Total Laparoscopic Hysterectomy: Retrospective Analysis of 262 Cases

Histerectomia Totalmente Laparoscópica: Análise Retrospetiva de 262 Casos

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ABSTRACT

Introduction: Hysterectomy is one of the most common gynecological procedures and may be performed either by vaginal approach, laparotomy or laparoscopy. Although total laparoscopic hysterectomy has multiple advantages, conflicting *major* complication rates have been previously reported.
Objectives: To describe our experience performing TLH and to evaluate complication rates.
Material and Methods: A retrospective observational study of all total laparoscopic hysterectomy performed in our department, by the same surgical team, between April 2009 and March 2013 (*n* = 262), was conducted. Medical records were reviewed for patient characteristics, operating time, uterine weight, post-operative hemoglobin variation, length of hospital stay, and intra and postoperative complications.
Results: Patient average age was 48.9 ± 9.0 years and 49.2% had previous abdominopelvic surgery. The average body mass index was 26.5 ± 4.5 kg/m² and 42% of women were either overweight or obese. The mean operating time during the total study period was 77.7 ± 27.5 minutes, but it decreased significantly as the surgical team's training increased. Average uterine weight was 241.0 ± 168.4g and average hospital stay was 1.49 ± 0.9 days. The mean postoperative hemoglobin variation was -1.5 ± 0.8g/dL. The *major* and *minor* complication rates were 1.5% (*n* = 4) and 11.5% (*n* = 30), respectively. One procedure was converted to laparotomy and two women had a vaginal vault dehiscence. No important urinary tract or bowel injuries occurred.
Conclusions: This study demonstrates that, in experienced hands, total laparoscopic hysterectomy is safe and with low complications rates.
Keywords: Hysterectomy; Laparoscopy; Postoperative Complications; Portugal.

RESUMO

Introdução: A histerectomia é a cirurgia ginecológica *major* mais frequentemente realizada nos países desenvolvidos, considerando--se três principais vias de abordagem: vaginal, abdominal e laparoscópica. Apesar de múltiplas vantagens, a histerectomia totalmente laparoscópica tem-se associado a controvérsia relativamente à taxa de complicações.
Objectivos: Análise da nossa casuística de histerectomia totalmente laparoscópica e avaliação da taxa de complicações.
Material e Métodos: Análise retrospetiva dos processos clínicos das doentes submetidas a histerectomia totalmente laparoscópica no nosso departamento, pela mesma equipa cirúrgica, entre abril de 2009 e março de 2013 (*n* = 262).
Resultados: As doentes tinham em média 48,9 ± 9 anos e 49,2% tinha antecedentes de cirurgia abdomino-pélvica. O índice de massa corporal médio era 26,5 ± 4,5 kg/m², sendo que 42% eram obesas ou tinham excesso de peso. O tempo operatório médio para realiza-ção da histerectomia totalmente laparoscópica foi 77,7 ± 27,5 minutos, diminuindo significativamente com o aumento da experiência da equipa cirúrgica. O peso médio da peça operatória foi 241 ± 168,4g e a duração média do internamento após a cirurgia foi 1,49 ± 0,9 dias. A diferença entre a hemoglobina pré e pós-operatória foi 1,5 ± 0,8g/dL. A morbilidade *major* foi 1,5% (*n* = 4) e a *minor* 11,5% (*n* = 30). Salienta-se um caso de conversão para laparotomia e dois casos de deiscência da cúpula vaginal. Não ocorreu nenhuma lesão urinária ou gastrointestinal grave.
Conclusões: Esta série demonstra que, se realizada por uma equipa cirúrgica adequadamente treinada, a histerectomia totalmente laparoscópica é segura e associada a baixa taxa de complicações.
Palavras-chave: Complicações Pós-Operatórias; Histerectomia; Laparoscopia; Portugal.

