Complications of laparoscopic lymphadenectomy for gynecologic malignancies. Experience of 372 patients.

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Abstract

Evaluation of lymph nodes is an integral part in the management of women with gynecologic cancers, which is why the pelvic and aortic lymphadenectomy is widely used as a staging and/or prognostic procedure in such malignancies. The purpose of this study was to describe our experience with pelvic and aortic laparoscopic lymphadenectomy and evaluate the safety and feasibility of this procedure for gynecologic malignancies. From January 2004 to December 2015, a laparoscopic pelvic and/or aortic lymphadenectomy was performed in 372 women at the Department of Gynecology Oncology of the University General Hospital of Castellon and at the Department of Obstetrics and Gynecology of Sant Pau and Santa Tecla Tarragona Hospitals. Out of the 372 cases, 240 combined pelvic and paraaortic lymphadenectomies were performed, while 108 and 24 patients underwent pelvic and aortic lymphadenectomy respectively. The mean operative times were 40 min (20-89) in order to perform a complete pelvic lymphadenectomy, 62 min (21-151) for transperitoneal aortic lymphadenectomy and 45 min (35-65) for a retroperitoneal approach. A conversion to laparotomy was needed in 1.6% of patients. Twenty-three (6.1%) complications were encountered in 372 patients undergoing laparoscopic lymphadenectomy. Nine (2.4%) major complications occurred intraoperatively while fourteen (3.7%) appeared postoperatively. The most frequent intraoperatory complication was vascular injury (1.3%). Laparoscopic lymphadenectomy can be considered a safe and achievable procedure, and could be considered the golden standard procedure for staging gynecologic malignancies.

Introduction

Evaluation of lymph nodes is an integral part in the management of women with gynecologic cancers. Pelvic and aortic lyphadenectomy is widely used as a staging and/or prognostic procedure in gynecologic malignancies [1,2]. Nevertheless, although the removal of lymph nodes containing metastases may have some therapeutic effect, it is still considered controversial [2]. The growing use of laparoscopic surgery in the management of gynecologic malignancies has become evident [3] and is being gradually accepted by the medical community. Since several authors developed surgical techniques to perform pelvic and aortic lymphadenectomy using a laparoscopic approach [4,5], the latter has been compared with laparotomic lymphadenectomy. Despite the obvious advantages offered by the laparoscopic approach, such a lower morbidity, pelvic and paraaortic lymphadenectomy must fulfill the oncologic standards of open surgery for optimal results. The purpose of this study was to describe our experience with pelvic and aortic laparoscopic lymphadenectomy and evaluate the safety and feasibility of laparoscopic pelvic and aortic lymphadenectomy for gynecologic malignancies.

Material and Methods

Laparoscopic pelvic and/or aortic lymphadenectomy was performed in 372 women for cervical (n=99), ovarian (n=63) and endometrial malignancies (n=210) at the Department of Gynecology Oncology of the University General Hospital of Castellon and the Department of Obstetrics and Gynecology of Hospital de Sant Pau y Santa Tecla. Tarrragona between January 2004 and December 2015. All these procedures were performed in a standarized fashion by two oncology surgeons (J.L.H., A.Ll. and J.S.).

We conducted a retrospective review of all patients, analyzing the demographic data on patients (age, body mass index (BMI)), operating times for pelvic and aortic laparoscopic lymphadenectomy, histopathological results, number of harvested lymph nodes, and lymphadenectomy-related complications.

Duration of surgery was defined from the time of incision of the peritoneum until complete removal of all lymph nodes from the corresponding area [6].

Adverse events were classified into intraoperative and postoperative. Intraoperative injuries were categorized into vascular, urinary, intestinal, neurological, and other. Postoperative complications included events resulting up to 6 months after surgery. Complication severity was evaluated following the Clavien-Dindo´s Classification of Surgical Complications [7].

All of the patients were provided with an informed consent for potential complications and the possibility of conversion to laparotomy.

The study approval was not required by the General University Hospital of Castellon Ethics Committee because this study did not entail experimental procedures. Data was analyzed with the Statistical Package for the Social Science software, version 22.0.

