Body Mass Index and Its Role in Total Laparoscopic Hysterectomy. A Single Center Experience

Ionut Faur[1][2],*Ionel Nati [3]Laurian Stoica[1][2], Alexandru Isaic[1][2], Cristi Tarta[1][2], Fulger Lazar[1][2], Amadeus Dobrescu[1][2]

[1] II nd Surgery Clinic, Timisoara Emergency County Hospital, Romania
[2] "Victor Babes" University of Medicine and Pharmacy Timisoara, Romania
[3] II nd Obstetric and Gynecology Clinic "Dominic Stanca" Cluj-Napoca, Romania
[4] Iuliu Hatieganu University of Medicine and Pharmacy Cluj-Napoca, Romania

Abstract:- Obesity represents nowadays a high-level problem worldwide with social, economic, and medical implications. Therefore, during the last years a true revolution has arisen regarding the way the suffering patients were to be treated from a surgery point of view. What we can confirm is that the way laparoscopic and robotic surgery has evolved is truly amazing in such a way that the next decade is considered to become a gold standard regarding the way surgery will be performed. Moreover, because of practicing these methods, obese patients become a very special category in the surgical fields.

On the other hand, some authors considered obesity as a contradiction to everything that laparoscopic surgery means but with the release of more other studies that demonstrated the veracity and reliability of these methods, things have lessened a bit from their end. In 1989, Reich was the one who performed the first total hysterectomy by means of laparoscopic surgery, method which was, however, improved over the years with the aim of expanding the applicability of this approach.

The main aim of this study is to analyze the influence of obesity over the intraoperative and post-operative evolution, in the context of total laparoscopic hysterectomy.

I. INTRODUCTION

Obesity and comorbidities associated with it are well known factors that affect negatively surgical outcomes. As we all know BMI is a predisposing factor for adenomyosis, uterin bleeding, endometrial hyperplasia and many females that require TLH in our center have a higher BMI. Therefore, during the last years a true revolution has arisen regarding the way the suffering patients were to be treated from a surgery point of view. In the past laparoscopy was technicaly considered challenging in obese patients and was ofen considered a relative contraindication [1-5]. What we can confirm is that the way laparoscopic and robotic surgery has evolved is truly amazing in such way that the next decade is considered to become a gold standard regarding the way

surgery will be performed. Abdominal hysterectomy has shown to be associated with higher rates of complications like wound infection, pelvic abcess, long postoperative stay. In present retrospective study we analyzed surgical parameters in performing TLH by BMI categories [6]. The main outcomes measures were duration of surgery, intraoperative blood loss, number of complications and duration of hospital stay.

II. MATERIALS AND METHOD

The study was performed in Surgical Clinic II of the „Pius Brinzeu" County Emergency Hospital Timisoara over a 4 year interval (January 2015-December 2019). Cases with fibroid, adenomyosis, endometrial hyperplasia, abnormal uterin bleeding, were included in the study and patients with 2 or more open abdominal surgeries and reports documenting severe abdominal intestinal adhesions or overt malignancy were excluded from the study. Cardiac and pulmonary comorbidities were not considered a contraindication of laparoscopic hysterectomy unless it contraindicated prolonged steep Trendelenburg position or use of pneumoperitoneum.

From a technical point of view, we used the following equipmnet and materials: optical trocar (10/15 mm Ethicon Surgery) placed at umbilical level, 2 trocars of 5 mm (5 mm/10 mm Ethicon Surgery) located left and right paramedian at 4-5 cm under the ombilical level, prehension clamp, Maryland forceps, 5 mm Ligasure clamp, Veress needle/Hasson cannula, monopolar hook, Schroeder uterin clamp, respectively Clermont-Ferrand (Karl Stortz) manipulator clamp and uterin morcellator (Gyncare X-Tract Tissue morcellator; Ethicon).

For this type of surgery, i.e., TLH surgery the standard position is the Lloyd-Davies one, where the level of pneumoperitoneum is between 12-16 mmHg, depending on BMI, and the antibiotic prophylaxis is administrated through a mono-dose of 3rd generation cefotaxime 30-60 minutes pre-operative. The method used for TLH is highly similar with the classic method. After completing the pneumoperitoneum, the next step is the comprehensive exploration and locoregional staging, followed by sectioning the lombo-ovarian pedicles using the Ligature sclamp; from here on, the next step is