INTRODUCTION

Hysterectomy is the most frequently performed major gynaecological procedure in developed countries.[1,2] An incidence of 1:461 women is currently estimated in the USA, corresponding to approximately 600,000 hysterectomies per year.[3-6] In addition, in 2008-2009, 338 hysterectomy procedures were performed in Canada in women aged 20.[2]

Since Reich *et al.* description of the first laparoscopic hysterectomy in 1989, three major hysterectomy approaches are considered: vaginal, abdominal and laparoscopic.[7] Several studies have discussed the advantages, disadvantages and complication rate related with each type of hysterectomy.[4,8-10] Initially, laparoscopic hysterectomy was associated with a high complication rate, namely urinary tract lesions.[11,12] Vaginal hysterectomy was considered as first-line approach, whenever possible, given its documented advantages (shorter surgical procedure

duration and stay, less postoperative pain, early return to professional activity) and low complication rate. Therefore, laparoscopic hysterectomy was only to be performed when the vaginal approach was not feasible, in order to avoid the abdominal hysterectomy.[6,8] However, more recent studies have shown that laparoscopic hysterectomy is safe and related with a low complication rate.[13,14] Donnez *et al.*, upon analysis of 3,190 laparoscopic hysterectomy procedures, have shown that laparoscopic approach presents multiple advantages when compared to the vaginal and abdominal approaches, with a similar morbidity.[9] Despite controversy, there is consensus regarding the importance of the learning curve and expertise of the surgical teams in published results, as well as the presence of specific indications for different hysterectomy approaches.[6,9,15-17] Therefore, gynaecologists should acquire adequate skills and training in every approach to hysterectomy, allowing for an individualized choice, taking into consideration surgery indication, patient's characteristics and will.[17] There are however evidences that the approach selection is rather based on surgeon's preference and experience than on evidence from the literature.[18]

In Portugal, laparoscopic hysterectomy is not widely performed. One study carried out by the *Colégio de Especialidade de Ginecologia e Obstetrícia da Ordem dos Médicos* (Portuguese College of Obstetricians and Gynaecologists) revealed that, in 2011, in 34 Portuguese hospitals, only 13% of performed hysterectomy procedures used this approach. The lack of professionals with enough training and experience was identified as the major restriction to the development of laparoscopic surgery.[19]

Our study involves the analysis of 262 total laparoscopic hysterectomy (TLH) procedures performed by the same surgical team.

MATERIAL AND METHODS

This is a descriptive, observational and cross-sectional study, with a retrospective analysis of the clinical records of all patients who had undergone TLH performed by the same surgical team and following the same surgical technique, between the 1st April 2009 and the 31st of March 2013.

Patients attended a follow-up visit at 1, 6 and 12 months after surgery (except surgeries that took place after 31st March 2012, as their follow-up has not yet reached the 12

Table 1 - Major and minor intra and post-operative complications

Major Complications
Ureteral lesion
Vesical lesion
Bowel perforation
Bleeding requiring blood transfusion
Vaginal cuff hematoma requiring surgical drainage or blood transfusion
Major complications related with anaesthesia
Conversion to laparotomy
Vaginal cuff dehiscence
Pulmonary embolism
Minor Complications
Bleeding* not requiring blood transfusion
Hematoma (with spontaneous drainage)
Iatrogenic serosal bowel injury
Infection (urinary, of the pelvic scar or other) or fever (body temperature > 38ºC on first seven days)
Deep vein thrombosis
Minor problems related with anaesthesia
Urinary incontinence

* Bleeding defined by subjective evaluation and at the same time confirmed by drop in haemoglobin levels higher or equal to 3.5 g/dL

month-period at the time of analysis) and complications and related symptoms were recorded. There was a non-attendance rate of 1.1% (*n* = 3) on the first month, 7.3% (*n* = 19) at six months and 14.1% (*n* = 37) at 12 months.

