilitation.

Key words: obesity, gynecologic disease, robotic surgery, laparoscopy, laparotomy

Introduction

Obesity is a global health problem that poses a challenge to optimal surgical management. Obese patients present with increased pre-operative, intraoperative, and postoperative morbidity. Longer hospital stay, higher rate of conversion of minimal invasive surgery to laparotomy, more incidences of DVT and thrombophlebitis as well as higher risk of wound infection, hospital readmission, and anesthesia related complications result in several limitations. In addition,the presence of comorbidities such as hypertension, diabetes, respiratory problems leads to extra difficulties in surgical treatment of obese patients that must be overcome. Moreover, obesity is considered to be the strongest risk factor for endometrial cancer, as the extra fat tissue increases the estrogen levels promoting endometrial proliferation. With incremental innovation in the technologies of minimal invasive surgery over the last decade, robotic surgery has evolved into the widespread approach for surgical management of obese population. Nowadays the benefits of robotic assisted laparoscopy for obese women with benign as well as malignant gynecological disorders, such as early stage uterine cancer, seem to be various (1). In our institution, we have conducted over one hundred robot assisted laparoscopic operations for the treatment of benign and malignant diseases, namely fibromas, endometriosis, endometrial hyperplasia with or without atypia, early stage endometrial cancer, since 2020. Among patients undergone robotic surgery there were obese women with body mass index over 30 kg/m^2.

The conclusions reached so far have shown tremendous benefit in hospital stay, intra-operative blood loss, wound healing and post-operative rehabilitation in general. The aim of this study is to highlight the numerous benefits of robot-assisted surgery in obese patients through the presentation of real life experience data of a single robotic centre.

Material and Methods

We conducted a retrospective study including 93 obese patients that underwent robot-assisted gynecologic surgery from January 2020 till January 2023. 62 of these women had BMI between 30 and 35 kg/m^2 and 31 had BMI>35 kg/m^2. Patients with BMI < 30 kg/m^2 were excluded from this study. The ethics committee of our hospital approved the study. All patients were given an informed consent. Both perioperative management and post-operative course of obese patients were documented and analyzed.

Our experience in robotic assisted procedures confirmed that a big disadvantage of this approach could be the long operation time. This problem could be solved by the learning curve of surgeons and surgical team. The long operation time was also correlated with anesthesiologic difficulties and several patient characteristics, such as body mass index (BMI), uterine size, previous surgeries, way of delivery etc. Till now, there was not a widely-used system to evaluate the feasibility of completeness of robotic-assisted procedures and the correlation with surgery time. Therefore, we created "Iavazzo score", a pre-operative tool that using the aforementioned values can adequately predict the possibility of success as well as the required operative time for the completion of gynecologic robot-assisted operation (*Table 1*). Our scoring system has proved to be very helpful in classifying obese patients and predicting their possibility of robot-assisted approach as well as the overall operative time in the present retrospective study (2). The multidisciplinary work of the surgical team is the key to success in the management of obese patients. A brief assessment of the patient that includes a comprehensive medical history and physical examination is conducted preoperatively. The patient is placed in lithotomy position using lithotomy boots to prevent acute compartment syndrome and nerve injury. Both arms are tucked with the use of bed extenders and arm boards (*Fig. 1*).

During anesthesia induction, ramp position is used to overcome difficult bag mask ventilation in obese women (3). Preoxygenation is a crucial step in anesthesia procedure and it has to be performed for at least five minutes. A video- guided tracheal intubation may be necessary to be performed. A trendelenburg position of 300 seems to be safe for obese patients with careful anesthetic management

Table 1. "Iavazzo" score

SCORE	BMI	Uterine size	Abdominal surgeries	Vaginal Parity	Pathology
1	<30	<10	None	Prior vaginal delivery	Benign (except from endometriosis and PID) OR Malignancy that does not need sentinel lymph node biopsy
2	30-35	10-13	C/S (1-2) and/or appendicectomy and/or laparoscopy without gynecological disease	No prior parity	Endometriosis and/or PID
3	>35	>13	C/S (3 or more) and/or midline vertical laparotomy for any reason and/or laparoscopy for gynecological disease (endometriosis) and/or myomectomy with any type of surgery	C/S only	Malignancy that needs Sentinel lymph node biopsy
4	-	-	-	-	Malignancy and lymphadenectomy C/S: cesarean section, PID: pelvic inflammatory disease

Figure1. A 55-year-old morbidly obese patient in lithotomy position

Figure 2. An obese patient in 30° Trendelenburg position

during pressure-controlled ventilation (*Fig. 2*). The Trendelenburg position leads to small bowel repulsion above sacral promontory and consequently to a clearer surgical field. However, it may reduce functional residual capacity and it might be necessary to take the patient out of Trendelenburg for a short period of time in order to improve oxygenation (4). Gel pads and shoulder supports are used to assist with obese patient positioning and to prevent slippage on the operating table. Pneumoperitoneum was performed using a Veress needle via the umbilicus without facing any difficulties in most cases. The pressure of CO2 during pneumoperitoneum is preserved at 15 mmHg until port placement and then it goes down at 8 mmHg in order to facilitate the anesthetic work. In no cases an extra long or bariatric trocar was used.