sectioning the anterior folds of the broad ligaments, these incisions getting united at the uterine isthmus level. Next stage consists of removing the bladder in embryologic plane, which will afterwards facilitate a safely approach of the uterin vascular network without interfering the ureters and of the anterior colpotomy. The uterus is orientated upwards with the help of the Clermont-Ferrand manipulator, followed by the incision of the back sheets of the broad ligament, the sectioning of the uterosacral ligaments and of the peritoneum, which covers the posterior vaginal cul-de-sac. The next practice after interception of the uterin pedicles is the circular colpotomy at the vaginal cul-de-sacs level, all this through using the monopolar hook, the section level being guided by the side of the uterine manipulator [7-12]. The extraction of the surgical piece is done transvaginally being followed by laparoscopic colporrhaphy. Postoperative antibiotic and analgesic protocol were standardized for all cases. Oral intake as started with the resumption of bowel activity as observed on listening of abdomen. As we present, patient data was reviewed for age, height, weight, parity, preoperative diagnosis, procedural details, duration of procedure, blood loss, hospital stay, postoperative complications (fever, wound infection, vaginal discharge). Statistical analysis was done on SPSS 22.0. Fisher exact test was performed to see the difference in frequencies of categorical data in between two groups and Student's t-test was performed to see the difference in mean values of quantitative date.

III. RESULTS

During the study period, 173 patients underwent attempted total laparoscopic hysterectomy: 62 patients were excluded as they were converted to abdominal hysterectomy after initial diagnostic laparoscopy, and 33 were suspicious of malignancy and in these cases, we performed radical laparoscopic hysterectomy (Wertheim procedure). Total patients included in the study 78 that underwent TLH for benign lesions.

The mean age of 78 patients was 48 +/- 2.3 years with a median parity of two. The mean BMI of the patients was 32.02 +/- 4.8 kg/m2 (range 23.1 to 53.2). Out of 78 patients, 40 patients had BMI< 30 kg/m2 (Group 1) (17 patients had a BMI >24.9 kg/m2) and 38 had a BMI > 35 kg/m2 (Group II).

Table 1 Indications for surgery

Diagnosis	Non-Obese (n=40)	Obese (n=38)
Fibroid	10 (26%)	25 (65,7%)
Adenomyosis	2 (5%)	3 (7,89%)
Abnormal uterin bleeding	16 (40%)	28 (73,6%)
Endometrial Hyperplasia	4 (10%)	4 (10,52%)
Cervical dysplasia	8 (20%)	9 (23,6%)
Chronic cervicitis	3 (7,5%)	7 (18,4%)
Chronic pelvic pain	4 (10%)	12 (31,5)
Ovarian mass	3 (7,5%)	3 (7,8%)
Tubo-ovarian mass	1 (2,5%)	1 (2,6 %)
Ovarian cyst	2 (5%)	1 (2,6%)

The most common indication of surgery was abnormal uterin bleeding (26 % in non-obese patients and 65.7 % in obese patients) followed by fibroid, cervical dysplasia, endometrial hyperplasia, and chronic pelvic pain. In the group of obese patients (BMI>30 kg/m2) we observed that uterin bleeding and endometrial hyperplasia are more frequent that in non-obese group. 78 cases were completed using purely endoscopic technique. Minimally invasive gynecologic surgery has many benefits over open surgery, including lower blood loss, decrease pain, shorter hospital stays, faster recovery, and fewer wound, bowel, and thrombotic complications.

Table 2 Clinical and observational parameters among non-obese and obese groups

Parameters	Non-Obese	Obese	P value
Duration of surgery (minutes)	102+/-11.2	119+/-15.7	0.05
Estimated blood loss (ml)	77.23+/-35.11	83.34+/-40.5	0.626
Length of hospital stay (days)	2.8+/-0.89	3.01+/-0.78	0.067
Minor complication	5	8	0.05
Major complication	3	5	0.07
Intra-operative hemorrhage	2	1	0.723
Bowel injury	1	3	0.065
Readmission	1	0	0.378
Blood transfusion	2	3	0.062

We encountered the following complications: 4 cases of serous lesions at the ileum level where patients benefited of enterorrahaphy, thread 3-0 monofilament; 2 cases of lesion on the inferior pole of the bladder, cases that benefited of double-layer cystoraphy. These complications are classified using Clavien-Dindo scale. When talking about major complications we did not found any differences between the two groups. Minor complications (such as fever, secondary hemorrhage, port site infections or functional dyspepsia) were significantly higher in the obese group when compared to the normal BMI group. Important intraoperative blood loss and bowel injury were major complications recorded in obese group.