The following parameters were analysed in order to characterize our group of patients: patent's age; body mass index (BMI); age at menarche and at menopause; use of hormone therapy; parity; medical and surgical history. As regards surgical procedure, the following were assessed: major surgical indication; ancillary surgical procedures; operative time; type of energy system used; use of epigastric trocar; indication for morcellated hysterectomy specimen; weight of hysterectomy specimen; duration of postoperative hospital stay; histopathological diagnosis; pre and postoperative haemoglobin and haematocrit variation; major and minor intraoperative complications (occurring up to 12 months after surgery), using criteria in previously published case series (Table 1).[9,11]

Surgical procedure

Upon adequate explanation, an informed consent was signed by all patients before surgery. Patients were admitted on the eve of surgery, and a blood sample was obtained for preoperative blood count and patients underwent bowel preparation. The blood count was re-tested on the first day after surgery.

All surgical procedures were performed under general anaesthesia and using Folley catheter for continuous urinary catheterisation. All patients received intravenous antibiotic prophylaxis with single-dose of cephoxitin (2 g)..

Surgery was performed with four skin incisions always including a transumbilical approach, usually using one 10 mm umbilical trocar for optical instruments, two lateral trocars and one 5 mm suprapubic trocar for surgical instruments. An epigastric 10 mm trocar replaced the suprapubic trocar in some situations.

Upon creating an operative field and before TLH, a diagnostic laparoscopy was also performed in order to identify the ureters, followed, when necessary, by adhesiolysis or endometriosis treatment. All TLH were performed using a Clermont-Ferrand uterine manipulator, following the Clermont-Ferrand technique, starting with clamping of the left round ligament; dissection of broad ligament anterior leaf up to the peritoneal vesicouterine fold; division of the posterior leaf of the broad ligament; clamping of the utero-ovarian or infundibulopelvic ligament (with or without preserving adnexae, respectively); similar procedure followed on the right side; dissection of the vesicouterine space pushing the bladder down; bilateral clamping of uterine arteries, cardinal and utero-sacral ligaments; circular colpotomy performed; removal of hysterectomy specimen through vaginal route (with or without the need for morcellation); vaginal cuff closure through the laparoscopic route, with bilateral utero-sacral ligament vaginal vault suspension; ensuring surgical haemostasis, pelvic washing and ureter inspection for peristalsis. Operative time for TLH was considered from the beginning of round ligament

clamping up to the conclusion of vaginal cuff closure.

Statistical analysis

Data were inserted on a database in FileMaker Pro 12 Advanced®. Statistical analysis used SigmaStat® (version 3.5) software. A descriptive analysis was performed, with central tendency and dispersion measures, taking into account the variables used in the study. The results referring to quantitative variables are presented as mean ± standard deviation. Kolmogorov-Smirnov was used for normality analysis and chi-square and Kruskal–Wallis tests were used for independent samples. A Dunn test was used for paired multiple comparisons. Statistical significance was considered for *p* values < 0.05.

RESULTS

In four years, 549 hysterectomy procedures were performed by the same surgical team. From these, 47.7% (*n* = 262) were TLH, 36.4% (*n* = 200) were abdominal hysterectomy procedures and 15.9% (*n* = 87) were vaginal hysterectomy procedures. As presented in Fig. 1, the number of TLH increased over the studied period of time, while abdominal and vaginal hysterectomy procedures decreased. In fact, the TLH rate increased from 32.9% (*n* = 47) in the first year to 53.1% (*n* = 68) in the fourth year (*p* < 0.001).

