INTRODUCTION

Obesity represents nowadays a high-level problem worldwide with social, economic, and medical implications (Mokdad AH, et al., 2001; Mokdad AH, et al., 2000; Mokdad AH, et al., 1999). 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 ay 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 (Hubert HB, et al., 1983; Lew EA and Garfinkel L, 1979; Gomel V and Taylor P), 1995). Moreover, because of practicing these methods, obese patients become a very special category in the surgical fields (National Institutes of Health, 1985; Pi-Sunyer FX, 1991; Manson JE, et al., 1990).

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 H was the one who performed the first hystectomy by means of laparoscopic surgery, method which was, however, improved over the years with the aim of expanding the applicability of this approach (Pitkin RM, 1976; Safran D, et al., 1993; Reich H, 1992; National Heart, Lung, Blood Institute, National Institute of Diabetes, Digestive, Kidney Diseases (US), 1998; Koh CH, 1998).

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.

EQUIPMENT AND METHOD

The study developed in the II nd Surgical Clinic of the “Pius Brinzeu” County Emergency Hospital Timișoara between 1st of January 2017-1st of January 2019 and it was applied to a general batch of 29 women patients diagnosed with benign pathology of the uterus and adnexa.

EXCLUSION CRITERIA were:
- Patients with uterine and/or ovarian malignant pathology
- Patients with uterine and/or ovarian benign pathology

Inclusion criteria was established only in order to obtain the most precise results regarding TLH operative, the following inclusion criteria was established at the batch’s level:
- Age over 18
- Patients with uterine and/or ovarian benign pathology

Conclusions:
By analyzing the comorbidities and the post-operative 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.

Keywords: BMI, Comorbidities, Complications, Intervention time

Correspondence: Ionel Nati, Department of Obstetric and Gynecology, II nd Obstetric and Gynecology Clinic Dominic Stanca, Cluj-Napoca, Romania, Email: faurflivanut@gmail.com
Each patient experienced THL surgery and inside each group the following factors were analyzed: age, time spent in the hospital, size of the uterus in longitudinal axis, adnexal changes, the size of the skinfold, other comorbidities, presence/absence of cicatrictial abdomen, the resume of the post-operative transit/movement, other complications, the suppression of drainage, reason of admittance in the hospital, ASA(American Society of Anaesthesiologists) score, result of the histopathologic test, how long the intervention took, quantity of lost blood during surgery and level of Hemoglobin both pre- and post-operative. With the help of the data obtained, it was possible to establish some ways of comparison between the 3 groups.

From a technical point of view, we used the following equipment and materials: optical trocar (10 mm/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 umbilical level, prehension clamp, Maryland forceps, 5 mm Ligasure clamp. AC Veress/Hasson cannula, monopolar hook, Schroeder uterine clam, respectively Clermont-Ferrand (Karl Stortz) manipulator clamp and uterine morcellator (Gyncare X-Tract Tissue morcellator; Ethicon).

For this type of surgery, i.e., THL 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 administered through a mono-doses of 3rd generation cefotaxime 30-60 minutes pre-operative.

The method used for THL is highly similar with the classic method. After completing the pneumoperitoneum, the next step is the comprehensive exploration and locoregional stage, followed by sectioning the lombo-ovarian pedicles using the Ligasure clamp; from here on, the next step is sectioning of 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 uterine 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 the interception of the uterine pedicles is the circular cordotomy 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. The extraction of the surgical piece is done transvaginally being followed by laparoscopic coagulation. In a Total Laparoscopic Hysterectomy, a small uterus can be removed whole through the vagina at the end of the procedure. If the uterus is large the tissue must be morcellated before extraction. Power morcellation has come under scrutiny recently because of concerns regarding the dissemination of uterine tissue. As suggested by Wright, dissemination of the cells during morcellation could be prevented with an appropriate preoperative workup that include a histological and physical exam (uterine size), up to date cervical screening, and an associated comorbidities score of study, respecting the parameters of each case. The differences between these 3 groups were evaluated using the Pearson coefficient, respectively the Fisher test, by establishing some reference values.

RESULTS

The general batch of the study was made of 29 diagnosed patients with benign and pathology of the uterus and it was developed in the Surgical Clinic II of the “Pius Brinzeu” County Emergency Hospital Timisoara. Their age range was between 41 and 78 years old, with the average of 53.96 years. The average admission time was of 4.79 days and the BMI level of 29.1 kg/m² (Figure 1).

