Gynecology; Gynecological Oncology

Minimally Invasive Approaches for Combined Gynecologic Surgeries: Our Three Years Clinical Experiences

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ABSTRACT

OBJECTIVE: To evaluate outcomes of gynecological patients with multiple pathologic conditions who were treated with combined laparoscopic procedures.

MATERIAL AND METHOD: We retrospectively analyzed 48 consecutive patients who underwent a combination of laparoscopic surgical procedures during a single operative session in Turgut Ozal University Hospital, Department of Gynecology. Outcomes included operative time, intraoperative blood loss, hemoglobin levels, mean hospital stay and complication rate. To investigate the relationship between body mass index (BMI) and other variables, we assigned each patient to three BMI groups.

RESULTS: The most common combination of procedures was laparoscopic hysterectomy and laparoscopic Burch colposuspension (18 patients). Blood loss was positively correlated with number of ports. Higher BMI was correlated with greater blood loss and operative time but not with complication rate.

CONCLUSIONS: Multiple pathologic conditions could be treated safely and effectively in a single laparoscopic operation. Obesity did not appear to be a risk factor for complications.

Keywords: Laparoscopy, Combined minimally invasive surgery, Obesity

Introduction

Laparoscopy has a good safety profile, with advantages over more invasive surgeries such as reduced operative procedure time, reduced complications, decreased hospital stay and improved recovery time. Recently, hysterectomy procedures in gynecological surgery are changing to type 7 total laparoscopic hysterectomy (TLH). Type 7 TLH is a procedure in which surgical dissection, blood vessel closure, suture placement and vaginal cuff closure are all performed through the trocars.[1]

Advances in laparoscopic surgery have enabled patients to undergo multiple procedures safely and effectively during a single operation. Combined procedures can be performed in the intraperitoneal and extraperitoneal spaces. Advantages of performing laparoscopic procedures in combination include less pain and morbidity, shorter hospital stay, better cosmetic results and faster recovery compared to multiple separate operations.[2] The risks of anesthesia are likewise minimized.

The aim of this study was to evaluate the outcomes of patients in our gynecology department who had multiple pathologic conditions such as myoma uteri, urinary stress incontinence, pelvic prolapse and other pathologic conditions like cholelithiasis umbilical hernia and who were treated with a combination of laparoscopic procedures during a single operative session.

Material and Method

The study was approved by the Turgut Özal University School of Medicine Ethics Committee and was conducted in accordance with the ethical principles described by the Declaration of Helsinki.

We retrospectively analyzed 48 consecutive patients in Turgut Ozal University Hospital, Department of Gynecology who had each undergone a combination of laparoscopic surgical procedures during a single operative session. The study period began in January 2009 and continued to the end of August 2012. The potential risks and benefits of the surgical procedures were explained to patients before surgery, and all patients gave written informed consent for the operations they were to undergo.

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Recorded variables included patient characteristics (age, body mass index (BMI), history of previous abdominal surgery); laboratory and biochemical data; intraoperative data (blood loss estimated via the fluid extraction device; operative time; complications); and postoperative course (complications, hospital stay) (Table 1). Preoperative and postoperative hemoglobin levels were measured in all patients. To investigate the relationships between body mass index (BMI) and other variables, we assigned each patient to one of three groups, as follows: low (BMI < 25 kg/m²), middle (25 ≤ BMI <35 kg/m²) or high (BMI ≥35 kg/m²).

Operations were performed by gynecologists and general surgeons. Pelvic examination, routine examinations including blood tests, electrocardiogram and chest radiographs, transvaginal or abdominal ultrasonography were performed in all the patients. One patient aged 40 was admitted to the emergency department with severe pelvic pain and upper abdominal pain associated with ovarian torsion and biliary vomiting respectively. The patients who had complaints of postmenopausal vaginal bleeding underwent endometrial biopsy with pipelle cannula. The patients with urinary incontinence were evaluated by means of complete history obtained using urinary incontinence questionnaires, urogynecological examination and multichannel urodynamic study.