Results

The results of our study are depicted in the *Table 2*. Mean operative time was 150 min. Mean "Iavazzo score" was 8.87. None of the procedures was converted to laparotomy. The mean blood loss was 350 ml. All of the patients were discharged at the first postoperative day (mean hospital stay: 2 days) and they had a smooth postoperative course without early or late complications. Mean operative time may be affected by the little experience of surgical team in the first robotic-assisted procedures.

Discussion

Past perceptions that obesity was a contra-indication to minimal invasive techniques have been proved to be incorrect (5). Minimal invasive techniques are associated with shorter hospitalizations and lower incidences of post-operative fever, ileus and wound infections. On the other hand, they are linked to longer operative times and to a substantial conversion rate to laparotomy, with a considerable proportion being attributable to obesity (6). What is more, a cohort study showed that successful staging via pelvic and para-aortic lymphadenectomy significantly decreased in the group of patients undergoing minimal invasive surgery for gynecologic malignancies. Another study reported that the rate of successful staging was reduced with increasing BMI (7). Despite these discouraging data, minimally access techniques are gradually widely-used in the field of gynecologic oncology, with the most common indication of endometrial cancer staging (6).

Robotics is a new era which represents advanced minimal invasive surgery. It incorporates the benefits of conventional laparoscopy, such as shorter hospital stay and lower complication rates in comparison with laparotomy, in a field of exposure and maneuverability that

Table 2. Results

	Mean values
Operative time	150 (min)
Conversion to laparotomy	0
"lavazzo score"	8.87
Blood loss	350 (ml)
Hospital stay	2 (days)
Post-operative complications (fever, ileus, wound infection)	0

relates largely to open surgery. The Da Vinci surgical system displays numerous advantages over long-established laparoscopy, specifically enlarged range of motion and tremor filtration, 3D high definition visualization, zero fulcrum effect (the perception of stiffness in conventional laparoscopy especially in obese population) as well as ease of learning (8). A big retrospective study by Subramaniam et al, which included robotic and laparotomy cohorts of obese women undergoing surgical management for primary endometrial cancer, reached the following conclusions: the advantages of robotic techniques over conventional laparotomy are more pronounced in obese population. Rate of conversion to open laparotomy was about 11%, lymph node dissection was more often performed in obese patients undergoing robotic surgery, blood loss and blood transfusions estimated to be reduced in robotic surgery patients. Furthermore, hospital stay as well as wound complication rate of obese patients undergoing robotic surgery were significantly decreased. On the contrary, operative times were estimated to be substantially longer (9). In another cohort by Bell et al. the longest operative times of the three techniques were encountered in patients undergoing robotic surgery. Despite the fact they experienced long operative times, they had significantly decreased blood loss, fewer complications, and earliest return to normal life. Retrieval of lymph nodes was equivalent among the three surgical techniques (10). Another study examined the surgical outcomes of robotic and laparoscopic hysterectomy with or without pelvic lymphadenectomy among obese patients and the findings were similar: less blood loss and shorter hospitalizations in obese women who underwent robotic surgery (11). A recent large retrospective cohort study evaluated the surgical results of robotic operations in morbidly obese and extremely morbidly obese women with endometrial cancer. A higher percentage of post-operative complications with increasing BMI was revealed by study analysis. However, the outcomes were not statistically significant (12). Concerning the overall costs of using the technology of this highly advanced minimal invasive technique, it has been estimated that has no significant deference between the open laparotomy and robotic surgery. A multicenter prospective observational study by Kosa et al. concluded that there is no statistically significant differences in the median overall costs among the three surgical techniques: laparotomy, non robot-assisted laparoscopy, and robot-assisted laparoscopy (13).

Our study presents some strengths and some limitations as well. Strengths of our study might be the sufficient sample size and the presentation of real life retrospective data of a single robotic centre. One limitation of our study could be its retrospective character. Moreover, our inexperience in the first robotic procedures in obese patients and the necessary learning curve of our team might affect our results.

Conclusions

The results of this retrospective study revealed numerous benefits for obese patients concerning perioperative management and post-operative rehabilitation. However, there are still challenges that surgical and anesthesia teams face when performing robotic-assisted operations in obese women. These difficulties could be overcome by performing more robotic-assisted operations, getting more experience and improving our skills. In conclusion, more studies should be conducted in order to reach precise conclusions about the feasibility of completeness of robotic-assisted procedures in obese populations.

Conflict of Interest

All authors have no conflicts of interest including relevant financial interests, relationships and affiliations.

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