From the admission’s reason point of view, we have obtained the following results: 82.75% of patients presented pains on the lower abdomen, 62.06% presented metrorrhagias, 27.58% menorrhagias, 10.34% fatty obesity, 17.2% constipation, 20.6% polyuria, 10.34% fatigability. As a result of the clinical-paraclinical investigations, we processed data with mandatory value, such as: the dimension of the uterus in longitudinal axis, the evaluation of the annexes, the level of the skin fold, associated comorbidities, presence/absence of the cicatrictial abdomen, restarting point of the intestinal transit, suppression of drainages, the result of the histopathological examination performed postoperative. We will present the general data regarding these parameters of the analysis process so that: when reporting to the dimension of the uterus in longitudinal axis which was basically determined both preoperative and postoperative, we have obtained an average value of 11.37 cm, the minimum of 6 cm, respectively the maximum of 25 cm. It was emphasized the fact that 34.4% of the patients presented ovarian cyst on the left side, associated with an average dimension of 3.1 cm. On the other hand, 37.9% were carries of ovarian cyst on the right side with an average dimension of 3.8 cm. Moreover, as a result of the fallopian tubes analysis, it was concluded that 10.34% of our patients presented unilateral/bilateral hydrosalpinx (Figure 2).

In 2015, Winner B, et al. found that morcellation within an insufflated bag took twenty minutes longer than unContained morcellation, with no increase in complications. And in 2016, Cohen et al. published a prospective in vivo study in which uterine tissue was stained with dye before morcellation, and the pelvis was inspected after morcellation (Mokdad AH, et al., 2001; Mokdad AH, et al., 2000; Mokdad AH, et al., 1999). Dye/tissue leakage was noted in 7 out of 76 cases, although the authors noted that most of the dye leakage was likely due to the method of introduction; actually spillage of tissue fragments was only noted in one case. Together, these studies indicate that power morcellation within a containment bag is feasible and effective, although efforts should be made to improve the technique. In 2016, the FDA (Food and Drug Administration Act) approved the first bag for contained morcellation (Hubert HB, et al., 1983; Lew EA and Garfinkel L, 1979; Gomez V and Taylor PJ, 1995). We use the morcellation technique if the long axis of the uterus is over 15 cm.

We have generated both a univariate and bivariate analysis for the 3 groups of study, respecting the parameters of each case. The differences between these 3 groups were evaluated using the Pearson coefficient, respectively the Fisher test, by establishing some reference values.

RESULTS

The general batch of the study was made of 29 diagnosed patients with benign and pathology of the uterus and it was developed in the Surgical Clinic II of the “Pius Brinzeu” County Emergency Hospital Timisoara. Their age range was between 41 and 78 years old, with the average of 53.96 years. The average admission time was of 4.79 days and the BMI level of 29.1 kg/m² (Figure 1).

From the admission’s reason point of view, we have obtained the following results: 82.75% of patients presented pains on the lower abdomen, 62.06% presented metrorrhagias, 27.58% menorrhagias, 10.34% fatty obesity, 17.2% constipation, 20.6% polyuria, 10.34% fatigability. As a result of the clinical-paraclinical investigations, we processed data with mandatory value, such as: the dimension of the uterus in longitudinal axis, the evaluation of the annexes, the level of the skin fold, associated comorbidities, presence/absence of the cicatrictial abdomen, restarting point of the intestinal transit, suppression of drainages, the result of the histopathological examination performed postoperative. We will present the general data regarding these parameters of the analysis process so that: when reporting to the dimension of the uterus in longitudinal axis which was basically determined both preoperative and postoperative, we have obtained an average value of 11.37 cm, the minimum of 6 cm, respectively the maximum of 25 cm. It was emphasized the fact that 34.4% of the patients presented ovarian cyst on the left side, associated with an average dimension of 3.1 cm. On the other hand, 37.9% were carries of ovarian cyst on the right side with an average dimension of 3.8 cm. Moreover, as a result of the fallopian tubes analysis, it was concluded that 10.34% of our patients presented unilateral/bilateral hydrosalpinx (Figure 2).

Figure 1: General distribution of patients based on BMI. Note: Dark blue: <=24.9 kg/m²; orange: 25-29.9 kg/m²; grey: 30-34.9 kg/m²; yellow: 35-39.9 kg/m²; blue: >40 kg/m²