The procedures that were carried out are summarised in Table 2. During surgery, the LigaSure™ vessel sealing system (Valleylab, Boulder, CO, USA) was applied whenever deemed necessary in order to provide tissue dissection and vessel sealing. In single-port procedures and inguinal hernia repairs, the 5-mm LigaSure was used, whereas during the other procedures both the 5-mm and the 10-mm LigaSure devices were used. All patients underwent surgery under general anesthesia. Insufflation was performed with carbon dioxide at a pressure of 14 mmHg for intraperitoneal procedures, and at 12 mmHg for extraperitoneal procedures. During total laparoscopic hysterectomy, bilateral salpingo-oopherectomy (TLH BSO) we did not use uterine manipulator. After the uterus was removed vaginally, closure of the vault was carried out laparoscopically. Burch colposuspensions were performed with transabdominal preperitoneal approach. After the space was dissected from the anterior abdominal wall, after visualizing Cooper's ligaments, two strips of polypropylene surgical mesh shaped 3x2 cm were inserted consecutively to retrovaginal space with tacker (Origin Med Systems, Menlo Park, CA, USA). The preperitoneal area was reperitonized with tacker also.

One patient underwent type 7 total hysterectomy, bilateral salpingo-oopherectomy and Burch colposuspension via a single port. Another patient underwent laparoscopic hysterectomy, bilateral salpingo-oopherectomy, sacrocolpopexy and Burch colposuspension via a single port.[2]

Statistical analyzes were performed with the use of SPSS version 17.0 (SPSS, Chicago, IL, USA). The Kolmogorov-Smirnov and Shapiro-Wilk tests were used to evaluate whether the data were normally distributed. Some data were found to be non-normally distributed, and, therefore, non-parametric tests were used for analyzes. For normally distributed variables, mean and standard deviation were calculated, whereas for non-normally distributed variables median and interquartile ranges (IQR) were calculated. Variance analyzes were performed with the Mann-Whitney or Kruskal-Wallis tests depending on the number of compared groups. Spearman correlation analysis and stepwise linear regression were used to assess independent risk factors for operative time and intraoperative blood loss while controlling for potential confounders. Age, gender, BMI, history of previous abdominal surgery and number of ports were used as independent categorical variables. Statistical significance was defined as $p \leq 0.05$.

Results

All procedures were completed laparoscopically, with no conversions to open surgery. No patients required blood transfusion. Patient characteristics and operative data are summarized in Table 1. The patients' overall mean age was 51±1 years (range 21 to 78 years). Mean BMI was 25.8 kg/m² (IQR 7.9 kg/m²; range 19 to 41 kg/m²). Median operative time was 90 min (IQR 60 min). Median blood loss was 60 ml (IQR 30 ml). Mean hospital stay was 1 day. There was a complication in one patient (Table 1), i.e. ureter injury during total laparoscopic hysterectomy (TLH).

Table 1: Patient characteristics and operative data

Variables	*mean ±SD, minimum-maximum **median (IQR), minimum-maximum
Age	*51 ± 1, 21-78
Body mass index (kg/m²)	*25.8 (7.9), 19-41
Operative time (minutes)	**90(60), 25-150
Blood loss (mL)	**60(30), 0-200
Preoperative hemoglobin	*12.7±0,8
Postoperative hemoglobin	*12.0±0,8
Hemoglobin difference	**1.0 (0,8)
Number of ports	**4 (0),1-7
History of previous abdominal surgery (%)	**19 (39.6)
Hospital stay	**1.0 (0,0), 1-7
Complications n,(%)	1 (2)
- *Ureter injury n, (%)*	1 (2)

The most common combination of procedures performed was laparoscopic type 7 total hysterectomy with bilateral salpingo-oopherectomy and laparoscopic Burch colposuspension (LHBSO; 18 patients). The next most common combinations were TLH BSO with cholecystectomy (6 patients) and laparoscopic sacrocolpopexy with rectopexy (5 patients) (Table 2).