Operative techniques

The patient was put into lithotomy position. A left-sided retroperitoneal laparoscopic approach was used, when it was required, for all endometrial and cervical cancer cases in this study. Our surgical technique is based on Querleu and Dargent's technique as reported by other authors [8-10]. The surgeon was on the left side of the patient. Four trocars were placed: one 12 mm supraumbilical Hasson trocar, one 10 mm Hasson in the axillary line 2-3 cm above the iliac crest and two 5 mm trocars in the median axillary line midway between the iliac crest and last rib [11]. Our dissection encompasses the nodal bearing tissue from the mid-portion of the common iliac arteries and extends to the left renal vein. We remove the entire left para-aortic lymph nodes. All lymph nodes were removed via an endoscopic bag through the 10 mm trocar to prevent port site metastases. In case of advanced cervical cancer, in which only aortic lymphadenectomy was required, the retroperitoneum was opened into the abdominal cavity after each case in order to prevent lymphocyst formation.

For ovarian tumors or when the peritoneum of the left paracolic gutter was opened, a transperitoneal lymphadenectomy is performed. We remove para-aortic nodes, and lymphatic nodes around the cava. In this case, the surgeon is positioned between the legs of the patient. We use 6 trocars: one 10 mm Hasson supraumbilical, one 10 mm trocar supraubic, two 5 mm trocar in both iliac fossaes, and two 10 mm trocar in the same line as the 5 mm trocars, parallel to the supra umbilical trocar.

When pelvic and aortic lymphadenectomy procedures are combined, we usually perform the extraperitoneal aortic lymphadenectomy first, to maintain the integrity of the peritoneum, followed by the transperitoneal pelvic lymphadenectomy.

In laparoscopic pelvic lymphadenectomy, 4 trocars are placed and the surgeon remaines on the left side of the patient. One 12 mm Hasson trocar suprabumbilical, one 10 mm trocar suprapubic region and two 5 mm trocars are placed in both iliac fossae. We initiate our approach by opening the pelvic peritoneum between the round ligament and the gonadal vessels, extending the incision cephalad toward the ipsilateral paracolic gutter. We identified anatomic structures: the psoas muscle, the genitofemoral nerve, the external and iliac vessels, the obturator nerve, the umbilical artery and the ureter. We then remove in monobloc the superficial obturator, external iliac and common iliac lymph nodes. The extraction is made in endoscopic bags through the suprapubic trocar and through the vagina in cases requiring a hysterectomy.

We perform lymph node dissection using bipolar energy and, in case of aortic lymphadenectomy, we use a forceps for vessel sealing (LigaSure™, 5 mm, blunt tip, Medtronic).

Additional surgical procedures were performed, as needed, after the laparoscopic lymphadenectomy, such as: laparoscopic hysterectomy or radical hysterectomy, bilateral salpingo-oophorectomy, omentectomy and appendectomy.

All fascial incisions equal to or greater than 1 cm were closed with delayed absorbable suture.

Results

Two hundred and forty combined pelvic and paraaortic lymphadenectomies were performed, while 108 and 24 patients underwent pelvic and aortic lymphadenectomy respectively. Transperitoneal approach was used in 100% of the pelvic lymphadenectomy procedures and in 17% of all aortic lymphadenectomy. An extraperitoneal approach was performed in 83% of all aortic lymphadenectomy procedures. In 24 patients an extraperitoneal paraaortic lymphadenectomy was performed exclusively to complete staging of cervical or endometrial cancer.

The median age and body mass index of the patients were 60 years (range 23-97 years) and 29.75 kg/m^2 (range 18-51 kg/m^2). Table 1 shows the epidemiological characteristics of the studied population. Indications for laparoscopic lymphadenectomy are shown in Table 2. The mean operative times were 40 min (20-89) for a complete pelvic lymphadenectomy, 62 min (21-151) for transperitoneal aortic lymphadenectomy and 45 min (35-65) for a retroperitoneal approach. Conversion to laparotomy was needed in 1.6% of patients (6 cases).

In patients with pelvic lymphadenectomy, an average of 13.6 (range 1-34) lymph nodes were harvested. The median of aortic nodal count was 2 (range 2-31) in the transperitoneal approach and 9 (range 5-20) in the retroperitoneal approach.