From the admission’s reason point of view, we have obtained the following results: 82.75% of patients presented pains on the lower abdomen, 62.06% presented metrorrhagias, 27.58% menorrhagias, 10.34% fatty obesity, 17.2% constipation, 20.6% polyuria, 10.34% fatigability. As a result of the clinical-paraclinical investigations, we processed data with mandatory value, such as: the dimension of the uterus in longitudinal axis, the evaluation of the annexes, the level of the skin fold, associated comorbidities, presence/absence of the cicatrictial abdomen, restarting point of the intestinal transit, suppression of drainages, the result of the histopathological examination performed postoperative. We will present the general data regarding these parameters of the analysis process so that: when reporting to the dimension of the uterus in longitudinal axis which was basically determined both preoperative and postoperative, we have obtained an average value of 11.37 cm, the minimum of 6 cm, respectively the maximum of 25 cm. It was emphasized the fact that 34.4% of the patients presented ovarian cyst on the left side, associated with an average dimension of 3.1 cm. On the other hand, 37.9% were carries of ovarian cyst on the right side with an average dimension of 3.8 cm. Moreover, as a result of the fallopian tubes analysis, it was concluded that 10.34% of our patients presented unilateral/bilateral hydrosalpinx (Figure 2).
From the point of view of the cicatrical abdomen, which was manifested to 24.14% of the patients (7 cases), in 75.86% cases (22 patients) can be discussed about intervention performed on the native abdomen. Moreover, regarding the post-operative recover, the average was of 27.7 hours while the drainage suppression was performed on an average of 35.1 post-operative. By analyzing the main comorbidities manifested inside the general batch, we obtained the following data: 51.72% (15 cases) presents HTA (Health Technology Assessment), 3.44% (1 case) atrial fibrillation, 6.89% (2 cases) congestive heart failure, 6.89% (2 cases) genital prolapse, 3.44% (1 case) chronic renal insufficiency, 38.6% (17 cases) iron deficiency anemia, 3.44% (1 case) pelvic inflammatory disease, 13.79% diabetes mellitus type II, 10.34% (3 cases) hypothyroidism, 37.93% (11 cases) hepatosteatosis. The ASA score at the batch’s level had the average of 2.5 and from the point of view of the histopathologic test we have obtained the following results; It can be easily observed the predominance of the benign pathology (angioleiomyoma, fibro angioleiomyoma, leiomyoma, adenomyosis) in 90% of the cases and a 10% of the malignant one (adenocarcinoma) after the HP exam. The average time of the intervention was of 118 minutes.

We considered necessary the division of the patients in 3 groups of study based on the level of BMI, so that the A group (27.8%) is made of patients with the age average of 50.1 years, BMI (kg/m²) between 19.5-24.9 kg/m², with the average level of 23.3 kg/m².

Group B (27.8%) is made of patients with the average age of 52.1 years old, BMI between 25-29.5 kg/m² with the with the average level of 27.1 kg/m².

Group C (44.82%) is made of patients with the average age of 57.4 years, BMI above 30 kg/m² and with the average level of 33.8 kg/m². The analysis of the main difficulties between the study groups was done by using the Clavien-Dindo classification.

With reference to the batch of the A group (8 patients, 27.58%), we obtained the following statistics: the average level of BMI was of 23.3 kg/m²; the average of the skin fold of 3.37 cm; the average age of the group was of 50.1 years; average time of admission of 4.25 days and the dimension of the longitudinal axis of uterus 10.25 cm. The clinical-paraclinical data emphasizes the fact that: 62.5% of the investigated patients presented ovarian cyst on the right side and approximately 25% presented bilateral ovarian cyst on the left side, while approximately 30.7% (4 cases) ovarian cyst on the right side. The analysis of the fallopian tubes distinguished 1 case of unilateral hydrosalpinx (7.6%). The average time of the intervention for this group was of 134 minutes (± 12). By analyzing the data obtained through the histopathological test, approximately 37% of the resection parts were uterine leiomyoma, 27% fibro angioleiomyoma, 18% angioleiomyoma, and 18% adenocarcinoma. This time again we encountered difficulties such as: 2 Clavien-Dindo grade I and 3 Clavien-Dindo grade III b. For the first type of difficulties we distinguished: 1 case of dyspnea which was decreased by administrating spasmodylics; 1 case of cystitis, case in which the patient benefited of specialized urology consultation and a proper drug management administration until her release of the hospital. Taking into consideration the second type of difficulties, i.e., grade III b, we encountered the following: 2 cases of serious lesions at the ileum level where patients benefited of enterorrhaphy, 1 case of lesion on the inferior pole of the bladder, case which benefited of double-layer cystogrophy.