Mean age of the 262 patients who underwent TLH was 48.9 ± 9 (minimum 21; maximum 84). Gynaecological and obstetric medical and surgical history data are presented in Table 2. We should remark that 15.6% (*n* = 41) of the patients were nulliparous, 23.7% (*n* = 62) were postmenopausal and 17.7% (*n* = 11) of the patients were on hormone therapy. As regards medical history, only 32.1% (*n* = 84) of the patients were healthy. High blood pressure (24.8%), depression (13.4%) and dyslipidemia (10.3%) were the most commonly associated co-morbidities. Mean BMI was 26.5 ± 4.5 kg/m², 14.9% of the patients were obese (*n* = 39) and 27.1% (*n* = 71) were overweight, according to the WHO criteria.[20]
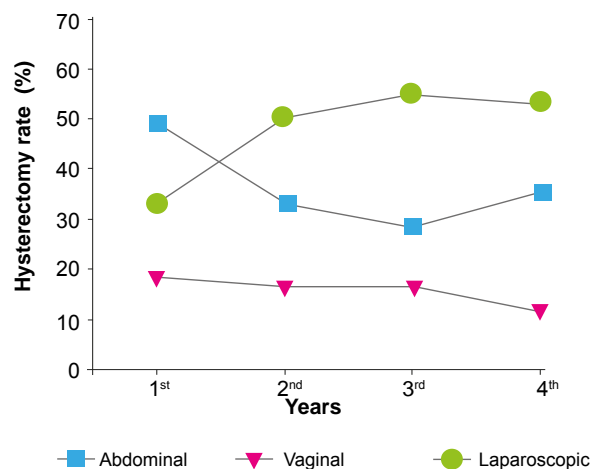

Figure 1 - Abdominal, vaginal and total laparoscopic hysterectomy rates over the four years of the study

Table 2 - Gynaecological and obstetric, medical and surgical history of patients who underwent TLH

Gynaecological and Obstetric History	
Menarche (mean ± SD; min - max)	12.5 ± 1.7 (8 - 17)
Parity	
Nulliparous, *n* (%)	41 (15.6%)
Multiparous, *n* (%); mean ± SD	221 (84.4%); 1.9 ± 0.8
Childbearing age	
Pre-menopausal, *n* (%)	200 (76.3%)
Post-menopausal, n (%); mean ± SD	62 (23.7%); 50.8 ± 3.6
Medical History	
Irrelevant, *n* (%) **Co-morbidities, *n* (%)**	84 (32.1%)
High blood pressure	65 (24.8%)
Depression	35 (13.4%)
Dyslipidemia	27 (10.3%)
Endocrine disorders	23 (8.8%)
Cancer	17 (6.5%)
Type 2 diabetes *mellitus*	12 (4.6%)
Respiratory disorders	12 (4.6%)
Venous insufficiency	11 (4.3%)
Cardiovascular disorders	10 (3.8%)
Blood disorders	10 (3.8%)
Others	26 (9.9%)
BMI (mean ± SD; min - max)	26.5 ± 4.5 (19 – 43)
Overweight, *n* (%)	71 (27.1%)
Obesity, *n* (%)	39 (14.9%)
Surgical History	
Gynaecological surgery (vaginal approach), *n* (%)	
Hysteroscopy	47 (17.9%)
Resectoscopic techniques	14 (5.3%)
Urogynaecology	4 (1.5%)
Cervical conization	3 (1.1%)
Gynaecological surgery (abdominal approach), *n* (%)	
Cesarian delivery	47 (17.9%)
Surgical laparoscopy	36 (13.7%)
Laparotomy	27 (10.3%)
Diagnostic laparoscopy	3 (1.1%)
Non-gynaecological surgery, *n* (%)	
Appendectomy	31 (11.8%)
Cholecistectomy	20 (7.6%)
Others	4 (1.5%)

BMI: Body mass index; **mean ± SD:** mean ± standard deviation; **min – max:** minimum and maximum value; Menarch. **Childbearing age:** years; **BMI:** Kg/m².