Positive para-aortic lymph nodes were present in 7 patients (1.88%), while 16 patients (4.3%) presented positive pelvic nodes. Twenty-three (6.1%) complications were encountered in 372 patients undergoing laparoscopic lymphadenectomy. Nine (2.4%) major complications occurred intraoperatively and fourteen (3.7%) postoperatively. The most frequent intraoperatory complication was vascular injury (1.3%). The vena cava was damaged in two patients, the left renal vein in one patient and the external iliac vein were injured in two patients. Laparotomy was performed in one patient to control bleeding in an external iliac vein lesion. The injury was corrected by a vascular surgeon using a vascular prosthesis. In the other cases, the surgeon repaired these lacerations with laparoscopic intracorporeal suturing using 4-0 polypropylene and postoperative recovery was uneventful. Two cases of injury

Table 1.Summary of patient characteristics.

Age (years), mean (range)	60 (23-97)
BMI (Kg/m^2), mean (range)	29,75(18-51)
Previous abdominal surgery, n (%)	119 (31.9)
Comorbidities, n (%)	
History of diabetes	37 (9.9)
History of hypertension	114 (30.6)
History of respiratory disease	26 (7)
History of cardiovascular disease	29 (7.8)
Tumor origin, n(%)	
Cervix	99 (26.6)
Ovary	63 (16.9)
Endometrium	210 (56.45)
BMI: Body Mass Index	

Table 2. *Indication for laparoscopic lymphadenectomy.*

Cervix	No. of patients	Endometrium	No. of patients	Ovary	No. of patients	
Squamous cell carcinoma	81	Endometrioid adenocarcinoma	189	Endometrioid adenocarcinoma	11	
Adenocarcinoma	12	Serous/Clear cell adenocarcinoma	6	Mucinous adenocarcinoma	11	
Large cell neuroendocrine carcinoma	2	Endometrial stromal sarcoma	4	Serous adenocarcinoma	32	
Clear cell carcinoma	1	Malignant mixed müllerian tumor	4	Other	9	
Other	6	Other	7			
TOTAL	99		210		63	372

to the ureter were reported; one during transperitoneal aortic lymphadenectomy and the other during pelvic dissection. All of them were repared by placing double-J catheters. One case of obturator nerve transection occurred requiring laparoscopic repair. Three cases of bowel perforation occurred. In one patient large intestine was injured due to excessive traction applied by the assisting surgeon during pelvic lymphadenectomy. In another two patients the complications appeared during the postoperative time.

The other postoperative complications included four cases of paralytic ileum, two cases of incisional hernia, two symptomatic lymphoceles and four lymphedemas. All these patients were managed with conservative treatment except for the incisional hernias, which required surgical repair. We observed no postoperative hemorrhage caused by the lymphadenectomy. No thromboembolic events were reported (Table 3).

With regards to our operative findings, no patient required reoperation nor were there any readmitted to the hospital after discharge.

Discussion

Minimally invasive surgery has become an option in the surgical management of early gynecologic malig-nancies. Several studies have demonstrated that laparoscopic lymphadenectomy is a safe and effective technique. There are many widely recognized advantages of a minimally invasive approach for gynecolo-gic malignancies compared to open surgery, which include less pain, smaller incisions, quicker recovery, shorter hospital stays, decreased blood loss, equivalent nodal counts, and in some reports, similar survival; however, there is an increased duration of surgery compared to the laparotomy approach [2,12-19].

In the present study, pelvic laparoscopic lymphadenectomy always used four trocars including a 12 mm Hasson supraumbilical trocar, a 10 mm suprapubic trocar, and two 5 mm trocars in both iliac fossae. This approach has been described by other authors but in our case the surgeon was positioned to the left side of the patient and not on the right as described by Dottino et al. [18]. Unlike other publications where the surgeon performs the right pelvic lymphadenectomy from the left side and the left from the right side [2], we performed both pelvic sides with the surgeon positioned on the left side. To perform the aortic retroperitoneal lymphadenectomy, we followed the technique described by Querleu, positioning ourselves on the left side of the patient [2,4]; however, some authors performed it positioning themselves on the right side of the patient [18,20].