By analyzing in detail the data obtained individually within each study group, it was emphasized the fact that there is a co-relation between the numbers of the comorbidities and the patients‘ age (r=0.767, p<0.04) and at the same time a positive moderated co-relation between the number of the comorbidities and the BMI (r=0.493, p<0.05). Somehow self-explanatory, it was emphasized the fact that group B and C which contained mostly patients with the BMI limit over the usual one, it was remarked a proportional increase of the comorbidities at the same time with the increase of the BMI. The data presented in Table 1 shows a strong positive co-relation between the BMI and the intervention time (p=0.047), therefore, those two being tied by proportional increase relation. For those patients with a high BMI, the operative time was extended due to the presence of excessive visceral fat which impeded the facial dissection and due to the tumoral dimension that manifested at the level of each batch of patients.
It was also observed that concomitant with the BMI increase took place an increase of the uterus’s average weight, through which it obtained a significant statistic co-relation (p<0.042). For what concerns the time of the admission and the BMI, we observed a statistically significant and positive co-relation (r=0.280, p<0.05) which means that for the obese patients the time spent in the hospital was way more extended compared to those normo-ponderal. If we are to take the age and the dimension of the uterus in longitudinal axis at the general batch level, we obtained a statistically negative co-relation (r=-0.297, p<0.05) since the uterus dimensions decreased while the age increased. For the obese patients, it was observed that the ovarian cyst associated to the uterine pathology increased at the same time with the increase of the BMI (r=0.827, p<0.05) and at the same time it was emphasized a strongly positive co-relation between the dimension of the skin fold and BMI (r=0.712, p<0.05).

With reference to the number of complications, we encountered 12 of them, out of which 8 were minor (Clavien-Dindo grade I), and 4 were major (Clavien-Dindo grade III b). The analysis shown in Table 1 emphasizes the fact that for some minor complications 4 were encountered within normo-ponderal patients, 2 within overweighted patients and 2 within obese patients (p=0.891). For what concerns the major complications, they were encountered mostly to the groups with a high BMI, while through the patients with a low BMI, there was no major complications encountered. In this way we obtained a statistically significant co-relation between BMI and the post-operative difficulties (p<0.05); on the other hand, for the obese patients there were higher chances of major complications (Clavien-Dindo>III) compared to the other patients, all this due to the more laborious dissection caused by the presence of the excessive fat tissue.

**DISCUSSION**

Many classification of Laparoscopic Hysterectomy have been proposed, the most used being the 2003 one by Reich (Safran D, *et al.*, 1993), which divides the Laparoscopic Hysterectomy procedure into LAVH (Laparoscopically Assisted Vaginal Hysterectomy), LH (Laparoscopic Hysterectomy) and TLH (Total Laparoscopic Hysterectomy), the latter being when the entire operation is performed laparoscopically, with no vaginal component except removal of the uterus. For these reasons, we decided to (1) include in this study only TLH with suture of the vaginal vault by laparoscopic approach, (2) use the Clavien-Dindo morbidity scale, which is a reproducible simple system to grade complications, based on the therapy required to treat them, (3) select from the TLH literature only recent studies published after 2007, and with a sizable number of patients.

Uterine morcellation is sometimes required to perform a hysterectomy via a minimally invasive approach. Morcellation has become controversial recently because of concerns regarding dissemination of occult malignancy. However, laparoscopic hysterectomy results in significantly less morbidity and mortality than open hysterectomy. Potential solutions include a careful preoperative workup and performing morcellation contained within a bag. Winner *et al.* from Department of Obstetrics and Gynecology, Washington University in St. Louis, St. Louis, Missouri conclude after one study that contained power morcellation at the time of Total Laparoscopic Hysterectomy is associated with a 20-minute increase in operative time when compared with uncontained morcellation (Winner B, *et al.*, 2015). In our clinic we use uncontained morcellation.

New devices and techniques that allow surgeons to offer more women the benefits of a minimally invasive approach should be further investigated and encouraged.

**CONCLUSION**

The whole team’s experience improved considerably during this study which focused on the improvement of the operative parameters. Moreover, the THL became a gold standard for the way the uterine/ovarian benign/malign pathology was regarded whether the studied patients are obese or non-obese. Also, by analyzing the difficulties and the post-operative 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.

### Table 1: Strong positive co-relation between the BMI and the intervention time

<table>
<thead>
<tr>
<th>Time of the intervention (minutes)</th>
<th>Blood loss intra-operative (ml)</th>
<th>Time in the hospital (days)</th>
<th>Minor complications</th>
<th>Major complications</th>
<th>Blood transfusion</th>
<th>Average weight of uterus (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>106 ± 12.2</td>
<td>83.61</td>
<td>4.25</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>181</td>
</tr>
<tr>
<td>122 ± 19.2</td>
<td>112 ± 11.2</td>
<td>4.8</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>194</td>
</tr>
<tr>
<td>134 ± 21.3</td>
<td>178 ± 23.2</td>
<td>5.07</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>194</td>
</tr>
<tr>
<td>0.047</td>
<td>0.05</td>
<td>0.04</td>
<td>0.89</td>
<td>0.05</td>
<td>0.05</td>
<td>194</td>
</tr>
</tbody>
</table>