Table 3 - Main surgical indication of patients who underwent TLH

Surgical Indication	*n*	%
Myomatous uterus	140	53.4
Endometrial polyposis	28	10.7
Adnexal disorders	27	10.3
Endometriosis	26	9.9
Endometrial hyperplasia	14	5.3
Urogenital prolapse	11	4.2
Isolated adenomyosis	7	2.7
Endometrial cancer	3	1.1
Breast cancer	2	0.8
Cervical cancer	2	0.8
Blood disorder	1	0.4
Cervical dysplasia	1	0.4

Table 4 - Main and ancillary surgical procedures

Main procedure - TLH, *n* (%)	
With unilateral or bilateral salpingo-oophorectomy	165 (63.0%)
With adnexal preservation	84 (32.1%)
With unilateral or bilateral salpingectomy	11 (4.2%)
With unilateral oophorectomy	2 (0.8%)
Ancillary procedures, *n* (%)	
Urogynaecological, *n* (%)	
Adhesiolysis	46 (54.1%)
Colpoperineorraphy	15 (17.6%)
Unilateral or bilateral ovarian cystectomy	10 (11.8%)
Excision of rectovaginal nodule	9 (10.6%)
Continence surgery (TVT-O)	8 (9.4%)
Cystoscopy	7 (8.2%)
Unilateral salpingectomy	6 (7.1%)
Excision of vesical endometriotic nodule	1 (1.2%)
Pelvic lymphadenectomy	1 (1.2%)
Other, *n* (%)	
Herniorraphy / hernioplasty	5 (5.9%)
Rectal shaving	3 (3.5%)
Omentectomy	3 (3.5%)
Appendectomy	2 (2.4%)
Bowel resection	1 (1.2%)
Haemorrhoidectomy	1 (1.2%)

TVT-O: tension-free vaginal tape-obturator.

Regarding surgical history, 49.2% (*n* = 129) of the patients had undergone at least one previous abdominopelvic surgery. From these, 17.9% (*n* = 47) had undergone at least one previous caesarean section. As regards other abdominal surgical history, 11.8% of the patients (*n* = 31) had been submitted to an appendectomy and 7.6% (*n* = 20) to a cholecystectomy.

The main surgical indications were: myomatous uterus (53.4%; symptom-related, namely with dysfunctional uterine bleeding (refractory to medical management), endometrial polyps (10.7%), adnexal pathology (10.3%), endometriosis (9.9%), endometrial hyperplasia (5.3%) and urogenital prolapse (4.2%; uterine prolapse related with myomatous uterus or simultaneous adnexal mass) (Table 3).

TLH was performed with unilateral or bilateral adnexal surgery in 63% (*n* = 165) of the patients, with bilateral adnexal preservation in 32.1% (*n* = 84), with unilateral or bilateral salpingectomy in 4.2% (*n* = 11) and unilateral oophorectomy in 0.8% (*n* = 2) (Table 4). Other ancillary surgical procedures were performed in 32.4% (*n* = 85) of the patients (Table 4), mainly including adhesiolysis in 46 patients, ureterolysis in five, surgical excision of endometriotic nodules (of the recto-vaginal septum in nine patients, of bladder and bowel in one patient) and pelvic lymphadenectomy in one patient (a 60-year old with endometrioid-type endometrial adenocarcinoma invading more than half myometrium).