We found a significant correlation of BMI with the operative time r=0. 234, P<0.0001) and duration of hospital stay (r=0.246, P<0.0001). However, there was no correlation

pf BMI with the estimated blood loss during surgery (r=0.083, P=0.298).

Table 3 Minor complications among two groups

Parameters	Non-Obese	Obese	P value
Fever	3 (7.5%)	4 (10.52%)	0.522
Port site infections	1 (2.5%)	5 (13.15%)	0.04
Secondary hemorrhage	0	2 (5.2%)	0.063
Functional dyspepsia	2 (5%)	3 (7.89%)	0.06
Hypokalemia	1 (2.5%)	0	0.233

In table 3 we observed that there is a strong correlation between BMI and port site infection with a p=0.004. This minor complication was treated in a conservative fashion with local antiseptic solution, antibiotics according to the results of antibiogram. The rest of the complications there are presented upwards have similar incidence in the two groups.

Table 4 Operative events among two groups

Parameters	Non-Obese	Obese	P value
Faild insufflation/extraperitoneal insufflation	1 (2.5%)	3 (7.89%)	0.04
Conversion to laparotomy	2 (5 %)	1 (2.63%)	0.536
Extra port required	1 (2.5%)	2 (5.2%)	0.06

IV.   DISCUSSION

It is known that high BMI is associated with an increase in the incidence of complications, but technological evolution has changed the approach regarding these patients. One of the main problems encountered at patients with BMI over 30 kg/m2 is with anesthesia, specifically with the patient's hemodynamic stability given on one hand by the patient's comorbidities (most commonly cardio-respiratory comorbidities), and on the other hand by the increase of the intra-abdominal pressure due to the pneumoperitoneum and the patient's position. Presence of BMI over 30 kg/m2 increases the risk of converting laparoscopic surgery to open surgery by 2 times as shown in previous studies. In our study a total of 3 cases were converted but none of them because of the BMI. One of them, with BMI higher than 30 kg/m2, was a case of adenomyosis with concurrent extensive endometriosis (13-14). In the remaining 2 cases the BMI were less than 30 kg/m2, and the possible reason was a malignant ovarian mass, respectively extensive abdominal adhesions rendering laparoscopy difficult.

Regarding obstetrical history, we had 8 nulliparous women, 41 with no vaginal deliveries (only C-section) and 29 patients with history of both natural births and cesarean section. In laparoscopic approach, the constraints of vagina are easily dealt with. One of the benefits of the laparoscopic approach is a better view of the elevation of the vaginal wall during its suture to the uterosacral ligaments, important fact for subsequent pelvic statics. Of course, there are also disadvantages, such as higher BMI associated with decreased space at vaginal end and longer operating time. Table 2 shows a positive correlation between intervention time and the BMI. Due to the presence of excessive visceral fat or due the tumoral dimensions, higher BMI will lead to longer operating time.

This aspect should improve considerably with the surgeon's level of experience. In support of this statement, a recent study consisting of 1460 patients with BMI over 30 kg/m2 was considered. The patients that have undergone a TLH for a benign condition showed no increase in perioperative or postoperative complications, with the mention that a longer operating time occurred (15-17).

During the 4-year study which focused on the improvement of the operative parameters, our team's experience improved considerably. Moreover, TLH became a standard for the way the uterine benign pathology was regarded regardless of the studied patient's BMI. Also, by analyzing the complications and the postoperative evolution, minor differences were encountered between the study groups, and it was demonstrated that there is no reason to see a high BMI level as an obstacle in performing TLH.

As a conclusion we can say that the current trend is to approach the higher BMI patients' cases laparoscopically, which represents a challenge for the surgeon but with a definite benefit for the patient.

Conflict of Interests
The authors declare that there is no conflict of interests regarding the publication of this paper.

REFERENCES

[1]. Mokdad AH, Serdula MK, Dietz WH, Bowman BA, Marks JS, Koplan JP. The continuing epidemic of obesity in the United States. JAMA 2000;284:165

[2]. Mokdad AH, Serdula MK, Dietz WH, Bowman BA, Marks JS, Koplan JP. The spread of the obesity epidemic in the United States, 1991–1998. JAMA 1999;282:1519–22.

[3]. M. J. Curet, "Special problems in laparoscopic surgery: previous abdominal surgery, obesity, and pregnancy," Surgical Clinics of North America, vol. 80, no. 4, pp. 1093–1110, 2000.

[4]. M. T. Goodman, J. H. Hankin, L. R. Wilkens et al., "Diet, body size, physical activity, and the risk of endometrial cancer," *Cancer Research*, vol. 57, no. 22, pp. 5077–5085, 1997.