Data were analyzed according to the three BMI groups (low, middle and high), as summarized in Table 3. Nearly half

of the patients were in the middle BMI group (n=19). In the high BMI group, median operative time and median intraoperative blood loss were statistically greater than in the low and middle BMI groups (p<0.002 and p=0.011 respectively).

However, the three BMI groups did not differ significantly in terms of preoperative and postoperative hemoglobin levels. The groups also did not differ significantly with respect to hospital stay or complication rate (Table 3).

Table 2: Combined laparoscopic gynecological procedures

Procedures	No. of patients (%)	No. of ports	Operative time, minutes mean ± SD (range)	Blood Loss, mL mean ± SD (range)
Laparoscopic type 7 total hysterectomy, bilateral salpingo-oopherectomy with Burch colposuspension	18 (37.5%)	4	89 ± 24 (65-100)	59 ± 41 (30-80)
Laparoscopic type 7 total hysterectomy, bilateral salpingo-oopherectomy with cholecystectomy	6 (12.5%)	7	127 ± 21 (125-150)	83 ± 10 (60-110)
Laparoscopic sacrocolpopexy with rectopexy	5(10.4%)	4	108 ± 27 (90-150)	33 ± 4 (30-60)
Laparoscopic cholecystectomy with unilateral ovarian cystectomy	4 (8.3%)	6	67 ± 24 (60-90)	58 ± 13 (40-75)
Laparoscopic ovarian cystectomy with appendectomy	2 (4.1%)	3	45 ± 3 45-50	55 ± 21 40-70
Laparoscopic type 7 total hysterectomy with Burch colposuspension	2 (4.1%)	4	75 ± 21 (60-90)	47 ± 10 (40-55)
Laparoscopic Burch colposuspension with bilateral tubal ligation	2 (4.1%)	3	35 ± 14 (25-45)	0
Laparoscopic Burch colposuspension with unilateral salpingo-oopherectomy	2 (2.1%)	3	50 ± 12 (45-55)	53 ± 11 (40-65)
Single port type 7 total hysterectomy, bilateral salpingo-oopherectomy with Burch colposuspension	1 (2%)	1	70	60
Laparoscopic bilateral ovarian cystectomy with bilateral tubal ligation	1 (2%)	3	55	70
Single port laparoscopic hysterectomy, bilateral salpingo-oopherectomy with sacrocolpopexy and Burch colposuspension	1 (2%)	1	150	150
Laparoscopic unilateral ovarian cystectomy with myomectomy	1 (2%)	3	50	65
Laparoscopic unilateral salpingo-oopherectomy with laparoscopic sacrocolpopexy	1 (2%)	4	110	60
Laparoscopic Burch colposuspension with sacrocolpopexy and umbilical hernia repair	1 (2.0%)	4	110	80
Laparoscopic type 7 total hysterectomy with umbilical hernia repair	1 (2%)	4	120	60
TOTAL	48			

Table 3: Comparison of patients according to body mass index group

	Low (BMI <25)	Middle (25≤ BMI <35)	High (BMI ≥ 35)	p**
No. of patients	18	19	11	
Age (mean ±SD)	49±1	48±9	57 ± 8	0.053
Number of ports*	4 (1)	4 (1.5)	4 (3)	0.027
History of previous abdominal surgery (%)	10 (55.6)	7 (36.8)	2 (18.0)	0.176
Operative time (minutes)*	82 (42)	87 (50)	137 (37)	0.002
Blood loss (mL)*	43±1	57±4	85±5	0.011
Hospital stay (days; mean ±SD)	1.0±0.0	1.3±1.4	1.0± 0.0	0.479
Complications (%)	0	1 (5.2)	0	0.456
Preoperative and postoperative hemoglobin difference (g/dL)*	0.7 (0.9)	1.0 (0.2)	0.8 (1.3)	0.584