Mean TLH operative time was 77.7 ± 27.5 minutes (minimum 25; maximum 180). As presented in Fig. 2, mean operative time was statistically significantly reduced from the first (87.4 ± 26.8 minutes) to the fourth year (69.1 ± 22.9 minutes) of the study (*p* < 0.05). Bipolar/monopolar energy system was used in 93.5% (*n* = 245) of surgeries (bipolar energy for clamping, coagulation and dissection procedures; monopolar energy only for circular colpotomy). In addition, ultrasonic energy (Ultracision®) was used in 4.6% (*n* = 12) of surgeries, LigaSure® system in 1.1% (*n* = 3) and Enseal® system in 0.8% (*n* = 2). Taking into account the uterine
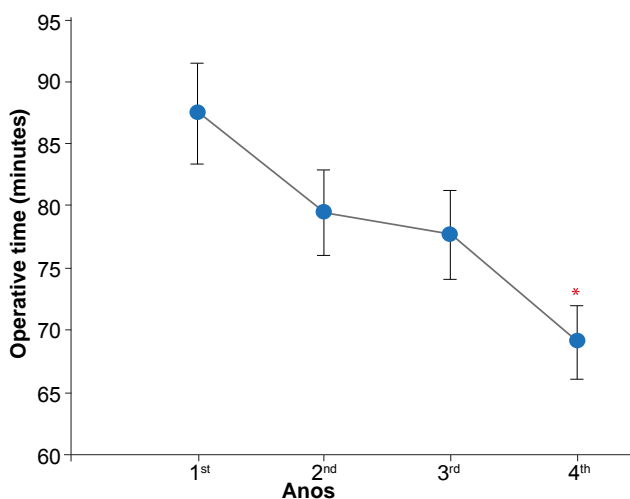
dimensions, an epigastric trocar placement was needed in 15.6% (*n* = 41) of surgical procedures. Morcellation of the operative specimen was needed in 30.9% (*n* = 81) of surgeries, using the vaginal route in 90.1% (*n* = 73) of surgeries. Mean weight of operative specimen was 241 ± 168.4 g (minimum 34; maximum 1,000). Postoperative mean hospital stay was 1.49 ± 0.9 days, with 64.5% of the patients presenting a one-day hospital stay (minimum 1; maximum 8).

As regards histopathological results, the most frequent were uterine fibroids in 69.1% (*n* = 181) of the patients, adenomyosis in 33.6% (*n* = 88), endometrial polyps in 17.2% (*n* = 45), ovarian pathology in 14.5% (*n* = 38) and endometriosis in 12.6% (*n* = 33).

Mean pre and postoperative haemoglobin difference was 1.5 ± 0.8 g/dL, with maximum loss of 4.7 g/dL. Haemoglobin reduction was 3.5g/dL or higher in 3.4% of the patients (*n* = 9). As regards mean pre and postoperative haematocrit difference, this was 4.9 ± 2.6%, with a maximum loss of 13.7%.

Major intraoperative complications involved two (0.76%) patients, namely one cardiac arrest during anesthesia induction in one patient with history of thymoma, successfully reversed with CPR and one conversion to laparotomy due to uncontrolled uterine bleeding, without any specific iatrogenic vascular lesion (the same patient with a 4.7 g/dL haemoglobin loss; this is a patient without any history of known coagulation abnormalities) (Table 5). Minor intraoperative complications included bleeding with no indication for blood transfusion in nine patients (3.4%) and two patients (0.76%) with serosal sigmoid iatrogenic laceration, in whom suturing was immediately performed (Table 5).

As regards postoperative major complications, two patients presented dehiscence of the vaginal cuff (0.76%), one with a stage IBG2 endometrial adenocarcinoma (the same patient who underwent pelvic lymphadenectomy) upon brachytherapy session and in the other patient it occurred five months upon surgery, in relation to sexual intercourse. These patients underwent vaginal cuff secondary closure by laparoscopic approach, upon excision of the fibrotic and necrotic tissue excision of cuff edges, allowing for easier healing. Postoperative infectious situations occurred in 15 patients (5.7%) namely 11 (4.2%) with lower urinary tract infections, two (0.76%) febrile cases, one (0.38%) infection of the vaginal cuff and one (0.38%) infection of the umbilical scar, with supra-aponeurotic fistula formation, which was excised three years upon surgery. Four (1.5%) patients presented with stress urinary incontinence, persisting in two patients at 12 months follow-up (Table 5). No vaginal cuff prolapse occurred beyond one year of follow-up. No ureteral or vesical lesion, no re-admission (less than 72 hours upon discharge) nor any intraoperative or immediate postoperative death occurred. Therefore, overall major morbidity was 1.5% (*n* = 4) and minor morbidity was 11.5% (*n* = 30).