Table 3. *Intraoperative and postoperative complications.*

Intraoperative complications	9(2.4%)
Vascular injury	5
Ureteral injury	2
Obturator nerve transection	1
Bowel lesion	1
Postoperative complications	14(3.7%)
Bowel lesion	2
Paralytic ileum	4
Incisional hernia	2
Symptomatic lymphocele/lymphedema	6

For the transperitoneal aortic approach, we used the technique described earlier in this paper, also used by other authors [21] but with a slight modification of trocar placement.

Laparoscopic lymphadenectomy can be done transperitoneally or retroperitoneally. The transperitoneal approach is preferred in most studies [2,4,8,18,20,22,23]. Transperitoneal lymphadenectomy allows inspection of the abdominal cavity including biopsies and intraperitoneal lavage for cytology. The retroperitoneal approach is associated with better exposure since the bowel is displaced by the elevated peritoneum [8,24]. In our series, we used the transperitoneal approach exclusively for the pelvic lymphadenectomy. For aortic lymphadenectomy in early ovarian cancer, we used transperitoneal approach, which allows a better excision of lymph nodes around the aorta and cava vein. In case of advanced cervical cancer or endometrial cancer we performed staging retroperitoneal aortic lymphadenectomy approach prior to radiotherapy because appears to be superior to the traditional open approach [25]. A body mass index of more than 30 or 35 is seen as the upper limit for laparoscopic paraaortic lymphadenectomy for some authors [26-29]. Although obesity is considered a limiting factor for laparoscopic lymphadenectomy [23,30], our group believes that laparoscopy, in hands of a skilled surgeon, is a good technique for gaining access to the retroperitoneal space, especially in patients with endometrial cancer. In our study we performed aortic retroperitoneal lymphadenectomy in 20 patients with cervical cancer with a median BMI of 24.2 and in 4 patients with endometrial cancer with a BMI of 30.9.

Some authors use the monopolar energy [20] or ultrasound [21,31] for resection of lymph nodes. Our team uses bipolar energy and vessel sealer because we think it has less risk of vascular lesions, ureter or bowel.

On average, 13.6 pelvic lymph nodes (range 1-34) and 2 (range 2-31) aortic lymph nodes in transperational approach and 9 (range 5-20) in retroperitoneal approach were removed in our study. These results are similar to those reported in other series [32].

The rate of major complications varies between 1% and 11.9% [2,18,20,23,26,28,33]. Our data analysis reveals a complication rate of 6.1%. Our most common complication was a major vessel injury. In the present study, 5 (1.3%) cases of major vessel injuries occurred during the lymphadenectomy, according to previous studies [31,34]. All vascular injuries were successfully managed using an intracorporeal suture technique, except one which was corrected by a vascular surgeon using a vascular prosthesis. Other less frequent intraoperative complications were visceral lesions including bowel perforation, ureteral injury, and obturator nerve transection, which have also been reported in other studies [2,22,31]. The rate of conversion to laparotomy was 1.6%.

Postoperative complications were paralytic ileum (4), incisional trocar hernias (2), lymphocyst (2) and lymphedema (4). Our rate of postoperative complications is comparable to other studies [35,36].

Major intraoperative complications occurred mainly in the first 6 years, whereas major postoperative complications were observed throughout the study.

The main limitation of our study is the fact that our postoperative data is incomplete since we could not perform a thorough and systematic follow up for all our patients, which is why our results may underestimate the true incidence rate of this complication in our series. Another limitation of the study is that the majority of our patients laparoscopic lymphadenectomy was combined with additional operations of different extent. In this heterogeneous cohort of patients, postoperative complications and morbidity are difficult to correlate with the laparoscopic part of the operation.

Conclusion

Laparoscopic lymphadenectomy can be considered a technically feasible and safe procedure and could be considered the golden standard procedure for staging gynecologic malignancies. Our results could reinforce the published data regarding laparoscopic lymphadenectomy.

We believe that laparoscopic lymphadenectomy will eventually be widely performed by gynecologic oncologists and may be implemented in any gynecologic oncologic center.

Acknowledgement

Conflict of Interest

The authors report no conflict of interest.

Ethical Approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent

Informed consent was obtained from all individual participants included in the study.

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