* Median (Interquartile range), ** Kruskal-Wallis test

Correlation analyses revealed several significant relations (Table 4). Number of ports was positively correlated with blood loss and operative time (rho=0.297, p=0.043 and rho=0.644, p<0.001 respectively). Higher body mass index (BMI) was correlated with greater blood loss and positively correlated with operative time (rho=0.431, p <0.002 and rho= 0.465, p <0.001 respectively). Age was also correlated with greater blood loss (rho=0.417, p <0.004) and with operative time (rho=0.319, p=0.029). Operative time was positively correlated with blood loss (rho = 0.550, p = 0.001). Hospital stay was positively correlated with complications (rho=1.000, p< 0.001).

Discussion

Few studies have investigated the combination of multiple laparoscopic procedures in one operative session. The present study differs from previous studies of combined laparoscopic procedures with respect to the diversity of procedures performed, the use of the LigaSure™ device in all patients, and the evaluation of obesity as a factor in operative outcomes.

There is evidence to suggest that combining laparoscopic procedures does not confer any disadvantage in terms of postoperative pain, operation length, hospitalization and recovery period or morbidity.[2,4,5] Ghidirim et al.[2] performed laparoscopic cholecystectomy combined with various procedures, such as wedge resections, multiple ovariotomies or electrosurgical coagulations of the ovaries, on the ovaries of 29 women with polycystic ovary disease and gallstones. The authors suggested that two types of procedure can be performed in a single session, conferring the advantages of minor surgical trauma, less formation of adhesion and facilitation of treatment of hormonal disorders and infertility. Wadhwa et al.[4] retrospectively analyzed 145 patients who had undergone combined surgical procedures. In 15 patients the procedures included open surgery, and in 129 of the remaining patients the combined laparoscopic procedures included cholecystectomy. The authors concluded that combined procedures, when compared with a single laparoscopic procedure, did not increase postoperative pain, hospitalization, or recovery period. In a smaller study, Schwartz[4] described 3 patients who underwent laparoscopic adrenalectomy combined with laparoscopic procedures on the ipsilateral kidney (nephrectomy, cyst decorti-

cation and cryotherapy, respectively). The author found that combining two surgical procedures in one session minimized morbidity and improved outcomes.

In all patients in our study, the LigaSure vessel closure system was used. It has been reported to be safe, effective and fast, with no associated major or minor complications in various laparoscopic procedures, including cholecystectomy[6] and hysterectomy.[7] The LigaSure device is designed to seal vessels that are up to 7 mm in diameter, and for this purpose it delivers a combination of pressure and bipolar thermal energy. Thermal spread to neighboring tissues is minimal, ranging from 0.5 to 2 mm.[8] The LigaSure device has been shown to be as reliable as clips or ligatures.[9] In obese patients, the vessel dissection and exposure required for the use of clips or ligatures are more difficult due to vessels being deeply embedded in adipose tissue. The LigaSure device is particularly useful in these patients because it renders vessel dissection and exposure unnecessary. In our experience, a general advantage of the 10 mm device is that it has a blunt, smooth tip which can act like the finger of the surgeon during blunt dissection and therefore does not traumatize neighboring tissues. We did not prefer to use uterine manipulator in all patients. Because our patients were generally in the postmenopausal period with small uterus.

Intraoperative blood loss in our patients was positively correlated with BMI; however, the median blood loss in the high BMI group was nonetheless minimal (70 mL). Operative times were also positively correlated with BMI. These two findings are consistent with results reported by Heinberg et al.[10] in their retrospective study of obese and nonobese patients undergoing TLH. In that study, blood loss was greater and operative times were longer in patients whose BMI was 30 or higher, compared to those in patients whose with BMI of less than 30.