Figure 2 - Mean TLH operative time over the four years of the study. *p* < 0.05: * vs 1st year

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Table 5 - Intra and postoperative major and minor complications

Complications	n	%
Major		
Vaginal cuff dehiscence	2	0.76
Major anaesthesia complications	1	0.38
Conversion to laparotomy	1	0.38
Minor		
Infective		
Urinary tract infection	11	4.20
Fever (body temperature > 38ºC on first 7 days)	2	0.76
Vaginal cuff infection	1	0.38
Umbilical scar infection (with fistula)	1	0.38
Bleeding requiring no blood transfusion	9	3.40
Urinary incontinence	4	1.50
Iatrogenic serosal bowel injury	2	0.76

DISCUSSION

Laparoscopic hysterectomy was initially criticized due to its technical difficulty, higher operative time and apparent increase in major complications, namely as regards the urinary tract. However, its benefits include less postoperative pain, a reduced hospital stay, an earlier return to professional activity, a short-term increase in quality of life and a better aesthetic outcome, when compared to abdominal hysterectomy.[8,9,15,21,22] From a technical point of view, laparoscopic approach benefits include high-definition imaging and vision amplification, allowing for an easier access to the uterine vessels, ureter, rectum and vagina.[9] Despite the initial controversy regarding laparoscopic approach-related complication rate, most recent studies are consensual and present TLH as a safe and first-line technique in multiple surgical scenarios, either benign or malignant.[9,10,13,14] However, laparoscopic hysterectomy has not yet reached the expected implementation in Portugal.[19]

We present in our study the analysis of 262 TLH performed by one surgical team in one *SNS* hospital. Our results show that upon training and technique establishment, laparoscopic approach became the preferred hysterectomy approach. In fact, and in accordance to other studies, our own experience was that after the first year of experience with the laparoscopic route, it was adopted as the main approach, with a relevant decrease mainly in abdominal hysterectomy procedures.[3,9,23] However, we must stress that, according to a 2009 Cochrane survey, as well as to the

American Congress of Obstetricians and Gynaecologists (ACOG) recommendations, considering its advantages and low complication rate, vaginal approach remains as first-line approach for hysterectomy. Laparoscopic hysterectomy should therefore be performed whenever vaginal approach is not feasible or indicated, in order to avoid the abdominal approach.[6,8]

Considering that hysterectomy is the major gynaecological surgery more commonly performed in developed countries, at a time when *SNS* cost reductions are a major issue, a cost-efficacy evaluation of the different approaches should also be carried out. Every laparoscopic surgery requires specific and expensive equipment and instruments. Preliminary studies have shown that laparoscopic hysterectomy was more expensive when compared to the abdominal approach.[18,24] However, over the past few years, with more surgical experience and consequently lower complication rates, this financial reality has changed. Minimally-invasive approaches (vaginal and laparoscopic) are associated with a reduced hospital stay, less postoperative pain, transfusional need and infectious complication rates, as well as an earlier return to professional activity, all these factors contributing to an indirect cost reduction associated to the surgical procedure. Very recently Wright *et al.* showed that vaginal hysterectomy is the least expensive method, followed by laparoscopic hysterectomy.[25] In fact, the laparoscopic approach has been related to reduced costs, when compared to abdominal

hysterectomy[25,26] and apparent financial barriers to the implementation of laparoscopic hysterectomy should be overcome.

Most patients who underwent TLH presented relevant medical co-morbidities, a mean BMI of 26.5 kg/m^2 (above ideal body weight-related BMI of 20 – 24.9 kg/m^2) and 42% of the patients were overweight or obese. In addition, almost half of the patients (49.2%) had undergone at least one previous abdominopelvic surgery.

The main surgical indications for hysterectomy in our study are in line with what is described in literature, with uterine fibroids assuming a major role (53.4%).[10,18,21,27,28] Histopathological results are also as expected from the major surgical indications, namely fibroids were present in 69.1% of surgical specimens.

Other ancillary procedures were performed, with variable complexities, in 32.4% of the patients. This shows the efficacy of the laparoscopic approach for different surgical procedures in Gynaecology, without the need for conversion to neither a laparotomy nor a second surgical time.