[5]. F.-T. Kung, F.-R. Hwang, H. Lin, M.-C. Tai, C.-H. Hsieh, and S.-Y. Chang, "Comparison of laparoscopically assisted vaginal hysterectomy and abdominal hysterectomy in Taiwan," *Journal of the FormosanMedicalAssociation*, vol. 95,no. 10,pp. 769–775, 1996.

[6]. R. Polet, P. de Jong, Z. M. van der Spuy, and M. Shelton, "Laparoscopically assisted vaginal hysterectomy (LAVH)—an alternative to total abdominal hysterectomy," *South African Medical Journal*, vol. 86, supplement 9, pp. 1190–1194, 1996.

[7]. A. Schneider, A. Merker, C. Martin, W. Michels, and N. Krause, "Laparoscopically assisted vaginal hysterectomy as an alternative to abdominal hysterectomy in patients with fibroids," *Archives of Gynecology and Ob*

[8]. Health implications of obesity. National Institutes of Health Consensus Development Conference Statement. Ann Intern Med 1985;103:1073–7.

[9]. Pi-Sunyer FX. Health implications of obesity. Am J Clin Nutr 1991;53 suppl:1595S–603S.

[10]. Manson JE, Colditz GA, Stampfer MJ, Willett WC, Rosner B, Monson RR, et al. A prospective study of obesity and risk of coronary heart disease in women. N Engl J Med 1990;322:882–9.

[11]. *stetrics*, vol. 259, no. 2, pp. 79–85, 1997.

[12]. S. Malur, M. Possover, W. Michels, and A. Schneider, "Laparoscopic-assisted vaginal versus abdominal surgery in patients with endometrial cancer—a prospective randomized trial," *Gynecologic Oncology*, vol. 80, no. 2, pp. 239–244, 2001.

[13]. Z. Holub, A. Jabor, L. Kliment Jr., J. Vor´aˇcek, and J. Luk´ac, "Comparison of two procedures for laparovaginal hysterectomy:a randomized trial," *European Journal of Obstetrics Gynecology and Reproductive Biology*, vol. 90, no. 1, pp. 31–36, 2000.

[14]. M. P.Milad, K.Morrison,A.Sokol,D.Miller, andL.Kirkpatrick, "A comparison of laparoscopic supracervical hysterectomy vs laparoscopically assisted vaginal hysterectomy," *Surgical Endoscopy*, vol. 15, no. 3, pp. 286–288, 2001.

[15]. A. Ostrzenski, "Laparoscopic total abdominal hysterectomy in morbidly obese women: a pilot-phase report," *Journal of ReproductiveMedicine for the Obstetrician andGynecologist*, vol.44, no. 10, pp. 853–858, 1999.

[16]. K. A. O'Hanlan, L. Lopez, S. L. Dibble, A.-C. Garnier, G. S.Huang, and M. Leuchtenberger, "Total laparoscopic hysterectomy: bodymass index and outcomes," *Obstetrics&Gynecology*, vol. 102, no. 6, pp. 1384–1392, 2003.[11] A. I. Sokol, K. Chuang, and M. P. Milad, "Risk factors for conversion

[17]. to laparotomy during gynecologic laparoscopy," *Journal* International Scholarly Research Notices 5 *of the American Association of Gynecologic Laparoscopists*, vol. 10, no. 4, pp. 469–473, 2003.

[18]. G. H. Eltabbakh, M. S. Piver, R. E. Hempling, and F. O. Recio, "Laparoscopic surgery in obese women," *Obstetrics and Gynecology*, vol. 94, no. 5, pp. 704–708, 1999.

[19]. N. Chopin, J. M. Malaret, M.-C. Lafay-Pillet, A. Fotso, H.Foulot, and C. Chapron, "Total laparoscopic hysterectomy for benign uterine pathologies: obesity does not increase the risk of complications," *Human Reproduction*, vol. 24, no. 12, pp. 3057–3062, 2009.

[20]. M.Osler, S.Daugbjerg, B. L. Frederiksen, and B.Ottesen, "Body mass and risk of complications after hysterectomy on benign indications," *Human Reproduction*, vol. 26, no. 6, pp. 1512–1518, 2011.

[21]. T. E. Nieboer, N. Johnson, A. Lethaby et al., "Surgical approach to hysterectomy for benign gynaecological disease," *Cochrane Database of Systematic Reviews*, no. 3, Article ID CD003677, 2009