In a study of laparoscopically performed gynecologic procedures, Camanni et al.[11] retrospectively assigned each of 503 patients to one of four groups based on BMI: underweight (BMI <18.5 kg/m^2), normal weight (BMI 18.5 to 24.9 kg/m^2), overweight (BMI 25 to 29.9 kg/m^2) and obese (BMI ≥30 kg/m^2). The authors compared the groups with respect to operative times, conversion to laparotomy, intraoperative and

Table 4: Correlation analysis of patient characteristics and clinical variables

Variables	Operative time		Blood loss		Hospital stay	
	Rho	*p*	Rho	*p*	Rho	*p*
Age	0.417	**0.004**	0.319	**0.029**	-0.038	0.799
BMI	0.465	**0.001**	0.431	**0.002**	-0.027	0.856
Previous surgery	-0.019	0.898	-0.153	0.307	0.121	0.416
Number of ports	0.644	**<0.001**	0.297	**0.043**	0.012	0.936
Operative time	0.550	**<0.001**	-0.098	1.000		
Complications	-0.114	0.460	-0.235	0.124	**1.000**	**<0.001**

postoperative complications, and duration of hospital stay. They concluded that BMI did not affect these variables in the various applications of gynecologic surgery included in the study. Similarly, in our study which includes a greater diversity of procedures, we found no differences between our low, middle and high BMI groups with respect to conversions to open surgery, complication rates or duration of hospital stay. We encountered only one incomplete ureter injury in all operations. This patient had normal BMI. We noticed the damage intraoperatively and inserted a double J catheter which was removed after 2 months.

The number of ports used during surgery was positively correlated with amount of blood loss in our patients, and this suggests that blood loss might be minimized through the use of fewer ports, or a single port. It appears that no studies of this particular question have been performed, but the possibility of minimizing blood loss through the use of single port methods should be investigated.

As examples of new combinations of complex procedures that may be performed laparoscopically, two patients in the present series merit further mention. They underwent single port laparoscopic surgery that included hysterectomy, bilateral salpingo-oopherectomy and Burch colposuspension, and in one of these patients, sacrocolpopexy was also included via single port.

In conclusion, we found that in patients who require multiple surgical procedures, including those patients whose diseases extend across multiple disciplines, the necessary procedures can be performed safely and effectively when combined in a single laparoscopic operation. In this setting, obesity does not appear to be a risk factor for negative outcomes.

Kombine Jinekolojik Ameliyatlarda Minimal İnvazif Yaklaşımlar: Üç Yıllık Klinik Deneyimimiz

ÖZET

AMAÇ: Kombine laparoskopik işlemlerle tedavi edilen çoklu patolojik durumdaki jinekolojik hastanın sonuçlarını değerlendirmek.

GEREÇ VE YÖNTEM: Turgut Özal Üniversitesi Hastanesi Jinekoloji bölümünde tek bir ameliyat oturumu süresince bir dizi laparoskopik ameliyat işlemi geçiren 48 hastayı geriye dönük olarak analiz ettik. Sonuçlar ameliyat süresi, ameliyat sırasındaki kan kaybı, hemoglobin seviyeleri, ortalama hastanede kalış süresi ve komplikasyon oranını içermektedir. Vücut kitle indeksi (VKİ) ve diğer değişkenler arasındaki ilişkiyi araştırmak için, hastaları üç VKİ grubuna ayırdık.

BULGULAR: En yaygın işlem kombinasyonu laparoskopik histerektomi ve laparoskopik Burch kolposüspansiyonu idi (18 hasta). Kan kaybının port sayısı ile pozitif korele olduğu tespit edildi. Daha yüksek VKİ, daha fazla kan kaybı ve ameliyat zamanı ile ilişkiliydi fakat komplikasyon oranı ile ilişkisi saptanmadı.

SONUÇLAR: Çoklu patolojik durumlar tek bir laparoskopik ameliyat ile güvenli ve etkili bir şekilde tedavi edilebildi. Obezite komplikasyonlar için bir risk faktörü olarak görünmedi.

Anahtar kelimeler: Laparoskopi, Kombine minimal invazif cerrahi, Obezite

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