Mean operative time in our study (262 TLH) was 77.7 minutes with a significant decrease from the first to the fourth year of the study. These results are in line with those described by other groups with overall recognized experience, such as Wattiez *et al.* and Malzoni *et al.*[15,16] The Malzoni group, for instance, described a mean operative time of 80 minutes.[16] The operative time described in our study is significantly lower than the one described by Santos *et al.* in one revision of 89 vaginal hysterectomy procedures assisted by laparoscopy, performed in one Portuguese Gynaecology department, describing a mean operative time of 120.6 minutes.[18] These results show that with a trained surgical team laparoscopy is not related with an increase of the operating time. In addition these results reinforce, once again, the importance of training and an initial learning curve in relation to laparoscopic procedures.

We should emphasize that this operative time has been possible even with a similar or higher uterine weight than that which is described in the literature.[9,21,29] Mean weight of surgical specimen in our study was 241 g (minimum 34; maximum 1,000). Donnez *et al.*, in one revision of 3,190 laparoscopic hysterectomy procedures, described a mean weight of 230 g.[9] In addition, the study by Santos *et al.* refers to a mean weight of 138.4 g[18] lower than the one described in our study. These results reinforce that the laparoscopic approach is possible, even in the presence of a voluminous uterus.

Mean postoperative stay was 1.49 ± 0.9 days, in line with what is described in literature. Malzoni *et al.*, for instance, have described a study involving 396 and 624 patients with mean hospital stays of 2.4 and 2.3 days, respectively.[16] We should remark a eight-day postoperative stay regarding one patient with type 3 von Willebrand disease whose hospital stay was extended for haemostasis control and to restore factor VII.

As regards postoperative progress, we found a mean haemoglobin decrease of 1.5 g/dL. These results are similar to those described by Malzoni *et al.* of a postoperative haemoglobin decrease of 1.44 and 1.39 g/dL.[16]

In our study there was a major complication rate of 1.5% and minor complication rate of 11.5%. There were no ureteral or vesical lesions, bowel perforations or death. This complication rate is comparable with the rates described in literature. In one study of 1,120 laparoscopic hysterectomy procedures, Karaman *et al.* described a major complication rate of 1%.[13] Brummer *et al.* carried out a multicenter retrospective study in Finland, including 27,827 TLH, in which major complication rate varied from 1.8% between 1992 and 1999 and 1% between 2000 and 2005.[23] In addition, Donnez and Donnez described in their retrospective study with 400 patients who underwent laparoscopic hysterectomy procedure a major complication rate of 1.5%.[10] We should remark that we have considered as minor complication the occurrence of a serosal sigmoid iatrogenic laceration with immediate suture, which for some authors would be considered as a normal occurrence.[15] In addition, we also considered as morbidity the case of urinary incontinence, according to the study by Walsh *et al.* who considers that vesical dysfunction should be assessed as a long-term complication of the laparoscopic approach.[4] However, previous studies on complication rates have not included this parameter. Regardless of this fact, the minor complication rate that we described is acceptable and is in line with current literature. For instance, Hoffman *et al.* described a 17.6% minor complications rate in their series of 108 LTH.[30]

The adopted methodology is a possible limitation in our study as data was obtained from clinical records and as such was dependent on clear and complete information. In addition, this was a retrospective and observational study, without a control group. As such we recognize the need for a prospective study with a control group, the latter including a vaginal or abdominal approach.

CONCLUSIONS

Our study shows that TLH is minimally invasive and is related to a low intra and postoperative complication rate, even in high BMI-patients and when there is a history of abdomino-pelvic surgery. To our knowledge, this is the first Portuguese TLH clinical series and reinforces that, when performed by an adequately-trained surgical team, TLH is a safe procedure, may be performed in an acceptable operating time and is feasible in the presence of a voluminous uterus.

CONFLICTS OF INTEREST

The authors declare that there were no conflicts of interest in writing this manuscript.

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